

**Peter Berners Fellgett
FRS, FIEE**

This obituary was produced by
Dr Richard Mitchell, Senior Lecturer in Cybernetics, University of Reading
(with comments from Dr Alex Andrew)

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Peter Fellgett - Professor of CyberneticsPeter Berners Fellgett, emeritus Professor of Cybernetics at the University of Reading, died peacefully in his sleep in November 2008 at his home in Cornwall. PBF, or $\pi\Phi$ as he liked to be known, was the first Professor of Cybernetics in the UK, having been appointed in 1964 into what became the Department of Applied Physical Sciences, which later became the Departments of Cybernetics and Engineering.

He was responsible for gathering a group of academics including Peter Atkinson, Paddy Walker, Alex Andrew, George Whitfield, John Seeley, Mike Usher, Arthur Allen, John Foley-Fisher and George Reynolds, being specialists in control, computing, artificial intelligence, instrumentation, electronics and aspects of human biology. They developed the degrees which were eventually called Cybernetics & Control Engineering, Cybernetic Science, Computer Science and Cybernetics and Psychology and Cybernetics - whose cybernetic content was consistent with Wiener's definition: control and communication in the animal and the machine. They were responsible for numerous research projects and, unusually at the time, for collaboration with industry. When he retired in 1987, these degrees and the Department still existed, despite the fact that the subject of cybernetics had become unfashionable. Since then, Cybernetics at Reading has been able to flourish, thanks to a new set of academics including his successor Kevin Warwick, but building on what Peter and others had established.



Cartoon by Dr Richard Mitchell

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PBF is perhaps most famous for the 'Fellgett Advantage', which arose from work for his PhD at the University of Cambridge. This technique in infrared spectroscopy involves the use of an interferometer which produces interference patterns for all wavelengths of light entering the device at the same time, as opposed to a spectrometer which only sees one wavelength at a time. This allows infrared spectra to be produced with resolution similar to that of optical-range spectra, where previously they had been vague wavy lines. This work, in particular, led to him being made an FRS in 1986.

From Cambridge he moved to the Royal Observatory in Edinburgh continuing his interests in instrument science. He commented that 'the basic idea of "instrument physics" is to understand in a full scientific sense why an instrument has a particular performance', he argued:

In most cases, a scientific instrument is devised in the first place as a means to the end of making some physical phenomenon or quantity susceptible to observation or measurement, and once it has served this purpose nobody thinks very deeply about it again. Consequently, it is often tacitly accepted that 'in theory' an instrument should have a particular performance, but 'in practice' it does not. This however is not good science, which demands that if theory and practice differ, then one or both must be improved. Had Adams and Le Verrier been content to say that 'in theory' Uranus moves in a particular orbit but 'in practice' in a slightly different one, the planet Neptune would never have been discovered.

This approach made him a very suitable candidate when, largely due to Professor Robert Ditchburn, the University of Reading, showing far-sighted initiative, created the Department of Applied Physical Sciences with two chairs, one in Engineering Science, the other in Cybernetics. Thus in 1964, Peter Fellgett became Professor of Cybernetics and Instrument Physics. There his interest in Instrument Science continued and he was responsible for encouraging Mike Usher to develop the force feedback seismometer, work which continues even today at Guralp Systems. Later he supervised Dave Keating in the development of the optical force-feedback microphone.

This latter work also related to his great interest in audio and another area for which he was renowned, namely Ambisonics. One motivation for this was to introduce more 'animal' aspects into the cybernetics degrees: sound localisation in humans is a non trivial problem. PBF, with Michael Gerzon, Peter Craven and others, was responsible for this major development in sound recording and reproduction, in which the use of four channels allowed 'surround sound' with unprecedented realism. The system was demonstrated, for instance, at a local IERE lecture in Reading. The audience heard sounds moving realistically around and then at one point an ambulance went passed with sirens going - those in the room were unsure whether this was in fact an ambulance going passed or another part of the demonstration.

He had a shared interest in instrumentation with his friend James Lovelock, of Gaia hypothesis fame. This led to the appointment of Lovelock as Visiting Professor of Cybernetics, to the mutual benefit of both Lovelock and Cybernetics. For instance, several members of the Department were involved in a project headed by Lovelock to study the lives of the dinosaurs, who survived on earth for very much longer than humans have, so far. An aspect of this that received much publicity was the construction and test-flying by George Whitfield of scale models of pterodactyls.

Another valuable appointment as Visiting Professor was of Philip Woodward of the Royal Radar Establishment. His early work on information theory applied to radar was fundamental to PBF's work in Edinburgh on automatic cataloguing of stars from necessarily imperfect images, and to instrumentation in general. Significantly, Woodward was head of a small group that wrote the world's first compiler for a version of Algol 68. From the start, Cybernetics students were taught Algol programming, necessarily Algol 60 at first, but Algol 68 when it became available. PBF was emphatic about the shortcomings of the language known as Basic as an introduction to

programming, commenting (in a version bowdlerised by Stan Kelly-Bootle) "Basic is manure. Extended Basic is manure with icing.". He also asked rhetorically "Is Computer Science?".

Retirement did not stop him commenting and advising. He continued to correspond with newspapers. He was referred to as the Royal Astronomical Society's long-established curmudgeon-in-chief. He wrote to Kevin Warwick on how to run the Cybernetics Department - should I be flattered that he did not so write to me when I was Head of Department? He urged that Britain's wiring regulations be overhauled having stumbled across what he believed to be a dangerous anomaly in the rules after narrowly avoiding a shock from the casing of his washing machine. In 2003, he stated that "It is a standing vice of geophysics not to argue against unpalatable facts and arguments but simply to ignore them and carry on as if they did not exist." He also provided a generic recipe for cooking: "Place the dry ingredients into a clean bowl. Add liquids as appropriate. Stir thoroughly and cook until done."

Although it is now 21 years since he retired, he still has an influence on the courses we offer. He stressed the importance of having high loop gain in feedback systems - I still use his phrase that the loop gain should be 'negligibly large'. We still teach a Principles of Feedback course where we cover Bode's fundamental work on the maximum attainable feedback. The Gaia hypothesis is also included - in a third year module. Instrumentation, and his approach, is still recognised in the other modules. In addition, we maintain the 'Fellgett Room' in his memory - he was pleased to receive such recognition, commenting that the only other room named after him was an extra toilet he had argued for in Edinburgh.

PBF called himself a cybernetist, as opposed to cyberneticist or cybernetician - primarily (as he told us in a revision tutorial in my final year) because it was the shortest. He described cybernetics as anything in which he was interested! He had very strong views on the use of English language: in the degree titled Cybernetics & Control Engineering, the ampersand is used rather than 'and', as the latter would indicate that the degree comprises jointly the two subjects of Cybernetics and of Control Engineering. He would certainly have had something to say if we had told him that the University Student Record system seems unable to cope with '&' in a degree title!

I remember him as a gifted academic, very supportive of students, always able to pick out the key aspects of a student project. I am for ever grateful for what he and colleagues taught me in Cybernetics, for his advice when I was writing my thesis and that he appointed me lecturer. I give below one of my cartoons of him, in characteristic pose - with barefeet!

**Dr Richard Mitchell, Senior Lecturer in Cybernetics, University of Reading
(with comments from Dr Alex Andrew)**

**Peter Berners Fellgett, FRS, FIEE, MA, PhD(Cantab). Born 11 April 1922. Elected FRSE
March 1961. Died 15 November 2008**