# Scott C. Lowe

## Current positions

since 2018 **Postdoctoral Research Fellow**, *Faculty of Computer Science, Dalhousie University*, Halifax, Canada.

since 2018 **Postdoctoral Research Fellow**, *Vector Institute*, Toronto, Canada.
(Joint affiliation.)

## Education

2012–2017 **Doctor of Philosophy (Ph.D. in Neuroinformatics)**, *Institute for Adaptive and Neural Computation, School of Informatics, University of Edinburgh*, Edinburgh, UK.
Thesis: Decoding information from neural populations in the visual cortex. Supervisors: Profs Mark van Rossum, Stefano Panzeri, and Alex Thiele.

2011–2012 **MSc with Distinction, in Neuroinformatics by Research**, *University of Edinburgh*, Edinburgh, UK, *average 75.3% — for comparison, a Distinction at* $\geq 70\%$ *is approximately equivalent to* $\geq 3.75/4$ *US GPA*.
Thesis: *An information theoretic analysis of perceptual learning data from macaque V1 and V4*, Supervisors: Profs Alex Thiele and Stefano Panzeri.

2007–2011 **MSci with First Class Honours, in Natural Sciences (Mathematics and Physics)**, *Durham University*, Durham, UK, *average 73.4% — for comparison, a First Class at* $\geq 70\%$ *is approximately equivalent to* $\geq 3.75/4$ *US GPA*.
Thesis: *On Artifical Neural Networks*, Supervisor: Dr Ian Jermyn.

## Experience

2018 **Postdoctoral Research Fellow**, *School of Psychology & School of Mathematics, University of Nottingham*, Nottingham, UK.

2017 **Co-founder and CSO**, *Cortirio*, London, UK.
Co-founder and Chief Scientific Officer at Cortirio, developing a portable brain scanner for diagnosing traumatic brain injury.

2017 **Entrepreneurial Fellow**, *Entrepreneur First*, London, UK.

2015 **Technical Research Assistant**, *Rochefort Lab, Centre for Integrative Physiology, University of Edinburgh*, Edinburgh, UK.
Development of tools for analysis of calcium imaging data from mouse primary visual cortex.

2010 **Web Technician**, *FleXtel Ltd*, Sandbach, UK.
Programming in PHP for telecoms company. Designed and coded new website selling isolated consumer product. Developed market-leading algorithms to price telephone numbers based on memorability of both numeric patterns and alphadial patterns http://www.flextel.com/numbers/.

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*scottclowe* • *Nationality: British*

## Grants, honors & awards

2017 Placed 8th out of 91 in NIPS 2017: Non-targeted Adversarial Attack competition, NIPS2017 Conference Competition Track, organised by Google Brain and Kaggle.

2016 Awarded a entrepreneurial fellowship with Entrepreneur First, London.

2015 Placed 57th out of 1049 in the National Data Science Bowl plankton species classification challenge, hosted by Kaggle.

2014 Placed 16th out of 504 in the American Epilepsy Society Seizure Prediction Challenge, hosted by Kaggle.

2013 Winner of "Most Viable Business Idea" award, Amazon Scotland Hackathon 2013.

2011 Awarded a 4-year scholarship by the University of Edinburgh School of Informatics Doctoral Training Centre in Neuroinformatics, with funding from grants EP/F500385/1 and BB/F529254/1 from the UK Engineering and Physical Sciences Research Council (EPSRC), UK Biotechnology and Biological Sciences Research Council (BBSRC), and the UK Medical Research Council (MRC).

2007 Awarded the Sandbach School *Boarders Trophy for Excellence in Mathematics*.

## Miscellaneous courses

July 2018 **Deep Learning & Reinforcement Learning Summer School 2018**, *CIFAR & Vector Institute*, Toronto, Canada, DLRLSS2018.

Feb 2018 **Deep Learning Specialization**, *deeplearning.ai*, Coursera, *Grade: 100%*.

Aug 2016 **Machine Learning Summer School 2016**, *Universidad Católica*, Arequipa, Peru, MLSS16.

Feb 2016 **Machine Learning**, *Stanford University*, Coursera, *Grade: 100%*.

## Open source projects

2018 **FISSA**, *a Python library for decontaminating somatic signals from 2-photon calcium imaging data*, available on GitHub and PyPI.

2016 **Superbar**, *Multi-colour bar charts for MATLAB, including customisable error bars and significance comparisons*, available on GitHub, and MATLAB FileExchange.

2016 **MOPI: MATLAB/Octave Package Installer**, *A simple and flexible package manager for both MATLAB and Octave*, available on GitHub.

2015 **MATLAB Schemer**, *A colour scheme manager for MATLAB*, available on GitHub, and through MATLAB FileExchange.

2013 **Colorlab**, *Perceptually uniform colormap generation*, available on GitHub.

## Online Presence

Blog scottclowe.com.

GitHub github.com/scottclowe.

LinkedIn linkedin.com/in/scottclowe.

StackOverflow stackoverflow.com/users/1960959/scottclowe.

## Publications

### Journal articles

*under review* **Scott C. Lowe**, Thomas Trappenberg, Sageev Oore, "LogAvgExp Provides a Principled and Performant Global Pooling Operator".

Nov, 2019 Lu Yihe, **Scott C. Lowe**, Penelope A. Lewis, Mark C. W. van Rossum, (2019, November), "Program synthesis performance constrained by non-linear spatial relations in Synthetic Visual Reasoning Test". arXiv: 1911.07721.

June, 2019 Nicholas Meade*, Nicholas Barreyre*, **Scott C. Lowe**, Sageev Oore, (2019, June), "Exploring Conditioning for Generative Music Systems with Human-Interpretable Controls". In *Proceedings of the 10th International Conference on Computational Creativity, 2019*. arXiv: 1907.04352.

Feb, 2018 Sander W. Keemink*, **Scott C. Lowe***, Janelle M. P. Pakan, Mark C. W. van Rossum, Nathalie L. Rochefort, (2018, February), "FISSA: A neuropil decontamination toolbox for calcium imaging signals". *Scientific Reports*, **8**. doi: 10.1038/s41598-018-21640-2

Jan, 2018 Daniel Zaldivar, Jozien Goense, **Scott C. Lowe**, Nikos K. Logothetis, Stefano Panzeri, (2018, January), "Dopamine is signaled by mid-frequency oscillations and boosts output-layers visual information in visual cortex". *Current Biology*, **28**(2). doi: 10.1016/j.cub.2017.12.006.

Aug, 2016 Janelle M. P. Pakan, **Scott C. Lowe**, Evelyn Dylda, Sander W. Keemink, Stephen P. Currie, Christopher A. Coutts, Nathalie L. I. Rochefort, (2016, August), "Behavioral-state modulation of inhibition is context-dependent and cell type specific in mouse visual cortex". *eLIFE*, **5**:e14985. doi: 10.7554/eLife.14985.

Sept, 2015 Michel Besserve, **Scott C. Lowe**, Nikos, K. Logothetis, Bernhard Schölkopf, Stefano Panzeri (2015, September), "Shifts of gamma phase across primary visual cortical sites reflect dynamic stimulus modulated information transfer". *PLoS Biology*, **13**(9): e1002257. doi: 10.1371/journal.pbio.1002257.

*in preparation* **Scott C. Lowe**, Daniel Zaldivar, Yusuke Murayama, Mark C. W. van Rossum, Nikos K. Logothetis, Stefano Panzeri (to be submitted), "Lamina and Frequency Distribution of Information in Primary Visual Cortex".

### Talks

Jun, 2021 Chris Whidden, Jason Newport, and **Scott C. Lowe** (2021, June), "Automating the post-processing of noisy hydroacoustic fish surveying for monitoring tidal turbines". To be presented at *International Conference on Ocean Energy*, Madrid, Spain. Accepted but delayed to 2021 due to COVID-19.

Oct, 2019 Nicholas Barreyre*, Nicholas Meade*, Sageev Oore, Vlado Keselj, **Scott C. Lowe** (2019, October), "Bitwise Conditional Controls Over Language Models for Music and Text". Presented at the *2019 Science Atlantic Conference for Mathematics, Statistics and Computer Science*, Dalhousie University, Halifax, Canada. **Awarded third place**.

May, 2015 **Scott C. Lowe** (2015, May), "What does LFP encode?". Presented at the *CINPLA Workshop: "Inferring network activity from LFPs"*, University of Oslo, Oslo, Norway.

## Poster Presentations

Nov, 2020 **Scott C. Lowe**, Robert Earle, Thomas Trappenberg, Sageev Oore, (2020, November). "Higher Order Activation Functions". To be presented at *From Neuroscience to Artificially Intelligent Systems (NAISys)*, Cold Spring Harbor Laboratory, NY, USA.

Oct, 2019 **Scott C. Lowe**, Thomas Trappenberg, Sageev Oore, (2019, October). "LogAvgExp Provides a Principled and Performant Global Pooling Operator". Presented at the *Evolution of Deep Learning Symposium*, Toronto, Canada.

Mar, 2019 S.I.R. Pereira, N. Gunasekara, **Scott C. Lowe**, M.C.W. van Rossum, P.A. Lewis, (2019, March). "Sleep and creativity: differential effects on abstraction and analogical reasoning". Presented at the *26th Annual Meeting of the Cognitive Neuroscience Society*, San Francisco, USA.

Mar, 2019 S.I.R. Pereira, N. Gunasekara, **Scott C. Lowe**, M.C.W. van Rossum, P.A. Lewis, (2019, March). "Sleep and creativity: differential effects on abstraction and analogical reasoning". Presented at the *5th Meeting of the Society for the Neuroscience of Creativity*, San Francisco, USA. **Awarded first place**.

Nov, 2016 D. Zaldivar, J. Goense, **Scott C. Lowe**, N.K. Logothetis, S. Panzeri, (2016, November), "Dopamine elicits lamina-and frequency-specific increase of information in the local-field-potentials of the macaque V1". Presented at the *2016 Meeting of the Society for Neuroscience*, San Diego, USA. Program No. 712.08.

July, 2016 J.M.P. Pakan, **Scott C. Lowe**, E. Dylda, S.W. Keemink, S.P. Currie, C.A. Coutts, N.L. Rochefort, (2016, July). "Behavioural state modulation of inhibitory activity is context-dependent and cell-type specific in mouse V1." Presented at the *10th FENS Forum of Neuroscience*, Copenhagen, Denmark.

Apr, 2016 J.M.P. Pakan, **Scott C. Lowe**, E. Dylda, S.W. Keemink, C.A. Coutts, N.L. Rochefort, (2016, April). "Sensory context and state-dependent modulation of inhibitory circuit activity in mouse V1". Presented at the *The Brain in Focus: New Approaches to Imaging Neurons and Neural Circuits*, Copenhagen, Denmark.

Sept, 2016 S.W. Keemink, J.M.P. Pakan, **Scott C. Lowe**, E. Dylda, M.C.W. van Rossum, N.L. Rochefort, (2016, September). "Independent Component Analysis (ICA) approach to extract GCampP6-somatic signals from neuropil contamination". Presented at the *5th European Visual Cortex Meeting*, Kloster Seeon, Munich, Germany.

Sept, 2016 J.M.P. Pakan, **Scott C. Lowe**, E. Dylda, S.W. Keemink, C.A. Coutts, N.L. Rochefort, (2016, September). "Context-dependent activity of inhibitory circuits in V1 during locomotion". Presented at the *5th European Visual Cortex Meeting*, Kloster Seeon, Munich, Germany.

Apr, 2015 **Scott C. Lowe**, D. Zaldivar, Y. Murayama, M.C.W. van Rossum, N.K. Logothetis, S. Panzeri, (2015, April), "Cortical dynamics across V1 laminae generate independent frequency channels encoding visual information". Presented at the *BNA2015: Festival of Neuroscience*, Edinburgh, UK. Poster Reference: P2-C-029.

Nov, 2014 **Scott C. Lowe**, D. Zaldivar, Y. Murayama, M.C.W. van Rossum, N.K. Logothetis, S. Panzeri, (2014, November), "Different cortical layers in V1 encode different visual information in different frequency bands". Presented at the *2014 Meeting of the Society for Neuroscience*, Washington DC, USA. Program No. 532.19.

July, 2014 **Scott C. Lowe**, D. Zaldivar, Y. Murayama, M.C.W. van Rossum, N.K. Logothetis, S. Panzeri, (2014, July), "Quantification of the Laminar and Frequency Structure of Information in Primary Visual Cortex". Presented at the *9th FENS Forum of Neuroscience*, Milan, Italy. Abstract number FENS-2860.

July, 2014 **Scott C. Lowe**, D. Zaldivar, Y. Murayama, M.C.W. van Rossum, N.K. Logothetis, S. Panzeri, (2014, July), "Quantification of the Laminar and Frequency Structure of Information in Primary Visual Cortex". Presented at the *AREADNE 2014 session*, Santorini, Greece.

Nov, 2013 **Scott C. Lowe**, X. Chen, M.C.W. van Rossum, S. Panzeri, A. Thiele, (2013, November), "Decoding spiking activity in V4, but not V1, correlates with behaviour in perceptual learning". Presented at the *2013 Meeting of the Society for Neuroscience*, San Diego, USA. Program No. 555.11.

July, 2013 **Scott C. Lowe**, X. Chen, M.C.W. van Rossum, S. Panzeri, A. Thiele, (2013, July), "Decoding spiking activity in V4, but not V1, correlates with behavioural performance in perceptual learning task". Presented at the *Twenty Second Annual Computational Neuroscience Meeting: CNS*2013*, Paris, France. *BMC Neuroscience* 2013, **14**(Suppl 1):P385 doi: 10.1186/1471-2202-14-S1-P385.

## Teaching experience

Autumn, 2013 **Neural Computation**, *Tutor*, University of Edinburgh.

## Computer skills

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| Languages | Python, MATLAB, C/C++, Bash |
| Development | Git, TDD, continuous integration |
| ML | PyTorch, Tensorflow, Theano, Scikit-learn |
| Web | PHP, Javascript, AJAX, HTML5, CSS3 |
| Markup | Markdown, YAML, JSON, XML |
| Database | SQL, MySQL |
| Cloud comp. | AWS |

## References


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- Prof. Mark van Rossum,
  Chair and Director/Neuralcomputation Research Group,
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- Prof. Stefano Panzeri,
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