Speech Proposing the Toast to John Hammersley

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David Kendall

John Michael Hammersley, Fellow of the Royal Society, Doctor of Science of both Cambridge and Oxford, sometime Major in the Royal Regiment of Artillery, Rouse Ball Lecturer of the University of Cambridge, von Neumann Medallist of the University of Brussels, and Gold Medallist of the Institute of Mathematics and its Applications, has of course many other distinctions too numerous to list here.

My hope is that in this brief appreciation of all that I have seen him achieve during the last forty years, I can catch the spirit of his very personal contributions to mathematics and statistics on the world scene, and his equally personal contributions to the quality of mathematical and statistical life in this country. Both have been profound.

First, contributions to mathematics and statistics. I have not had time to make the bibliographical studies such a survey demands, and very probably I shall list things out of their true order, but the first startling JMH paper I remember was about some anomalies of the solutions to iterative equations of the form $x_{n+1} = f(x_n)$, which perhaps now, if we were to look at them again, might seem a partial anticipation of the current studies of chaotic deterministic systems.

Next I remember the excitement with which I first read his Royal Statistical Society paper on the estimation of integer-valued parameters, and the superefficiency that is characteristic of this situation. That piece of work was important for me in forcing me to take an interest in one of his examples: Alexander Thom's record of his careful measurements of the diameters of neolithic stone circles, leading to a claim that a unit of length had been employed in their construction. I was one of the scoffers then — and of course there were many — but eventually I came to suspend disbelief, and at last (with Simon Broadbent and Wilfrid Kendall) to take part in a statistical examination that went a long way to confirm this startling proposal. Alexander Thom is now much respected by archaeologists *because he persuaded them to think of neolithic man as a colleague rather than a savage*. One is reminded of Hardy's — or was it Littlewood's — remark, that the ancient Greek mathematicians were not scholarship candidates, but fellows of another college. Without John's intervention that revolution in archaeological thinking might never have occurred.

Another highly original contribution was his and Simon Broadbent's development of percolation theory. Gradually this has progressed from industrial concern about coal utilisation to a central problem in both probability theory and solid state physics. Closely associated with this is the work on self-avoiding random walks which again has profound implications for physics and chemistry. Each of these problems was a natural field for the application of diverse Monte Carlo techniques with which Hammersley's name will always be associated.

As John will possibly tell us himself, in the reminiscences and perhaps refutations that these random remarks will I hope spark off, 'Monte Carlo' was not exactly the phrase with which to woo the Oxford Mathematical Institute of the nineteen forties and fifties. Probability was not taught and was scarcely known in Oxford, though there were splendid exceptions like E.A. Milne who employed its techniques with great ingenuity.

One of John's special gifts was however much appreciated there. This was his skill in concocting the all but insoluble scholarship questions that were then in vogue (and which passed the test of acceptance only if they baffled one's fellow examiners).

With John's later work I am not so closely in touch, but one ought to mention a combined attack on theories about the origin of comets by Ray Lyttleton, John Hammersley and myself. John produced a computer solution to the basic integral equation, I showed that this was the minimal solution, and to this day we don't know whether it is the only solution, or not! Nor are we likely to find out, for astronomers have an irritating way of scrapping problems every year or so and moving on to some quite different topic.

One matter which brought many of us close together was the urgent need to do something about the teaching of mathematics in schools, where "A and B were still competing with C (who always lost) in various sorts of race, and honest grocers mixed their teas and made a reasonable profit". (I quote a review of about that time by a fellow Queen's man, Horace Elam, who taught mathematics with great skill and dedication at Magdalen College School.) With Jack Howlett and Harry Reuter we tried in various ways to brighten things up.

I recall going with Jack Howlett to a school in the Cotswolds to talk severally about queues and computers to an audience of children presided over by a Headmaster who concluded the formal proceedings with the remark: "Well, you won't have understood any of that, so I think we should dispense with questions and let you run off to your teas". However, as soon as the Headmaster's back was turned, there was an eager throng of boys and girls wanting to discuss what we had been saying.

Experiences like this convinced John that some massive effort should be made to bring before school teachers a review of the exciting and really quite simple — but *new* — kinds of mathematics that could easily and usefully be added to the curriculum, whether they were reflected in the examinations or not. This led to an Oxford Conference inspired by John, in which many of us participated. I see it as one of the first seeds that was to generate the SMP, the UK Mathematics Olympiad, and the Institute for Mathematics and its Applications.

Over many years John had a very happy summer association with Jerzy Neyman's marvellous group in the Statistical Laboratory in Berkeley, California. Neyman was to become a close personal friend and indeed father figure for us both.

The other great figure of the day was R.A. Fisher. I remember with awe how John once dared publicly to ask Fisher whether fiducial probability satisfied Kolmogorov's axioms.

Looking back over all this I see a pattern of trying to answer questions that *demand* answers, rather than seeking questions to which known answers can be taken down off the shelf.

Two generations of statisticians and probabilists in this country have been greatly affected by what one might call John's 'socratic' role. I know that it prodded me into taking unexpected and surprisingly fruitful directions on many occasions, and I am sure that others will echo that acknowledgement. We all owe John a great deal — including of course the numerous heated discussions in which we did *not* reach agreement. I am delighted to see that John will stay in Oxford after his retirement, where I am sure he will continue to provoke and inspire us.

I am immensely proud to be asked to propose his health, which I now do: let us drink it with musical honours: **JOHN HAMMERSLEY!**

37 Barrow Road
Cambridge CB2 2AR.