

DOMINIC STANDAGE, Curriculum Vitae

School of Psychology, Centre for Computational Neuroscience and Cognitive Robotics
University of Birmingham
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Citizenship Canadian / British

EDUCATION

DALHOUSIE UNIVERSITY, HALIFAX CANADA

Doctor of Philosophy, Computer Science, September 2003 – August 2007

Thesis title Mechanisms of short term and long term memory in cortex: neural fields and synaptic plasticity

UNIVERSITY OF WESTMINSTER, LONDON UK

Master of Science, Artificial Intelligence, October 1997- January 2001

Graduated with Distinction

Thesis title An electronic nose: a hybrid neural network architecture to classify bacteria from gas sensor data

DALHOUSIE UNIVERSITY, HALIFAX CANADA

Bachelor of Arts, Psychology, 1988-1991

ACADEMIC POSITIONS

UNIVERSITY OF BIRMINGHAM, SCHOOL OF PSYCHOLOGY, BIRMINGHAM, UK

Marie Curie Senior Research Fellow, Computational Psychology Laboratory, September 2018 – present

Design, implementation and analysis of systems-level brain models for the investigation of cognitive control, decision making and working memory; design and co-supervision of behavioural and electrophysiological experiments; data acquisition and analysis. Funded by Maria Sklodowska-Curie Actions individual fellowship

QUEEN'S UNIVERSITY, CENTRE FOR NEUROSCIENCE STUDIES, KINGSTON CANADA

Postdoctoral Research Fellow, Dept. of Physiology / Dept. of Biomedical and Molecular Sciences, November 2007 – August 2018

Memory, Action and Perception Laboratory / Cognition and Action Laboratory (September 2016 – August 2018)

Acquisition, processing and analysis of resting state and functional MRI and behavioural data, including graphical (network science) and machine learning methods for investigating whole-brain functional networks during motor learning; Funded by the Canadian Institutes of Health Research (CIHR)

Computational Neuroscience Laboratory (September 2011 – August 2017)

Design, implementation and analysis of neural models of brain function, including biophysical models of intracellular, network and systems-level computations; design and co-supervision of behavioural and electrophysiological experiments to investigate perceptual decision making, learning and working memory. Funded by CIHR and the Natural Sciences and Engineering Research Council of Canada (NSERC)

Visual Information Processing Laboratory (November 2007 – May 2009, February 2014 – August 2016)

Design, implementation and analysis of network and systems-level models of cortical function for the investigation of perceptual decision making and working memory. Funded by CIHR and NSERC

Laboratory for the Neural Basis of Decision Making (May 2009 – January 2014)

Design, implementation and analysis of biophysical and mathematical models of perceptual and economic decision making and interval timing; design and co-supervision of behavioural and electrophysiological experiments. Funded by CIHR, Human Frontiers Science Program, and NSERC

DALHOUSIE UNIVERSITY, FACULTY OF COMPUTER SCIENCE, HALIFAX CANADA

Research Assistant, Computational Neuroscience Group, September 2003 – August 2007

Design, implementation and analysis of computational models of brain function, including the use of mathematical and neural models of attention, learning and working memory. Funded by NSERC

Teaching Assistant, September 2003 – August 2007

Curriculum development, lecturing, teaching tutorials and marking assignments

INDUSTRY POSITIONS

THOMSON SCIENTIFIC, LONDON UK

Business Systems Developer, March 2002 – August 2003

Technical specification and development of internal business systems, including global intranet applications and language translation systems. Platforms include C#, CSS, HTML, JavaScript, MSXML, Oracle Database and Perl on Windows systems

BLOOMS OF BRESSINGHAM LTD, BERKSHIRE UK

Senior Developer / Webmaster, May 2000 – March 2002

Specification, development and administration of all technical facets of online business, transactional processing and financial reporting. Management of contract developers and designers. Platforms include Apache, BASH, CSS, HTML, Java, JavaScript, MySQL, Perl, PHP, PostgreSQL, and XML/XSLT on Linux systems

REVOLUTION LTD, LONDON UK

Senior Developer, September 1997 - May 2000

Software applications specification and development, management of in-house and contract developers, and client liaison. Platforms include CSS, HTML, JavaScript, MySQL, Oracle Database, Perl, PHP, Microsoft SQL Server and XML/XSLT on Linux and Windows systems

PUBLICATIONS

MANUSCRIPTS SUBMITTED FOR REVIEW

T. Scott Murdison, **Dominic Standage**, Philippe Lefèvre and Gunnar Blohm. Effector-dependent response deterioration by stochastic transformations reveals mixed reference frames for decisions, *bioRxiv*, doi.org/10.1101/193235

David M. Milstein, **Dominic Standage** and Michael C. Dorris, Motor planning processes are influenced by the value and timing of potential actions

PUBLISHED PAPERS

Dominic Standage, Corson N. Areshenkoff, Joseph Y. Nashed, R. Matthew Hutchison, Melina Hutchison, Dietmar Heinke, Ravi S. Menon, Stefan Everling and Jason P. Gallivan, Dynamic reconfiguration, fragmentation and integration of whole-brain modular structure across depths of unconsciousness, *Cerebral Cortex*, *bhaa085*, doi:10.1093/cercor/bhaa085

Dominic Standage, Martin Paré and Gunnar Blohm, Hierarchical recruitment of competition alleviates working memory overload in a fronto-parietal model, *Journal of Vision*, 19(12):8, 1–24, 2019, doi:10.1167/19.12.8

Benjamin Cuthbert and **Dominic Standage**, On the short-lived nature of working memory: drift and decay in a population-coding model, *Journal of Neuroscience*, 38:48:10241-10243, 2018, doi:10.1523/JNEUROSCI.1877-18.2018

Laura Medlock, Lauren Shute, Mark Fry, **Dominic Standage*** and Alastair Ferguson*, Ionic mechanisms underlying tonic and burst firing behaviour in subfornical organ neurons: a combined experimental and modeling study, *Journal of Neurophysiology*, 120:5:2269-2281, 2018, doi:10.1152/jn.00340.2018 (*co-senior author)

Dominic Standage and Martin Paré, Slot-like capacity and resource-like coding in a neural model of multiple-item working memory, *Journal of Neurophysiology*, 120:4:1945-1961, 2018, doi:10.1152/jn.00778.2017

Dominic Standage, Da-Hui Wang, Richard Heitz and Patrick Simen, Toward a unified view of the speed-accuracy trade-off, *Frontiers in Neuroscience*, 9:139, 2015, doi:10.3389/fnins.2015.00139

Zahra Dargaei, **Dominic Standage**, Christopher J. Groten, Gunnar Blohm and Neil S. Magoski, Ca²⁺-induced uncoupling of Aplysia bag cell neurons, *Journal of Neurophysiology*, 113:3:808-821, 2015, doi:10.1152/jn.00603.2014

Dominic Standage, Da-Hui Wang and Gunnar Blohm, Neural dynamics implement a flexible decision bound with a fixed firing rate for choice: a model-based hypothesis, *Frontiers in Neuroscience*, 8:318, 2014, doi:10.3389/fnins.2014.00318

Dominic Standage, Gunnar Blohm and Michael C. Dorris, On the neural implementation of the speed-accuracy trade-off, *Frontiers in Neuroscience*, 8:236, 2014, doi:10.3389/fnins.2014.00236

Dominic Standage, Thomas Trappenberg and Gunnar Blohm, Calcium-dependent calcium decay explains STDP in a dynamic model of hippocampal synapses, *PLoS ONE*, 9(1):e86248, 2014, doi:10.1371/journal.pone.0086248

Dominic Standage, Hongzhi You, Da-Hui Wang and Michael C. Dorris, Trading speed and accuracy by coding time: a coupled-circuit cortical model, *PLoS Computational Biology*, 9(4):e1003021, 2013, doi:10.1371/journal.pcbi.1003021

Dominic Standage and Martin Paré, Persistent storage capability impairs decision making in a biophysical network model, *Neural Networks*, 24:1062 - 1073, 2011, doi:10.1016/j.neunet.2011.05.004

Dominic Standage, Hongzhi You, Da-Hui Wang and Michael C. Dorris, Gain modulation by an urgency signal controls the speed-accuracy trade-off in a network model of a cortical decision circuit, *Frontiers in Computational Neuroscience*, 5:7, 2011, doi:10.3389/fncom.2011.00007

Dominic Standage, Sajiya Jalil and Thomas Trappenberg, Computational consequences of experimentally derived spike-time and weight dependent plasticity rules, *Biological Cybernetics*, 96:615 - 623, 2007, doi:10.1007/s00422-007-0152-6

Dominic Standage and Thomas Trappenberg, The trouble with weight-dependent STDP, *Proceedings of the International Joint Conference on Neural Networks 2007*, 1359 – 1364, doi:10.1109/IJCNN.2007.4371154

Dominic I. Standage, Thomas P. Trappenberg and Raymond M. Klein, Modelling divided visual attention with a winner-take-all network, *Neural Networks*, 18, 5-6:620 - 627, 2005, doi:10.1016/j.neunet.2005.06.015

Dominic I. Standage, Thomas P. Trappenberg and Raymond M. Klein, A continuous attractor neural network model of divided visual attention, *Proceedings of the International Joint Conference on Neural Networks 2005*, 2897-2902, doi:10.1109/IJCNN.2005.1556385

Dominic I. Standage and Thomas P. Trappenberg, Differences in the sub-threshold dynamics of leaky integrate-and-fire and Hodgkin-Huxley neuron models, *Proceedings of the International Joint Conference on Neural Networks 2005*, 396-399, doi:10.1109/IJCNN.2005.1555863

Thomas P. Trappenberg and **Dominic I. Standage**, Multi-packet regions in stabilized continuous attractor networks, *Neurocomputing*, 65-66:617 - 622, 2005, doi:10.1016/j.neucom.2004.10.052

BOOK CHAPTERS

Dominic Standage and Thomas Trappenberg, Cognitive Neuroscience, *The Cambridge Handbook of Cognitive Science*, Keith Frankish and William Ramsey (eds.), Cambridge University Press, 2012, ISBN: HB 978-0521871419 PB 978-0521691901

MANUSCRIPTS IN PREPARATION

Dominic I. Standage, Corson N. Areshenkoff, Daniel J. Gale, Joseph Y. Nashed, J. Randall Flanagan and Jason P. Gallivan, Whole-brain dynamics of sensorimotor adaptation learning

Dominic Standage and Michael C. Dorris, Time-dependent disinhibition of the superior colliculus during eye-movement decisions: a neural model

Meng Yan, Hongzhi You, **Dominic Standage** and Da-Hui Wang, A local-circuit model with bistable neurons implements graded persistent activity without fine tuning

SELECTED NATIONAL AND INTERNATIONAL CONFERENCE ABSTRACTS

Dominic Standage, Qingyang Tian, Xiaochun Wang, Jintao Yang, Gunnar Blohm, Michael C. Dorris and Dietmar Heinke, Evidence is most heavily weighted in the middle of predictable intervals: testing a behavioural prediction of a neural circuit model of timing and decision making, *Vision Science Society Meeting, VSS 2020, May 15 - 20, St. Pete Beach, USA*

Dominic Standage, Gunnar Blohm and Dietmar Heinke, A cognitive signal controls speed-accuracy trade-off in a neural model of two-stage decision making in the frontal eye fields, *Society for Neuroscience Meeting, SfN 2019, Chicago, USA*

Daniel J. Gale, Corson Areshenkoff, Joseph Y. Nashed, **Dominic Standage**, J. Randall Flanagan and Jason P. Gallivan, Network interactions of frontoparietal regions during visuomotor adaptation, *Society for Neuroscience Meeting, SfN 2019, Chicago, USA*

Dominic Standage, Gunnar Blohm and Dietmar Heinke, Cognitive control of speed-accuracy trade-off in a neural model of two-stage decision making, *Bernstein Conference 2019, Berlin, Germany*

Ben Cuthbert, **Dominic Standage**, Martin Pare and Gunnar Blohm, Colour clustering in visual working memory, *Conference on Cognitive Computational Neuroscience, CCN 2019, Berlin, Germany*

Dietmar Heinke, Jordan Deakin, **Dominic Standage** and Andrew Schofield, Noise and motion: A new visual search paradigm with multiple random dot kinematograms, *Vision Science Society Meeting, VSS 2019, St. Pete Beach, USA*

Dominic Standage, Joseph Y. Nashed, Corson N. Areshenkoff, J. Randall Flanagan and Jason P. Gallivan, Whole-brain modular structure of spontaneous neural activity at rest predicts future sensorimotor learning and relearning, *Society for Neuroscience Meeting, SfN 2018, San Diego, USA*

Corson N. Areshenkoff, Joseph Y. Nashed, **Dominic Standage** and Jason P. Gallivan, Functional coupling between the basal ganglia and cerebellum during visuomotor adaptation learning, *Society for Neuroscience Meeting, SfN 2018, San Diego, USA*

Dominic Standage, Martin Paré and Gunnar Blohm, Disinhibition as a canonical neural mechanism for flexible behavior, *Conference on Cognitive Computational Neuroscience, CCN 2018, Philadelphia, USA*

Benjamin E. Cuthbert, **Dominic Standage**, Martin Paré and Gunnar Blohm, Strategic working memory performance may confound the interpretation of cumulative task statistics, *Vision Science Society Meeting, VSS 2018, St. Pete Beach, USA*

Laura Medlock, Nick Simpson, **Dominic Standage** and Alastair Ferguson, Conductance-based model of subformal organ neurons predicts integration of cardiovascular and inflammatory signals, *Canadian Neuroscience Meeting 2018, Vancouver, Canada*

Dominic Standage, Joseph Y. Nashed, J. Randall Flanagan and Jason P. Gallivan, The evolution of whole-brain community structure during sensorimotor adaptation, *Society for Neuroscience Meeting, SfN 2017, Washington, DC, USA*

Joseph Y. Nashed, **Dominic Standage**, J. Randall Flanagan and Jason P. Gallivan, Individual differences in adaptation learning are linked to dynamic changes in functional brain states, *Society for Neuroscience Meeting, SfN 2017, Washington, DC, USA*

Joseph Y. Nashed, **Dominic Standage**, J. Randall Flanagan and Jason P. Gallivan, Dynamic changes in brain network organization during visuomotor adaptation learning, *Society for the Neural Control of Movement Meeting, NCM 2017, Dublin, Ireland*

Parisa Abedi Khoozani, **Dominic Standage** and Gunnar Blohm, An implicit approximate normalization model for multi-sensory intergration across references frames, *Canadian Neuroscience Meeting 2017, Montreal, Canada*

Dominic Standage, Martin Paré and Gunnar Blohm, Cognitive control by disinhibition: a cortical model of decision making and multiple-item working memory, *Society for Neuroscience Meeting, SfN 2015, Chicago, USA*

Dominic Standage and Martin Paré, Fronto-parietal interactions support working memory capacity in a hierarchical cortical model, *Society for Neuroscience Meeting, SfN 2014, Washington, DC, USA*

T. Scott Murdison, Odelia Y. Lee, **Dominic Standage** and Gunnar Blohm, HD-tDCS modulates decision response times, *Society for Neuroscience Meeting, SfN 2014, Washington, DC, USA*

Dominic Standage, Da-Hui Wang and Gunnar Blohm, Neural dynamics of the speed-accuracy trade-off, *Computational Neuroscience Meeting CNS 2014, Quebec City, Canada*

Dominic Standage and Michael C. Dorris, Dynamic modulation of the superior colliculus by the cortical encoding of predictable intervals: a neural field model of eye-movement decisions, *European Conference on Eye Movements, ECEM 2013, Lund, Sweden*

Dominic Standage, Dhushan Thevarajah, Abdullah Abunafeesa and Michael C. Dorris, Fronto-basal ganglia disinhibition of the superior colliculus by the encoding of time during decisions: a neural model, *Society for Neuroscience Meeting, SfN 2012, New Orleans, USA*

Gunnar Blohm, Timothy Lillicrap and **Dominic Standage**, An alternative to explicit divisive normalization models, *Vision Science Society Meeting, VSS 2012, Naples, USA*

SCHOLARLY PRESENTATIONS

INVITED TALKS

Neural dynamics of cognitive control, *Toronto Western Hospital, Krembil Seminar Series, Jun 24, 2020*

Cognitive control of decision making by interval timing, *University of Toronto, Computational Neuroscience Seminar, April 15, 2015*

Optimal decision algorithms implemented in brain circuitry: an exemplary convergence of theory, behaviour and neurophysiology, *SHARCNET Scientific Computing Seminar Series, University of Ontario Institute of Technology, October 3, 2013*

Decisions in space and time: a neural model of the speed-accuracy trade-off, *Queen's University, Department of Physiology Invited Speaker Series, March 8, 2010*

Gain modulation by a signal encoding elapsed time controls the speed-accuracy trade-off in a network model of a decision circuit in LIP, *Queen's Centre for Neuroscience Studies, Neuroscience Research Day, September 24, 2009*

Working memory capability impairs decision making in a biophysical network model, *University of Montreal, Mathematical Neuroscience Group, March 24, 2009*

CONFERENCE ORAL PRESENTATIONS AND OTHER TALKS

Task-dependent changes to whole-brain modular structure (before,) during and after sensorimotor learning, The Breakfast Meeting, Centre for Human Brain Health, University of Birmingham, February 21, 2019

Adaptable modular structure in whole-brain functional networks predicts sensorimotor learning, *Queen's Centre for Neuroscience Studies, Friday Fights, January 26, 2018*

Hierarchical recruitment of competition alleviates working memory overload in a fronto-parietal model, *Queen's Centre for Neuroscience Studies, Friday Fights, January 19, 2018*

Feedback inhibition underlies slot-like capacity and resource-like neural coding, *Queen's Centre for Neuroscience Studies, Friday Fights, November 27, 2015*

A local-circuit mechanism for the encoding of elapsed time in the range of hundreds of milliseconds: evidence for generic timing circuitry and implications for decision making, *Annual Retreat for the Computational Approaches in Neuroscience - Action, Control and Transformations Program (NSERC CAN-ACT), Toronto, Canada, September 26 – 27, 2012*

Gain modulation by the encoding of urgency controls the speed-accuracy trade-off in a network model of LIP, *Annual Retreat of the Canadian Action and Perception Network, Ingersol Canada, October 1 – 2, 2009*

A canonical cortical model predicts persistent mnemonic activity in area LIP is afferently driven, *Canadian Physiological Society Meeting, CPS 2009, Mont St. Anne, Canada*

Neural field models of cortical microcircuits: neurons, neural populations and parametric issues, *Queen's Centre for Neuroscience Studies, Friday Fights, February 20, 2009*

TEACHING AND MENTORSHIP

GUEST LECTURING

University of Birmingham, School of Psychology, September 2018 – present

CNCR 03 24299: Mind, Brain and Models (graduate)

CNCR 03 24302: Foundation Computational Neuroscience – Cognitive Robotics Issues (graduate)

CNCR 03 30808: Practical Research Skills for Computational Neuroscience and Cognitive Robotics (graduate)

Queen's University, Centre for Neuroscience Studies, January 2010 - 2018

NSCI 850: Introduction to Modelling in Neuroscience (graduate)

LSCI 426/826: Current Concepts in Sensorymotor Neuroscience (undergraduate / graduate)

Queen's University, School of Computing, Cognitive Science program, January 2016 – 2018

COGS 300/3.0: Programming Cognitive Models (undergraduate)

STUDENT SUPERVISION

Research co-supervisor, University of Birmingham, School of Psychology

Msc, Computational Neuroscience and Cognitive Robotics – Speed-accuracy trade-off in visual search (co-supervising with Dietmar Heinke)

Bsc, Psychology – *Strategies for working memory performance (co-supervised with Dietmar Heinke)*

Research co-supervisor, Queen's University, Centre for Neuroscience Studies

Msc, Neuroscience – *Time-variant bounded accumulator models of choice (co-supervising with Gunnar Blohm)*

Msc, Neuroscience – *Single neuron modelling of neurons in the subfornical organ, September 2016 – August 2018 (co-supervised with Al Ferguson)*

BSc, Neuroscience (Hons.), *Controlling working memory capacity and overload by reward, September 2016 – May 2017 (co-supervised with Gunnar Blohm and Martin Paré)*

Bsc, Neuroscience (Hons.), *Research Thesis: tDCS over FEF modulates decision making, September 2015 – May 2016 (co-supervised with Gunnar Blohm)*

Bsc, Neuroscience (Hons.), *Research Thesis: Variability in temporal estimates optimizes decision making, September 2012 – May 2013 (co-supervised with Gunnar Blohm)*

Bsc, Neuroscience (Hons.), *Research Thesis: The timing of changing evidence affects perceptual decisions, September 2011 – May 2012 (co-supervised with Mike Dorris)*

Bsc, Physics (Hons.), *Research Thesis: A flexible model of recurrent spiking neurons with spike-timing dependent plasticity, January – May, 2011 (co-supervised with Gunnar Blohm)*

TEACHING ASSISTANCE

Curriculum development, lecturing, teaching tutorials, marking assignments

Dalhousie University, Faculty of Computer Science, September 2003 – December 2006

CSCI 2132, *Software Development, September - December 2006*

ECMM 6010, *Technology Issues in Electronic Commerce, September 2004 – December 2005*

CSCI 1204, *Computer Techniques for Health and Life Science, January - May 2004*

CSCI 1200, *Introduction to Computing for Non-Majors, September - December 2003*

ACADEMIC SERVICE

EDITORIAL POSITIONS

Guest Associate Editor, *Frontiers in Neuroscience*

Research Topic, *Toward a unified view of the speed-accuracy trade-off: behaviour, neurophysiology and modelling*, Eds. Dominic Standage, Da-Hui Wang, Richard P. Heitz and Patrick Simen

PEER REVIEWING

Biological Cybernetics, Brain Research, Cognition, Computational and Systems Neuroscience (Cosyne), Conference on Cognitive Computational Neuroscience (CCN), European Journal of Neuroscience, Frontiers in Computational Neuroscience, Frontiers in Psychology, Human Brain Mapping, Journal of Experimental Psychology, Journal of Neuroscience, International Joint Conference on Neural Networks (IJCNN), Nature Communications, Neural Networks, PLoS Computational Biology, Psychopharmacology, Scientific Reports, Workshop on Development and Learning in Artificial Neural Networks (DevLEANN)

COMMITTEE WORK

Postdoctoral representative, Strategic Research Committee, Queen's University, January – July, 2011

Postdoctoral representative, Executive Committee, Queen's Centre for Neuroscience Studies, January – December, 2011

Graduate student rep., Faculty Graduate Committee, Faculty of Comp. Sci., Dalhousie University, Jan – December, 2006

GRANTS AND AWARDS

SUBMITTED

Canadian Institutes of Health Research operating grant, *Investigating the role of cognitive brain networks in human motor learning*, co-applicant with Jason Gallivan, J. Randall Flanagan and Stephen Scott (930,000CAD requested, submitted March 3, 2020)

AWARDED

Maria Sklodowska-Curie Actions individual fellowship, *Visual search and cognitive control of the speed-accuracy trade-off*, co-written with Dietmar Heinke (195,454.80EUR; 2018-2020)

Natural Sciences and Engineering Research Council of Canada operating grant, *Parietal cortex persistent activity and working memory capacity*, co-written with Martin Paré and Kevin Johnston (250,000CAD awarded to Martin Paré, 2009-2014)

Faculty of Graduate Studies Scholarship, Dalhousie University (36,000CAD, 2003-2007)

Pump Priming research award, University of Birmingham, *Urgency-dependent weighting of evidence during decisions*, co-written with Dietmar Heinke (2000GBP; 2018)

Postdoctoral travel award, Queen's University (1,000CAD, 2009)

Travel Award, 16th Annual Computational Neuroscience Meeting *CNS*2007*, Toronto, Canada (750USD, June 2007)

Travel Award, 9th International Conference on Cognitive and Neural Systems, Boston, USA (750USD 2005)

Queen's Centre for Neuroscience Studies, Neuroscience Research Day Award (200CAD, 2009)

INDUSTRY AFFILIATIONS

DISTRIBUTED COMPUTE LABS

Academic Advisor for Computational Neurobiology

DCL Advisory Board, September 2019 - present

VOLUNTEER WORK

KINGSTON CLIPPERS SOCCER CLUB

Head Coach, 2002 Girls, January 2010 – August 2015; September 2017 – August 2018

Asst Coach, 1997 Boys, September 2011 – August 2012

Member of Board of Directors, January – December 2011

HALIFAX CITY SOCCER CLUB

House League Coach, May 2006 – August 2007

Assistant Coach, 1997 Boys, September 2006 – August 2007

Member of Board of Directors, December 2006 – November 2007

REFERENCES

Available on request