

The Open University
Statistics Department
2002 Report

1. Membership

Professor P.H. Garthwaite (Head of Department)
Ms L.J. Champion
Professor F. Critchley
Dr A.E. Faria
Dr C.P. Farrington
Professor J.C. Gower
Dr D.A. Henderson
Dr G.E. Iossif
Mr I.W. Martin (from February)
Professor M.C. Jones
Dr P.V. Larsen (to June)
Dr K.J. McConway
Dr C.M. Queen
Mr B.E.T.H. Twala (from October)
Dr S.K. Vines
Ms H.J. Whitaker
Mrs J.E. Williams

Long-term visitor

Dr P.C. Taylor (University of Hertfordshire)

Short-term visitors

Dr S. Al-Awadhi (University of Kuwait, Kuwait)
Dr S. Eguchi (Institute of Statistical Mathematics, Tokyo)
Dr I. Koch (University of Newcastle, Australia)
Dr A. R. Pewsey (Universidad de Extremadura, Spain)
Professor G. Haesbroeck (University of Liege, Belgium)
Professor M. Schyns (University of Namur, Belgium)
Mr S. Torcida (Universidad Nacional del Centro de la Provincia de Buenos Aires, Argentina)

Full-time research students

Mr B. Wright
Mrs L. Sun
Mr B.E.T.H. Twala (to September)
Mr E. Mubwandarikwa (from October)

Part-time research students

Mr G. Blunt (to March)
Ms J. Burrett
Mr A. Garrett
Dr M. King
Mr M. Lunt
Mr A. Pewsey (to December)

Support staff

Ms E. Ostrowski, Departmental Secretary
Mrs T.A. Johns, Senior Secretary

2. Introduction

2002 was another active year for the Department in both research and teaching. February saw the arrival of our new staff tutor, Ian Martin, but we were sorry in June to lose Pia Larsen to the University of Southern Denmark.

In the course of the year, members of the Department published 24 papers in refereed journals, 1 book and 2 other publications. As always, research activities were very much to the fore in the daily life of the Department. We hosted 7 overseas visitors, held 12 seminars during the year, and three internal research mornings. Two of our part-time research students successfully gained their PhDs. Members of the Department presented their work at numerous conferences in seven countries as well as the UK.

Our teaching continued to flourish. Our two new second-level courses, [M248](#) Analysing Data and [BM240](#) Quantitative Methods in Business, both neared completion, ready for presentation in 2003. In conjunction with the Learning and Teaching Support Network and the RSS Statistical Computing Section, we organised a highly successful one-day workshop entitled *Flexible Learning in Statistics*, on various aspects of distance learning.

Further information on the Department is available through our web pages at <http://mcs.open.ac.uk/Statistics>.

3. Teaching

Presentation

The Department presented four courses (30 CATS points each): [MDST242](#) *Statistics in Society*, [M246](#) *Elements of Statistics*, [M343](#) *Applications of Probability* and [M346](#) *Linear*

Statistical Modelling. Altogether the Department's courses attracted a total of more than 2,100 students.

Each of the Faculty of Mathematics and Computing's first level courses, [MU120](#) *Open Mathematics* and [MST121](#) *Using Mathematics*, contains substantial amounts of statistical material (roughly one quarter of each) with which Daniel Henderson and Jane Williams were involved.

Kevin McConway contributed to the presentation of [U205](#) *Health and Disease*.

MST121, M246 and M346 were also presented to students of the Singapore Institute of Management.

Production

Work on two exciting new second level courses was all but completed, on schedule. [M248](#) *Analysing Data* is an introductory statistics course boasting innovative computer-assisted learning tools. The course will replace M246 in 2003. Gillian Iossif is Course Team Chair.

The new course [BM240](#) *Quantitative Methods in Business* is 'owned' by the Mathematics & Computing Faculty, within which the Statistics Department is situated, and forms an important contribution to the Open University's new undergraduate degree in Business Studies. It too is due to start in 2003 and Chris Jones is Course Team Chair.

Ambitious plans for two further new courses were discussed: a second-level course to follow on from M248, and an introductory course aimed at social science students.

Paddy Farrington contributed to the production of [S320](#) *Infectious Disease*, a new third-level Science Faculty course, which will also be presented in 2003.

Other

The undergraduate [Diploma in Statistics](#) is awarded to students who successfully study M246, M343 and M346 (or their predecessors) plus one other course from a list of electives. The latest available figures are that 97 students were awarded the Diploma in 2001/02.

4. PhDs awarded

A PhD was awarded to Gordon Blunt for his thesis *Mining credit card data* (supervisors: D. J. Hand, Imperial College, K. J. McConway and M. C. Jones).

A PhD was also awarded to Arthur Pewsey for his thesis *Analysis of Skew Data on the Line and Circle* (supervisors: T. Lewis, University of East Anglia, and M.C. Jones).

5. Research interests

The Department is home to three Research Groups: *Multivariate Statistics* (Critchley (chair), Faria, Garthwaite, Gower, Jones, Larsen (University of Southern Denmark), Queen, Taylor, Twala, Vines, Constantine (CSIRO, retired), Cook (University of Minnesota), Marriott (National University of Singapore)), *Bayesian Statistics* (Queen (chair), Faria, Farrington, Garthwaite, Henderson, McConway, Vines) and *Medical Statistics* (Vines (chair), Farrington, Garthwaite, Kanaan (American University of Beirut), Whitaker). Research also continues, of course, on topics not covered by these Research Groups. Members of the Department are involved in a variety of research projects, including:

- *Influence analysis* (Critchley)
- *Regression graphics* (Critchley, Cook (University of Minnesota))
- *Multivariate analysis* (Critchley, Garthwaite, Gower, Faria, Larsen (University of Southern Denmark), Vines)
- *Differential geometry in statistics* (Critchley, Larsen (University of Southern Denmark), Marriott (National University of Singapore))
- *Environmental modelling* (Faria)
- *Bayesian statistics* (Faria, Garthwaite, Henderson, McConway, Queen, Vines, Whitaker)
- *Quantifying expert opinion* (Faria, Garthwaite, Queen)
- *Time series forecasting* (Faria, Queen)
- *Graphical models* (Faria, Queen)
- *Branching processes* (Farrington)
- *Goodness of fit of GLMs with sparse data* (Farrington)
- *Interval-censored survival data* (Farrington)

- *Capture-recapture methods* (Farrington, Garthwaite, Whitaker)
- *Statistics of infectious diseases (estimation of epidemic parameters and of vaccine efficacy; evaluation of vaccine safety; epidemic detection systems)* (Farrington, Kanaan (American University of Beirut), Whitaker)
- *Case crossover and case series studies* (Farrington, Vines)
- *Biased regression methods* (Garthwaite)
- *Monte Carlo confidence intervals* (Garthwaite)
- *Meta-analysis* (Garthwaite)
- *Clinical trials* (Garthwaite)
- *Multidimensional scaling* (Gower)
- *Biplots* (Gower)
- *Procrustes analysis* (Gower, Dijksterhuis (Royal Veterinary and Agricultural University, Copenhagen))
- *Bioinformatics* (Henderson)
- *Hidden Markov models* (Henderson)
- *Distribution theory* (Jones)
- *Local dependence* (Jones, Koch (University of Newcastle, Australia))
- *Skew t distributions* (Jones, Larsen (University of Southern Denmark), Faddy (University of Birmingham))
- *Miscellaneous smoothing topics* (Jones, Nielsen (Codan, Copenhagen), Park (Seoul National University), Yu (University of Plymouth))
- *Circular distributions* (Jones, Pewsey (Universidad de Extremadura))
- *Projects in archaeology* (Jones, Williams-Thorpe (Earth Sciences, OU), Potts (Earth Sciences, OU))

- *Spatial statistics* (Kanaan (American University of Beirut), Taylor, Mugglestone (MRC Institute for Environmental Health, Leicester))
- *Statistical methods in plant ecology and evolution* (McConway)
- *Statistical issues in brand management* (McConway, Harris (Management, OU))
- *Learning about concepts of randomness* (McConway, Johnston-Wilder (Mathematics Education, OU), Mason (Mathematics Education, OU), Pratt (University of Warwick))
- *Comparative methods using phylogenies* (McConway, Silvertown (Biological Sciences, OU))
- *Methods for comparing cladogenesis rates in phylogenies* (McConway, Sims (Smithsonian Institution, Washington DC))
- *Ecological and genetic correlates of long-term population trends in plants* (McConway, Silvertown (Biological Sciences, OU), Lupton (Rothamsted Experimental Station), Macnair (University of Exeter))
- *Dynamic models* (Faria, Queen)
- *Classification and regression trees* (Twala, Jones, Taylor)
- *Bayesian analysis of case-control studies* (Vines)
- *Principal components analysis* (Vines)
- *Minimum distance estimation* (Warwick (Cancer Research UK), Jones, Eguchi (Institute of Statistical Mathematics, Tokyo), Critchley)
- *Environmental epidemiology* (Whitaker)

6. Publications

6.1 Book

Garthwaite, P.H., Jolliffe, I.T. & Jones, B. (2002) *Statistical Inference, second edition*, Oxford University Press.

6.2 Publications in refereed academic journals

Andrews, N., Miller, E., Waight, P., Farrington, P., Crowcroft, N., Stowe, J. & Taylor, B. (2001) Does oral polio vaccine cause intussusception in infants? Evidence from a sequence of three self-controlled case series studies in the United Kingdom. *European Journal of Epidemiology*, **17**, 701-706.

Boys, R. J. & Henderson, D. A. (2002) On determining the order of Markov dependence of an observed process governed by a hidden Markov model. *Scientific Programming*, **10**, 241-251.

Crawford, J.R. & Garthwaite, P.H. (2002). Investigation of the single case in neuropsychology: confidence limits on the abnormality of test scores and test score differences. *Neuropsychologia*, **40**, 1196-1208.

Critchley, F., Marriott, P. & Salmon, M. (2002) On preferred point geometry in statistics. *Journal of Statistical Planning and Inference*, **102**, 229 - 245.

Critchley, F. (2002) Discussion of 'An adaptive estimation of dimension reduction space' by Y. Xia et al. *Journal of the Royal Statistical Society, Series B*, **64**, 392.

Farrington C.P. (2002) Interval estimation for Poisson capture-recapture models in epidemiological studies. *Statistics in Medicine*, **21**, 3079-3092.

Galindo Sardinias, M.A., Zambrano Cardenas, A., Coutin Marie, G., Santin Pena, M., Alino Santiago, M., Valcarcel Sanchez, M. & Farrington, C.P. (2001) Lack of association between intussusception and oral polio vaccine in Cuban children. *European Journal of Epidemiology*, **17**, 783-787.

Jolliffe, I.T., Uddin, M. & Vines, S.K. (2002) Simplified EOFs - three alternatives to rotation. *Climate Research*, **20**, 271-279.

Jones, M.C. (2001) Multivariate t and beta distributions associated with the multivariate F distribution. *Metrika*, **54**, 215-231.

Jones, M.C. (2002) A dependent bivariate t distribution with marginals on difference degrees of freedom. *Statistics and Probability Letters*, **56**, 163-170.

Jones, M.C. (2002) Marginal replacement in multivariate densities, with application to skewing spherically symmetric distributions. *Journal of Multivariate Analysis*, **81**, 85-99.

Jones, M.C. (2002) Student's simplest distribution. *The Statistician*, **51**, 41-49.

Jones, M.C. (2002) The complementary beta distribution. *Journal of Statistical Planning and Inference*, **104**, 329-337.

Jones, M.C. (2002) On fractional uniform order statistics. *Statistics and Probability Letters*, **58**, 93-96.

Jones, M.C. (2002) On Khintchine's theorem and its place in random variate generation. *The American Statistician*, **56**, 304-307.

Jones, M.C. & Balakrishnan, N (2002) How are moments and moments of spacings related to distribution functions? *Journal of Statistical Planning and Inference*, **103**, 377-390.

Kanaan M.N. & Farrington C.P. (2002) Estimation of waning vaccine efficacy. *Journal of the American Statistical Association*, **97**, 389-397.

Kudesia G., Partridge S., Farrington C.P. & Soltanpoor N. (2002). Changes in age-related seroprevalence of antibody to varicella-zoster virus: Impact on vaccine strategy. *Journal of Clinical Pathology*, **55**, 154-155.

Park, B.U., Kim, W.C. & Jones, M.C. (2002) On local likelihood density estimation. *Annals of Statistics*, **30**, 1480-1495.

Prescott, G.J. & Garthwaite, P.H. (2002) A simple analysis of misclassified binary data with a validation sub-study. *Biometrics*, **58**, 454-458.

Ramsay, C.R., Wallace, S.A., Garthwaite, P.H., Monk, A., Russell, I.T. & Grant, A.M. (2002) Assessing the learning curve effect in health technologies: Lessons from the non-clinical literature. *International Journal of Technology Assessment in Health Care*, **18**, 1-10.

Silvertown, J., McConway, K. J., Hughes, Z., Biss P., Macnair, M. & Lutman P., (2002) Ecological and genetic correlates of long-term population trends in the Park Grass Experiment. *American Naturalist*, **160**, 409-420.

Thompson, M. O., Vines, S. K., Aquilina, J., Wathen, N. C. & Harrington, K. (2002) Are placental lakes of any clinical significance? *Placenta*, **23**, 685-690.

Zuur, G., Garthwaite, P.H. & Fryer, R.J. (2002) Practical use of MCMC methods: Lessons from a case study. *Biometrical Journal*, **44**, 433-455.

6.3 Refereed conference contributions

Critchley, F. (2002) What is the dimension of a dendrogram? In *Proceedings of the 9th Congress of the French Classification Society*, Toulouse, 35 - 38.

Critchley, F. (2002) Discussion of 'Recent advances in dimension reduction for regression'. *2002 Proceedings of American Statistical Association meeting*, New York: American Statistical Association. [CD-ROM]

7. Seminars and Conferences at the Open University

The Department continued to run its active seminar programme with invited external speakers. During the year we heard:

Nuala Sheehan (Leicester University) *Graphical models in genetics*

Dave Denison (Imperial College) *Bayesian prediction using adaptive ridge estimators*

Shinto Eguchi (Tokyo University) *Robustifying maximum likelihood estimation by psi-divergence*

Philip O'Neill (University of Nottingham) *Bayesian inference for stochastic epidemic models*

Ian Jolliffe (University of Aberdeen) *Something in the air? Multivariate analysis and atmospheric science*

Sarel Steel and Nelmarie Louw (University of Stellenbosch, South Africa) *Variable selection in discriminant analysis: measuring the influence of individual cases*

Gentiane Haesbroeck (University of Liege, Belgium) *Robust estimation of multivariate location and scatter*

Michael Schyns (University of Namur, Belgium) *Smooth optimisation for the MCD estimator*

Anthony Ledford (Man Investment Products) *Some statistical aspects of quantitative futures*

Inge Koch (University of Newcastle, Australia) *Are normal kidneys Gaussian?*

Arthur Pewsey (Universidad de Extremadura, Spain) *Testing for symmetry and modelling asymmetry on the circle*

Simon Godsill (University of Cambridge) *Bayesian harmonic models for musical signal analysis*

In May, the department hosted a workshop on computer-aided and distance learning. This workshop, entitled *Flexible Learning in Statistics*, was organised in conjunction with the Learning and Teaching Support Network and the RSS Statistical Computing Section. The speakers at this workshop were:

Jane Williams (The Open University) *Distance teaching of undergraduate statistics at the Open University*

Barbara Smith (University of Southampton) *Tutorial tennis*

Jane Bruce & Steve Bond (London School of Hygiene and Tropical Medicine) *Using learning technology to deliver a distance-learning based MSc in epidemiology*

Clive Anderson & Nick Fieller (University of Sheffield) *A distance learning version of the Sheffield Statistics MSc*

Andrew Bertie (The Open University) *JAVA applications for teaching statistics*

Mike Talbot (BioSS) *Promoting new statistical methods using the Web - the SMART initiative*

Adrian Bowman (University of Glasgow) *The next steps?*

We also ran three internal research sessions during the year. Speakers were: Catriona Queen, Daniel Henderson, Alvaro Faria, Paul Taylor, Linjuan Sun, Bheki Twala, Heather Whitaker, Ben Wright, Karen Vines, Paul Garthwaite and Frank Critchley.

8. Conference papers presented

F. Critchley

German Classification Society Conference, Mannheim. *On ziggurats and dendrograms*. (Invited speaker.)

C.P. Farrington

23rd Annual Conference of the International Society for Clinical Biostatistics. Dijon *Branching process models for the surveillance of infections under conditions of high vaccine coverage.* (Invited speaker.)

Annual Conference of the Société Française de Statistique, Brussels *Estimation des paramètres épidémiologiques de maladies infectieuses à partir de données sérologiques.* (Invited speaker.)

First International Conference of Vaccine Safety, Rome. *Control without separate Controls: Evaluation of vaccine safety using only cases.* (Invited speaker.)

P.H. Garthwaite

Scottish and Northumbrian Academic Statisticians' Meeting, Edinburgh. *Quantifying expert opinion as a probability distribution.*

CHEBS Conference on Elicitation, Sheffield. *Quantifying opinion about a logistic regression using interactive graphics.*

The Royal Statistical Society conference (RSS 2002), Plymouth. *Experts' reactions to surprise data: How do we model it?*

J.C. Gower

8th Conference of the International Federation of Classification Societies, Krakow, Poland. *The geometry of triadic distances.*

8th Conference of the International Federation of Classification Societies, Krakow, Poland. *A comparison of the multidimensional scaling of triadic and dyadic distances.*

XXIst International Biometric Conference, Freiburg, Germany. *Model terms.*

International Conference on Statistics and Methodology, Ljublijana, Slovenia. *A unified approach to biplots.* (Invited speaker.)

M.C. Jones

38th Gregynog Statistical Conference, University of Wales: *The skew t and other families of order statistic distributions* (Invited speaker.)

Mathematical Methods of Reliability Conference (MMR 2002), Trondheim, Norway: *The skew t and other families of order statistic distributions* (Invited speaker.)

S.K.Vines

German Classification Society Conference, Mannheim. *Integer based principal components*. (Invited speaker.)

H.J. Whitaker

23rd Annual Conference of the International Society for Clinical Biostatistics: *The impact of correcting for time effects on estimation of the basic reproduction number of infectious diseases*.

B.J. Wright

Research Students Conference 2002, Warwick University: *Experiences Modelling a Traffic Network*.

9. Other seminars and talks given

F. Critchley

RTH Aachen: *Diagnostics meets Robustness at the Influence Curve*.

C.P. Farrington

Institute of Child Health: *Evaluation of vaccine safety: the self-controlled case series method*.

University of Nottingham: *Branching process models for the surveillance of infections under conditions of high vaccine coverage*.

University of Nottingham, Medical School: *Evaluation of vaccine safety: the self-controlled case series method*.

Glaxo-Smith-Kline Biologicals, Rixensart, Belgium: *Evaluation of vaccine safety: the self-controlled case series method*.

University College London: *Branching process models for the surveillance of infections under conditions of high vaccine coverage*.

P.H. Garthwaite

University of Durham: *Bayesian analysis of misclassified binary data from case-control studies with a validation sub-study*.

Cranfield University: *Quantifying expert opinion as a probability distribution*.

University of Lancaster: *Quantifying opinion about a logistic regression using interactive graphics*.

S.K. Vines

University of Lancaster: *Multivariate statistics made simple*.

10. Editorships

F. Critchley

- Editorial board member: *Journal de la Société Française de Statistique*
- Editorial board member: *Studies in Classification, Data Analysis, and Knowledge Acquisition* (book series, Springer-Verlag)

C.P. Farrington

- Associate Editor: *Journal of the Royal Statistical Society Series B*
- Editorial board member: *Statistics in Medicine*
- Associate editor: *Lifetime Data Analysis*

P.H.Garthwaite

- Associate editor: *Journal of the Royal Statistical Society, Series B*

J.C. Gower

- Associate editor: *Journal of Classification*
- Associate editor: *The Mathematical Scientist*

M.C. Jones

- Associate editor: *Communication in Statistics*
- Associate editor: *Journal of Nonparametric Statistics*
- Associate editor: *Statistica Sinica*

11. Grants awarded

F. Critchley

- National Science Foundation (USA), \$1900, second level travel award from R D Cook for research visit to him at the University of Minnesota. TOPIC: Regression Graphics.

- German Science Foundation, EUR 500, travel grant to give invited paper at University of Mannheim. TOPIC: Multivariate Analysis.

M.C. Jones

- Joint holder, with Earth Sciences Department at OU, of grant for £21,159 from the Leverhulme Trust for 'Provenancing of Neolithic bluestone axes and implications for Stonehenge'.

C.M. Queen

- £500 from the Royal Society towards conference fees and travel expenses for the Seventh International Conference on Bayesian Statistics, Tenerife.

S.K.Vines

- German Science Foundation, EUR 500, travel grant to give invited paper at University of Mannheim. TOPIC: Multivariate Analysis.

12. Other activities

F. Critchley

- is a selector, Civil Service Selection Board for fast stream statisticians.
- is external examiner for the undergraduate and masters statistics programme at the University of Aberdeen.
- examined a PhD for the Université Paul Sabatier, Toulouse.
- conducted joint research with P.K. Marriott at the National University of Singapore and R.D. Cook at the University of Minnesota.
- completed supervision of PhD student at University of Birmingham.

C.P. Farrington

- continued as a member of the WHO Global Advisory Committee on Vaccine Safety.

- continued as a member of the DoH's Spongiform Encephalopathy Advisory Committee (SEAC) Epidemiology Subgroup.
- examined a PhD for Monash University, Australia.
- is an honorary member of the Faculty of Public Health Medicine and an honorary lecturer at the Department of Epidemiology and Population Sciences, London School of Hygiene and Tropical Medicine, lecturing on vaccine efficacy evaluation and analysis of sero-epidemiological data.
- undertook consultancy work for Glaxo-Smith-Kline Biologicals on the estimation of vaccine efficacy.
- organised the session on Infectious Diseases at the 23rd ISCB meeting in Dijon in September.

P.H. Garthwaite

- is external examiner for undergraduate mathematics courses at the University of Durham.
- examined a PhD for University College, London.
- was a sponsored visitor for a CHEBS Focus Fortnight on Elicitation, in Sheffield.

J.C. Gower

- is Honorary Secretary of the Sir Ronald Aylmer Fisher Memorial Committee of Great Britain.
- is a member of the Council of the International Federation of Classification Societies.
- is a Foreign Member of the Advisory Board of IOPS (Interuniversitaire Onderzoekschool voor Psychometrie en Sociometrie).
- was Referent (external examiner) for a PhD in Leiden (The Netherlands), external examiner for a PhD from Stellenbosch (South Africa) and internal examiner for Arthur Pewsey.

M.C. Jones

- attained *World Ranking of 23* according to the Institute for Scientific Information's 2002 study of citations of mathematics and statistics papers between 1991 and 2001.

- is external examiner for undergraduate statistics courses for Imperial College of Science and Technology, London.
- is a member of the Institute of Mathematical Statistics Committee on Fellows.
- refereed 24 papers.
- organised invited session on *Distribution Theory in the 21st Century* at RSS2002, Plymouth.

K.J. McConway

- External reviewer of management science, statistics and operations research degree courses, University of Hertfordshire.

C.M. Queen

- examined PhDs, once for the University of Warwick and once for the University of Newcastle.

S.K. Vines

- is secretary of the General Applications Section Committee.

H.J. Whitaker

- was awarded her PhD by the University of London.

J.E. Williams

- continued in her role as Faculty of Mathematics and Computing Sub-Dean (Courses in Presentation).