

JAMES BAILIE

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jameshbailie.github.io

EDUCATION & RESEARCH

- 2020– PhD (statistics)
- Harvard University* Beginning in September 2020, a PhD student within the Statistics Department at Harvard, researching statistical privacy under the advisorship of Prof. Xiao-Li Meng.
- 2013–2017 Bachelor of Science (Honours)
- The Australian National University* Majored in mathematics and statistics with a GPA of 6.971. See [a descriptive list of my upper division and graduate coursework in mathematics, statistics and computer science](#).
- Received high distinctions in courses covering metric spaces, spectral theory, Hilbert spaces, measure theory, topology, ODEs, vector calculus, algebraic topology, linear algebra, group theory, generalised linear modelling, statistical inference, stochastic processes, Markov chains and martingales. Also completed 9 courses in computer science, including artificial intelligence, reinforcement learning, algorithms, information theory and theory of computation.
- Honours in pure mathematics completed in 2017 with thesis *Vector Fields on Spheres*, supervised by Dr. Vigleik ANGELTVEIT.
- 2016–2017 Vacation Research Scholar
- The Australian Mathematical Sciences Institute* Summer project *Stable Homotopy and Category of Spectra*, supervised by Dr. Vigleik ANGELTVEIT. Work presented at AMSIConnect conference in Melbourne, February 2017. vrs.amsi.org.au/james-bailie-2017
- 2013–2014 Summer Research Scholar
- The University of Queensland* At the Centre for Educational Innovation and Technology.

AWARDS & SCHOLARSHIPS

- The International Association for Official Statistics* 2020 · Young Statisticians Third Prize
- Awarded for the paper *Big Data, Differential Privacy and National Statistical Organisations*.
- Australian Bureau of Statistics* 2019 · Ken Foreman Award
- Awarded for significant methodological contributions in the areas of data linking, confidentiality and machine learning.
- The Australian-American Fulbright Commission* 2019 · Fulbright Future Scholarship
- Awarded for a full U.S. PhD program (up to five years) starting in 2020. Benefits include paid tuition and research fees, a monthly stipend of approximately US\$2,400, and health insurance, for a period of five years.
- The Australian National University* 2017 · ANU Honours Scholarship
- 2016 · Hanna Neumann Prize for Third Year Mathematics (awarded to the top student in the cohort)

2015 · Boyapati Computer Science and Mathematics Prize for Second Year (awarded to the top student in the cohort)

2014 · Boyapati Computer Science and Mathematics Prize for First Year (awarded to the top student in the cohort)

WORK EXPERIENCE

- The Australian Bureau of Statistics*
- 2018–2020 **Researcher**
- Working on machine learning applications, administrative data use, data integration, confidentiality, differential privacy, and emerging statistical attacks, within the Methodology Division.
- Extensive use of the R programming language as well as experience in writing mathematical proofs and developing theoretical analysis. Completed graduate courses in survey methodology and time series methods, with marks of 90% and 98% respectively.
- Started as a graduate in 2018 in Methodology Futures, with projects on data integration and machine learning decision models to improve Census workforce efficiency.
- In November 2018, rotated to the Data Integration, Access and Confidentiality Methodology Unit. Currently investigating statistical privacy vulnerabilities (e.g. averaging, differencing and reconstruction attacks) and protections (including the application of differential privacy in the ABS).
- In 2019, received the *Ken Foreman Award* and *ABS Census and Data Services Group Excellence Award* for this work.
- The Department of the Prime Minister and Cabinet*
- 2020 **Secondee**
- Six week secondment to the data team within the COVID-19 taskforce.
- The Australian National University & Self-employed*
- 2013–2017 **Tutor**
- Tutor for *MATH1115 Advanced Mathematics and Applications 1* at the Australian National University in semester 1 of 2017. In semester 2, tutor for the follow-on course *MATH1116*. Led classes of approx. 30 students in discussions and small group work in addition to marking fortnightly assignments and exams. Received an average rating of 4.3 out of 5 in the student evaluations of overall satisfaction. Previously, a private high school and university mathematics tutor.
- Menzies School of Health Research*
- 2013–2016 **Data Analyst**
- Casual employee in data management and analysis for the *Engaging Stakeholders in Identifying Priority Evidence-Practice Gaps and Strategies for Improvement in Primary Health Care* project during 2013 to 2015. Tasks included data cleaning, synthesis and presentation, using Python and STATA programming languages. Managed and analysed large datasets (2 million+ entries) in order to extract indicators on health centre performance.
- In 2016, conducted Poisson regression to investigate trends in hospitalisation rates in Broken Hill, using the R programming language.
- Menzies School of Health Research*
- 2011–2013 **IT Assistant**
- Casual employee as part of the One21seventy National Centre for Quality Improvement in Indigenous Primary Health Care. Worked on database design and management, statistical analysis, Python and VBA programming, document proof reading, data entry and technical writing.

SELECTED PAPERS

- 2019 Bailie J, *Big Data, Differential Privacy and National Statistical Organisations*. Awarded the 2020 Interational Association for Official Statistics (IAOS) Young Statisticians Third Prize. Upcoming in the *Statistical Journal of the IAOS*, December.
- Chipperfield J, Bailie J, *Weighting a Survey that is Linked to Multiple Administrative Files when there are False Negatives*. Submitted to the *Statistical Journal of the IAOS*.
- Bailie J, Chien C, *ABS Perturbation Methodology Through the Lens of Differential Privacy*, UN Economic Commission for Europe, Work Session on Statistical Data Confidentiality.
- Bailie J, Lu E, Elazar D, Chiu K, *A Disrete Calibration Approach to Improving Data Linkage*. Paper presented to the ABS Methodological Advisory Committee (members include Professor Robert Breunig, Professor Kerrie Mengersen, Professor Scott Sisson, Professor Dianne Cook, Scientia Professor Robert Kohn).
- 2014–2016 Statistical analysis while at the Menzies School of Health Research acknowledged in seven publications. See jameshbailie.github.io/Papers/index.html for a comprehensive list.

SELECTED TALKS

- 5/2/2020 *Designing Formally Private Mechanisms for the $p\%$ Rule*, NIASRA's (National Institute for Applied Statistics Research Australia) 'Workshop on Advances in Statistical Disclosure Limitation', University of Wollongong
- 8/11/2019 *The Promises of Differential Privacy*, ABS Seminar
- 1/10/2019 *Using Admin Data and Machine Learning to Predict Dwelling Occupancy on Census Night*, Statistical Society of Australia's 'Young Statisticians Conference'
- 2/9/2019 *New Statistical Attacks on Population Count Tables*, ABS Seminar
- 9/2/2017 *Stable Homotopy Theory*, Australian Mathematical Sciences Institute Connect Conference

PROGRAMMING SKILLS

- Basic* C++, Javascript, Visual Basic for Applications
- Intermediate* Git, Linux command-line, Python, SAS, STATA, SQL
- Advanced* R, \LaTeX