

Obituary



Max Kelly, FAA
5 June 1930 – 26 January 2007

Gregory Maxwell Kelly was solely responsible for introducing category theory into Australia at a time when the subject was in its infancy. The Eilenberg–Kelly monograph *Closed Categories* of 1966 set the stage for two more generations of Australian category theorists. This research stream reached maturity with Max’s book *Basic Concepts of Enriched Category Theory* (CUP 1982), and now finds application in many areas of mathematics, theoretical physics, computer architecture, software design, and information management.

As a student of the Marist Brothers at Bondi, Max topped the NSW Leaving Certificate overall. He went on to win, in 1951, the University Medal for Mathematics at the University of Sydney and to gain the James King of Irrawang Travelling Scholarship to study at Cambridge. There he obtained a BA with First Class Honours and two Wright’s Prizes in 1953, a Rayleigh Prize in 1955, and PhD in 1957; the doctorate was in algebraic topology under the supervision of Shaun Wylie. Max returned to the University of Sydney in early 1957 as a Lecturer in Pure Mathematics and was promoted to Senior Lecturer in 1961 and to Reader in 1965.

My first contact with Dr G.M. Kelly as a name was in preparing for Honours Mathematics at the Leaving Certificate. The practice was to attempt all past papers. I still have the blue typeset papers for 1959 and 1960 which declare Professor T.G. Room as Chief Examiner and Dr G.M. Kelly as one of two Assessors.

In November 1960 Max married Imogen Datson.

Max’s love of category theory also consolidated in the early 1960s while he was giving lectures on homology theory. In an attempt to understand the singular

cohomology ring of a product of spaces, Max found that he could not even formulate the questions he wanted to ask without some basic concepts from category theory. Although he had heard of functors and natural transformations at Cambridge from the book by Eilenberg and Steenrod on *Foundations of Algebraic Topology*, he met Mac Lane's concept of categorical product first during lectures of Michael Atiyah at Harvard, while Max was a visitor at MIT in late 1962. Max had soon himself developed some lasting ideas in the field; one concept he called 'complex categories'. While visiting Tulane University (New Orleans) in 1963–1964, he met Eilenberg at Las Cruces giving a series of lectures on differential graded categories, which Eilenberg and Moore had recently invented; these were the same things as complex categories. Eilenberg insisted that Max remain in the US for another year. Indeed Eilenberg, on the spot, rang Alex Heller at Urbana and arranged a job at the University of Illinois for 1964–1965. Max's joint work with Sammy Eilenberg had germinated.

In January 1964, Max drove Imogen and two small children, Dominic and Martin, from New Orleans to Miami for a ten-minute talk at an American Mathematical Society meeting. Saunders Mac Lane introduced himself at the end of the talk and invited Max to visit Chicago. In the span of a couple of months, Max had met both founders of category theory: Eilenberg and Mac Lane. He soon met many more of the international categorical community and greatly valued these colleagues who became prominent in his life. Their tributes on his death attest to reciprocal affection.

My first contact with Max as a person was in 1965 when he taught two subjects to the Pure Mathematics Honours year at Sydney: category theory and topology. I found his lectures inspiring; they seduced me away from mathematical analysis. When Max had made a topic his own, he was able to provide a Bourbaki-style account of it at the drop of a hat. He actually arrived at our topology class prepared to teach us algebraic topology. After he asked us a few questions, it became clear we had done no topology, so he changed on the spot to teach us general topology. Soon he came to discuss product spaces and acted surprised that we knew nothing about the axiom of choice. Immediately Max listed six statements equivalent to the axiom of choice, explained them, and proceeded to prove the equivalence. He completed five of the implications in that one lecture, totally without notes and with only a few squats staring out the window taking stronger puffs at the cigar. The next lecture he finished the proof using a lemma I have not seen elsewhere. Max must have forgotten the precise form of the lemma since it was not the one we were asked to prove in the final exam. Brian Day and I became Max's postgraduate students in 1966, the year before he moved to the University of New South Wales as Professor of Pure Mathematics. Brian moved too, while I stayed at Sydney. Our relationship with our supervisor was very formal in those days.

Of course, by mid-1971, when I was at Macquarie and Max had returned to UNSW from Chicago, the formality had gone. Max had arranged a sabbatical at UNSW for the prominent category theorist Peter Freyd. During Freyd's stay Max organised, with the strong support of Bernhard Neumann, the first conference in Australia on category theory.

Max was elected Fellow of the Australian Academy of Science in 1972 and moved back to the University of Sydney as Professor in 1973. He was a true academic: erudite in the classics, prolific researcher and publisher, editor for several journals, successful department head, traveler, linguist, raconteur, and bon-vivant. He supervised five PhD students to completion; other supervisions include the MSc of Amnon Neeman in 1979. Max was very proud when, in 2002, Imogen gained her PhD in medieval drama.

Michael Makkai (McGill) claims Max as a logician in his passionate insistence on precision and clarity in mathematics and his belief in, and search for, the grand order at the heart of the world. Much of Max's work could be called higher order universal algebra.

He was very aware of how fortunate his life had been, and felt an obligation to give something back to the community. He was not motivated by making money, but by teaching and learning. To that end, he gave freely of his time to aspiring young mathematicians and to all those keen to learn. An example of this occurred when, frustrated by bureaucracies, he enlisted the power of the media and was able to borrow, for a blind girl in the Catholic school system, a mathematics textbook in Braille which had been gathering dust in a State Department of Education office. This commitment to social justice was further evidenced by his involvement with Action for World Development and his efforts to help the Aboriginal community in Redfern. He befriended Father Ted Kennedy, Mum Shirl and others active in these movements. He also questioned the morality of the Vietnam War, making himself quite unpopular with some of the clergy of the day.

Many were moved by the words of encouragement Max offered young category theorists in his speech at the 2006 Category Theory Conference dinner in Halifax, Canada.

Max had an active and analytical mind to the very end. He attended the Category Seminar at Macquarie two weeks before he died, excusing himself the next week because of an appointment. He started learning ancient Greek recently and in his last months was engaged in complex research on coherence theory, which he was typing despite failing eyesight. This research will be completed and published by collaborators in Canada and Italy.

Max Kelly is survived by Imogen, their children, Dominic, Martin, Catherine and Simon, and 10 grandchildren.

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