

Profile and Research Interests

Professor of Statistics and Data Science focused on structure-aware methods in modern data analysis and optimisation. My research integrates statistics, operational research and numerical linear algebra to deliver interpretable, computationally efficient solutions with public value (healthcare, national statistics, industry).

Interests: structured low-rank approximation and completion; big data analytics; responsible, low-compute data science; data-driven mathematics pedagogy.

Education and Qualifications

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

Academic and research leadership

2025 – **Director of Research**, School of Mathematics, CU
2023 – **Management Board**, Digital Transformation Innovation Network, CU.
2023 – **Co-lead**, Data Science Academy, CU.
2023 – **Academic Lead**, Turing University Network.
2023 – **Academic Lead**, Welsh Crucible.
2019–2023 **Deputy Chair then Chair**, CU's Strategic Partnership with Office for National Statistics.
2021– **Professor**, School of Mathematics, CU
2021– **Head of Statistics and Data Science**, 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

- 2025 “College Education Deans’ Award”, awarded, CU’s Enriching Student Life awards.
- 2024 “Excellence in Enhancing Research Culture”, awarded, CU’s Celebrating Excellence awards.
- 2024 “Personal Tutor of the Year”, nominated, CU’s Enriching Student Life 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 Enriching 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– Royal Statistical Society.
- 2009–2014 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 100 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.
- Ten of my PhD students have completed, I currently supervise four 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 100 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 2025.

Supervision

- PDRAs: 5 ECRs.

- **PhD:** 10 completions; currently supervising 5. Prizes include *SET for Britain* (Parliament), RSS Young Statistician awards, SIAM-UKIE poster prize; invited *EURO Summer Institute* and keynote at *PyCon Belgrade*.
- **MSc:** 100+ dissertations, many co-designed with ONS, Welsh Government and NHS partners.

Research income and some examples

- I have personally acquired about £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 during 2016–2022.

2025	Maths Degrees for the Future, PI, <i>London Mathematical Society/Campaign for Mathematical Sciences</i>	£500K
2025	iHEATRISK – Individual Heat Risk Toolkit, Co-I, <i>University of Illinois System/Cardiff University Joint Seed Grant</i>	£35K
2025	Human-centred Data Prioritisation and Acquisition Recommender for Confident & Defensible Decisions, Co-I, <i>EPSRC</i> ,	£1.2M
2022–2023	Research in pairs, PI, <i>London Mathematical Society</i> ,	£1K
2021–2024	Novel area-modulation perimeter for identifying changes in visual field sensitivity in glaucoma, Co-I, <i>MRC</i> .	£1.8M
2020–2021	Acoustic approaches for digital asset management, Co-I, <i>Airbus</i> .	£120K
2019–2021	Low-rank approximation, <i>PICS</i> , Co-I.	£25K
2018–2022	Anomaly detection in large complex data, PI, <i>EPSRC CASE/ONS</i> .	£113K
2018–2022	Networking Data Science across GW4 and the Alan Turing Institute, PI, <i>GW4</i> .	£40K
2016–2021	Novel methods for assessing management initiatives in the NHS, PI, <i>Cwm-Taf University Health Board</i> .	£35K
2014	Low rank approximations to matrices - a statistical application, PI, <i>London Mathematical Society</i> .	£1.5K
2014	Conference - Optimal Decisions in Statistics and Data Analysis, Co-I, <i>Quintiles</i>	£20K
2013–2017	Calibration, missing data and non-response, PI, <i>EPSRC CASE/ONS</i> .	£90K
2009–2010	Reliability and minimal detectable change of measures of participation in individuals with Huntington's disease, Co-I, <i>EU Huntington's Disease Network</i> .	£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).

Leadership

- **Institutional leadership:** Deputy Head and Director of Research, School of Mathematics, Cardiff University (2021–), overseeing research strategy, REF preparation, and academic workload planning. Successfully led the School through Academic Futures restructuring, safeguarding posts.
- **Strategic partnerships:** Academic Chair of Cardiff University's strategic partnership with the **Office for National Statistics** (2019–2023), delivering joint lectureships, collaborative PhD studentships, and the establishment of a secure data research suite at sbarc—spark.
- **National leadership in research development:** Academic Chair of the **Welsh Crucible** since 2023, Wales's flagship researcher-development programme. Secured a five-year, £0.5M renewal from HEFCW and all Welsh universities. The programme mentors 30 early-career researchers annually; over 70% subsequently secure competitive funding or leadership roles.
- **Leadership in education:** Co-lead of the **Mathematics for the Modern World** degree programme and recipient of the **College Deans' Award for Education (2025)** for introducing January-start MSc intakes that improved accessibility and international participation.
- **Sectoral leadership:** Academic Lead for Cardiff's membership of the **Alan Turing Institute** and co-lead of the **Data Science Academy**, aligning Cardiff's digital and AI strategy with UKRI and Welsh Government priorities.

- **Disciplinary leadership:** Appointed to the **QAA Advisory Panel for Mathematics, Statistics and Operational Research**, shaping the 2022 national subject benchmark statement. Editor for *MSOR Connections* and the Royal Statistical Society's *Real World Data Science* platform.
- **Civic and collaborative leadership:** Co-lead of the £0.5M Campaign for Mathematical Sciences-funded curriculum renewal initiative, embedding the Well-being of Future Generations (Wales) Act in mathematics education.

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

- Consistently receive exemplary student feedback (regularly achieving 100% overall satisfaction) across undergraduate and postgraduate teaching; scores are routinely among the highest in the School of Mathematics and often the highest in the College of Physical Sciences and Engineering.
- Created over 85 credits of new undergraduate and postgraduate modules, and have designed and launched nine MSc programmes and two undergraduate programmes. Established a preliminary year for international students and co-led the design of the new civic-focused degree *Mathematics for the Modern World*.
- Recipient of the **College Deans' Award for Education (2025)** for introducing January-start MSc intakes, improving international access and flexibility for part-time learners.
- Co-lead for the **£0.5M Campaign for Mathematical Sciences award** supporting national curriculum reform in mathematics and statistics education, embedding civic and sustainability principles aligned to the Well-being of Future Generations (Wales) Act.
- Authored a pedagogically focused textbook, *Statistical Inference*, published by Springer (2020), which is used internationally in MSc and PhD-level courses.
- Published multiple peer-reviewed papers on mathematics education and student learning, including studies on mathematical error taxonomies, teaching evaluation, and confidence-building, in leading journals such as *Teaching Mathematics and its Applications*, *MSOR Connections*, and *Perspectives: Policy and Practice in Higher Education*.
- Co-organised and chaired the national **CETL-MSOR Conference (2023)**, hosting 150 delegates and leading sessions on data-informed assessment and inclusive mathematics education.
- Guest Editor for a special issue of *Teaching Mathematics and its Applications* on post-pandemic pedagogy and continuing Editor for *MSOR Connections*, the UK's principal journal for research in mathematics and statistics education.
- Member of the **sigma National Steering Group for Statistics Support**, contributing to the UK-wide framework for excellence in mathematical sciences learning and teaching.
- Appointed by the **Quality Assurance Agency for Higher Education (QAA)** to the Advisory Board for the *Mathematics, Statistics and Operational Research* subject benchmark statement, helping shape national standards for mathematical sciences education.

Publications

Refereed research papers

1. J Gillard, V Knight, K Smith, and H Wilde, Optimizing healthcare queues: A case study on chronic respiratory illness, *IMA Journal of Management Mathematics*, In print, Jan. 2025.
2. V Knight, M Harper, NE Glynatsi, and J Gillard, Recognising and evaluating the effectiveness of extortion in the iterated prisoner's dilemma, *PLoS One*, **19**, (7), e0304641, Jul. 2024.
3. 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.
4. 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.
5. J Gillard, E O'Riordan, and A Zhigljavsky, Polynomial whitening for high-dimensional data, *Computational Statistics*, **38**, (3), 1427–1461, 2022.

6. 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.
7. 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.
8. H Wilde, V Knight, and J Gillard, Evolutionary dataset optimisation: Learning algorithm quality through evolution, *Applied Intelligence*, **50**, (4), 1172–1191, 2020.
9. H Wilde, V Knight, and J Gillard, Matching: A python library for solving matching games, *Journal of Open Source Software*, **5**, (48), 2169, 2020.
10. 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.
11. 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.
12. A Zhigljavsky, R Whitaker, I Fesenko, K Kremnitzer, 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.
13. N Dewart and J Gillard, Using Bradley–Terry models to analyse test match cricket, *IMA Journal of Management Mathematics*, **30**, (2), 187–207, 2019.
14. S Ford, J Gillard, and M Pugh, Creating a taxonomy of mathematical errors for undergraduate mathematics, *MSOR Connections*, **18**, (1), 37–45, 2019.
15. 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.
16. A Žilinskas, J Gillard, M Scammell, and A Zhigljavsky, Multistart with early termination of descents, *Journal of Global Optimization*, 1–16, 2019.
17. 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.
18. J Gillard and A Zhigljavsky, Optimal directional statistic for general regression, *Statistics & Probability Letters*, **143**, 74–80, 2018.
19. 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.
20. 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.
21. 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.
22. 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.
23. 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.
24. 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.
25. 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.
26. 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.
27. 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.
28. 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.
29. 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.
30. 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.

31. 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.
32. 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.
33. 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.
34. 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.
35. 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.
36. J Gillard and A Zhigljavsky, Optimization challenges in the structured low rank approximation problem, *Journal of Global Optimization*, **57**, (3), 733–751, 2013.
37. 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.
38. J Gillard, A generalised Box–Cox transformation for the parametric estimation of clinical reference intervals, *Journal of Applied Statistics*, **39**, (10), 2231–2245, 2012.
39. 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.
40. 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.
41. 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.
42. 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.
43. J Gillard and A Zhigljavsky, Analysis of structured low rank approximation as an optimization problem, *Informatica*, **22**, (4), 489–505, 2011.
44. J Gillard, An overview of linear structural models in errors in variables regression, *REVSTAT–Statistical Journal*, **8**, (1), 57–80, 2010.
45. J Gillard, Cadzow’s basic algorithm, alternating projections and singular spectrum analysis. *Statistics and Its Interface*, **3**, (3), 335–343, 2010.
46. 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.
47. 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,