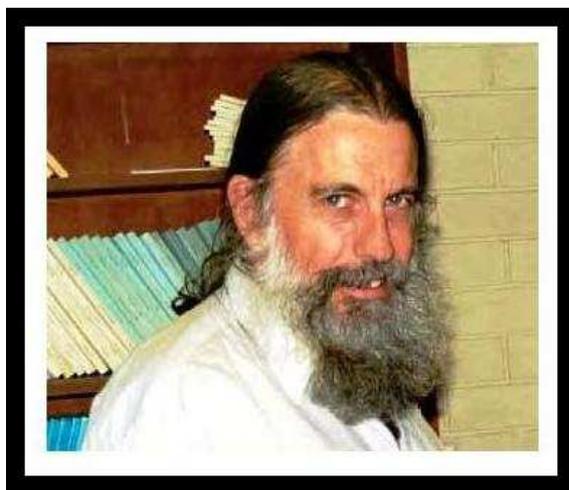


SIMON FITZPATRICK MEMORIAL VOLUME

JONATHAN M. BORWEIN, FRSC

1. THE LIFE OF SIMON FITZPATRICK, 1953–2004

On Saturday August 21 [2004] Simon Fitzpatrick lost his long struggle with cancer. Simon was both a distinguished mathematician and a champion chess player. He was a senior lecturer in the School of Mathematics and Statistics at the University of Western Australia since 1991, and in 1999 was appointed an International Correspondence Chess Master by the International Correspondence Chess Federation based in Switzerland.



Simon Fitzpatrick: 29/07/53 – 21/08/04

Simon Peter Fitzpatrick was born on July 29, 1953 in St John of God Hospital, Perth, and shortly after his birth went to Dalwallinu in country Western Australia where his father worked as a doctor. He was the first of four children. In fact Simon, his brothers Frank (b. 1955, d. 1975) and Leigh (b. 1956), and his sister Julie (b.1958) were all born within five years and one day of each other. Simon began his schooling in Dalwallinu and then attended school in the Perth suburb of Scarborough after his family moved to Perth in 1963. As a pre-schooler, Simon was taught chess by his mother, and bridge by his father. He was particularly attracted to chess, and as a school boy established himself as one of the leading juniors in Western Australia. He was the State Junior Chess Champion each year from age 12 to 17. His distinction in chess may have played some part in earning him a full scholarship to Hale School for his high school years. Simon's undergraduate career

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at the University of Western Australia resulted in a near “straight-A” record, with Simon completing a Bachelor of Science degree with first class Honours at the end of 1974. His exceptional performance earned him the award of five university prizes, including the Lady James Prize in Physical Science in 1973 as the most outstanding graduate in Science, Engineering, or Medicine, and the H. C. Levey Prize in 1974 for the top honours graduate in Mathematics.

Simon left Perth in 1975 to undertake postgraduate study at the University of Washington in Seattle, supported for three years by a CSIRO postgraduate studentship, and then by a Teaching Assistantship. In the words of his PhD supervisor, Professor Robert Phelps, “he was impressive from the start ... he took the four PhD qualifying exams within a month of his arrival [in Seattle] and scored first in three of them and second in the fourth (in a competition with eleven other students).” Professor Phelps regarded Simon, even then, as “one of the brightest graduate students I have encountered in my total of 16 years at this institution.”

During his time in Seattle, Simon met and married Deborah Marie Dace. It was clear to his friends and colleagues that Simon and Deborah gave each other enormous love and support through a marriage that lasted more than twenty years up to Deborah’s death on 31 March 2003. After completing his PhD thesis, entitled “*The differentiability of distance functions and the GSP in Banach spaces*”, in March 1980 Simon returned, with Deborah, to Australia briefly as a Visiting Research Scientist in the Division of Mathematics and Statistics of the CSIRO in Melbourne. Then, in August 1980 he took up a two year Visiting Lectureship in the Department of Mathematics at the University of Illinois in Champaign-Urbana.

Simon and Deborah returned to Australasia in 1982 when Simon was appointed to a lectureship at the University of Auckland, New Zealand. His time there was very productive. In particular his collaboration with Bruce Calvert in Auckland resulted in eleven joint publications over the next decade. Renewed contact was made with mathematicians in Australia during his sabbatical year in 1988, in particular with Grant Keady at the University of Western Australia and John Giles at the University of Newcastle. The year 1988 also marked the start of Simon’s fruitful collaboration with Jonathan Borwein. They were visitors at the same time in Newcastle and Canberra, and later that year also they collaborated at Jon’s institution Dalhousie in Canada. This period of collaboration alone led to three joint articles, a collaboration that was to result in ten joint journal articles prior to his death. The year 1988 also saw Simon promoted to Senior Lecturer in Auckland.

In 1991 Simon was attracted back to Perth with an offer of a Senior Lectureship at the University of Western Australia, and he held this position until his death. Simon was active in both teaching and research. At various times he was convenor of the Pure Mathematics Seminar, and the Departmental Mathematics Colloquium.

In July 1992 he organised a mini-conference on Banach Spaces at the University of Western Australia to take place after a workshop on this topic organised by John Giles at the University of Newcastle, and before the annual meeting of the Australian Mathematical Society in Perth. This initiative was followed up with research visits to Newcastle and Vancouver (where Jon Borwein was by then working) during his period of Study Leave in 1993–94. Later research visits were made to Vancouver, and the University of California, Santa Barbara in 1998.

The international reviewing journal *Mathematical Reviews* lists 48 research publications by Simon Fitzpatrick, and the majority of these have received external

reviews. Simon has been described as a keen and incisive researcher and a careful writer, with a fine eye for mathematical elegance. Simon's interest in and willingness to work on problems brought to him by others made him an especially valuable research associate, "a versatile modern pure mathematician willing and able to interact with his colleagues". At various times, sixteen different mathematicians or statisticians have been his coauthors, with joint articles comprising about 85% of his published work.

At the University of Western Australia Simon taught undergraduate mathematics courses at all year levels, and in 1992 he convened a committee to review all second year mathematics and statistics courses, to enable the Department to respond to changes in the high school and first year mathematics curriculum. With Grant Keady he shared an interest in the Maple Computer Algebra system and its applications, especially to undergraduate mathematics teaching. He was the fourth year Honours Convenor as recently as the first half of 2004. Simon gained especial satisfaction from supervising the work of his Masters student Sanka Balasurya, and in seeing Sanka's thesis completed and submitted in June this year.

Simon's concern for high quality mathematics teaching led to his acceptance of the role of Chief Examiner for the TEE (tertiary entrance) Calculus examination for three years 1994-96. The Calculus exam paper in 1994 written under Simon's leadership, along with the other two mathematics TEE papers, inspired seven heads of mathematics at senior high schools in Western Australia to write a joint letter congratulating the Secondary Education Authority on the quality of the papers, noting that "the philosophy and intent of the courses was examined as well as the content and objectives (which have in previous years been the focus of the papers)". The other two members of the Calculus Examining Panel were senior mathematics high school teachers, and held Simon in very high regard. In 1996 Simon did most of the work in preparing the paper but was taken ill and ended up in hospital just before the panel could hold its final meeting. Because of the rigid deadlines for the TEE the other two examiners had to take responsibility for the paper without any further input from Simon. At that stage the two examiners took the unusual step of contacting Dr Mike Partis, the Director of the Secondary Education Authority at the time, asking for a private interview. It turned out that Simon had set a question which was "ingenious and interesting" - and therefore by definition much too difficult for the TEE Calculus examinees. However the other two examiners were so over-awed by Simon's standing as a mathematician that they couldn't bring themselves to change the question when he had been invalided out. Of course, the teachers were right about the difficulty of the question. Mike Partis solved the problem by appointing himself to the examining panel and producing a much watered down version of Simon's question. A few weeks later Simon was out of hospital and was told what had happened. He was not in the least offended, and was much amused that the other two examiners had been so over-awed by his supposed mathematical authority.

Simon's enthusiasm for chess never left him. He continued playing actively when he moved to New Zealand. He played the standard over-the-board version of the game to a consistently high standard, and also became a top-flight lightning player. Whilst in New Zealand he took up correspondence chess with characteristic enthusiasm. In Auckland he found a further use for a chess clock: he brought his chess clock along to a Department of Mathematics meeting, believing that one single member

of the Department tended to talk as much as all the rest combined. The recollection of David Gauld, who was Head of Department at the time, is that “it was a close competition”. As Simon got older - and as his health declined - he became more interested in correspondence chess and latterly this was his main sphere of activity. This slow form of the game was particularly suited to Simon’s temperament and analytical skills and he soon reached international level as a correspondence player. His success was recognised by the award of the title of International Correspondence Master in 1999. In the following year Simon was Captain of the Australian correspondence chess team in the CC Olympiad XIV preliminaries, the chess-equivalent of the Olympics and conducted by e-mail. There were many things in life that brought Simon joy. Besides Mathematics and Chess, his friends have mentioned his fondness for cats, bridge, lawn bowls, cryptic crosswords, and the Indian Ocean. Simon always walked to work or took public transport; he regarded driving a car as unnecessary.

Simon Fitzpatrick was held in high esteem by his friends and colleagues. He is remembered especially by his siblings Leigh and Julie, and by his friend of many years and partner during his last year, Natalie Casal. Those of us who knew him within Mathematics remember him as a very private and quiet person, an incisive thinker, and someone with enormous courage. As his long battle with cancer progressed we could do little more than stand alongside him with sympathy and admiration. Simon approached this battle as he would a chess match, with the same determination, quietness and perseverance. In Simon’s own words from last December: “*My chess playing came in, you give up if and only if you know you are lost for sure.*” Indeed, Simon’s favorite film was Ingmar Bergman’s “The Seventh Seal” about a Swedish knight in the middle ages. Death arrives to claim the knight, but is persuaded to play a game of chess - if the knight loses he’ll go with Death; if he wins then Death will leave without him. A chess player has no chance when Death cheats. (September 2004)

Written by Cheryl E Praeger with assistance from Natalie Casal,
Leigh Fitzpatrick, David Gauld, Robert Phelps, and Mike Partis.¹

Cheryl Praeger’s obituary of Simon is also posted at

<https://www.maths.uwa.edu.au/People/fitzpatr/obit.htm>

We draw the reader’s attention to the online memorial being maintained at

<https://www.maths.uwa.edu.au/People/fitzpatr/>.

These pages include Mike Partis’s tribute to Simon

<https://www.maths.uwa.edu.au/People/fitzpatr/CAWA%20Obituary.html>

from the perspective of a chess player. They also contain some photos and personal tributes from several mathematicians who knew him well: John Giles, Bruce Calvert, Jon Borwein and Bob Phelps.

1.1. **John Giles.** I first met Simon at the University of Washington in 1977; I had come on study leave and Simon was making enthusiastic headway on his doctoral studies under the supervision of Bob Phelps. I was tremendously impressed by his paper [46] produced from his time in Seattle. He used the Clarke subdifferential of Lipschitz functions - an optimisation tool - and applied it to the study of the differentiability of distance functions in the geometry of Banach spaces. It was a brilliant example of cross fertilisation between two fields of study and gave added

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impetus to the study of the differentiability of Lipschitz functions in both fields. The paper [41] attracted me by his considerable ingenuity. We met at the University of Auckland in January, 1985 and our discussion led to our first joint paper with Jon Borwein [35]. In 1988 he spent 9 months at the University of Newcastle under an ARC Grant project The determination of differentiability properties of distance functions on Banach spaces and application to non smooth optimisation.

We produced two joint papers [30, 28] and he began in earnest his fruitful collaboration with Jon Borwein. He and I were joint editors of the Proceedings of the Centre for Mathematical Analysis 20 (1988). He participated in a Workshop at the University of Newcastle on *Differentiability of convex and locally Lipschitz functions on Banach spaces* in June, 1992. We met again at Simon Fraser University, British Columbia in 1994 when we were both on study leave working with Jon Borwein. Simon was extraordinarily perceptive, orderly and enthusiastic in his research. Australian mathematics has lost a talented contributor to our craft.

1.2. Bruce Calvert. Simon Fitzpatrick has been a colleague and mate of mine since he joined the Auckland mathematics department in 1982. We started our collaboration by doing a paper on convex functions in non-reflexive Banach spaces [39, 6], and another on accretive operators in Banach spaces [32]. We then wrote a series of papers developing Ando's classic result on characterising Banach lattices with p -additive norms, using norm one linear projections onto sublattices [34, 33, 23, 19]. Some of our papers developed the Blaschke-Kakutani theory that characterises inner product spaces by the property that every two dimensional subspace is the range of a norm one linear projection, or even both topics [31, 21, 20, 18, 21, 15]. I always found Simon good to work with. Simon was very intelligent, pleasant company, and energetic in his research work. He liked a game of 2 bridge at lunchtime, and was quite good at it. He was an enthusiastic teacher, and at times we would talk together about our lecturing work. Once he ran a series of lectures, on convex functions, which I attended, and he lectured perfectly well. Simon shared some of my interests in the University, and the wider society, and we attended some of the Association of University Staff meetings together. He played his part in departmental administration, and was concerned by our tolerance of low standards. Simon and his wife Deborah were friendly folk, and they hosted the department at several evenings of board games. They enjoyed nature, and helped plant trees on Tiritiri Matangi, a small island. They left for Perth in 1991, when Simon took up his job at the University of Western Australia. At Simons departmental farewells a lot of people were able to say how he had been valued, and would be missed, and I was pleased to be able to choose farewell presents for Simon and Deborah. In later years we corresponded, and I was impressed by how well Simon handled Deborahs bad health, and his own.

1.3. Jon Borwein. Simon and I first wrote a paper together with John Giles in 1986, [35]. We met and spent four months working together in Newcastle and at the ANU in 1988. This was a very rich period intellectually in our lives and produced [22, 24, 26, 27]—the latest with Petar Kenderov who also visited Australia at that time. Simon visited Dalhousie immediately after and also worked with Adrian Lewis (leading to a joint paper which is published for the first time in this volume). In 1993 I moved to Simon Fraser and Simon spent a partial sabbatical with me which ultimately generated [12, 14, 16] and also led to very fruitful work

with Robert Phelps. In 1995 I went to Perth for two months, on the first day Simon collapsed and entered hospital for the first time. Ten days later he asked for mathematics to read. The material I sent him were worked on in 1998 when he visited me in Newcastle and Vancouver and formed the basis of our work in [3]. The results in [2] came from better understanding our own earlier work in [12, 24]. At the time of his death, Simon and I were engaged in exciting work on the structure of monotone operators, which I hope I can complete without his insight.² Simon had an unusual ability to concentrate matched with wonderful geometric insight and technical strength.

This ability to concentrate allowed him to do crosswords during marrow transplants and certainly contributed to his ten years of productive living with cancer. When we were together, we worked in the same office—often at the same blackboard for hours at a time. This is quite unlike any of my other serious collaborations in which typically brief exchanges punctuate solitary work. An hour, a day, a week or a year later neat notes full of succinct mathematics ready for T_EX-ing would usually appear. When I think about convexity and like matters, I would often imagine Simon’s suggestions in my head and then contact him; it will be hard to do without his judicious mathematical insights, his insight and his shared delight in Mathematics.

2. FINAL RECOLLECTIONS

On the whole, as Lyle Noakes has observed “Simon had very little to say about himself. Others were less reserved.” We complete this retrospective with some further recollections of Simon from one of his last collaborators Stephen Simons, and then from his doctoral supervisor Bob Phelps.

2.1. Stephen Simons. My first personal contact with Simon was when he came to visit Santa Barbara for two weeks in 1998, though I had been aware of his work for some time. I was very impressed by his ability to “ask the right question”, and his even uncannier ability to construct counterexamples. His short visit to Santa Barbara resulted in a joint paper that was published in the Proceedings of the American Mathematical Society.

I paid a return visit to Simon Perth for a month in 1999. I really enjoyed seeing him in his element. When he had a mathematical insight while walking along the street, he would stop dead in his tracks. He cut a very impressive figure, this tall motionless bearded man with his funny hat with the flap down the back, and his brain working furiously. He introduced my wife and me to his passion, lawn bowling, and even put his uniform on for us. The white of his uniform contrasted strongly and incongruously with the black of his hair and his beard. My visit to Perth resulted in a paper that was published in the Journal of Convex Analysis.

While I was in Perth, we discussed Simon’s cancer. In the 15 months since his visit to Santa Barbara, his attitude towards this had changed from it being an inconvenience that he had had to live with to a realization that the question was not “if” but “when” it was going to kill him. As his cancer progressed, Simon showed extraordinary courage and good humor, despite the fact that his wife also died from cancer after an excruciatingly painful two-year illness in April 2003. The following extracts from his messages bear this out: “Since I don’t feel like dying

²Indeed, I have largely now succeeded and report on the results in my solo paper in this volume.

just yet, I go into the cancer ward early next week for them to find out whether this is malignant ... Actually the nuclear medicine people may score a paper out of finding lymphoma as a side-effect of using a spiral CT scan while looking for possible blood clots in the lungs... I had arrived at the hospital because of chest pains. ... I am thinking of writing a novel called 'Waiting for a bed in the cancer ward' which would probably not win the Nobel prize!". Writing about a visit to the hospital he wrote: "... The nurse had not met a person who overcomes boring situations like this by solving the Times crossword, but was quite happy to cooperate in writing in the solutions." Later, after throat surgery, he wrote: "... I am trying to make up a convincing story about a pub brawl with broken bottles everywhere to explain the scar on my throat."

During this period, Simon did not only write to me about his illness. Of course, a number of his messages were about mathematics. But he also wrote about local and global politics. On the local level: "... Three Australian Universities have agreed to the Union's demands, but ours is offering far less ... I have been trying to convince the Union that a strike from second week of next semester with unlimited duration is the way to go, but they don't seem to understand ... The second week because we can spend the first week using the lectures as polemics against the administration, interrupted by some Mathematics." After the invasion of Iraq, Simon's e-mail signature line became: "Blair is Bush's poodle. Howard is Bush's hamster." Curiously, while both Simon and I are interested in monotone operators, both of our joint papers were on convex analysis. The irony of this is that much of the current work about monotone operators is based on a paper that Simon wrote in 1998, about which he himself wrote "Nothing deep there, just a potboiler". Since this paper appeared in the proceedings of a workshop and not a recognized journal, it was largely ignored until it was rediscovered by a number of authors starting in 2001. It seems that the "Fitzpatrick function", as it is now known, may lead to even more results about monotone operators than it already has.

I am deeply saddened by Simon's untimely death. We have lost a fine mathematician with very good mathematical taste. We have also lost a fine human being with enormous courage and a sense of humor, which he kept in the most adverse of circumstances.

2.2. Bob Phelps. I first heard of Simon Fitzpatrick when my colleague Isaac Namioka received a letter from him in early 1975, following up on an earlier inquiry on Simon's behalf from Professor Wendy Robertson. Simon had expressed an interest in working on a PhD thesis with either Professor Namioka or me, or both. Happily for me, Isaac was scheduled for a sabbatical leave the coming academic year and Simon became my student. He was impressive from the start: Not only had he graduated with Honours from the University of Western Australia, but within a month of his arrival he took our four PhD qualifying exams and scored first in three of them and second in the fourth (in competition with eleven other students); an amazing accomplishment. Needless to say, I was delighted when this tall, gentle, bearded, long-haired and very bright young man asked to work with me; who wouldn't be pleased at the prospect of advising a student who had already published one research paper! (In fact, by the time he received his PhD in 1980, he had four research papers in print and another one submitted for publication.) In 1977-78, I was away from Seattle, visiting University College London and potentially losing contact with Simon (in those days before email). But Simon willingly

traveled to London and we were able to discuss mathematics and enjoy each other's company for a couple of weeks.

My last really close association with Simon was during an extended visit to Australia during the summer of 1992. We spent a marvelous two weeks in Newcastle, sharing a small cottage across the highway from the University. During the day, we participated in the lively Workshop on Differentiability with John Giles, his colleagues and other visitors at the maths department; in the evening, we shopped for and prepared our own meals (which always included delicious local ales) and worked hard on our third (and last) joint paper. Later that summer, I had the pleasure of visiting Simon on his home turf, since the annual meeting of the Australian Mathematical Society was held at the University of Western Australia in Perth.

In reading over my file of correspondence with Simon, I am struck by the breadth of his mathematical interests. It is apparent that when someone brought a mathematical problem to his attention, he would invariably come up with an original relevant idea. This willingness to think about other people's problems helps explain why he has co-authored papers with sixteen different mathematicians or statisticians. I'm sure that all of them share the same sense of loss that I have at his passing. (August 2005)

3. CURRICULUM VITAE—UNIVERSITY OF WESTERN AUSTRALIA

Curriculum Vitae

Simon Peter Fitzpatrick, born 29 July 1953

Research Interests:

Monotone operators on Banach spaces; geometry of Banach spaces, including the Radon-Nikodym property, metric projections onto sets and nonexpansive projections onto subspaces; differentiability of functions on Banach spaces; probability theory.

Other Activities:

International Master; International Correspondence Chess Federation (1999)

Assistant Editor and Problems Editor of the Mathematical Chronicle (1986--1987)

University Degrees:

BSc Hons, University of Western Australia, 1975

PhD, University of Washington, 1980

Appointments:

Visiting Research Scientist, CSIRO DMS, Melbourne, 1980

Visiting Lecturer, University of Illinois, Urbana, 1980--1982

Lecturer, Department of Mathematics and Statistics, University of Auckland, 1982--1991

Senior Lecturer, School of Mathematics and Statistics, University of Western Australia, 1991--2004

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This list has been updated by Simon's colleagues.

4. ABOUT THIS VOLUME

This volume contains 24 papers by 45 authors (including Simon Fitzpatrick) celebrating the research life of Simon Fitzpatrick. While we have published the papers in alphabetic order, they naturally fall under four general areas which capture many if not most of Simon's research interests. They are:

- 4.1. **Monotone Operators and Related Functions.** This represents seven papers by Bauschke, Maclaren and Sendov; Borwein; Burachik and Iusem; Combettes and Hirstoaga; Garcia, Lassonde and Revalski; Simons; Zalinescu
- 4.2. **Convexity, Convex Programming and Generalizations.** This contains six papers by Borwein, Monsanto and Vanderwerff; Butnariu, Reich and Zaslavski; Ernst and Thera; Ioffe; Moreno, Papini and Phelps; Rubinov
- 4.3. **Differentiability and Geometry of Normed Space.** This consists of six papers by Bandyopadhyayan and Godefroy; Fabian, Loewen and Wang; Fitzpatrick and Lewis; Giles (two papers); Mordukhovich

4.4. Nonsmooth Analysis and Lipschitz Functions. This comprises five papers by Azé and Corvellec; Bernard, Thibault and Zlateva; Eberhard, Sivakumaran and Wentzel; Ledyaev, Treiman and Zhu; Penot

Surely, the best possible memorial for Simon Fitzpatrick is that of the work of the large number of fine mathematicians who have contributed to this collection and to other volumes dedicated to Simon Fitzpatrick's memory such as [1].

Finally, I should like to thank the many people who have assisted with producing this volume, but especially, Bob Phelps, John Giles and my coeditors Petar Kenderov and Stephen Simons.

Jonathan Borwein, Dalhousie University
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FACULTY OF COMPUTER SCIENCE, DALHOUSIE UNIVERSITY, HALIFAX, NS, CANADA, E-MAIL:
JBORWEIN@CS.DAL.CA