Obituary

Geoffrey Matthews 1917-2002

MARGARET BROWN

Geoffrey Matthews was a pioneer in the introduction of modern mathematics in primary and secondary schools in the 1960s and 1970s, and then became the first holder of the first established chair in mathematics education in the UK. Within the Mathematical Association, he chaired the Teaching Committee, was a founder member of the Mathematics Education and Industry Committee, and was President of the Association in 1977-78. He died on September 13th, 2002.

The two world wars each had a profound effect on his early life. He never met his father, a promising young naval officer who was lost at sea in the sinking of HMS Hampshire in 1916, seven months before his only child was born. Geoffrey, in turn, after graduating in 1938, spent a mere few months in a chartered accountants' office before being called up to the Army at the start of the Second World War. In between these dates he had at least experienced a first class mathematical education, having been taught by Alan Robson (of Durell and Robson) at Marlborough, from where he had gained a scholarship to Jesus College Cambridge.

Like his father, Geoffrey had a distinguished war record. He served on the front line as an intelligence officer, having taken part in the D-Day landings. His fluent German, acquired during a pre-university stay in Hanover to study art, and his undoubted guile, enabled him to manage and extract valuable information from captured troops. He received a 'mention in dispatches' and a United States Bronze Star, with a citation for 'exceptional zeal and energy...'. Zeal and energy certainly characterised all his later endeavours in mathematics education, and his war experience proved to be good training for his first post-war job, as a mathematics teacher at Haberdashers' Aske's (then in Hampstead).

In his privately published autobiography, *Mainly on the bright side*, Geoffrey wrote:

> 'The best investment, financially and otherwise, was becoming a life member of the Mathematical Association in 1947. It was far and away my best teacher. I read *The Mathematical Gazette* avidly as well as the superb Reports produced by the Teaching Committee. I also gradually made friends by attending the London branch meetings at the Regent Street Polytechnic.' [1, p. 53]

It was at one of these meetings that he first met Arthur Rollett (of Cundy and Rollett), the Staff Inspector for Mathematics. This led to his launch of a Mathematics Society at Haberdashers', with an early activity being to construct and to study the exotic mathematical shapes Rollett had introduced in his London branch lecture.

After four years, Geoffrey obtained a head of department post at St

Dunstan's College, Catford, where he remained for 14 years, latterly as deputy head. In the early years, in parallel to building an excellent mathematics department out of a group of mainly non-specialist staff, he completed a part-time PhD on infinite matrices at Birkbeck College, and published five academic papers. He extended the extracurricular activities on offer at St Dunstan's with a series of maths clubs for different year groups, and encouraged the sixth formers to present papers to each other with the results of their investigations; some of these found their way into *The Mathematical Gazette*. His notes for mathematics staff typically included the advice 'IT IS FORBIDDEN NOT TO WASTE TIME'. About this time he was also encouraged by Arthur Rollett to write a calculus textbook [2] which was well-regarded and widely used for over 20 years. The royalties were given to charity.

When Geoffrey asked his ex-sixth formers which topic from their university course they would most have liked to learn at school, the most common answer was 'matrices'. This led to an attempt to devise a simple introduction to the topic through encoding and decoding for the younger age groups, leading to more advanced work further up the school. The encoding lesson (which turned YOGI into BEAR if the encoding matrix rather than its inverse was used to decode) was later repeated on television, in the *Gazette*, and to great acclaim at many teachers' courses and meetings, including the Mathematical Association Annual Conference at King's College London in 1962. My own first encounter with Geoffrey was listening to this 'Matrices for the Million' lecture at a teachers' course in Cambridge; I can remember thinking that the choice of Yogi Bear (then a popular cartoon hero) was appropriate as the avuncular Dr Matthews had an appearance not unlike that of a large teddy bear.

Even while at Haberdashers', Geoffrey had become impatient with the archaic mathematical curricula which seemed quite unsuited for most of his pupils, even in a highly selective school. He inspired his St Dunstan's colleagues to join with him in experimenting with introducing topics like probability and statistics, computing, sets and logic into the curriculum. The result was a set of 'spotty' books on these topics, predating most other 'modern maths' books; they were quickly snapped up by a teaching profession hungry for change. Like many other teachers, I enjoyed using ideas from them alongside having to teach a traditional syllabus. Later, a full St Dunstan's course with a dedicated O-level examination emerged, but by this time the SMP series had captured much of the market.

Arthur Rollett had not only encouraged Geoffrey's activities in the UK, but also despatched him as an English delegate to several international conferences on 'modern maths', where he was often the only practising schoolteacher but where his linguistic skills came in useful (and even earned him a reference from Georges Papy as a 'polyglot extraordinaire'). Rollett also proposed him for his next challenging role starting in 1964, which was to be Director of the Nuffield Primary Mathematics Teaching Project. The specified age range was 8-13, but Geoffrey engineered the change in starting

age to 5, and in the event only sets of problem cards (Green, Red and Purple) were published for early secondary pupils .

Geoffrey's earlier experiences of management and publishing contributed to the success of the Nuffield Project in broadening and modernising the curriculum. Such was the clamour to become one of the 12 pilot LEAs that he was able to insist as a condition of entry that each LEA staffed and furnished a mathematics centre with comfortable chairs and practical workshops for courses. Many of these were later transformed into the first general purpose teachers' professional centres.

Geoffrey selected a diverse central team who worked with advisors and teachers in the pilot areas to produce a series of attractive teachers' guides which combined explanations of mathematical ideas with classroom ideas, and colourful displays of children's work to show what could be done. Geoffrey was keen to set high artistic standards, and took great pains to obtain the services of a gifted designer. The title of the first guide, and the first of the three promotional films, was 'I do and I understand'. Later books appeared in three series, 'Computation and structure', 'Shape and size', and 'Graphs leading to algebra'. The content was innovatory, as were the additional topic books on subjects like logic, environmental geometry, probability and statistics, and computers and young children. Finally there was a series of guides about assessment, which involved collaboration with Piaget in Geneva. Geoffrey was as usual unafraid of going right to the top.

The decision to produce teachers' books rather than pupil texts was controversial, but aimed at empowering teachers. Teachers meeting in LEAs were clearly enthused, but it was not obvious how much direct impact the project publications were having on classrooms. Harold Fletcher, a member of the Nuffield team, soon filled the vacuum with pupil materials attempting to translate the ideas in the teachers' guides. A later Nuffield project, for which Geoffrey chaired the Consultative Committee but with Eric Albany as the organiser, also provided pupil materials which sold well but which lacked the inspiration and originality of the original teachers' books. But certainly the combination of the teachers' guides and the later texts had a huge impact on primary mathematics. They led to a further project aimed at nursery teachers, Early Mathematical Experiences, funded by the Schools Council, which Geoffrey co-directed with his second wife Julia – known to friends as Pat. Geoffrey and Pat were invited to give talks and workshops all over the UK and indeed the world. I never knew them to turn down a request to talk to teachers, no matter how remote the spot or inconvenient the journey. They often returned with amusing anecdotes about their travels, including the Inspector in a developing country who was not convinced that he was in favour of the Nuffield emphasis on teaching pupils to think, especially not the girls.

Just as Nuffield was finishing Geoffrey was approached by the director of the newly formed Centre for Science Education at Chelsea College, London University, to see if he was interested in being appointed to the first established Chair of Mathematics Education in the UK, financed by Shell.

The Centre was already the headquarters of the many Nuffield Science Projects and at the request of the DES was starting an innovative PGCE for science teachers. It seemed logical to extend the scope of the Chelsea Centre to mathematics and Geoffrey, as director of the Nuffield Mathematics Project, was the natural choice to oversee this move.

The transfer into academia in 1969 did not curb Geoffrey's energy or ambition. His many overseas contacts enabled him to establish Chelsea as a leading international mathematics education research centre. They also helped him to take a key role in the organisation of the Second International Congress on Mathematical Education at Exeter in 1972. The first ICME, in Lyons in 1969, was a badly organised affair, and Geoffrey assisted in establishing at Exeter the pattern of activities which has persisted in the nine ICMEs since then.

At Chelsea Geoffrey obtained funding for two major initiatives. The first, production of computer-based problem-solving activities in science using mathematical models, was one of the earliest software packages for schools. This grew into the Computers in the Curriculum Project, directed by Professor Bob Lewis, which was to have a significant effect on the pattern of curriculum software in the UK.

The second direction Geoffrey pursued was in research in conceptual development, following his earlier contact with Piaget. He obtained the largest grant then given by the Social Science Research Council (now ESRC) for an exploration of 'Concepts in Secondary Mathematics and Science (CSMS)' (1975-81). The mathematical results, published in Children's Understanding of Mathematics 11-16 [3], demonstrated the wide range of mathematical attainment in secondary schools, and provided a conceptual framework for the secondary curriculum. The book had a considerable influence on the recommendations of the Cockcroft Report, and through that on the secondary curriculum and the new GCSE in the 1980s, and on the best-selling SMP 11-16 series. Both science and mathematics strands of CSMS led to a sequence of research projects at Chelsea, to be continued at King's College London, following a merger in 1985. First the graded assessment project materials in mathematics and science (GAIM and GASP respectively), and then the cognitive acceleration projects (CASE and CAME), have been adopted by many schools and are direct successors to the CSMS work, as is the recent 5-year longitudinal Leverhulme Numeracy Research Programme at King's.

In his retirement after 1977 Geoffrey, with his customary energy, started on a new hobby of sculpture and painting, the latter in a style which owed something to Matisse. Until Parkinson's disease sadly prevented further work, he played a leading role in the Free Painters and Sculptors group. In this, as in all else, he had stalwart support from Pat, who has survived him. Two children from his first marriage provided him with grandchildren and great grandchildren.

I had the great privilege of working with Geoffrey at Chelsea between 1969 and 1977; for me, and for many others, he acted as a personal mentor,

just as Arthur Rollett had been for him. Working with him was always stimulating; his creative mind continually poured forth ideas for new initiatives, and he pursued with great zeal those he decided to follow up. He was also terrific company, with a wonderful sense of humour; he found it difficult to suppress an irreverent giggle even on the most serious of occasions. Indeed in everything Geoffrey did in mathematics education he was cheerfully subversive, and unafraid of challenging the status quo. He was far from being a woolly liberal though, and could get fierce about matters of precision and punctuality. He was both strategic and tactical, and especially successful in persuading funders and others that his ideas should be pursued. His ambitious plans for mathematics education were always for the benefit of children and teachers, especially those in more deprived areas and developing countries, but he was never ambitious for himself. Even in adversity he remained generous and optimistic, believing in people as well as projects, and inspiring all around him to independent achievement.

He and Pat were surrounded by a large group of loyal friends, from both inside and outside mathematics education, many of whom attended both his cremation near his home in Bexley Heath and, in November 2002, a party in London to celebrate his remarkable life.

References

1. Geoffrey Matthews, *Mainly on the bright side* (2nd edn), Jumpix Books (2000).
2. G. Matthews, *Calculus*, John Murray (1958).
3. K. Hart (ed.), *Children's understanding of mathematics 11-16,* John Murray (1981).

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An appreciation

Donald Coxeter – Master of many dimensions

The death of Professor Harold Scott Macdonald Coxeter at the age of 96, on 31 March 2003 after a debilitating illness, calls for a response. Donald, as he liked to be called, spent nearly all of his working life at the University of Toronto, but his fame and influence have spread all over the world.

The story begins with two prep-school boys in adjacent beds recovering from flu. One was John Flinders Petrie, whose father was famous for his interest in Egyptian pyramids, and whose name is now attached to wiggly polygons round the middles of Platonic polyhedra. The other was Donald. They were *visualizing* four-dimensional space. Coxeter praecox soon left

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