

Curriculum Vitae for
Jonathan J Hunt

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Research Experience

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

Education

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|-------------------------------------------------|-------------------------------------------------------------|-----------|
| PhD | | 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 | |
| Bachelor of Science (Honours, 1st class) | | 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 conference and workshop papers)¹

Barreto, A., Dabney W., Munos, R., **Hunt, J.J.**, Schaul, T. Silver, D., van Hasselt, H. (2017) Successor Features for Transfer in Reinforcement Learning *Neural Information Processing Systems*

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

¹ Full texts of all publications available on my website <https://me.net.nz>

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. (Filed 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

Transfer and generalisation in RL (07/18) *Brain Corporation, San Diego, USA*

Transfer and generalisation in RL (07/18) *Intel AI, San Diego, USA*

Deep Reinforcement Learning for Robotic Control (03/18) *Human Brain Project Workshop on Cognitive Systems for Non-Specialists* Technical University Munich, Garching, Germany

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

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| 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

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| 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.

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

Other

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

Professional Activities

2011 Administrative assistant for the Australian Course in Advanced Neuroscience

Peer review

Reviewer for International Conference on Learning Representations (2016-18)

Reviewer for Association for the Advancement of Artificial Intelligence (2018)

Reviewer for Neural Information Processing Systems (2012-17)

Reviewer for International Conference on Machine Learning (2017-18)

Ad-hoc review for Scientific Reports (2018)

Ad-hoc review for Journal of Process Control (2018)

Several ad-hoc reviews for Network: Computation in Neural Systems (2008-12)

Ad-hoc review for PLoS Computational Biology (with Geoff Goodhill) (2007)