

Curriculum Vitae for  
**Jonathan J Hunt**

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## Research Experience

12/2016-Ongoing	<b>Senior Research Scientist</b>	Google DeepMind
10/2014-01/12/2016	<b>Research Scientist</b>	Google DeepMind
09/2013-09/2014	<b>Scientist</b>	Brain Corporation
05/2012-09/2013	<b>Scientific Programmer</b>	Brain Corporation
05/2012-2016	<b>Adjunct Researcher</b>	Queensland Brain Institute, University of Queensland
06/2011-05/2012	<b>Postdoctoral Research Fellow</b>	Queensland Brain Institute, University of Queensland
2003-2006 Summers and part-time	<b>Research Assistant</b>	Massey University

## Education

<b>PhD</b>		2007-2011
University of Queensland, Australia		
Title	Natural scenes and the development of the visual cortex	
Supervisors	Prof. Geoffrey J Goodhill and Prof. Jason Mattingley	
<b>Bachelor of Science (Honours, 1st class)</b>		2003-2006
Massey University, New Zealand		
Major	Mathematical Physics	
Project Title	Polysaccharide sequence reconstruction from digest patterns	
Supervisor	A/Prof. Martin Williams	

## Publications and talks

### Full-text publications (including workshop papers)

(full texts available on my website)

Barreto, A., Dabney W., Munos, R., **Hunt, J.J.**, Schaul, T., Silver, D., van Hasselt, H. (2017) Transfer in Reinforcement Learning with Successor Features and Generalised Policy Improvement *ICML LifeLong Learning Workshop*

Rae, J.\*, **Hunt, J.J.\***, Danihelka, I., Harley, T., Senior, A., Wayne, G., Graves, A. Lillicrap, T.P. (2016) Scaling Memory-Augmented Neural Networks with Sparse Reads and Writes. *Neural Information Processing Systems*

Dulac-Arnold G., Evans R., van Hasselt H., Sunehag P., Lillicrap T.P., **Hunt J.J.**, Mann T., Weber T., Degris T., Coppin B. (2016) Deep Reinforcement Learning in Large Discrete Action Spaces. *Arxiv preprint*

Lillicrap, T.P.\*, **Hunt, J.J.\***, Pritzel, A., Heess, N., Erez, T., Tassa, Y., Silver, D., Wierstra, D. (2016) Continuous control with deep reinforcement learning *International Conference on Learning Representations*

Heess N.\*, **Hunt, J.J.\***, Lillicrap, T.P., Silver, D. (2015) Memory-based control with recurrent neural networks. *NIPS Deep Reinforcement Learning Workshop*

Hughes, N., **Hunt, J.J.**, Sengpiel, F., Ibbotson, M., Goodhill, G.J. (2014) Stripe-rearing changes multiple aspects of the structure of primary visual cortex. *NeuroImage*. 95:305-319

**Hunt, J.J.**, Dayan, P., Goodhill, G.J. (2013) Receptive field development with abnormal visual input can be explained by sparse coding. *PLoS Computational Biology*. 9:e1003005

**Hunt, J.J.**, Mattingley, J., Goodhill, G.J. (2011) Randomly oriented edge arrangements dominate naturalistic arrangements in binocular rivalry. *Vision Research*. 64:49-55

**Hunt, J.J.**, Ibbotson, M., Goodhill, G.J. Sparse coding on the spot: spontaneous retinal waves suffice for orientation selectivity. *Neural Computation*. 24:2422-33

Forbes, E.M.\*, **Hunt, J.J.\***, Goodhill, G.J. (2011) The combinatorics of neurite self-avoidance. *Neural Computation*. 23:2746-2769

**Hunt, J.J.**, Bosking, W., Goodhill, G.J. (2011). Statistical structure of lateral connections in the primary visual cortex. *Neural Systems & Circuits*. 1:3

**Hunt, J.J.\***, Giacomantonio, C.E.\*, Tang, H., Mortimer, D., Jaffer, S., Vorobyov, V., Erickson, G., Sengpiel, F., Goodhill, G.J. (2009). Natural scene statistics and the structure of orientation maps in the visual cortex. *Neuroimage*. 47:157-172

**Hunt, J.J.**, Cameron, R.G., Williams, M.A.K. (2006) On the simulation of enzymatic digest patterns: the fragmentation of oligomeric and polymeric galacturonides by endopolygalacturonase II. *Biochimica et Biophysica Acta*. 1760:1696-1703

\* equal contributions

#### Conference presentations

**Hunt, J.J.**, Dayan, P., Goodhill, G.J. Sparse coding model of binocular receptive field development reproduces changes in abnormal rearing. *Cosyne 2012*, Salt Lake City USA.

Hughes, N., **Hunt, J.J.**, Cloherty, S.L., Ibbotson, M.R., Sengpiel, F., Goodhill, G.J. (1/2013) *6th Australian Workshop on Computational Neuroscience*, Melbourne, Australia

**Hunt, J.J.**, Ibbotson, M., Goodhill, G.J. (11/2012) An efficient coding model of mostly spot-like visual input: oriented receptive fields can still dominate. *Society for Neuroscience*, New Orleans.

**Hunt, J.J.** Dayan, P., Goodhill, G.J. (11/2012) A simple unsupervised learning model is a good predictor of receptive field changes in abnormal rearing conditions. *Society for Neuroscience*, New Orleans.

Hughes, N., **Hunt, J.J.**, Cloherty, S.L., Ibbotson, M.R., Sengpiel, F., Goodhill, G.J. (9/2012) Gaussian process methods for evaluating visual map changes following abnormal visual input. *Queensland Brain Institute 4th Brain Plasticity Symposium*

**Hunt, J.J.** Dayan, P., Goodhill, G.J. (9/2011) Coding with two eyes: an unsupervised learning model of binocular receptive field development. *Queensland Brain Institute-Munich Centre for Neurosciences Symposium*, Queensland Brain Institute, Brisbane, Australia

**Hunt, J.J.**, Mattingley, J.M., Goodhill, G.J. (9/2010) Emphasizing entropic edges: entropic edge arrangements dominate visual perception. *Brain Plasticity Symposium*, Queensland Brain Institute, Brisbane, Australia.

**Hunt, J.J.**, Giacomantonio, C.E., Tang, H., Mortimer, D., Jaffer, S., Vorobyov, V., Erickson, G., Sengpiel, F., Goodhill, G.J. (11/2008) Abnormal visual input during development does not alter the co-circularity statistics of orientation maps in visual cortex. *Society for Neuroscience*, Washington DC.

**Hunt, J.J.**, Giacomantonio, C.E., Tang, H., Mortimer, D., Jaffer, S., Vorobyov, V., Erickson, G., Sengpiel, F., Goodhill, G.J. (9/2008) Co-circularity statistics in cat primary visual cortex are not driven by visual input. *Brain Plasticity Symposium*, Brisbane, Australia.

**Hunt, J.J.**, Smith, D.H., Mortimer, D., Giacomantonio, C.E., Tang, H., Erickson, G., Sengpiel, F., Goodhill, G.J. (7/2007) The influence of natural image scene statistics on the structure of orientation maps. *Vision Down Under*, Cairns, Australia.

#### Demonstrations

**Hunt, J.J.**, O'Connor, P. (12/2013) A mobile development platform for adaptive machine learning and neuromorphic computing in robotics. *Neural Information Processing Systems*, Lake Tahoe, CA, USA.

#### Patents

**Hunt, J.J.**, Sinyavskiy, O. (Filed 2013, Granted 2016) Apparatus and methods for developing parallel networks using a general purpose programming language. US Patent 9390369

Sinyavskiy, O., **Hunt, J.J.** (Filed 2013, Granted 2016) Multithreaded apparatus and methods for implementing parallel networks.

**Hunt, J.J.**, Sinyavskiy, O., Kimball, R.H., Hall, E.M., Levin, J.A., Bender, P., Canoy, Canoy, M-D.N. (Priority 2011, Granted 2016) Apparatus and methods for developing parallel networks using a general purpose programming language. US Patent 20160217370

**Hunt, J.J.**, Sinyavskiy, O. (Filed 2013, Granted 2015) Spiking neuron classifier apparatus and methods using conditionally independent subsets. US Patent 9195934

## Talks

Reinforcement Learning in Continuous Action Spaces (04/17) *Nantes Machine Learning Meetup* Nantes, France.

Does your brain use JPEG? Image representations in the visual cortex (9/2011) *School of Chemical and Physical Sciences, Victoria University, New Zealand.*

Does your brain use JPEG? Image representations in the visual cortex (9/2011) *Institute of Fundamental Sciences Lecture Series, Massey University, New Zealand.*

Statistical machine translation (2009) Maths journal club, University of Queensland, Australia.

Cryptographically secure random number generators (2009) *Maths journal club, University of Queensland, Australia.*

Moore's law meets neuroscience (2009) *Barcamp Brisbane, Australia*

Mapping the brain: understanding the layout of the visual cortex (10/2007) *Institute of Fundamental Sciences Lecture Series, Massey University, New Zealand.*

## Continuing education

2013	Learning how to Learn	Completed online course by Barbara Oakley and Terrence Sejnowski
2012	Neural networks for machine learning	Audited online course by Geoffrey Hinton
2012	Analysis of Algorithms I	Audited online course by Tim Roughgarden
2011	Introduction to Artificial Intelligence	Audited online course by Peter Norvig and Sebastian Thrun
2009	Okinawa Computational Neuroscience Summer School	3 week course
2009	Apple Xcode Tools Workshop	2 day course
2008	Kioloa Machine Learning Summer School	2 week course

## Supervision

2012-2016	Co-supervision (20%) of Nick Hughes	PhD	Neural Plasticity via Visual Cortical Maps
2011	Co-supervised Nick Hughes	Mathematics honours project	Gaussian process estimators of orientation preference maps
2010/11	Co-supervised Elizabeth Forbes	Summer research project	Combinatorics of Dscam1
2008	Co-supervised Tim Lamberton	3rd year project	Position-angle dependence of orientation preferences in primary visual cortex

## Teaching

website.

2011, 2010	Guest lecturer	MATH3104	Mathematical Biology	University of Queensland
2010	Tutor	MECH3750	Engineering Analysis II	University of Queensland
2010	Tutor	HRSS3100	Research Methodology	University of Queensland
2009	Tutor	STAT2202	Probability Models	University of Queensland
2008	Tutor	MATH3104	Mathematical Biology	University of Queensland
2008, 2007	Tutor/Guest lecturer	MATH2200	Scientific computing	University of Queensland
2005	Private tutor		High school physics	New Zealand
2004	Lab demonstrator	124.101/2	Physics	Massey University

## Non-research Employment

### IT

8/2008-9/2010 part time **System administrator** Queensland Brain Institute  
Responsible for the setup, operation and user training of the high performance computing facility.

### Other

2005 part time **Residential advisor** Massey University Halls of Residence  
Responsible for, and first point of contact to 60 international students.

## Awards

2012	Cosyne Presenter Travel Grant	\$500, awarded on the basis of submission scores
2007-2011	Queensland Brain Institute top-up scholarship	\$5000 per annum, for 3 years
2007-2010	Australian postgraduate award	\$22,000 per annum + fees, for 3 years PhD study
2009	University of Queensland Graduate School Research Travel Grant	\$5000, for international travel for study related purposes. I used my grant to visit the UCL Gatsby Computational Neuroscience Unit to collaborate with Prof. Peter Dayan.
2006	Industrial Research Ltd Bursary in Mathematics	\$500, awarded to a postgraduate level student whose studies includes mathematics with an emphasis on application
2005	Massey University Scholar	\$4000, awarded to top 5% of undergraduate students
2005	Massey University Vice Chancellor's Merit List	Awarded on the basis of academic merit
2005	Massey University Institute of Fundamental Sciences Summer Scholarship - Physics	\$6000 scholarship to pursue a summer research project
2005	Massey University Magnetic Resonance Scholarship	\$500, awarded to the most suitable physics 3rd year student
2005	Massey University Senior Prize in Mathematics	\$200, awarded to the most suitable 3rd year mathematics student
2005	Massey University Institute of Fundamental Sciences Millenium List Scholar	Recognises high achievement in fundamental sciences
2004	Massey University Vice Chancellor's Merit List	Awarded on the basis of academic merit
2004	NZ Forest Research Institute Physics Scholarship	\$1000, awarded on the basis of first year physics results, jointly awarded
2004	Bennett's University Book Centre Prize in Mathematics	\$100, to the most suitable 2nd year internal undergraduate student in mathematics
2004	Massey University Institute of Fundamental Sciences Millenium List Scholar	Recognises high achievement in fundamental sciences
2003	Massey University Institute of Fundamental Sciences Millenium List Scholar	Recognises high achievement in fundamental sciences

## Professional Activities

2011 Administrative assistant for the Australian Course in Advanced Neuroscience

### Peer review

Reviewer for Neural Information Processing Systems (2012-17)

Reviewer for International Conference on Machine Learning (2017)

Reviewer for International Conference on Learning Representations (2016-17)

Several ad-hoc reviews for Network: Computation in Neural Systems

Ad-hoc review for PLoS Computational Biology (with Geoff Goodhill), Scientific Reports

## Community Outreach

- 2008 Participant in the UQ graduate school 3 minute thesis challenge
- 2008 Co-organised Introduction to Neuroscience talk and tour for Queensland Smart State Academy
- 2008 Tour guide for Queensland Brain Bee
- 2008, 2007 Science Fair Judge for Kelvin Grove State College
- 2007 Guest presentation at Ironside State School