

Current positions

since 2022 **Postdoctoral Research Fellow**, *Vector Institute*, Toronto, Canada
Advisors: Prof. Sageev Oore and Prof. Graham Taylor

Education

2012–2017 **Doctor of Philosophy (Ph.D. in Neuroinformatics)**, *Institute for Adaptive and Neural Computation, School of Informatics, U. 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**, *U. 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 Artificial Neural Networks*, Supervisor: Dr Ian Jermyn.

Experience

2020 – 2022 **Postdoctoral Research Fellow (Full time)**, *Faculty of Computer Science, Dalhousie University*, Halifax, Canada
Deployment of deep learning methods to imagery collected for benthic habitat mapping.
Advisor: Prof. Thomas Trappenberg

2019 – 2020 **Postdoctoral Research Fellow (Full time)**, *Faculty of Computer Science, Dalhousie University*, Halifax, Canada. Joint affiliation: Dept. of Electrical and Computer Engineering
Applying deep learning to CPAP data, and echograms collected at tidal energy sites in the Bay of Fundy. Advisors: Dr. Sageev Oore, Prof. Kamal El-Sankary

2018 – 2019 **Postdoctoral Research Fellow (Full time)**, *Faculty of Computer Science, Dalhousie University*, Halifax, Canada. Joint affiliation: Vector Institute
Research in novel deep learning methods. Advisors: Dr. Sageev Oore, Prof. Thomas Trappenberg

2018 **Postdoctoral Research Fellow (Full time)**, *School of Psychology & School of Mathematics, University of Nottingham*, Nottingham, UK
Program synthesis for visual reasoning tasks. Advisor: Prof. Mark van Rossum

2017 **Co-founder and CSO (Full time)**, *Cortirio*, London, UK
Co-founder and Chief Scientific Officer at [Cortirio](#), developing a portable brain scanner for diagnosing traumatic brain injury.

- 2017 **Entrepreneurial Fellow (Full time)**, *Entrepreneur First*, London, UK
Exploration of new startup ideas.
- 2015 **Technical Research Assistant (Full time)**, *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 (Full time)**, *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 alphanumerical patterns <http://www.flextel.com/numbers/>.

Grants, honors & awards

- 2022 Awarded Mitacs Accelerate grant IT27877: Artificial intelligence driven monitoring and prediction of true sleep health on CPAP machines to improve patient care and reduce the harm of obstructive sleep apnea.
- 2021 Compute Canada Resources for Research Groups (RRG) competition, 2021 (Value: CAD 20,059). Project: "Global Benthic Habitats".
- 2020 Awarded Mitacs Accelerate grant IT19053: Monitoring and Analysis of COVID-19 Acute Respiratory Distress Syndrome on Ventilators.
- 2019 Awarded Mitacs Accelerate grant IT16140: Active Learning for Fish School Recognition in Echograms in the Bay of Fundy.
- 2018 Awarded an NVIDIA GPU Grant (Titan V).
- 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 an 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).

Miscellaneous courses

- Jul 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](#)

Publications

Journal articles & Conference proceedings

- Nov, 2022 **Scott C. Lowe**, Robert Earle, Jason d'Eon, Thomas Trappenberg, Sageev Oore, (2022), "Logical Activation Functions: Logit-space equivalents of Probabilistic Boolean Operators". To appear in *Proceedings of the Thirty-sixth Conference on Neural Information Processing Systems*. [arXiv: 2110.11940](#).
- Aug, 2022 **Scott C. Lowe**, Louise P. McGarry, Jessica Douglas, Jason Newport, Sageev Oore, Christopher Whidden, Daniel J. Hasselman, (2022), "Echofilter: A Deep Learning Segmentation Model to Improve the Automation, Standardization, and Timeliness for Post-Processing Echosounder Data in Tidal Energy Streams". *Frontiers in Marine Science*. **9**:867857. [doi: 10.3389/fmars.2022.867857](#) [arXiv: 2202.09648](#).
- Nov, 2021 **Scott C. Lowe**, Thomas Trappenberg, Sageev Oore, "LogAvgExp Provides a Principled and Performant Global Pooling Operator". [arXiv: 2111.01742](#).
- 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](#).
- Jun, 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 Dylida, 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](https://doi.org/10.7554/eLife.14985).
- Sep, 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](https://doi.org/10.1371/journal.pbio.1002257).
- Talks**
- Jul, 2022 **Scott C. Lowe**, Robert Earle, Jason d'Eon, Thomas Trappenberg, Sageev Oore, (2022, July). "Logical Activation Functions" (Spotlight talk). Presented at the *Beyond Bayes: Paths Towards Universal Reasoning Systems Workshop, 39th International Conference on Machine Learning (ICML)*, Baltimore, Maryland, USA, 2022.
- May, 2022 Craig J. Brown, Ben Misiuk, Ben DiTrollo, Thomas Trappenburg, **Scott C. Lowe**, Katleen Robert. (2022, May) "Benthic Ecosystem Mapping For Sustainable Ocean Stewardship In A Shifting Ocean Climate". Presented at *Geohab 2022*, Venice, Italy.
- May, 2022 Ben Misiuk, Craig J. Brown, Vicki Ferrini, **Scott C. Lowe**, Thomas Trappenburg. (2022, May) "Comparing Manual And Automated Feature Engineering Approaches For Mapping Seabed Sediments In The Bay Of Fundy, Canada". Presented at *Geohab 2022*, Venice, Italy.
- Feb, 2022 Louise P. McGarry, **Scott C. Lowe**, Jessica Douglas, Jason Newport, Sageev Oore, Christopher Whidden, and Daniel J. Hasselman, (2022, Mar) "Echofilter: A Deep Learning Segmentation Model Improves The Automation, Standardization, And Timeliness For Post-Processing And Reporting Echosounder Data In Tidal Energy Streams". Presented at *Ocean Sciences 2022 (OSM 2022)*, Virtual.
- Jul, 2021 Isaac Xu, Thomas Trappenberg, **Scott C. Lowe**, (2021, July). "Toward Semi-Supervised Classification of Underwater Benthic Habitat Imagery". Presented at *Dalhousie Computer Science In-House Conference (DCSI)*, Dalhousie University, Halifax, Canada.
- Jul, 2021 Shakhboz Abdulazizov, Thomas Trappenberg, **Scott C. Lowe**, (2021, July). "An Autoencoder Model of Bathymetry and Multibeam Echosound Backscatter". Presented at *Dalhousie Computer Science In-House Conference (DCSI)*, Dalhousie University, Halifax, Canada.
- Jun, 2021 Chris Whidden, Jason Newport, **Scott C. Lowe** (2021, June), "Automating the post-processing of noisy hydroacoustic fish surveying for monitoring tidal turbines". Presented at *International Conference on Ocean Energy*, Madrid, Spain (Virtual).
- 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**, Daniel Zaldivar, Yusuke Murayama, Mark C. W. van Rossum, Nikos K. Logothetis, Stefano Panzeri, (2015, May), "What does LFP encode?". Presented at the *CINPLA Workshop: "Inferring network activity from LFPs"*, University of Oslo, Oslo, Norway.
- Jan, 2014 **Scott C. Lowe**, Daniel Zaldivar, Yusuke Murayama, Mark C. W. van Rossum, Nikos K. Logothetis, Stefano Panzeri, (2014, January), "Independent channels of information in visual cortical Local Field Potentials". Presented at the *Institute for Adaptive and Neural Computation Workshop, Jan 14, 2014*, Edinburgh.
- Poster Presentations**
- Sep, 2022 Isaac Xu, **Scott C. Lowe**, Thomas Trappenberg, (2022, September). "Label-Free Monitoring of Self-Supervised Learning Progress". To be presented at the *2022 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE)*, Halifax, Nova Scotia, Canada, 2022.
- Jul, 2022 **Scott C. Lowe**, Robert Earle, Jason d'Eon, Thomas Trappenberg, Sageev Oore, (2022, July). "Logical Activation Functions: Logit-space equivalents of Probabilistic Boolean Operators". Presented at the *Beyond Bayes: Paths Towards Universal Reasoning Systems Workshop, 39th International Conference on Machine Learning (ICML)*, Baltimore, Maryland, USA, 2022. **Selected for spotlight talk.**
- Nov, 2020 **Scott C. Lowe**, Robert Earle, Thomas Trappenberg, Sageev Oore, (2020, November). "Higher Order Activation Functions". 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](#).
- Jul, 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. Dylida, 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.
- Sep, 2016 S.W. Keemink, J.M.P. Pakan, **Scott C. Lowe**, E. Dylida, M.C.W. van Rossum, N.L. Rochefort, (2016, September). "Independent Component Analysis (ICA) approach to extract GCaMP6-somatic signals from neuropil contamination". Presented at the *5th European Visual Cortex Meeting*, Kloster Seeon, Munich, Germany.
- Sep, 2016 J.M.P. Pakan, **Scott C. Lowe**, E. Dylida, 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](#).
- Jul, 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.
- Jul, 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](#).
- Jul, 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](#).

Media coverage

- Nov, 2021 "Dr. Scott C. Lowe", [Lodestar profile](#), *Journal of Ocean Technology*, **16**:3.
- Nov, 2021 "Predicting depth of entrained air and seafloor boundaries: DeepSense's Echofilter Model", [Trade Winds profile](#), *Journal of Ocean Technology*, **16**:3.

Mar, 2021 "AI software developed in N.S. provides glimpse into wild and murky Bay of Fundy",
[News article](#), [CBC](#).

Supervision experience

- 2021–2022 **Amit Baroi**, *Master of Resource & Environmental Management (in progress)*,
Dalhousie University, Topic: Building a global benthic habitat imagery dataset
Co-supervised by Prof. Thomas Trappenberg
- 2020–2022 **Isaac Xu**, *Master of Computer Science (in progress)*, Dalhousie University, Topic:
Addressing the impact of imbalanced data in self-supervised learning
Co-supervised by Prof. Thomas Trappenberg
- 2020–2022 **Shakhboz Abdulazizov**, *Master of Computer Science (in progress)*, Dalhousie
University, Topic: Learning multi-modal representations of benthic habitat data
Co-supervised by Prof. Thomas Trappenberg
- 2019–2020 **Robert Earle**, *Honours Computer Science & Statistics*, Dalhousie University, Thesis:
"Behaviour Of Higher Order Activation Functions"
Co-supervised by Dr. Sageev Oore
- 2018–2019 **Nicholas Barreyre**, *Combined Honours Bachelor of Science*, Dalhousie University,
Thesis: "Conditional Sequence Generation: Controlling Neural Language Models
For Music And Text"
Co-supervised by Dr. Sageev Oore
- 2018–2019 **Nicholas Meade**, *Honours Bachelor of Computer Science*, Dalhousie University,
Thesis: "Conditional Sequence Generation: Controlling Neural Language Models
For Music And Text"
Co-supervised by Dr. Sageev Oore

Teaching experience

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

Online Presence

Blog scottclowe.com
GitHub github.com/scottclowe
LinkedIn linkedin.com/in/scottclowe
StackOverflow stackoverflow.com/users/1960959/scottclowe

Computer skills

Languages Python, MATLAB, Bash/shell, regex, C/C++
Development Git, pre-commit, TDD, CI/CD, GHA
ML PyTorch, TensorFlow, Theano, Scikit-learn
Job Scheduler SLURM, LSF
Cloud comp. AWS, GCP
Web PHP, Javascript, AJAX, HTML5, CSS3

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Markup Markdown, rST, YAML, JSON, TOML, XML
Database SQL, MySQL

References

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- Dr. Nathalie Rochefort,
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