

THE  TIMES**Professor Sir Christopher Zeeman**

Sir Christopher Zeeman explaining his theories in 1987 with the help of his daughter Francesca Royal Institution of Great Britain

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Mathematician who explained ‘catastrophe theory’ and established a leading research institute at Warwick university

The mathematician Sir Christopher Zeeman raised the profile of his subject with a series of televised lectures on “catastrophe theory” — the mathematics of how systems can have sudden surprising shifts, often arising from apparently gradual changes, for instance the buckling of a metal bar under pressure or the setting off of a landslide.

In building up a research institute at Warwick university, he developed catastrophe theory — first devised by the French topologist René Thom in the 1960s — which has influenced

Share thinking in areas from psychology to economics and finance. The “catastrophe” notion is also known as the theory of singularities, and Zeeman, a compelling lecturer with a penchant for batik shirts, constructed models to explain it. He devised a machine with a cardboard wheel and two elastic bands to show the points at which sudden change takes place.

The contraption was one of many accessories that delighted Zeeman’s audience during the Royal Institution’s 1978 Christmas Lectures, which were broadcast live on the BBC. He was the first mathematician to give the lectures, which had started in 1825.

An imposing figure with a shock of white hair, Zeeman tied up three children in a demonstration of topology, which is the study of curves, surfaces and other shapes and how their properties behave under deformation, twisting and stretching. He also demonstrated the mathematics of musical instruments and used boomerangs and teaspoons to express concepts.

Zeeman had already raised the profile of Warwick university, which was founded in 1965; its mathematics institute, which he established with a handful of students, is highly regarded. At the same time, he visited schools to give demonstrations. His advice to maths teachers was simple. “Find a subject that is playable, and exploit the play area,” he said.

His determination to render complex maths more accessible made him enemies who accused him of “dumbing down”. He claimed that he was opening up the debate. Unlike Thom, Zeeman looked for applications for these apparently pure mathematical ideas in fields as diverse as embryology and meteorology. He began his own career with a noble failure — a year-long attempt to prove the theories of the French mathematician Henri Poincaré, who studied topology. “A good mathematician probably has 25 failures to each success,” Zeeman said. “The important thing is that new ideas keep coming.”

He was made a Fellow of Gonville and Caius College, Cambridge, in 1955 and appointed lecturer two years later, establishing himself as a leading exponent of the area within topology concerning knots. He first drew international acclaim in 1960 with a paper in which, in 18 lines, he showed that any knot unwinds itself as soon as it is transferred into a sufficiently high dimension. Knot theory, he discovered, shed light on the behaviour of strands in the double helix of DNA, and explained how circular structures such as those in living cells are able to unravel.

Even then, he was agitating for ways to communicate maths to a wider public. In 1964, he was invited to establish a mathematics institute at the new University of Warwick. After a sleepless night, he decided to risk leaving Cambridge. He invited half a dozen fellow topologists to join him. When at first each declined, he overcame reluctance with bluff: “What a pity. All the others have accepted!” By this ruse, he recruited enough talent to make an impact.

He made himself unpopular with administrators early on by backing the students’ attempt to run their own union. He also broke with convention by insisting that undergraduates call

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His greatest achievement at Warwick was the establishment of an international research centre for maths. After visiting the Institut des Hautes Études Scientifiques near Paris, he said to himself, “Britain needs this”. Within ten years, more than 2,000 foreign mathematicians had visited the new centre — “all of the big names were in there,” said Ian Stewart, a former colleague. Forty years later, the department, which is based in the Zeeman building, has 900 undergraduates, with another 150 postgraduates. A portrait of him hangs in the common room.

Erik Christopher Zeeman was born in Japan in 1925. His father, Christian, a Danish fisherman, had set up a business there and died in unexplained circumstances in 1929. His mother, Christine (née Bushell), was an English governess. His enthusiasm for mathematics was kindled at the age of seven by his mother’s explanation of the use of “x” to work out an area within a rectangle. He attended Christ’s Hospital in Horsham, West Sussex, and joined the RAF in 1943, training as a navigator. The atomic bombs were dropped on Hiroshima and Nagasaki just a week before he was to be deployed on bombing missions against Japan. After demobilisation, he went up to Christ’s College, Cambridge.

Zeeman’s first marriage, to the medieval scholar Elisabeth Salter, produced a daughter, Nicolette, who became a professor of medieval literature. In 1960, he married Rosemary Gledhill; they had five children. Three of them, Crispin, Mary Lou and Francesca, were seen assisting him with the 1978 lectures. Crispin became a travel photographer and head of marketing at a research body; Mary Lou is a professor of mathematics; and Francesca works in film and television. Tristan studied computing; Sam is a biologist.

Zeeman was made a fellow of the Royal Society in 1975. In 1988, he became principal of Hertford College, Oxford, and was knighted in 1991. To those he taught, he would say: “Study at least one subject in sufficient depth to affect you for life, and for the rest of the time, do whatever you enjoy.”

At home in retirement in Woodstock, Oxford, he followed his own advice, and took up bellringing. He never lost his sense of fun or the joy at demonstrating his prowess with a boomerang — he was an expert thrower — with an accompanying mathematical explanation as to why the wooden object would always come back.

Professor Sir Christopher Zeeman, mathematician, was born on February 4, 1925. He died on February 13, 2016, aged 91

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