Memories of Mervyn Stone

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Mervyn and Solveig Stone in 1982
Photo courtesy of Helen Bridgeman

With much sadness we record the death, on 19 September 2020, of our friend and colleague Mervyn Stone. He made major contributions to our discipline and is an important part of the history of our department. He joined UCL in 1968 and remained for the rest of his working life. After retiring in the 1990s he continued his activities as an emeritus professor.

Below I have reproduced the obituary of Mervyn that I wrote for the Royal Statistical Society,[1] and I have added some further memories and a list of his publications. Among other things they are a reminder of how active he was in his writing and thinking.

[1] *J. R. Stat. Soc. Series A,* **184,** 1, 396–398. doi: 10.1111/rssa 126.38, Open Access.

Obituary published by the Royal Statistical Society

Mervyn Stone died on 19 September 2020, aged 87. He was a brilliant mathematician, professor of probability and statistics, and thinker.

He was elected to the Royal Statistical Society in 1955; served on the Series B Editorial Panel (1966–1969) and as Editor of Series B (1975–1977); on the Research Section Committee (1974–1977), the Conference Committee (1977–1978) and as a Member of Council (1976–1980). He was awarded the Guy Medal in Silver in 1980 for his contributions to statistical theory. His theoretical interests are listed in his CV as: criticism of formal Bayesian methods, design of experiments, large deviations, cross-validation, and coordinate-free multivariate analysis. His applied work included applications in psychology, pharmacology, stem cell modelling, water privatisation, and the influence of darkness on road casualties. He was passionate about statistics and its use to improve society. After he retired he undertook a number of projects related to the use, and misuse, of statistics in public policy, including funding of the National Health Service (NHS), performance of the police service, traffic safety measures and immigration. He made lasting contributions to statistics and to our society.

Mervyn Stone was born in Barbon, Westmorland, on 27 September 1932. He was educated at Barbon and Middleton elementary schools and then at Lancaster Royal Grammar School. From there he won a scholarship to Cambridge University to read Mathematics, where his

lecturers included L.A. Pars, R.A. Lyttleton, Paul Dirac, Sir Harold Jeffreys, Bertha Jeffreys, Frank Anscombe, Fred Hoyle and Herman Bondi. He graduated with a BA in Mathematics (1st class) in 1954 but was disappointed not to gain a DSIR research studentship, possibly because his Tripos III work suffered from much time and interest spent on extra-curricular activities. Instead he was "generously admitted at the last minute by Stats Lab Director John Wishart" to the Cambridge Diploma in Mathematical Statistics, where, in his words,

> "the nine months were spent, under eventually renowned teachers, acquiring theory and the ability to spend hours pulling levers on noisy Brunsvigas or turning handles on equally noisy Facits. I ended up with a 'distinction' grade largely (according to external examiner David Finney) on the basis of my practical work with data from the Applied Psychology Research Unit in Chaucer Road (care of Violet Cane, about to move to be professor at Manchester)."

The "eventually renowned teachers" included Henry Daniels and Dennis Lindley. In that year he also met Solveig, his wife-to-be.

After his Diploma, Mervyn accepted a job at the MRC Applied Psychology Research Unit in Cambridge where he obtained permission to work part time for a PhD, in which he chose to study the application of Shannon's information measure to the design and comparison of regression experiments. He completed his PhD in Statistics in 1958 and then took up a one year post as a Fulbright research associate at Princeton before being appointed to a lectureship in 1961 in Dennis Lindley's new statistics department at the University College of Wales at Aberystwyth. He spent the year 1965-66 as a visiting professor at the University of Wisconsin, then took up a Readership at the University of Durham, before moving to University College London in 1968, first as a Reader then as Professor of Probability and Statistics, and later, Head of Department. Dennis Lindley had recently been appointed to the Chair in Statistics at UCL and had a vision of promoting the Bayesian philosophy. Dennis was delighted to appoint Mervyn, who, he told us, was a Bayesian. But Mervyn was far too free-thinking to be limited by that epithet and in fact very little of Mervyn's work in statistical theory was directed towards developing formal Bayesian methods.

There was a special Biometric Society meeting in London in the early 1970s where David Cox and Dennis Lindley were called upon to argue the cases respectively for and against the use of randomisation in statistical inference and design. Mervyn proposed the vote of thanks to the speakers and in an eloquent contribution said that he wholeheartedly agreed with Dennis's argument but with David's conclusion.

MERVYN's research papers cover a wide range of mathematical methods and theoretical ideas and are notable for their originality at many levels, as well as a "minimalist" style of writing. His publications also include a variety of scientific applications, authoritative studies on Florence Nightingale and Adolphe Quetelet, papers on the use of statistics in public finance and a book on *Coordinate-free Multivariable Analysis*, sub-titled *An illustrated geometric progression from Halmos to Gauss and Bayes* (Clarendon Press, 1986). In addition to his notable discussion paper *Strong inconsistency from uniform priors* (JASA, 1976), which includes his famous Flatland example introducing what is now known as Stone's paradox, he frequently presented papers for discussion at Royal Statistical Society meetings. Among these, *Marginalization paradoxes in Bayesian and structural inference* (with Philip Dawid and James Zidek, JRSS B, 1973) was highly influential (causing Dennis Lindley to retract his own ideas on improper priors) and *Cross-validatory choice and assessment of statistical predictions* (JRSS B, 1974) spawned what is now a far-reaching methodology.

MERVYN was a dedicated teacher who strove to find new ways to impart understanding. As one example, in his "Pebble Sampling Experiment" students were asked to estimate the total weight of 100 pebbles by sampling and weighing 10 of them, using a variety of sampling schemes. They were stones of different shapes and sizes that he had collected from a river bed in Wales. This simple exercise turned out to be remarkably effective in teaching concepts of probability, estimation, sampling distributions, bias and variance, as well as the sampling schemes themselves, and it is still used today.

AFTER RETIRING, Mervyn became more active in local politics, contributing to the North-West London NHS user group Community Voice and supporting his wife Solveig who was a Councillor in the London Borough of Hillingdon. His natural stance on many issues was anti-establishment, a position that perhaps sometimes lost him influence, but it was always rooted in cogent argument. He wrote articles on the use of statistics in several areas of public concern. Much of this work involved reading and comprehending voluminous (and often badly explained) technical reports, which he did with no remuneration and little support, motivated only by a desire improve society and to expose nonsense. He was particularly scathing about the misuse of statistics in NHS funding formulae and the unwarranted claims made about them. At the end of a paper that he was working on when he died, he wrote of himself:

> "One of Mervyn's few concessions to everyday social grace was the straight face he tried to keep about econometrics' thoughtless use of additive linear modelling of the real world in its glorious diversity,"

Aspects of these projects were brought together in a thoughtful booklet *Failing to Figure — Whitehall's costly neglect of statistical reasoning* (Civitas, 2009), which concluded with six suggestions for improving policy-making.

He was devastated by the sudden death in 1994 of his son Richard, aged 32 with a young family and a promising career in statistics, caused by a rare genetic condition, and again in 2008 by the untimely death from cancer of his wife Solveig. He is survived by his daughter Helen and five grand children.

Further memories

As noted earlier, Mervyn joined our department in 1968 when Dennis Lindley was its Head. Then it was the Department of Statistics, but shortly afterwards it became the Joint Department of Statistics and Computer Science. This happened when the London Institute of Computer Science was closed and its staff were transferred to various colleges, including UCL. Mervyn became Head of the joint department in 1979 and a few years later we split into separate departments of Computer Science and Statistical Science.

Department of Statistical Science

The name Statistical Science was Mervyn's choice, and was supported by most staff at that time.[2] We often discussed the name of our discipline, which was generally regarded as being unsatisfactory, and I think such discussion still continues. In any case this name worked and has been copied by other institutions.

Among Mervyn's innovations were Journal Club and the SCORE degree. Journal Club took place at 4pm each Monday over a mug of tea. The idea was that one of us, or a visitor if we had one, would introduce a topic, perhaps for 15–20 minutes, which we then discussed. It was not supposed to be a polished piece of research but rather a new idea that might have come from the journals, or a discussion of a new method or concept. The sessions varied in quality of course and were often helpful to the speakers in clarifying their own ideas.[3]

SCORE was an acronym for Statistics, Computing, Operational Research and Economics. This was a new BSc course designed to attract students by offering a variety of related subjects — which it did, and it also attracted more students to study statistics.[4] This necessitated a revamping of many of our course units so that they

[2] Cedric Smith, who was the professor and head of Human Genetics, and who taught a popular course to our students, was strongly in favour of Statistical Science. I approved of the idea, but I was ambivalent because it is hard to pronounce clearly on the telephone.

[3] There was one occasion when a visitor from the USA had only progressed a few minutes into his talk when animated discussion broke out and the rest of his talk was lost.

[4] At that time the image of statistics was perceived to be less exciting to school leavers than the other subjects.

were accessible to students taking different degrees. Numbers of students were expanding but numbers of lecturers were not.

As noted earlier, Mervyn was a dedicated teacher who tried to find new methods to impart theory and an understanding of its practical relevance.

He invented a derivation of the formula for the variance of the sum of n observations drawn at random without replacement from a population of size N. His argument noted that, because of the symmetries inherent in random sampling, this variance must be of the form $An + Bn^2$, where A and B are constants that are easily determined by elementary algebra from the special cases $n = 1$ and $n = N$.[5] A more streamlined argument noted that the variance must be symmetric in n and $N - n$, and hence of the form $Cn(N - n)$, because the observations *not* sampled were themselves a simple random sample of size $N - n$, and the variance of their sum must be the same as that of the original n.[6] An article developing this argument was published in *Biometrika* in 1974, but its great contribution was to impart to students a deeper understanding of the concept of sampling variance.

In his course on Linear Methods he once set a test that consisted of the single question: what are $z_1, z_2, \ldots, z_{n-p}$? The students were expected to identify the context as well as the meanings of the different symbols. He explained later that he had set this question in an attempt to get inside the students' heads after a particularly difficult tutorial in which one of them had finally asked in frustration "What **are** $z_1, z_2, \ldots, z_{n-p}$?".

Mervyn had an aversion to stating the obvious — a style that certainly shortened his contributions, though perhaps sometimes at the expense of clarity. In the early 1970s there was a proposal to allow staff car parking in the UCL front quadrangle, which caused much heated discussion in the staff newsletter at the time,[7] and to which Mervyn wrote a passionate contribution. A colleague commented that Mervyn clearly felt strongly about the issue but he wasn't quite sure whether Mervyn was for or against the proposal.

The Stone Society

Until it moved to Torrington Place in 2000 our department was located on Gower Street, in the North West building of the main block. Karl Pearson and his son Egon were successive heads of the department in that building, and in the late 1970s or early 1980s it was named the Pearson Building, though this name has now been

[5] For $n = 1$ we get $A + B = \sigma^2$, the population variance, and for $n = N$ we get $AN + BN^2 = 0$. Hence A and B can be found.

[6] Putting $n = 1$ gives $C(N - 1) = \sigma^2$, so the required variance is

$$\sigma^2 n(N - n)/(N - 1)\,.$$

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[7] There was a regular UCL staff paper newsletter then.

dropped because of Karl's association with eugenics. After Egon retired he had an office in the Mathematics Department and in the 1970s he regularly visited our department.

There was also a departmental student society called the Pearson Society, dating at least from the 1950s and possibly earlier, that organised various academic and social activities.[8] When the joint department split in 1985, the Pearson Society continued to exist in Computer Science and a new student society — the Stone Society — was formed in Statistical Science. Mervyn was something of a cult figure among the students and they made him its patron.

[8] Its past presidents included David Bartholemew, Peter Moore, David Hill and no doubt others who later became eminent statisticians.

Discussion papers

THE PAPERS that Mervyn presented for discussion, mostly at Royal Statistical Society meetings, show many aspects of his originality and style. They include:

- Marginalization paradoxes in Bayesian and structural inference (with Philip Dawid and James Zidek); JRSS B, 1973.[9]
- Cross-validatory choice and assessment of statistical predictions; JRSS B, 1974.[10]
- Strong inconsistency from uniform priors; JASA, 1976.[11]
- Continuum regression: cross-validated sequentially constructed prediction embracing ordinary least squares, partial least squares and principal components regression (with Rodney Brooks); JRSS B, 1990.[12]
- Influence of light-level on the incidence of road casualties and the predicted effect of changing 'summertime' (with Jeremy Broughton and Martin Hazelton), JRSS A, 1998.[13]
- How not to measure the efficiency of public services (and how one might); JRSS A, 2008.
- The abuse of regression in the National Health Service allocation formulae: response to the Department of Health's 2007 'resource allocation research paper' (with Jane Galbraith), JRSS A, 2011.

[9] This was highly influential, among other things prompting Dennis Lindley to retract his views on the innocuousness of improper priors.

[10] Perhaps embodying Mervyn's most influential work. Cross-validation is of course now a widely-used and far-reaching methodology.

[11] Including his famous Flatland example and what is now known as Stone's paradox.

[12] A novel approach to predicting y from n observations on p variables, where p is large and n relatively small.

[13] Notable for its use as "control" observations the inferred absence of accidents at each accident site a week before and after each accident. It showed that increased daylight in the evening resulted in a much larger reduction in accidents than increased daylight in the morning.

He had a natural instinct to criticise an argument, including his own,[14] and a gift for finding flaws in complicated methods and counter-examples to reveal them. I think his deep understanding of the geometry of least squares, among other things, enabled him to see things that others could not. Following the publication of his booklet *Failing to Figure* an interview with him appeared in *Significance*.[15] Below is a full list of his publications.

[14] I remember at least one presentation where he spent nearly all of his allotted time pointing out the weaknesses in his method and very little time explaining what it actually was.

[15] *Significance* March 2010, volume 10, issue 1, pages 31–33.

Mervyn Stone's publications

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