

AARON STOCKDILL

Quantitative Technologist at Qube Research and Technologies

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EDUCATION

Doctor of Philosophy, *University of Cambridge, UK.*

2017–2021

- Computer Science. Thesis: “Automating representation change across domains for reasoning”, supervised by Prof. Mateja Jamnik. Developed a theory of cross-domain *correspondences* to enable user-aware, contextual AI explanations in an interdisciplinary team from Cambridge and Sussex.
- Have published six conference papers and one workshop paper, all peer reviewed, presenting two. One further is under review. Presented a one hour seminar for the AI Research Group Seminar Series in the Computer Lab, and a 15 minute Postgraduate Seminar at college.
- Hamilton Cambridge International Scholarship recipient, awarded once every three years; gives full funding and stipend.
- Computing Officer for the Selwyn College MCR Committee, which represents graduate students at the college; I managed the punt reservations, committee elections, and website. In the department, I managed the AI Research Group website.

Bachelor of Science with First Class Honours, *University of Canterbury, NZ.*

2013–2016

- Computer Science honours, GPA 8.9 of 9, 2016. Report: “Neuromorphic Computing with Reservoir Neural Networks on Memristive Hardware”. Simulated new hardware to implement faster and more power efficient neural networks.
- Published two peer-reviewed conference papers.
- Double major in Computer Science and Mathematics, GPA 8.83 of 9, 2013–2015.
- Graduating BSc(Hons) Computer Science Student of the Year Prize 2016 recipient, and Graduating BSc Computer Science Student of the Year Prize 2015 recipient, for highest cohort grades.
- Committee member of the Computing Society and Mathematics Society, providing academic support, social functions, and subject promotion. Built the Computing Society website. Helped co-ordinate the eventual merger of these two societies.

RECENT EMPLOYMENT

Quantitative Technologist, *Qube Research and Technologies, London.*

Feb 2023–present

Research Fellow in Informatics, *University of Sussex, UK.*

Sept 2021–Jan 2023

- Developing theory and tools to describe representations in a uniform, and cognitively centred, manner (RIST).
- Working as part of a research team of six split between Sussex and Cambridge, continuing work from my PhD.
- Formalising the cognitive representation notation (RISN), while developing a web app using React and ReScript.

Software Engineer, *Jane Street Europe.*

Jan 2021–July 2021

- Worked with an international team to develop, deploy, and support in-house software in the finance industry.
- New and existing software was developed using OCaml; the environment demanded software that was fault-tolerant, distributed, and real-time. Development was backed up by extensive testing and code review.
- Provided operational support deploying our software to servers around the globe, and ensured 24/7 up-time for users of our software. We also supported users with trouble-shooting, and providing new features both responsively and proactively.

Supervisor, Computer Science, *University of Cambridge, UK.*

2017–2020

- Organised and ran small group teaching sessions for undergraduate students in their first and second years.
- Tailored individual and group work to the students’ needs, ensuring my time and feedback was used effectively and targeted to their interests and weaknesses for both coursework and future career.
- Encouraged and moderated group discussions that included all members of the group, ensuring the students were teaching each other as much as I was teaching them; this gave new perspectives to their peers and verified their own understanding.

Lecturer, Computer Science, *University of Canterbury, NZ.*

2017

- Planned then delivered lectures full time in Term 3 for more than 400 students in the ‘Introduction to Computer Science’ course which covers foundational concepts; in I received an average 4.30 of 5 in teaching effectiveness.
- Developed and graded a cohesive, comprehensive three-part assignment, which was delivered and assessed online.
- Worked with students individually both as part of the lab tutor teams and during office hours, the latter allowing me to spend time working with students that otherwise struggle in higher education environments.

TECHNICAL SKILLS

- Specialist in artificial intelligence, principally logical but also statistical; applications range from education to analysis to physics. My research includes theoretical proofs, human participant evaluations, and statistical analysis.
- Secondary computer science specialisation in machine learning, algorithms, and data structures; mathematics specialisation in graph theory, algebraic structures, linear algebra, and probability.
- Proficient with OCaml, ReScript, Python, Standard ML, HTML/CSS/Javascript, C, and \LaTeX . Familiar with APL, C++, Fortran, Haskell, Lisp, and PHP. Others can be learnt quickly. Familiar with standard office software.

SELECTED PUBLICATIONS

- Examining Experts' Recommendations of Representational Systems for Problem Solving.** Aaron Stockdill, Gem Stapleton, Daniel Raggi, Mateja Jamnik, Grecia Garcia Garcia, and Peter C.-H. Cheng, IEEE Symposium on Visual Languages and Human-Centric Computing, 2022, pp. 1–6. <https://dx.doi.org/10.1109/VL/HCC53370.2022.9833141>
- Representational Interpretive Structure: Theory and Notation.** Peter C.-H. Cheng, Aaron Stockdill, Grecia Garcia Garcia, Daniel Raggi, and Mateja Jamnik, 13th International Conference on the Theory and Application of Diagrams, 2022, pp. 54–69. https://dx.doi.org/10.1007/978-3-031-15146-0_4
- Considerations in Representation Selection for Problem Solving: a Review.** Aaron Stockdill, Daniel Raggi, Mateja Jamnik, Grecia Garcia Garcia, and Peter C.-H. Cheng, 12th International Conference on the Theory and Application of Diagrams, 2021, pp. 35–51. https://dx.doi.org/10.1007/978-3-030-86062-2_4
- Cognitive Properties of Representations: A Framework.** Peter C.-H. Cheng, Grecia Garcia Garcia, Daniel Raggi, Aaron Stockdill, and Mateja Jamnik, 12th International Conference on the Theory and Application of Diagrams, 2021, pp. 415–430. https://dx.doi.org/10.1007/978-3-030-86062-2_43
- Correspondence-based analogies for choosing problem representations.** Aaron Stockdill, Daniel Raggi, Mateja Jamnik, Grecia Garcia Garcia, Holly E. A. Sutherland, Peter C.-H. Cheng, and Advait Sarkar, IEEE Symposium on Visual Languages and Human-Centric Computing, 2020, pp. 1–5. <https://dx.doi.org/10.1109/VL/HCC50065.2020.9127258>
- How to (Re)represent it?.** Daniel Raggi, Gem Stapleton, Aaron Stockdill, Mateja Jamnik, Grecia Garcia Garcia, and Peter C.-H. Cheng, IEEE 32nd International Conference on Tools with Artificial Intelligence, 2020, pp. 1224–1232. <https://dx.doi.org/10.1109/ICTAI50040.2020.00185>
- Dissecting Representations.** Daniel Raggi, Aaron Stockdill, Mateja Jamnik, Grecia Garcia Garcia, Holly E. A. Sutherland, and Peter C.-H. Cheng, 11th International Conference on the Theory and Application of Diagrams, 2020, pp. 144–152. https://dx.doi.org/10.1007/978-3-030-54249-8_11
- Inspection and Selection of Representations.** Daniel Raggi, Aaron Stockdill, Mateja Jamnik, Grecia Garcia Garcia, Holly E. A. Sutherland, and Peter C.-H. Cheng, Intelligent Computer Mathematics, 2019, pp. 227–242. https://dx.doi.org/10.1007/978-3-030-23250-4_16

SELECTED AWARDS

- Best Student Paper, Diagrams Conference 2021.** 2021
Awarded for 'Considerations in Representation Selection for Problem Solving: a Review'
- Hamilton Cambridge International Scholarship, Cambridge Trust, University of Cambridge.** 2017
Full scholarship to study towards my PhD at the University of Cambridge.
- Graduating BSc(Hons) Computer Science Student of the Year, University of Canterbury.** 2016
Awarded for academic achievement throughout my undergraduate and honours study.
- G B Battersby Trimble Scholarship in Computer Science, University of Canterbury.** 2016
Awarded for academic merit, broad knowledge outside of computer science, and research of benefit to New Zealand.
- Freemasons University Scholarship.** For academic merit, community involvement, and leadership potential. 2016
- Page Memorial Prize, University of Canterbury,** for academic achievement in Level 300 Mathematics. 2015

OUTREACH AND VOLUNTEERING

- Representational Systems Theory: What, Why and How, Diagrams 2022 tutorial.** 2022
- Co-organising and will run a 90 minute tutorial at Diagrams 2022, targeted at researchers in diagrammatic representations.
 - The tutorial will be an interactive introduction to Representational Systems Theory, using a web app we have developed.
- STIMULUS Volunteer, University of Cambridge.** 2018–2020
- Volunteered 90 minutes per week at a local sixth form college, working with the teacher to extend both their knowledge and that of the students, providing extra resources and information, raising their enthusiasm for computer science.
 - Engaged individually with students to provide practical help, extension activities, or alternative explanations, developing and encouraging their passion for computer science and programming.
- Scholarship Calculus Coordinator, Cashmere High School, NZ.** 2015–2016
- Developed the Scholarship Calculus programme for advanced Year 13 students, building on their standard curriculum and producing a set of resources for myself and future teachers running this programme.
 - As a result of the new programme and teaching pattern, my 2016 cohort received a record four scholarships, double the previous best record for the school, and helping fund the students' tertiary education.