Prof. Jonathan Gillard

Curriculum Vitae

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Address: School of Mathematics
Cardiff University
Phone: +44 29 20 870619
Email: GillardJW@Cardiff.ac.uk

Education and Qualifications

2009 G.Stat. Royal Statistical Society
2008 Ph.D. Statistics Cardiff University

Academic and research leadership

2023 – **Management Board**, Digital Transformation Innovation Network, CU.
2023 – **Academic Lead**, Turing University Network.
2023 – **Academic Lead**, Welsh Crucible.
2019–2023 **Deputy Chair and then Chair**, CU's Strategic Partnership with Office for National Statistics.
2021– **Professor**, School of Mathematics, CU
2021– **Head of Statistics**, School of Mathematics, CU
2021– **Deputy Head of School**, School of Mathematics, CU
2019–2021 **Deputy Chair**, CU's Strategic Partnership with Office for National Statistics.
2017–2021 **Deputy Head**, Statistics Group, School of Mathematics, CU.
2016–2022 **Management Board**, Data Innovation Research Institute, CU.
2016– **Management Board**, School of Mathematics, CU.
2016–2021 **Director of Student Recruitment and Admissions**, School of Mathematics, CU.
2016–2018 **Senate**, member, CU.
2016–2018 **Court**, member, CU.
2014–2016 **Secretary**, Learning and Teaching Committee, School of Mathematics, CU.

Positions held

2023–2027 **External Examiner of taught programmes**, University of Warwick.
2020–2024 **External Examiner of taught programmes**, University of Bristol.
2019–2022 **External Examiner of taught programmes**, University of Sheffield.
2019–2022 **External Examiner of taught programmes**, University of Central Lancashire.
2019–2020 **Visiting Researcher**, Part-time secondment at Office for National Statistics
2018–2021 **Reader**, School of Mathematics, CU.
2018 **Visiting Professor**, CRAN and Université de Lorraine, Nancy, France.
2015–2018 **Senior Lecturer**, School of Mathematics, CU.
2016 **Visiting Professor**, CRAN, Grenoble, France.
2011 **Visiting Researcher**, University of Auckland and Victoria University of Wellington, NZ.
2010–2015 **Lecturer**, School of Mathematics, CU.
2007–2010 **Fixed-term Lecturer**, School of Mathematics, CU.

Recent honours and awards

2022 "Excellence in Leadership", nominated, CU's Celebrating Excellence awards.
2021 "Most Approachable Member of Staff", second place, School of Mathematics, CU.
2019 "Personal Tutor of the Year", nomination, School of Mathematics, CU.
2019 "Lecturer of the Year", nomination, School of Mathematics, CU.
2014 "Excellence in Teaching", shortlisted, CU's Celebrating Excellence awards.
2014 Selected participant for Welsh Crucible.
Development programme for future research leaders in Wales.
2011 "Most Effective Teacher", shortlisted, CU's Enhancing Student Life awards.
2011 Selected participant for Cardiff Futures.

Editorial boards

2022– Editor for Royal Statistical Society's Real World Data Science
2021 Guest Editor for Teaching Mathematics and its Applications.
2021 Guest Editor for Statistics and its Interface.
2020– Editor for MSOR Connections.
2018– Editor for Frontiers in Big Data.

Fellowships

2018 Senior Fellow of the Higher Education Academy
2011 Fellow of the Higher Education Academy

Society memberships

2018– European Network for Business and Industrial Statistics.
2017– EURO Working Group on Continuous Optimization.
2017– International Society for Global Optimization.
2015–2019 British Society for Research into Learning Mathematics.
2009– Invited member of Royal Statistical Society.
2009–2014 Invited member of Institute of Mathematics and its Applications.

Society leadership

2014–2017 Committee Member for Royal Statistical Society's South Wales Local Group.
2012–2014 Member of Royal Statistical Society's Advisory Publication Network.

Research

- I have published over 50 papers, receiving over 950 citations, in high-quality peer-reviewed journals. I am an intra-disciplinary researcher working at the interface of statistics, operational research, linear algebra, and optimization, and have track records in each of these listed disciplines, with a mix of sole and joint publications.
- Contributor to two REF impact cases in 2014 and 2021.
- Seven of my PhD students have completed, I currently supervise three more. The quality of the work in one PhD thesis was confirmed by receipt of a SET for Britain award presented in the Houses of Parliament and the student being one of only two UK-based researchers to be selected to take part in the prestigious EURO Summer Institute for Healthcare. Another PhD student won prizes at two Young Statistician Meetings, giving free attendance at two Royal Statistical Society conferences, whilst another was awarded a prize for their poster at a SIAM-UKIE meeting and was an invited keynote speaker at a PyCon conference in Belgrade.
- Over 90 MSc students have successfully completed their dissertations under my supervision, each of them working on joint projects with industry.
- Springer research monograph on "Low-rank approximations and their statistical application" due to be published in 2024.

Research income and some examples

- I have acquired about £2.5M in external research grants since 2008. As management board member of the Data Innovation Research Institute, I have overseen over £13M worth of income to CU in the past five years.

2022–2023	Research in pairs, PI, *London Mathematical Society*,	£1K
2021–2024	Novel area-modulation perimetry for identifying changes in visual field sensitivity in glaucoma, Co-I, *MRC*.	£1.8M
2020–2021	Acoustic approaches for digital asset management, Co-I, *Airbus*.	£120K
2019–2021	Low-rank approximation, *PICS*, Co-I.	£25K
2018–2022	Anomaly detection in large complex data, PI, *EPSRC CASE/ONS*.	£113K
2018–2022	Networking Data Science across GW4 and the Alan Turing Institute, PI, *GW4*.	£40K
2016–2021	Novel methods for assessing management initiatives in the NHS, PI, *Cwm-Taf University Health Board*.	£35K
2014	Low rank approximations to matrices - a statistical application, PI, *London Mathematical Society*.	£1.5K
2014	Conference - Optimal Decisions in Statistics and Data Analysis, Co-I, *Quintiles*	£20K
2013–2017	Calibration, missing data and non-response, PI, *EPSRC CASE/ONS*.	£90K
2009–2010	Reliability and minimal detectable change of measures of participation in individuals with Huntington's disease, Co-I, *EU Huntington's Disease Network*.	£36K

Advisory boards/panels

- Member of RSS's Head of Statistics Groups Committee (2023–)
- Member of Turing's Research and Innovation Advisory Committee (2023–)
- Invited contributor to Times Higher Education Global Academic Reputation Survey (2022).
- Invited member of the Mathematics, Statistics and Operational Research QAA Subject Benchmark Survey review group (2022).
- Horizon Europe, expert evaluator (2022–).
- EPSRC Peer Review College, member (2019–).
- Statistics Special Interest Group for sigma, member (2018–).
- Academic Advisor for the Government Statistical Service (2017–2019).

Selected conference organisation

- CETL-MSOR 2023, Cardiff, Organizing committee.
- NUMTA 2023, Italy, Scientific committee.
- IEEE-ICASSP 2019, UK, Scientific committee.
- NUMTA 2019, Italy, Scientific committee.
- LeGO 2018 - the 14th International Workshop on Global Optimization, Netherlands, Scientific committee.
- Numerical Computations: Theory and Algorithms 2016, Italy, Scientific committee.
- 21st International Symposium on Mathematical Theory of Networks and Systems, Netherlands, Scientific committee.

Teaching and Scholarship

- I consistently receive exemplary feedback from student evaluations (regularly achieving 100% overall satisfaction), which are ranked amongst the highest in the School of Mathematics and for most of the time have been ranked top.
- Created 85 credits of new UG/PG modules, have designed and developed four MSc programmes, and one UG programme. Designed and implemented a preliminary year for international students.
- Author of a textbook on Statistical Inference, published by Springer in 2020.
- Appointed by the Quality Assurance Agency for Higher Education (QAA) to the Advisory Board for the Mathematics, Statistics and Operational Research subject benchmark statement.

Publications

Refereed research papers

1. J Gillard, V Knight, and H Wilde, A novel initialisation based on hospital-resident assignment for the $$k$$-modes algorithm, *Soft Computing*, **27**, (14), 9441–9457, May 2023.

2. J Gillard and K Usevich, Hankel low-rank approximation and completion in time series analysis and forecasting: A brief review, *Statistics and Its Interface*, **16**, (2), 287–303, 2023.
3. J Gillard, E O'Riordan, and A Zhigljavsky, Polynomial whitening for high-dimensional data, *Computational Statistics*, **38**, (3), 1427–1461, 2022.
4. J Gillard, E O'Riordan, and A Zhigljavsky, Simplicial and minimal-variance distances in multivariate data analysis, *Journal of Statistical Theory and Practice*, **16**, (1), 1–30, 2022.
5. JW Gillard and K Usevich, "Matrix optimization problems in statistics," in *Encyclopedia of Optimization*, PM Pardalos and OA Prokopyev, Eds. Cham: Springer International Publishing, 2020, pp. 1–7.
6. H Wilde, V Knight, and J Gillard, Evolutionary dataset optimisation: Learning algorithm quality through evolution, *Applied Intelligence*, **50**, (4), 1172–1191, 2020.
7. H Wilde, V Knight, and J Gillard, Matching: A python library for solving matching games, *Journal of Open Source Software*, **5**, (48), 2169, 2020.
8. H Wilde, V Knight, J Gillard, and K Smith, Segmentation analysis and the recovery of queueing parameters via the Wasserstein distance: A study of administrative data for patients with chronic obstructive pulmonary disease, *arXiv preprint arXiv:2008.04295*, 2020.
9. A Zhigljavsky, I Fesenko, H Wynn, K Kremnitzer, J Noonan, J Gillard, and R Whitaker, A prototype for decision support tool to help decision-makers with the strategy of handling the COVID-19 UK epidemic, *medRxiv*, 2020.
10. A Zhigljavsky, R Whitaker, I Fesenko, K Kremnizer, J Noonan, P Harper, J Gillard, T Woolley, D Gartner, J Grimsley, *et al.*, Generic probabilistic modelling and non-homogeneity issues for the UK epidemic of COVID-19, *arXiv preprint arXiv:2004.01991*, 2020.
11. N Dewart and J Gillard, Using Bradley–Terry models to analyse test match cricket, *IMA Journal of Management Mathematics*, **30**, (2), 187–207, 2019.
12. S Ford, J Gillard, and M Pugh, Creating a taxonomy of mathematical errors for undergraduate mathematics, *MSOR Connections*, **18**, (1), 37–45, 2019.
13. VA Knight, M Harper, NE Glynatsi, and J Gillard, Recognising and evaluating the effectiveness of extortion in the iterated prisoner's dilemma, *arXiv preprint arXiv:1904.00973*, 2019.
14. A Žilinskas, J Gillard, M Scammell, and A Zhigljavsky, Multistart with early termination of descents, *Journal of Global Optimization*, 1–16, 2019.
15. J Gillard and K Usevich, Structured low-rank matrix completion for forecasting in time series analysis, *International Journal of Forecasting*, **34**, (4), 582–597, 2018.
16. J Gillard and A Zhigljavsky, Optimal directional statistic for general regression, *Statistics & Probability Letters*, **143**, 74–80, 2018.
17. J Gillard and A Zhigljavsky, Optimal estimation of direction in regression models with large number of parameters, *Applied Mathematics and Computation*, **318**, 281–289, 2018.
18. JW Gillard, An initial analysis and reflection of the metrics used in the Teaching Excellence Framework in the UK, *Perspectives: Policy and Practice in Higher Education*, **22**, (2), 49–57, 2018.
19. H Butcher and J Gillard, Simple nuclear norm based algorithms for imputing missing data and forecasting in time series, *Statistics and its Interface*, **10**, (1), 19–25, 2017.
20. JW Gillard and D Kvasov, Lipschitz optimization methods for fitting a sum of damped sinusoids to a series of observations, *Statistics and its Interface*, **10**, (1), 59–70, 2017.
21. JL Vile, JW Gillard, PR Harper, and VA Knight, A queueing theoretic approach to set staffing levels in time-dependent dual-class service systems, *Decision Sciences*, **48**, (4), 766–794, 2017.
22. G Davies, J Gillard, and A Zhigljavsky, "Comparative study of different penalty functions and algorithms in survey calibration," in *Advances in Stochastic and Deterministic Global Optimization*, Springer, Cham, 2016, pp.87–127.
23. D Evans and J Gillard, Difference-based methods for truncating the singular value decomposition, *Communications in Statistics-Simulation and Computation*, **45**, (3), 863–879, 2016.
24. J Gillard, V Knight, J Vile, and R Wilson, Rostering staff at a mathematics support service using a finite-source queueing model, *IMA Journal of Management Mathematics*, **27**, (2), 201–209, 2016.
25. J Gillard and AA Zhigljavsky, Weighted norms in subspace-based methods for time series analysis, *Numerical Linear Algebra with Applications*, **23**, (5), 947–967, 2016.
26. JL Vile, JW Gillard, PR Harper, and VA Knight, Time-dependent stochastic methods for managing and scheduling emergency medical services, *Operations Research for Health Care*, **8**, 42–52, 2016.

27. G Davies, J Gillard, and A Zhigljavsky, "Calibration in survey sampling as an optimization problem," in *Optimization, control, and applications in the information age*, Springer, Cham, 2015, pp.67–89.
28. J Gillard, Linear time-dependent reference intervals where there is measurement error in the time variable-a parametric approach, *Statistical methods in medical research*, **24**, (6), 788–802, 2015.
29. J Gillard and A Zhigljavsky, Application of structured low-rank approximation methods for imputing missing values in time series, *Statistics and its Interface*, **8**, (3), 321–330, 2015.
30. JW Gillard and AA Zhigljavsky, Stochastic algorithms for solving structured low-rank matrix approximation problems, *Communications in Nonlinear Science and Numerical Simulation*, **21**, (1-3), 70–88, 2015.
31. J Gillard, Method of moments estimation in linear regression with errors in both variables, *Communications in Statistics-Theory and Methods*, **43**, (15), 3208–3222, 2014.
32. J Gillard and V Knight, Using singular spectrum analysis to obtain staffing level requirements in emergency units, *Journal of the Operational Research Society*, **65**, (5), 735–746, 2014.
33. J Gillard and A Zhigljavsky, Stochastic methods for Hankel structured low rank approximation, in *Proceedings of 21th International Symposium on Mathematical Theory of Networks and Systems*, 2014, pp.961–964.
34. J Gillard and A Zhigljavsky, Optimization challenges in the structured low rank approximation problem, *Journal of Global Optimization*, **57**, (3), 733–751, 2013.
35. L Quinn, H Khalil, H Dawes, NE Fritz, D Kegelmeyer, AD Kloos, JW Gillard, M Busse, and OMS of the European Huntington's Disease Network, Reliability and minimal detectable change of physical performance measures in individuals with pre-manifest and manifest huntington disease, *Physical therapy*, **93**, (7), 942–956, 2013.
36. J Gillard, A generalised Box–Cox transformation for the parametric estimation of clinical reference intervals, *Journal of Applied Statistics*, **39**, (10), 2231–2245, 2012.
37. J Gillard, K Robathan, and R Wilson, Student perception of the effectiveness of mathematics support at Cardiff University, *Teaching Mathematics and Its Applications: International Journal of the IMA*, **31**, (2), 84–94, 2012.
38. R Lewis, J Thompson, C Mumford, and J Gillard, A wide-ranging computational comparison of high-performance graph colouring algorithms, *Computers & Operations Research*, **39**, (9), 1933–1950, 2012.
39. JL Vile, JW Gillard, PR Harper, and VA Knight, Predicting ambulance demand using singular spectrum analysis, *Journal of the Operational Research Society*, **63**, (11), 1556–1565, 2012.
40. J Gillard, K Robathan, and R Wilson, Measuring the effectiveness of a mathematics support service: An email survey, *Teaching Mathematics and Its Applications: International Journal of the IMA*, **30**, (1), 43–52, 2011.
41. J Gillard and A Zhigljavsky, Analysis of structured low rank approximation as an optimization problem, *Informatica*, **22**, (4), 489–505, 2011.
42. J Gillard, An overview of linear structural models in errors in variables regression, *REVSTAT–Statistical Journal*, **8**, (1), 57–80, 2010.
43. J Gillard, Cadzow's basic algorithm, alternating projections and singular spectrum analysis. *Statistics and Its Interface*, **3**, (3), 335–343, 2010.
44. J Gillard, M Levi, and R Wilson, Diagnostic testing at UK universities: An e-mail survey, *Teaching Mathematics and its Applications: An International Journal of the IMA*, **29**, (2), 69–75, 2010.
45. J Gillard and T Iles, Methods of fitting straight lines where both variables are subject to measurement error, *Current Clinical Pharmacology*, **4**, (3), 164–171, 2009.

Books

1. J Gillard, *A First Course in Statistical Inference*. Springer, 2020.

Editorials

1. J Gillard, C Ketnor, C Mac An Bhaird, and C Smith, Special issue editorial: Restarting the new normal, *Teaching Mathematics and its Applications: An International Journal of the IMA*, **40**, (4), 249–253, 2021.

Selected conference papers

1. J Gillard and K Usevich, Convex optimization for matrix completion with application to forecasting, in *AIP Conference Proceedings*, AIP Publishing LLC, vol. 2070, 2019, pp.020042.
2. J Gillard and A Zhigljavsky, Global optimization challenges in structured low rank approximation, in *International Conference on Learning and Intelligent Optimization*, Springer, Cham, 2017, pp.326–330.

3. J Gillard, D Kvasov, and A Zhigljavsky, Optimization problems in structured low rank approximation, in *AIP Conference Proceedings*, AIP Publishing LLC, vol. 1776, 2016, pp.060004.
4. J Gillard and A Zhigljavsky, Global optimization for structured low rank approximation, in *AIP Conference Proceedings*, AIP Publishing LLC, vol. 1738, 2016, pp.400003.
5. A Zhigljavsky, N Golyandina, and J Gillard, "Analysis and design in the problem of vector deconvolution," in *mODa 11-Advances in Model-Oriented Design and Analysis*, Springer, Cham, 2016, pp.243–251.
6. J Gillard and A Zhigljavsky, Stochastic methods for Hankel structured low rank approximation, in *Proceedings of 21th International Symposium on Mathematical Theory of Networks and Systems*, 2014, pp.961–964.
7. PR Harper, J Gillard, VA Knight, L Smith, JL Vile, and JE Williams, Emergency medical services modelling. In *SIMULTECH*, 2013, pp.549–555.
8. K White, B Cooper, J Gillard, D Graham, and R Wilson, Summer internships in sigma-sw, in *CETL-MSOR Conference Proceedings*, 2012.
9. B Cooper, J Gillard, D Graham, J White, and R Wilson, Summer internships in sigma-sw, in *Conference Proceedings of CETL-MSOR 2011*, 2011, pp.39–48.
10. J Gillard, P Harper, V Knight, and J Williams, Forecasting Welsh ambulance demand, in *2nd Student Conference in Operational Research*, 2010.
11. JL Vile, JW Gillard, PR Harper, and VA Knight, Forecasting Welsh ambulance demand using singular spectrum analysis, in *Proceedings of the XXXVI International ORAHS Conference*, Franco Angeli, 2010, pp.196–208.
12. R Wilson and J Gillard, Some problems associated with running a maths support service, in *CETL-MSOR Conference 2008*, 2009.

Book reviews

1. J Gillard, Review on the book Yaroslav D. Sergeyev, Renato De Leone (Eds.) Numerical infinities and infinitesimals in optimization, *Optimization Letters*, **17**, (2), 511–513, 2022.
2. J Gillard, Deterministic global optimization: An introduction to the diagonal approach, *Optimization Methods and Software*, **34**, (1), 218–219, 2019.
3. J Gillard, Bayesian and frequentist regression methods, *Journal of the Royal Statistical Society: Series A*, **178**, (4), 1100–1101, 2015.
4. J Gillard, Sequential analysis: Hypothesis testing and changepoint detection, *Journal of the Royal Statistical Society: Series A*, **178**, (3), 785, 2015.
5. J Gillard, The R book, *Journal of Applied Statistics*, **41**, (4), 909, 2014.
6. J Gillard, Approaching multivariate analysis, a practical introduction, 2nd edn, *Journal of the Royal Statistical Society: Series A*, **175**, (3), 823, 2012.
7. J Gillard, Circular and linear regression: Fitting circles and lines by least squares, *Journal of the Royal Statistical Society: Series A*, **174**, (3), 843, 2011.
8. J Gillard, Matrix computations and semiseparable matrices: Vol. 1, linear systems; vol. 2, eigenvalue and singular value methods, *Journal of the Royal Statistical Society: Series A*, **174**, (2), 514–515, 2011.
9. J Gillard, Large covariance and autocovariance matrices, *Journal of the Royal Statistical Society: Series A*, **182**, (2), 714,
10. J Gillard, Patterned random matrices, *Journal of the Royal Statistical Society: Series A*, **182**, (2), 714,