The Open University Statistics Group

2019 Report

1. Membership

Dr K. Adhikari (from March)
Miss A. Bromley
Miss C. Calvert
Dr F. Elfadaly
Dr Á.E. Faria
Professor P.H. Garthwaite
Mrs A. Gibb (to September)
Dr R.M. Hilliam (from April)
Professor M.C. Jones (to April)
Mrs R. Neal (from August)
Dr C.M. Queen
Dr M. Riaz (from September)
Mx R. Thomas (from June)
Dr N.T. Trendafilov
Dr S.K. Vines

Long-term associates

Professor C.P. Farrington [Emeritus Professor]
Professor M.C. Jones [Emeritus Professor] (From April)
Professor K.J. McConway [Emeritus Professor]
Dr A. Noufaily (Warwick Medical School) [Visiting Research Fellow]
Dr Y.G. Weldeselassie (Warwick Medical School) [Visiting Research Fellow]
Dr H.J. Whitaker (Public Health England) [Visiting Research Fellow]

Full–time research students

Mrs M. Moustafa
Mr M Khokan

Part–time research students

Mr R. Harris (to April)

2. Introduction

Here is an overview of the substantial activity in Statistics at the Open University in 2019, in both research and teaching.

On the research side, all our usual activities and outputs are described in Section 4 onwards of this report. During the year, members of the group published 24 papers in refereed journals, along with a number of other outputs (see Section 6). Pre-publication papers can be found in our technical report series, at

https://www.open.ac.uk/stem/mathematics-and-statistics/research/annual-reports

On the teaching side, over 2970 students were enrolled on the Statistics modules presented for study from dates in 2019 (see Section 3).

It is with the deepest regret that we record the death in February of the ex-member of the statistics group Dr Dan Lunn. Dan worked for the OU for many years, contributing mainly to courses in applied mathematics, and then in statistics. RIP Dan. Later in May, we also lost our dear colleague Prof John Gower. John was Professor of Statistics in the group and a delightful colleague from the mid-nineties until his formal retirement in 2006. He continued to have close links with the group, as Emeritus Professor, with regular visits to the Open University. John was still doing research until a few days before his death. He will really be much missed.

Our excellent colleague, Prof Chris Jones, retired in April after more than 25 years of service at the Open University. Chris was an exceptionally valued and admired colleague: for his outstanding contributions over so many years to teaching, for his excellent research, and for writing this series of annual reports for years. We are happy to announce his retirement in his own words! Best wishes to Chris for a long and happy retirement.

We are very pleased to welcome Dr Rachel Hilliam back to the group, as Senior Lecturer in Statistics from April. Rachel was Staff Tutor in the group since 2011, then at a senior level since 2015. She was the Director of Teaching in the school before she left us last year for a post at the University of Warwick. Welcome back Rachel! We are also very happy to welcome our new excellent Lecturer in Statistics, Dr Kaustubh Adhikari, who joined the group in March. Our numbers of colleagues were further expanded by the three new valuable appointments of Mrs Ruth Neal and Mx Rowan Thomas as Staff Tutors and of Dr Muhammad Riaz as Research Associate. Good luck, folks! In the other direction, we were sad to see one of our staff tutors, Mrs Ann Gibb, leave us in September but are thrilled that she is carrying on her work with the OU and links with the group as an Associate Lecturer on our statistics modules.

The Statistical Advisory and Consultancy Services continue, supporting research in other disciplines across the Open University. These are run by Álvaro Faria and Paul Garthwaite. Two web pages explain the services:

https://openuniv.sharepoint.com/sites/units/stem/maths-stats-intranet/Pages/Statistics-Advisory-Service.aspx

https://openuniv.sharepoint.com/sites/units/stem/maths-stats-intranet/Pages/Statistical-Consultancy-Service.aspx

Further information on the Group's research activities is available through our general web pages
https://www.open.ac.uk/stem/mathematics-and-statistics/research/groups/statistics

3. Teaching

Presentation

The Group continued to present six modules of 30 CATS points each with one of them (M140) being presented twice in the year. These, with numbers of students starting the presentations of each module in 2019 given in square brackets, are:

- [M140](#) *Introducing Statistics* (Chairs: Calvert, Bromley) [February 608; October 1096]

- [M248](#) *Analysing Data* (Chairs: Queen, Faria, Hilliam) [457]

- [M249](#) *Practical Modern Statistics* (Chairs: Faria, Garthwaite) [188]

- [M343](#) *Applications of Probability* (Chair: Trendafilov) [287]

- [M346](#) *Linear Statistical Modelling* (Chair: Garthwaite) [187]

- [M347](#) *Mathematical Statistics* (Chair: Elfadaly) [155].

The first level mathematics module, [MU123](#) *Discovering Mathematics,* also contains a little statistical material.

Production

Work on M348 *Applied Statistical Modelling* has continued, with the aim to replace [M346](#) *Linear Statistical Modelling* in October 2022. The new module represents a very considerable update compared with the old, prompted partly by its prominent roles in our new undergraduate degree in Data Science (see below) and a new degree in Economics. Dr Karen Vines is the production Module Team Chair.

Qualifications

Our modules are compulsory components of degrees in [Mathematics and Statistics](#), [Mathematics](#), [Computing & IT and Statistics](#), [Mathematics and its Learning](#), [Economics and Mathematical Sciences](#) and [Data Science](#), as well being specified options in certain other qualifications. The Mathematics and Statistics degree was awarded to 36 students in 2019. Other joint degrees that include a substantial element of statistics were also awarded.

We also award a [Professional Certificate in Practical Statistics](#), for successful study of M140, M248, M249 and M346, and a [Graduate Certificate in Theoretical Statistics and Probability](#), for M343 and M347. The first of these two qualifications was awarded to 2 students in 2019.

The new undergraduate degree in [Data Science](#) has started and there were 468 students registered in 2019. The new degree features all our statistics modules, some compulsory, some optional, as well as others from computing and mathematics. M140, M248 and M348 will also be compulsory modules in a new Economics degree.

4. Research interests

Research in the Statistics Group has been centred for many years around three main themes: *Bayesian Statistics, Medical Statistics* and *Multivariate Statistics*. Clearly, these three general areas cover a huge variety of research projects in Statistics. Recently, our new colleague, Kaustubh Adhikari, has been working on *Statistical Genetics*; the modern topic that has attracted a number of potential PhD candidates to the group. Research also continues on topics not directly

covered by these research themes, of which single case studies, distribution theory, time series forecasting, improved confidence intervals and statistics in the media are but a selection. Ongoing collaborations continue in areas such as medicine, psychology, and earth sciences.

For details, see https://www.open.ac.uk/stem/mathematics-and-statistics/research/groups/statistics and the publications, talks and other items to follow.

5. PhDs awarded

Ross Harris for his thesis
Analysis of serological surveillance data: patterns of blood-borne infection and heterogeneity in people who inject drugs
(supervisors: C.P. Farrington, H.J. Whitaker and D. De Angelis)

6. Publications

6.1 Publications in refereed journals

Adachi, K. & ***Trendafilov, N.T.*** (2019) Some inequalities contrasting principal component and factor analyses solutions, *Japanese Journal of Statistics and Data Science*, **2**, 31-47.

Adhikari, K., Mendoza-Revilla, J., Sohail, A., Fuentes, M., Lampert, J., Chacón-Duque, J.C., Hurtado, H., Villegas, V., Granja, V., Acuña-Alonzo, V., Jaramillo, C., Arias, W., Barquera Lozano, R.B., Everardo, P., Gómez-Valdés, J., Villamil-Ramírez, H., de Cerqueira, C.C.S., Hunemeier, T., Ramallo, V., Schuler-Faccini, L., Salzano, F.M., Gonzalez-José, R., Bortolini, M.-C., Canizales-Quinteros, S., Gallo, C., Poletti, G., Bedoya, G., Rothhammer, F., Tobin, D.J., Fumagalli, M., Balding, D. & Ruiz-Linares, A. (2019) A GWAS in Latin Americans highlights the convergent evolution of lighter skin pigmentation in Eurasia. *Nature Communications*, **10**:358.

Amdeberhan, T., Glasser, M.L., ***Jones, M.C.,*** Moll, V., Posey, R. & Varela, D. (2019) The Cauchy-Schlömilch transformation. *Integral Transforms and Special Functions,* **30,** 940-961.

Bouché, N.F. & ***McConway, K.*** (2019) Melatonin levels and low-frequency magnetic fields in humans and rats: new insights from a Bayesian logistic regression. *Bioelectromagnetics*, **40**, 539-552.

Calvert, C. & ***Hilliam, R.*** (2019) Student feedback to improved retention: using a mixed-methods approach to extend specific feedback to a generalisable concept. *Open Learning: The Journal of Open, Distance and e-Learning*, **34**, 103-107.

Elden, L. & ***Trendafilov, N.T.*** (2019) Semi-sparse PCA, *Psychometrika*, **84**, 164-185.

Fontanella, S., Valentini, P. & **Trendafilov, N.T.** (2019) Simple structure detection through Bayesian exploratory multidimensional IRT models, *Multivariate Behavioral Research*, **54**, 100-112.

Hilliam, R. & Goldrei D. (2019) Creating an online mathematics and statistics community of learners. *New Directions in the Teaching of Physical Sciences*, **14**: 1.

Hilliam, R. & Arrowsmith, G. (2019) Enhancing the student experience with the use of a dedicated subject website. *MSOR Connections*, **17**, 39-45.

Hilliam, R. & Williams, G. (2019) Academic and pastoral teams working in partnership to support distance learning students according to curriculum area. *Higher Education Pedagogies Journal*, **4**, 32–40.

Jones, M.C. (2019) On a characteristic property of distributions related to the Laplace. *South African Statistical Journal,* **53**, 31-34.

Jones, M.C. (2019) Inverting Khintchine's relationship and generating length biased data. *Statistics and Probability Letters,* **154**, article no. 108539.

Jones, M.C. & Marchand, É. (2019) Multivariate discrete distributions via sums and shares. *Journal of Multivariate Analysis,* **171**, 83-93.

Jones, M.C., Marchand, É. & Strawderman, W.E. (2019) On an intriguing distributional identity. *The American Statistician,* **73**, 16-21.

Ruderman, A., Pérez, O., **Adhikari, K.**, Navarro, P., Ramallo, V., Gallo, C., Poletti, G., Bedoya, G., Bortolini, M.-C., Acuña-Alonzo, V., Canizales-Quinteros, S., Rothhammer, F., Ruiz-Linares, A. & González-José, R. (2019) Obesity, genomic ancestry, and socioeconomic variables in Latin American mestizos. *American Journal of Human Biology*, **31**, e23278.

Salibi, A., **Hilliam, R.**, Burke, F.D. & Heras-Palou, C. (2019) Prospective Clinical Trial Comparing Trapezial Denervation with Trapeziectomy for the Surgical Treatment of Arthritis at the Base of the Thumb. *Journal of Surgical Research,* **238**, 144-151.

Schmid, A.B., **Adhikari, K.**, Ramirez, L.-M., Chacón-Duque, J.C., Bedoya, G., Ruiz-Linares, A. & Bennett, D.L. (2019) Genetic components of human pain sensibility: an experimental pain study. *BMJ Open*, **9**: e025530.

Shabuz, Z.R. & **Garthwaite, P.H.** (2019). Contribution of individual variables to the regression sum of squares. *Model Assisted Statistics and Applications*, **14**, 281-296.

Steer, C.D., Macleod, J., Tilling, K., Lim, A.G., Marsden, J., Millar, T., Strang, J., Telfer, M., **Whitaker, H.**, Vickerman, P. & Hickman, M. (2019) The impact of opiate substitution treatment on mortality in the UK: a natural experiment using the Clinical Practice Research Datalink. *Health Services and Delivery Research*, **7**: 3.

Trendafilov, N.T. & Fontanella, S. (2019) Exploratory factor analysis of large data matrices, *Statistical Analysis and Data Mining*, **12**, 5-11.

Vines, K.*,* Hughes, C., Alexander, L., ***Calvert, C.****,* Holmes, H., Kotecki, C., Pearson, V., Colwell, C. & Park, K. (2019) Sonification of numerical data for education. *Open Learning: The Journal of Open, Distance and e-Learning*, **34**, 19-39.

Warren, R.F., Edwards, N.R., Babonneau, F., Bacon, P.M., Dietrich, J-P., Ford, R.W., ***Garthwaite, P.****,* Gerten, D., Goswami, S., Haurie, A., Hiscock, K., Holden, P.B., Hyde, M.R., Joshi, S.R., Kanudia, A., Labriet, M., Leimbach, M., Oyebamiji, O., Osborn, T.J., Pizzelio, B., Popp, A., Price, J., Riley, G., Schapoff, S., Slavin, P., Vielle, M. & Wallace, C. (2019) Producing Policy-relevant Science by Enhancing Robustness and Model Integration for the Assessment of Global Environmental Change. *Environmental Modelling and Software*, **111**, 248-258.

Whitaker, H.J. & ***Ghebremichael-Weldeselassie, Y.*** (2019) Self-controlled case series methodology. *Annual Review of Statistics and Its Application*, **6**, 241-261.

Xiong, Z., Dankova, G., Howe, L.J., Lee, M.K., Hysi, P.G., de Jong, M.A., Zhu, G., ***Adhikari, K.****,* Li, D., Li, Y., Pan, B., Feingold, E., Marazita, M.L., Shaffer, J.R., McAloney, K., Xu, S.H., Jin, L., Wang, S., de Vrij, F.M., Lendemeijer, B., Richmond, S., Zhurov, A., Lewis, S., Sharp, G.C., Paternoster, L., Thompson, H., Gonzalez-Jose, R., Bortolini, M.C., Canizales-Quinteros, S., Gallo, C., Poletti, G., Bedoya, G., Rothhammer, F., Uitterlinden, A.G., Ikram, M.A., Wolvius, E., Kushner, S.A., Nijsten, T.E., Palstra, R.T., Boehringer, S., Medland, S.E., Tang, T., Ruiz-Linares, A., Martin, N.G., Spector, T.D., Stergiakouli, E., Weinberg, S.M., Liu, F. & Kayser, M. (2019) Novel genetic loci affecting facial shape variation in humans. *eLife*, **8**: e49898.

6.2 Book chapters

McConway, K. (2019) Statistical work: the changing occupational landscape. In *Data in Society: Challenging Statistics in an Age of Globalisation*, Eds: J. Evans, S. Ruane & H. Southall, Bristol: Policy Press, pp. 13-22.

6.3 Other publications

Hilliam, R. and Arrowsmith, G. (2019) Behind Closed Doors: Using a dedicated subject site to create a community of learners in mathematics and statistics. *IET Quality Enhancement Report Series*, The Open University, **29**: https://sway.office.com/KfprXQHrAH78OZ1L?ref=Link.

McConway, K. (2019) Cancer and night shift work: what we still do not know and why. *The Lancet Oncology*, **20**, 1051–1052.

McConway, K. (2019) Review of "Bayesian Data Analysis for Animal Scientists: the Basics", *Journal of the Royal Statistical Society Series A*, **182**, 1644.

7. Seminars at The Open University

Over the year we heard the following seminar speakers:

Muhammad Riaz (The Open University) *Physical activity during pregnancy as an aid to smoking cessation and predictors of smoking cessation during pregnancy: Results from a randomised control trial and a systematic review for the predictors*

Chris Dent (University of Edinburgh) *The 9 August blackout event, and open questions in power system reliability analysis*

8. External conference papers and posters given

K. Adhikari

Craniofacial Genetics Symposium, Pittsburgh *Variation of facial morphology in Latin Americans* [invited talk]

Annual Meeting of the British Association of Dermatologists, Liverpool *Exploring the ethnic diversity of our appearance through genetics of dermatological features* [invited talk]

British Society for Investigative Dermatology Annual meeting, Bradford *Genetic heterogeneity of pigmentation variation in Eurasia*

R. Hilliam

Royal *Statistical* Society Conference 2019, Belfast *Creating an online mathematics and statistics learning community* [poster]

K.J. McConway

Centre for Investigative Journalism Summer School, London *101 on science reporting: How to read scientific papers and press releases*

Association of British Science Writers Summer School, London *Why the full story probably isn't in the press release, and how to find out what really is*

National Press Foundation (USA), Paris Accords of Science Communication, Paris *Why the full story probably isn't in the press release, and how to find out what really is*

9. Other external seminars and talks given

Á.E. Faria

IntellTech Intelligent Technologies, Brazil *Bayesian Graphical Models in Multivariate Data Analysis*

K.J. McConway

University of Reading *Presenting statistics in the media and to the public*

Lancaster University (half-day workshop for STOR-I doctoral training centre) *Communicating numbers and uncertainty to non-statisticians: How to get the key points across in the media and elsewhere*

City University, London *How not to be taken in by the numbers*

Harwell Science Campus, UKRI (half-day workshop for UKRI/World Federation of Science Journalists course for African science journalists) *Working with statistics and with scientific papers*

H.J. Whitaker

Drug Safety Research Unit, Southampton *The self-controlled case series method*

10. Editorial roles

M.C. Jones

- Associate Editor: *Journal of the Korean Statistical Society* (to April)
- Associate Editor: *Statistics and Probability Letters*
- Member, Editorial Board: *Statistical Methods in Medical Research*

K.J. McConway

- Statistical Advisor: *Endocrine-Related Cancer*
- Statistical Advisor: *Journal of Endocrinology*
- Statistical Advisor: *Journal of Molecular Endocrinology*

N.T. Trendafilov

- Associate Editor: *Behaviormetrika*
- Associate Editor: *Computational Statistics*
- Associate Editor: *Japanese Journal of Statistics and Data Science*

H.J. Whitaker

- Associate Editor: *Endocrine Connections*

11. Grants awarded

K. Adhikari

- Awarded a Santander Research & Scholarship Award to the tune of £5,000 for *The genetics of specific language impairment in the Aymara people*

- Awarded a Genetics Society Heredity Fieldwork Grant to the tune of £1,500 for *The genetics of Antarctic climatic adaptation in Tierra del Fuego*

12. Other activities

K. Adhikari

- delivered a statistics Masterclass at The Royal Institution

- was quoted in the article 'It is 99.9% Likely Nigel Farage's Brexit Party Hid Impermissible Donations – and PayPal Can Prove It' at the Byline Times newspaper

F. Elfadaly

- is Honorary Lecturer, National Heart and Lung Institute, Imperial College London

C.P. Farrington

- is expert adviser to the Tribunal de Grande Instance de Paris (France) in litigation over the teratogenicity of valproic acid

- gave evidence as expert witness to the Paris Criminal Court in litigation relating to the adverse effects of the drug Mediator

P.H. Garthwaite

- external examiner for MSc in Applied Statistics with specialisation in Actuarial Science at the University of Mauritius

- gave a seminar talk to Ecology and Environmental Science entitled `Eliciting expert opinion in Bayesian statistics'

- examined a PhD at the University of Leeds

R. Hilliam

- is an RSS accreditation assessor

- is a visiting Research Fellow in Medical Statistics at the University of Derby, running statistics and research design training for doctor of professional practice students

- member of Professional Affairs Committee, RSS

- committee member of Teaching Statistics, Special Interest Group, RSS

- is Honorary Associate Professor in Statistics, University of Warwick

- statistical reviewer for BMJ paediatrics

K.J. McConway

- is a member of the Advisory Committee and Trustee of the Science Media Centre, writing invited comments on statistical aspects of scientific papers, and contributing in other ways to the work of the Centre

- committee member, RSS Data Ethics Special Interest Group

- external examiner, MSc in Data Analytics for Government, University College London

- member of the Royal Society/Advisory Council on Mathematics Education Working Group on Assessing Statistics

- contributed to UK Chief Medical Officers' Round Table on social media and children's mental health

- is a reader/assessor of submissions for Queen's Anniversary Prizes for Higher and Further Education

- was interviewed for BBC Radio 4 More or Less podcast, about Scottish alcohol pricing, and for BBC Radio Scotland, on statistically-based diet recommendations about meat eating

N.T. Trendafilov

- elected member of the Board of Directors, European Regional Section of the International Association for Statistical Computing (IASC)

- Had an invited visit and gave a talk on 'Semi-sparse PCA' at the Department of Mathematical and Computing Science, Tokyo Institute of Technology and RIKEN Center for Advanced Intelligence Project (AIP), Japan

S.K. Vines

- gave a talk for the e-Learning community and delivered a couple of training sessions for eSTEeM and for the OU's APD programme

- external examiner for undergraduate statistics modules at Kingston University, London