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EDITORIAL NOTICE:

MAX KELLY

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; see TAC Reprints, No. 10), and now finds application in many areas of mathematics, theoretical physics, computer architecture, software design, and information management.

Max received all his schooling at Bondi Beach where he was a student of the Marist Brothers throughout his primary and secondary education. Max topped the NSW High School Leaving Certificate Examination 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

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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. In November 1960 Max married Imogen Datson.

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

Max Kelly'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 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, while Max was a visitor at MIT in late 1962. Max had himself soon developed some lasting ideas in the field; one concept he called "complex categories". While visiting Tulane University (New Orleans) in 1963-64, 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 1964-65. 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 valued greatly these colleagues who became prominent in his life. Their tributes on his death attest to reciprocal affection.

My first contact with Dr Kelly 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 Dr Kelly 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 Kelly'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 Peter Freyd. During Freyd's stay Max organized, 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 including serving as a founding editor of *Theory and Applications of Categories*, 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 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.

Max was one of the first mathematicians to attract research funding from the Australian Government through the ARC. The granting body had maintained the culture that money should only be provided for experimental equipment and fieldwork travel. Max's applications forcefully made the case that these items correspond, for mathematicians, to face-to-face discussion. This led to the recognition of the legitimacy of funding for research fellows, visiting researchers, and our own travel. Another way in which Max broke down the tyranny of distance for Australian category theory was to establish and maintain a Category Mailing List in those email-free days. Our papers and that List were typed by a secretary using an IBM electric typewriter with several "golf balls" for the different fonts. The List was photocopied onto address labels for mailing out our preprints.

As I browse Max's publication list of over 90 journal articles, my mind is full of the history. There are so many original theorems and new concepts in those works, all presented with Max's obsession for completeness, beauty and accuracy. I also know some of the plans Max had for further research. My regret is that his physical health slowed this progress in the last couple of years and that we are denied the benefit of those future insights. For his own words on his work, I recommend the recent short article [G. Maxwell Kelly, The beginnings of category theory in Australia, *Categories in algebra, geometry and mathematical physics*, Contemporary Math. **431** (Amer. Math. Soc., Providence, RI, 2007) 1–6] and [Saunders Mac Lane and category theory, in *Saunders Mac Lane, Selected Papers* (ed. I. Kaplansky; Springer-Verlag, New York, Heidelberg, Berlin, 1979) 527–543].

Max 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 teach-

ing 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 Fr 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 White Point, Nova Scotia. 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 Richard Wood, Bob Walters and Aurelio Carboni.

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

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