Michael Owen Leslie Bacharach was born in London on 9th November 1936. He was the younger son of Elizabeth Owen, a seamstress, and Alfred Bacharach, a research chemist and the editor of the Penguin series *Lives of the Great Composers*, who had met through their left-wing political affiliations. Michael was educated at St. Paul’s School (1950-55) and Trinity College, Cambridge (1955-8) where he achieved a first class degree in economics, studying mathematics for Part I and economics for Part II. After he graduated, Trinity offered him a teaching post but he turned it down. He went to Stanford University, California for a year to study econometrics (1958-59) before returning to Cambridge, to the Department of Applied Economics, for his doctorate (1959-1965). After a year doing research at the Food and Agriculture Organisation in Rome (1965-66), he moved to Oxford where he was a Junior Research Fellow at Nuffield College (1966-7) and then a Temporary Teaching Fellow at Balliol College (1967-69). After two years at Balliol he chose to take an appointment as a Student, or fellow, of Christ Church and University Lecturer, and remained as such for the rest of his career. From 1991 he was also a Research Associate of the Institute of Economics and Statistics and in 1996 he was awarded the title Professor by the University, in recognition of his distinction.

During his career, Michael published over fifty articles and books in a number of areas, using a variety of methodologies. He divided his research interests into nine main subject areas: input-output analysis, the theory of economic planning and policy-making, Bayesian statistics, the methodology of economics, Rational Expectations, common knowledge and the economics of information, the foundations of game theory and rational decision theory, experimental economics and the economics of co-operation. At the beginning of his career, in the 1960s, Michael was involved with the Cambridge Growth Project, directed by Professor Richard Stone and Professor J. Brown. He worked on inter-industry relations and economic planning, modelling the way in which the producing sectors of an economy depend on each other’s outputs. His Ph.D. examined the mathematics of extrapolating input-output coefficients as
technology and economic structure change over time and was published as a book, *Bi-Proportional Matrices and Input-Output Change* (1970), which is still an important reference in the field. He put this knowledge to practical use, being employed as a consultant by: the Food and Agriculture Organization in Rome (Jun-Dec 1965), the Economic Commission for Europe in Geneva (1967 and 1970) and the UK Atomic Energy Authority (1975-77).

In Oxford, in the 1970s, Michael ran a Seminar on Mathematical Economics with John Enos and Michael Dempster. He was a Charter Member of the Game Theory Society and in 1976 published *Economics and the Theory of Games*, an early textbook on game theory. This is the study of strategic interaction. It models the underlying payoff structure of a situation and assumes that a payoff maximising player will make her optimal choice, or best response, given the choices of the other players. An outcome where every player plays a best response to every other player is called a Nash Equilibrium and, if there is a single rational way to play a game, then it involves playing a Nash Equilibrium strategy. There may be more than one Nash Equilibrium in which case there is an ‘equilibrium selection’ problem. Whether or not there is a single rational way to play a game is unproven but much of game theory revolves around predicting the play of rational agents by identifying Nash Equilibria.

By the time that game theory had become a core discipline in economics in the 1980s, Michael had already turned his attention to its philosophical foundations, both clarifying and criticising its assumptions. He was still running a seminar on Advanced Topics in Mathematical Economics, but its content was more eclectic than the title suggests. He covered foundational issues in decision theory and game theory, using formal methods from both economics and philosophy. In his research Michael turned to the epistemic foundations of economics and, in particular, game theory. He criticised the assumption of Rational Expectations, that individuals and firms can correctly predict the future. He introduced new tools to analyse common knowledge, the assumption that every individual knows what everyone else knows, everyone knows that everyone knows this and so on ad infinitum. He laid out a new framework for analysing situations of differential information using the knowledge
operator of modal logic. This is now the standard formal apparatus for studying such problems. He also pioneered the use of syntactic logic in the analysis of games and used it to show that, if players will play an action they know to be uniquely optimal, this is not enough to yield the result that a rational player will necessarily play a Nash Equilibrium strategy, even when a unique Nash Equilibrium exists. (It can be predicted that they would play a Nash Equilibrium strategy only when the Nash Equilibrium is the result of the iterated deletion of dominant strategies.)

In the 1990s, Michael continued to run seminars on game theory for economists and also to jointly run a number of interdisciplinary seminars and visiting speaker series, including a seminar series on decision theory with Susan Hurley where many of the ideas that would come to be central to his research had their initial presentation. In 1991 he set up and became Director of the Bounded Rationality in Economic Behaviour Unit. He continued to develop new theories to explain empirical observations of behaviour and began to make use of experimental methods to test their predictions. He investigated behaviour in co-ordination games, when there is more than one Nash Equilibrium. Although standard game theory is unable to provide a prediction of behaviour, in real life people do manage to co-ordinate. He came to the conclusion that, pace game theorists, it is crucially important that the actor does not reason about a problem as it is represented by the theorist but as she represents it to herself. He modelled this as ‘Variable Frame Theory’, which has attracted considerable attention especially among experimental economists. Michael also investigated ‘Buridanic’ choices, where people chose between options that have no relevant distinguishing features. The ass that this theory was named after did not choose between two identical bales of straw and starved to death. Real people do make such choices and, in order to understand how they chose, Michael worked on a theory of default reasoning in decision-making. Michael was critical of the individualistic focus of game theory. He suggested that, rather than always asking the question “what should I do?”, people sometimes see themselves as members of teams and, instead, ask “what should we do?”, which yields different answers. This draws on his variable frame theory, with the frames being individual and group
identity, and has the implication, in line with the empirical evidence, that humans may be more co-operative than standard economic theory predicts. Michael regarded the last ten years as the most successful of his research life. His ideas had come together in a unified research programme with clear long-term aims. Much of this was detailed in the book that he was writing at the time of his death, *Framing and Agency: Extended Game Theory*, which is being published posthumously by Princeton University Press in 2005.

Much of Michael’s work involved working in teams. He collaborated with researchers in a variety of disciplines, including sociology, psychology and philosophy, as well as economics. One particular theme on which he collaborated with others was trust. With other members of BREB he elaborated and tested a mechanism called ‘trust responsiveness’, which is the idea that overtly putting one’s trust in someone makes them respond in a trustworthy fashion. He was also part of an inter-disciplinary group that was investigating how people signal that they are trustworthy. In addition, he had associations with academics outside of Oxford, holding many visiting appointments over the course of his career, the main ones being at: Harvard (1976), Siena (1984), Brescia (1986), Bergamo (1987), Pavia (1988), Torino (1989) and Edinburgh (1997).

In line with his research and his upbringing, Michael believed strongly that there is such a thing as society and he was one of those who publicly opposed granting Mrs. Thatcher an honorary degree. He had a lifelong love of music, both jazz and classical, and played the piano and the flute. He was also an avid follower of cricket. Michael was devoted to his family groups. His first marriage was to Susanna Montiel in 1958. After it broke up, he spent nine years as a single parent, bringing up their daughter Ana. He met his second partner, Elizabeth Fricker, in 1974 when she was a second year undergraduate. They moved in together in 1976, had two children, Julian and Emily, and were married in July 2001. Together they developed a noticeable appreciation for all things Italian. Most of Michael’s visiting professorships were held in Italy and his death was marked by the Italian press as well as the British broad sheets. He died whilst on holiday with his family there. On August 12th, 2002 he had a heart
attack on the beach in Versilia, one of the places where he had been happiest.

Natalie Gold

**Extract from Obituary in ‘The Independent’**

His second book, Economics and the Theory of Games (1976), heralded a fascination with game theory that was to last all his life. However, his later work became more critical of that theory and of conventional economic models. The restrictive rationality assumptions on which they have often been based (and, in the case of game theory, which he analysed through pioneering use of the logic of knowledge) were particular targets. In the early 1990s, he created the Bounded Rationality in Economic Behaviour research unit, which he directed until his death. While doing so, he produced some of the work that he saw as his most important.

Game theory and conventional economics have been dominated by the principle that the best way to understand the interaction of a group is to start by analysing the decisions facing individuals within it. Such theories usually treat each individual as an autonomous agent, with coherent beliefs and desires, asking the question “What should I do?” and acting in accordance with the answer. The individual’s decision problem is typically modelled in abstract, mathematical terms. For example, a central idea of game theory is that the key features of an interaction can be captured by specifying a few variables - the “players”, their knowledge and preferences, and the “strategies” available to them - and representing them mathematically.

Bacharach’s 1976 book (though subsequently partly overtaken by developments in the subject) was, when it was written, one of the most elegant introductions to the theory. But, notwithstanding his mathematical ability and preference for formal models, much of the last 20 years of Bacharach’s career were spent developing a sophisticated critique of conventional game theory. Major components of it have appeared in academic papers, but the book on which he was working at the end of his life was intended to be its fullest statement.

The critique had its roots in his wide inter-disciplinary knowledge. This left him unsatisfied with accounts of strategic
interaction that use only the sparse conceptual repertoire of standard game theory. Such accounts, he felt, leave out how agents represent or “frame” problems to themselves and, equally important, how they think other players are doing so. His “variable frame” theory, developed during the 1990s, was an attempt to incorporate these issues into game theory without sacrificing its formal rigour or predictive power. The aim was not just greater realism in describing mental processes; he saw framing as the solution to foundational questions about society, such as how people co-ordinate their actions and whether they will co-operate.

The explanation of co-ordination and co-operation are major problems for theories, like standard game theory, built on methodological individualism. The central message of the Prisoners’ Dilemma, perhaps the most famous abstract game, is that agents who act on principles of individual rationality may fail to take opportunities for collective benefits. Litter, over-fishing and arms races are commonly cited examples. However, there are many instances where co-ordination or co-operation do occur. Some arise in everyday life, such as the avoidance of collisions on the road and the provision of blood for transfusion by voluntary donations; others have been observed in controlled laboratory conditions, including in recent studies of trustworthy behaviour conducted by Bacharach and his experimental economics research group in Oxford.

Bacharach’s objective was to extend game theory in ways that would allow it to explain co-ordination and co-operation better. The key to these phenomena, he thought, was not just altruism; rather it was framing and, in particular, a psychological tendency for individuals sometimes to see themselves as members of “teams”, rather than as isolated, independent, agents. On his account, there are times when their psychology leads individuals to act in accordance with the answer not to “What should I do?” but to “What should we do?”. This view of agents could have radical implications for economics, social science, psychology and philosophy, potentially illuminating the balance between co-operation and hostility in society. It is deeply unfortunate that his death prevented Bacharach from completing the final exposition of it that he intended.
However, he leaves a significant intellectual legacy. His work on input-output analysis is still used. Enough of his more recent ideas have been developed in sufficient detail to influence others and he had co-researchers across several disciplines who are aware of them. He was an inspirational supervisor to many of his research students, having a remarkable knack of combining generous encouragement with uncompromising scrutiny of their work. Many regarded him as a mentor long after they had moved to academic posts of their own. His death is a great loss to them and to social science. He was still at his intellectual peak.

Robin Cubitt

Memorial Service Address by Robert Sugden

I first met Michael at a seminar he organised in Oxford, I think in 1988. Over the fourteen years since then, we gradually became friends and intellectual allies. Probably I still know less about Michael the rounded person than many of you do; but I think I’ve been close to the research he’s done over those years, and which he saw as his best work. I’ve admired it and learned from it, and I like to think that I influenced it too. So, I shall talk about Michael Bacharach the economist.

Michael was sixty-five when he died. For most economists of that age, their major contributions have been around for twenty-five years or more, and there is a fairly clear sense in the profession of how significant those contributions have been. But, as I’ve said, Michael thought that his most recent work was his best; and I think he was right about this. So it’s still too early to say how much impact his ideas will have. But there is no doubt that the people who work on the same problems as Michael worked on see his ideas as extremely important; I’ll try to explain why.

His work was highly original, very different in many ways from typical economics. Obviously, this originality was partly due to his extraordinary intelligence. But I think there was more to it than that.

He had enormous enthusiasm for new ideas. I often used to get long e-mail messages from him, asking what I thought of some new
idea he’d just had, or had just heard from someone else. It was the same every time we met: he always had new ideas he wanted to try out; he was excited about them and he wanted to know how other people responded to them. He wasn’t preoccupied (as so many academics are) with re-stating and defending positions he had taken in the past: he was always trying to discover something new.

Economists tend to be resistant to the idea that other academic disciplines might have something to contribute to the understanding of economic issues. Not Michael. In developing his theories, he drew on ideas, discoveries and methodologies from an astonishing range of disciplines: analytical philosophy, philosophical logic, sociology, social psychology, experimental psychology, cognitive science, artificial intelligence, biology – and probably others I have overlooked.

Among academics, there is a tendency to look down on interdisciplinary research as unstructured or unrigorous. But no one could ever accuse Michael of lack of rigour. Rigour was his trademark. He had been trained as a mathematical economist, and so there was never anything loose in his mathematics. But (in a way that many economic theorists are not), he was also absolutely precise in presenting arguments outside his formal models. In an obituary, Robin Cubitt (who was once one of Michael’s graduate students) talks about how Michael as a supervisor combined ‘generous encouragement’ with ‘uncompromising scrutiny’. From my experience of once writing a paper for a volume which Michael edited, I can attest to this. He scrutinised every sentence for literal truth, and tested every sentence against every other for logical consistency. No short cuts were allowed. These were the standards he applied to his own work. When you read one of Michael’s papers, you can be sure that there will be no loose ends in the argument that can unravel, no gaps concealed by rhetorical flourishes: everything is open to view, everything fits together properly.

One of the things I most admired about Michael was that he worked to his own research agenda. A lot of work in economic theory is driven by fashion: at any one time, there is only a small set of problems that are deemed to be worthy of the attention of leading theorists. Clever people who work in these areas are the people we call
leading theorists; clever people who work outside them are eccentrics. But it didn’t seem to matter to Michael whether other people thought the topics he was working on were important or not. He had the intellectual self-confidence to trust his own instincts. He just tried to find answers to the questions he thought were worth answering. And, much more than many more flashy theorists, he did find answers to questions that were worth answering.

So, what were these questions, and what were his answers?

It’s not easy to explain fifteen years of Michael’s research in simple terms in a few minutes, but here is the best I can do. He worked on the foundations of game theory – that is, the study of strategic interactions between people. Michael was well ahead of his time in seeing the significance of game theory for economics. But from the outset, he saw that there were deep problems in the theory – problems about the internal consistency of its assumptions, about the indeterminacy of its predictions about behaviour, and about the accuracy of those predictions when they are determinate. Michael’s research programme has been to understand why these problems arise and how they can be resolved.

The central tradition of game theory is to analyse strategic interactions between ideally rational players. In recent years, however, there has been a movement away from this approach. The consensus now, I think, is that the problems of game theory result from assuming too much rationality on the part of real human players. Michael’s diagnosis is different.

On Michael’s account, the flaw in the theory is not that it assumes that people are better at reasoning than they really are. Rather, its model of valid reasoning is flawed. Michael’s project is to reconstruct game theory with a truer representation of what valid reasoning is – truer in two ways.

First, he argues that game theory confuses the world as seen by the theorist with the world as seen by the individual actor in the theorist’s model. It assumes that the actor reasons about the decision problem that appears in the model, rather than about the problem as she represents it to herself. Michael’s solution is to enlarge the theoretical representation of a game so that it includes the ‘frames’ that the players use to describe to themselves the problems they face.
Michael was the first person to see clearly how this idea could be used in game theory. Among other things, it turns out to help to explain how people can coordinate their actions without communicating with one another.

Second, he argues that game theory is wrong to assume that a person’s reasoning – say, my reasoning – is always about what I should do, given what I expect others to do, rather than about what we should do together. In rational choice theory, this is heresy. He develops a model of team thinking, in which individuals act as members of teams. Michael wasn’t the first person to have this idea – I think he was influenced by Susan Hurley and myself, although we weren’t the first to think of it either. But he developed it into a much more complete theory of team thinking than anyone else has done.

At first, he needed the idea of team thinking to fill what he saw as a gap in his explanation of how people use frames to coordinate their actions. But, over the last few years, he found more and more ways in which these two big ideas fitted together, and in which they led to new ways of theorising about human rationality. At the time he died, he was working on a book which would have integrated all these ideas.

I hope it will be possible to publish those parts of the book that he had finished before he died. But in any case, his most important ideas are published, and many people have seen how significant they are for some of the central issues of economics. They will live on.

Robert Sugden

Memorial Service Address by Jonathan Miller

I think that Michael would have appreciated the Proustian problem which I have in reconstructing those early days at St Paul’s School when we first became acquainted with one another. If we had continued to see each other the memories would have been elaborated and reinforced. What happens when a friendship continues throughout life is that the myths of its pleasurable origins are constantly re-told and re-edited so that subsequent events are visualised and experienced as examples and epitomes of what were originally enjoyed and objected to. Although we never fell out or quarrelled we made little
effort to renew and maintain what had once been a mutually amused companionship. I have often said that England was stuck in the thirties until the 1960s, and although St Paul’s was a day school so that one could escape from some of the wilder excesses of a system which was so vividly illustrated by Lindsey Anderson’s film ‘If’, there were certain aspects of school life which struck some of us as oppressive and even absurd. I suspect that the main reason why we took such pleasure in each others company in those days was that we recognised one another as informal members of an underground, albeit passive, resistance to the as yet unreformed ideology of the English public school — a world of prefects, patriotism and prayers.

At a distance of more than fifty years it’s difficult to remember exactly how the members of this scattered resistance recognised one another but it had something to do with what W H Auden described as ‘the ironic points of light which flash out wherever the just exchange their messages’. I can’t remember exactly where or even when I first picked up one of the flashes transmitted by Michael but I imagine that it must have been in one of those places which those of us who felt at odds with the Pauline proprieties regarded as safe-havens. There was art school for example which was for many of us a bohemian sanctuary in which subversive ironies were safely shared between those who for one reason or another refused to join the Combined Cadet Force and who opted for fencing as opposed to the manly rigours of rugger and boxing.

Wherever or whenever it was Michael and I rapidly established a subversively joking relationship which soon developed into a series of explicitly comic routines which we ventured to offer as a contribution to the annual performance of the so called Colet club review. I can scarcely remember what it is we did together on the stage although it seemed to mystify and irritate the master who was in charge of the event, especially when Michael came up with the inspired title of Les Enfants du Parody, and I can still recall his embarrassment at having to explain its allusion to Jean Louis Barault’s film which both of us had recently seen at the Everyman cinema in Hampstead.

Anyway by that time Michael and I were sharing a weekend life outside school visiting each others houses in North London. Michael as it happens was a year or more younger than I was but I have to
admit that I learnt more from him that he ever did from me. For one thing Michael was an accomplished mathematician and he patiently tried to explain the mysteries of calculus and perhaps most memorably Bertrand Russell’s mathematical logic. I must have been a frustratingly stupid pupil, even though I was forcibly struck by the formal elegance of his imagination and although I didn’t fully understand what he had to say at the time, I can recognise by hindsight at least the flare and finesse which characterised the work that later made his reputation.

But in contrast to some of his more conventional mathematical colleagues for whom literature was little more than a pretentious indulgence, Michael was a sophisticated reader who revelled in Proust’s lengthy reminiscent paragraphs and it was due to his infectious enthusiasm that I discovered not only Proust but also the novels of Gide and Flaubert. He also broadened my musical taste by introducing me to Debussy and Ravel. In fact for me the most vivid mnemonic of our friendship, the acoustic equipment of the Madeleine dipped in tea is Ninon Vallin’s rendering of Claire de Lune. It has only just dawned on me that my recent decision to set Pelleas and Melisande in the world of the Guermantes is the distant but undeniable consequence of Michael’s benevolent tuition.

During this time Michael and I continued to collaborate as writers and performers of comic sketches. Although I don’t know how we managed to do it or how it came about we somehow managed to get ourselves a weekly spot on a radio show called Under Twenty Parade. And I imagine it might come as a surprise to his children not to mention his academic colleagues that Michael had a brief applauded career as a radio comic. But all that came to an end when we went our separate ways at university.

I saw Michael rather infrequently after that and looking back as I now have occasion to do I find it difficult to forgive myself for having carelessly allowing such a valuable friendship to lapse.

Jonathan Miller
Memorial Service Address by Peter Oppenheimer

Michael and I were appointed to tutorships in economics within a couple of years of each other in the late 1960s. We were colleagues for 30 years, most of a working lifetime. I seldom pondered my good fortune in having such a colleague, any more than I reflected on the environmental privilege of being able to refer to Tom Quad or Peckwater as my office building. It’s so easy to take good things for granted, none more so than a working relationship that is a habitual source of confidence and wisdom. I’m not here thinking solely of Michael’s professional calibre as an economist (of which more in a moment), but also of his conscientious administration over a lengthy run of years as our senior tutor in PPE. Routine matters aside, I have special recollections of the somewhat melancholy thoroughness which he would bring to the task — a rare task, happily — of disciplining academically delinquent undergraduates. Intellectual laziness or neglect aroused in him a deep-seated exasperation, tempered by sadness and puzzlement that academic attainment could hold so little appeal for the delinquents in question; and might there not be some approach, or device, worthier than schoolmasterly sanctions to persuade them to alter their priorities? Michael’s own devotion to academic life and work was too obvious to need stating — and was matched only, I believe, by his devotion to the members of his family, of whatever generation.

The objectives that he pursued in research were twofold. On the one hand, technical rigour and exactitude; and on the other, that this rigour be directed to achieving a genuinely new level of understanding of economic phenomena, and not merely an elegant reformulation of familiar insights. Michael imposed these requirements upon himself as a matter of course. But he also used them as the basis for constructive guidance to graduate students and, if asked, to younger or less accomplished colleagues. Together with his methodical and patient style of exposition, it made him an inspirational research supervisor and research director. In more basic domains, undergraduate pupils still striving to grasp the broad picture could be daunted by Michael’s insistence on detail and precision. Daunted — but at the same time
memorably edified by the meticulous exercises in logical or mathematical reasoning being laid before them.

Economists distinguish between so-called positive or explanatory aspects of their subject, and normative or prescriptive aspects. Between how the world works, and how it may be made to work better. It is illuminating to consider Michael’s scholarly persona in terms of this distinction. Overtly he was a strict positivist. In his doctoral youth he investigated input-output relations. That is to say, the structure of mutual dependence among the producing sectors of a developed economy upon each other’s outputs. Thereafter he moved away from this comparatively empirical focus, to concentrate on the fundamentals of economic decision-taking. This too involves interdependence. Not, however, of whole industries or enterprises upon one another’s technology, but rather of individual persons upon one another’s reasoning and behaviour. In the process, Michael was drawn into extending his analytical methodology beyond purely economic frameworks, such as the theory of games, to include elements from a range of neighbouring disciplines: sociology, logic, psychology, artificial intelligence…. The unifying thread was the positivist urge to explain and therefore understand how individuals function in a social context. Being rooted in this positivist agenda, Michael’s work did not claim to identify any quick-fix routes to social betterment. He did not propound ideological remedies for injustice; or peddle formulaic cures for famines; or recommend more ingenious tax regimes to grind the faces of the rich. Nonetheless, while devoid of preaching, Michael’s scientific commitment did rest on a firmly held set of fundamental beliefs and values. He was seldom moved to articulate them in public discussion, but they were apparent to people who knew him. He did not believe in God. But he had a deep, rather eighteenth-century confidence in the ultimate capacity of human beings to learn to organise a good society through rational co-operative behaviour. A good society being one which minimises collective pressure to conform, and gives wide scope to individual tastes and lifestyles, but which also strives to avoid extremes of inequality. How much inequality is acceptable, and what actions are desirable to mitigate it, Michael regarded as pragmatic and very difficult questions, not to be satisfactorily resolved by recourse to
ideological recipes. He approved of artistic patronage and did not think that it should all come from the taxpayer, though quite a lot of it should. He viewed social solidarity in various forms (not necessarily including pure altruism) as indispensable for enabling individuals to realise their human potential, quite apart from any mundane assistance in coping with life’s vicissitudes. In relation to grander sentiments such as patriotism he was far more cautious, because of their tendency to spill over into undue aggression. Humanity’s rougher instincts need to be curbed through social institutions. During the Thatcher years Michael was equally appalled by three things: first, Mrs Thatcher’s bellicosity over the Falklands conflict; secondly, her dictum that “There is no such thing as society, only individuals”; and thirdly, her logical impertinence in daring to assert the two aforementioned positions simultaneously. In 1985 he associated himself with the then Regis Professor of Medicine, the President of Corpus Christi, and one or two others, in publicly opposing the motion to grant Mrs Thatcher the Honorary Degree thitherto customary for an Oxonian Prime Minister. A rare excursus on Michael’s part into the realm of political initiatives.

It is hard to reconcile Michael’s death on the not-quite-eve of his retirement with the extraordinarily youthful atmosphere that emanated from him: a young family, and full creative vigour in research, with funding from the most prestigious public bodies. Happily this makes it easy to fall in with his own generally optimistic outlook on inheritance, the opposite in fact of that proposed by Mark Anthony: The good things that men do live after them; The evil are oft interred with their bones. I don’t know about evil things that Michael did. If there were any, he was very discreet about them. But to his children Julian and Emily, and to their older sister Ana, he has bequeathed an impeccable inventory of priorities — educational, artistic and Italian. And to his professional colleagues, an almost completed book on decision theory and related topics, incorporating the fruits of his thinking and experimentation over (at least) the past decade. Along with a major extension of ideas derived from the analysis of risk and uncertainty (such as the idea that mathematically identical risks are perceived differently by most people, depending on the form or context in which they are presented), the book elaborates the
innovative concept of “team reasoning “ as a style of decision-taking uniquely characteristic of cohesive groups of individuals. These diverse legacies, familial and professional, we shall in our respective ways relish and reflect upon for many years to come.

Peter Oppenheimer

**Recollections**

Michael and I were at school together during the war first as evacuees in a village in North Wales and then in Essex followed by the Hall near our home in Hampstead. We were contemporaries at St Paul’s as Bacharach 1 and Bacharach 2. From there we took different paths. Michael achieved the “heights” of a scholarship to Trinity College, Cambridge, then went to Stanford and on to begin his career at Oxford. I achieved the “depths” as an underground mining engineer and mine manager, working in the very different world of a Midlands coal field. I never knew exactly what Michael did in his teaching and research in Oxford, nor did he know exactly what I did, managing production and difficult labour relations in Stoke on Trent and Nottingham. But when we met up (regrettably too rarely) it was always as if we’d only been apart for just a day or two – natural, relaxed and comfortable – as was his approach to everyone. When I visited Michael’s home in Oxford, first in Warnborough Road and then in Alma Place, the surroundings where familiar since Michael had furniture, books and pictures from our parents’ home – notably the grand piano and our father’s set of Groves Dictionary of Music. Michael added another dimension of familiarity as he so wonderfully continued the tradition of our father, Alfred whose life had been a brilliant combination of work in science, a love of food and wine, enthusiasm for music and precise and disciplined use of the English language. Michael had the same multi-faceted approach to life that was very much in his father’s mould. This he combined with the kindness, warmth and concern for others which sprung from our mother, Lily. It was always a pleasure to converse with him and to feel his interest in a world outside Oxford, although without a doubt he was a completely Oxford person, albeit with a love of other countries.
expressed by the house near Toledo and then his love of Italy and his search for a home there, sadly not concluded. He had an absolute commitment to his family and a deep involvement in every aspect of his life with Lizzie and the activities and achievements of Emily and Julian which I admired but couldn’t emulate. His care for Ana showed the same dedication and commitment and I know he valued her enormously. I miss him.

John Bacharach

Michael and I first came together at St. Paul’s to edit *The Debater*, which had been started by G. K. Chesterton and which had by 1953 become (we decided) very dull indeed. We immediately circumvented all the traditional pieties. The customary meeting with (and indeed, at) the girls’ school was like the negotiation of an impossible political treaty. Their articles on “being asked to write for *The Debater*” came down to our end of the table, and Michael and I wrote a very large NO on each of them. The final issue of our régime, with its neo-Vorticist cover, lewd lino-cut cartoons, existentialist poems and a Letter to the Editor which asked “Why should I join the Old Pauline Club?…This looks like jobs for the boys”, was too much: Chesteron’s venerable organ was quietly closed down.

Michael was one of those unassumingly charismatic and dissident presences who can suddenly make school seem worthwhile. In a characteristically mandarin prose his editorials attacked the Rules or welcomed workmen who had mysteriously arrived on the school premises (“Him we visualise in the tuck-shop putty-caked over a chipped white cup of tea, at an hour when all but the barlady we know best refuse to serve us on a fruitless skive.”) I began to imitate these involved cadences, and even adopted his style of handwriting to do so (tentative soft angular pencil on lined sheets – reduced means, maximum effect). When I now read the reports of the Gramophone Society which we jointly ran I cannot tell which of us wrote them. (We both had a passion for Ravel, but I think he was less impressed
by the Soviet composers I advocated). I can recognise the Bacharach manner when it is used (good-humouredly) against him, as here in a beautiful display of accumulating negatives in a report of the Milton Society, which met to read plays: “We could rely upon hardly a single member not to turn up, though Bacharach did not fail us.” Perhaps he wrote this himself.

When Bacharach did “turn up” life was always the better for it. He was thin, with delicate freckled skin. He had a slightly feline lisp and a baleful manner, looking at you with a full use of his eyebrows and an individual was of folding his arms. He sometimes seemed haunted by an indefinable angst, like Helion Sumastros, heron of one of his Pinteresque pre-Pinter playlets. The quick, precise mind contained a streak of cruelty, I sometimes thought, but most of the time he purred with amusement. When Eric Korn left, he teamed up with Jonathan Miller in the school revue. Miller-and-Korn had been quick-fire radio chatter that left the parents perplexed and the school aching with laughter. But Jonathan had already moved into his most rapt and mercurial mode of intellectual mime (becoming Gregor Samsa or Bertrand Russell or a duffel-coated tortoise, in lightning changes of character) and Michael’s dry contributions sometimes seemed superfluous. But it set the seal on his cultural presence in school.

I am still surprised to realise that Michael was only seven weeks older than I am, so infinitely more sophisticated was he when we were both sixteen. For nearly fifty years we have been half-smiling at each other in ironic recall across the Oxford streets. Too late now to explore those memories more fully.

John Fuller

During the academic year 1963-4 (if I recall correctly), Richard Stone introduced me to his best student, young Michael Bacharach. His impressive intelligence and breadth of knowledge, within and
without economics, was obvious; it was also clear that the topics he was working on were not worthy of such intellectual power.

I didn’t hear from or about him for many years. Then came his paper basing the concept of common knowledge on modal logic. It was one of those intellectual clarion calls we hear so rarely. After that, Michael’s combination of philosophy and rigor yielded insight after insight. I finally met him in person again when giving some lectures at Oxford, and he showed not only his intellectual intensity but also his warmly felt hospitality.

His qualities have become a permanent part of my memories and, no doubt, of those of many others.

Kenneth J. Arrow

Michael Bacharach was an extremely responsible father who I could trust throughout my life and turn to at any hour of need. During his two marriages, first to my own mother Susi and then to Lizzie, he kept up a consistent relationship with me and was an exceptionally stable figure. He was also very kind and understanding and was somebody that I could always rely on.

I found him to be extremely self-disciplined, both intellectually and in his lifestyle, and therefore rigorous and strict. It was quite natural for him to have the same high expectations of others as he had of himself. Many is the time I have embarked upon a conversation with him (sometimes about his work in economics) only to have my more fanciful ideas put in their place!

All in all, I have never known such a dependable personality and I was very surprised at his death which was quite unexpected.

Ana Bacharach
Michael and I arrived in Oxford at the same time, September 1965. Michael had beaten me for the 1965-66 Junior Research Fellowship at Nuffield College and I had instead become IBM Junior Research Fellow at the Mathematical Institute. We met in the Michaelmas Term at a seminar in Nuffield given, I believe, by Chris Allsopp. In the following year I succeeded Michael at Nuffield College as Junior Research Fellow and in January 1967 became Fellow and Tutor in Mathematics at Balliol College where Michael soon arrived as a term fellow in Economics. We were from the beginning – and I would like to think to the end – friends as well as colleagues. Michael and Susy Bacharach introduced my first wife, Ann, and me to the racy set at Cambridge which included, amongst many others, Frances Crick, Nicky Kaldor and John Gayer-Anderson. As colleagues, together with John Enos and a variety of illustrious economists, we conducted the Mathematical Economics Seminar for over twenty years.

What I remember most fondly about Michael was his characteristic giggle. As all his friends know, Michael had a well developed sense of the absurd, the incongruent and the downright illogical. The same quiet giggle appeared when these characteristics appeared either socially or professionally. It was the signal to friends to recognise that the statement, behaviour, situation, … was not to be taken as seriously as it might at first blush warrant. To the perpetrator it appeared as a polite – possibly nervous – reaction to events. I treasure to this day a number of these moments over many years.

Michael Dempster
He stood beside us, like our youth,
Transform’d for us the real to a dream,
Closing the palpable and the familiar
With golden exhalations of the dawn.

Coleridge, *Wallenstein*.

The Mike I knew comes from more than thirty years ago. I remember our first meeting vividly. It was February 15th 1968: I had just been elected a Fellow of Balliol, and was feeling rather sore at the prospect of leaving my wonderful research post at the Warburg Institute for the humdrum life of an Oxford don. Christopher and Bridget Hill had the inspired idea of inviting all the younger Fellows and those about to join the college next year to a buffet supper in the Lodgings. It was there I met the two most glamorous young couples in Oxford, Malcolm and Jenny Green, and Mike and Susi Bacharach.

Mike was the handsomest man in Oxford, tall and dark-haired, with thick lips and a gentle smile, elegant and intellectual beyond belief: he could explain the absolutely opaque utility factor in economics, to a point of crystal clarity - until he stopped talking. Susi was a Spanish beauty of extraordinary vivacity and energy. I fell in love with them both, and their daughter Ana. Life for them seemed to pass in a succession of discussions, which extended through the night until dawn: the combination of their minds was unique. Susi had an endless imagination, and a desire never to go to bed; Mike’s mathematical brain would transform her wildest speculations into possible universes: they could hold and elaborate the same fantasy for hours on end, finally returning the idea to its eggshell as dawn broke. I have never before or since experienced such conversations, such wide-ranging discussions in which everyone contributed to the building of a dream castle, without any sense of personal rivalry or the slightest disagreement. It was the greatest intellectual experience I have ever known.

I spent as much time as I could with them, in their tall thin house in Warnborough Road, filled with exotic antiques, which Susi had acquired in her role as a stall-holder in the Portobello Road and Camden Market; she taught me how to recognise the periods of tribal
art, before and after the influence of Birmingham. The sitting-room was painted black, with strange seventeenth-century primitive Spanish art: there was a ‘Roman charity’ of appallingly powerful ugliness (the bearded old man sucking at his daughter’s breast through the bars of a darkened canvas – the first time I had ever seen such an image). There was a ‘Rape of Europa’, whose sources I researched for her in the photographic archive of the Warburg, looking up the endless grey metal filing cabinets labelled ‘Zeus, loves of.’. One summer I visited their seventeenth century Spanish courtier’s residence in Orgaz, near Toledo, and drank brandy at a local novillada as the bull crashed against the rickety scaffolding of a temporary arena before being inexpertly slaughtered by novice matadors; later we ate the fresh bull’s meat that was on sale behind the stadium, one of the few times I have eaten meat fresh in the ancient style, which has not experienced rigor mortis or needed to be hung.

Slowly Susi slipped away, and my own marriage broke up: for a year I came to live in an attic room in Mike’s house, and used to sit with Mike and Ana in their basement kitchen with its yellow oilcloth table and its ever open bottle of red wine: it was Mike who taught me that there is always another bottle and another evening, one should never finish both together. He taught me also the pleasure of drinking slowly from heavy ancient glasses, and of meandering conversation. I remember once a discussion about the morality and etiquette of falling in love with one’s student: it might be wiser, I said, not to live together until she has graduated: only Lizzie knows if he heeded my advice.

One Easter (around 1971-2), Mike, Larry Siedentop and I decided to take a four-day break in Istanbul: the cost was £40, and we reckoned it was cheaper and more interesting than staying in Oxford. Turkish Airlines (on which we were to fly) had just acquired some new Boeing 747s, but had omitted to pay for pilot training; when the first airplane fell out of the sky Mike’s mathematical skills made him jubilant: the chances of a second crash were infinitesimal. Two weeks later another one dropped like a stone over Paris, killing two hundred passengers. That apparently completely altered the statistical prognosis, in ways that logically I could not understand. But they
learned how to close the baggage door, and the flight was nervous but uneventful.

We stayed in a tourist hotel in Taksim Square. It snowed a little and was very cold. By day we walked the ancient walls of Constantinople, and met the gypsies encamped along them; we found the most beautiful monument in the world, Theodore Metochites’ Kariye Djami, whose frescoes redeem Byzantine civilisation; we experienced Ayia Irene, the most perfect of all Byzantine churches with its green mosaic dome and iconoclastic cross; we talked to young Palestinian students training in exile to be doctors and engineers. Half way down the Istiklal Caddesi by Galatasaray Square on the right, hidden down a back alley, was (and still is) an ancient restaurant in a nineteenth century Jewish synagogue, called the Yeni Rejans (or Régence in normal French). It was run by three Russian princesses left behind by the revolution, who had married Turks, but still spoke perfect pre-revolutionary French. There was a Russian stove in the centre of the bare wooden room, a women’s gallery at one end, and wood benches by the tables. Around the walls were brass plaques recording the favourite seats of long-vanished foreign diplomats and exiles of the twenties. The food was exquisite Russian borsch and Black Sea fish; on each table was a bottle of chilled vodka with slices of lemon in it; and when the meal was over, there was always the polite but unanswerable question, ‘Combien de vodkas, messieurs?’ We felt like characters in a novel, and ate there every night. Since then I have been back twice in thirty years, and am happy to say the place is unchanged, except that the princesses have passed on, and their daughters have replaced them: the French is not so pure, but the food is just as good: salut aux princesses.

By then Mike had left Balliol for Christ Church, despite being offered (after a fierce battle) a Fellowship together with the right to choose his colleague: he was driven away by the hatred of Lord Balogh for mathematical economics. It is hard now to remember the vitriolic divisions within Economics between the political economists and the mathematicians in the days when Economics believed it ruled the world.

When Mike and Lizzie first began to live together, I found them a college flat beneath ours in Saint Margaret’s Road, and remember
her brother Jeremy craftily practising Bach downstairs on the cello before his Oxford interview, to charm his future interviewer through the floorboards. Penny and I were married on October 4th 1976, and Mike was my best man; Lizzie came to the celebration, which was a lunch for seven at a friend’s restaurant closed for the day.

Since then we have gone our different ways, meeting by chance but always with that sense of old friends who do not need to justify or explain; the last time we met was at our silver wedding in Holywell Manor garden on September 23rd 2001. I doubt if Mike ever understood the profound effect that those early memories of his physical and intellectual beauty have had on the rest of my life; for me he truly represents youth at its highest point, in the sixties when dreams were indeed more vivid than reality.

Oswyn Murray

I first knew Michael as the partner of my fellow philosophy student Lizzie Fricker, in the late 1970s when I was a graduate student in Oxford. I was living in London in those days but needed to be in Oxford often, and Lizzie and Michael kindly offered to let me stay regularly (and my two Siamese cats irregularly) in a spare room in their house in Alma Place. My visits there were embellished by fizzy interdisciplinary conversations over long, sumptuous dinners. Michael was still a frequent traveller to Spain in those days, and there was a Spanish accent, elegant and earthy, to his cooking as well as the décor; over time his aesthetic focus shifted from Spain to Italy. I recall Michael’s enjoyment in planning a lovely cobblestone courtyard that was laid in their garden. Michael’s distinctive taste was expressed in so many things that he did, but always in a way that invited others to share in the pleasure he took in beautiful things, never in a way that excluded others.

As well as a love of things Italian, Michael and I shared interdisciplinary and unorthodox tendencies that made us natural collaborators. For some years in the mid to late 1980s we together ran
a graduate seminar on philosophy and economics, focussing on the theoretical foundations of decision and game theory. I think we both took great pleasure in this long intellectual partnership, and looked forward to our intense weekly seminar discussions and lunches in the Oxford Social Studies Faculty. The seminar eventually culminated in the volume we edited together. After that, we grew apart intellectually as our research developed along different tracks, but we remained warm friends, and occasionally had long and stimulating conversations about collective action and team reasoning, which remained a shared interest. He was an intellectual resource for me, a source of knowledge, clarity, imagination, and judgement. The last time I saw Michael was in the summer term of 2002, when I invited him to dine in All Souls and to meet a former doctoral student of mine who was also interested in collective action. We parted, as always in recent years, saying how good it was to talk and that we must see one another more often.

I have a strong image of Michael in conversational flow, eyes lit up by an insight, his precise, resonant voice carrying an enjoyment of intellectual exchange that often spilled over into warmth and amusement. He was a wonderful friend and a generous and gifted colleague and I will miss him deeply.

Susan Hurley

Many highly intelligent people are not intellectuals, and not all intellectuals are highly intelligent. Michael Bacharach was, to put it mildly, both an intellectual and a highly intelligent person. No part of life was too small to benefit from fresh theoretical reflection, of which Michael would give it the best: lucid, powerful, completely unpretentious and deeply searching. He loved surfaces; he loved finding out what lay beneath them. For him, thinking was no departure from the pleasures of life but a way of making them more profound. A good distinction has as subtle a taste as a good wine. To talk to Michael about bounded rationality or Italian beach society, logic or
lego, was to learn by playing with ideas, or against them – disagreement was part of the fun. If the unexamined life is not worth living, I have never felt less in danger of living it than with Michael and Lizzie and, increasingly, Julian and Emily.

My closest professional connection with Michael concerned epistemic logic, which tries to model the formal structure of human knowledge, seeking an elusive fertile compromise between mathematical elegance and the rough ground of our actual limitations in practice. Unlike many economists even in that area where economics and philosophy overlap, Michael could think like a philosopher, always willing to question an assumption no matter how great its formal convenience. Sometimes he did not know the canonical technique that logicians had developed for proving a certain kind of result and would invent one of his own. Interdisciplinary syntheses are often shallow, muffling the distinctive voices of each discipline; Michael’s interdisciplinary analyses were the opposite, because he engaged each side on its own terms. He published in some of the leading journals of philosophy in the world. One guesses how much he learned from Lizzie, and how much she learned from him. His death is a self-evidently cruel setback to the development of the lines of thought on which he was working: but his ideas are so robust that, in the long run, they will look after themselves. Like his children, they will have a life of their own.

Michael jokingly said that, soon after his appointment at Christ Church (which has changed much since then), he was classified as ‘unsound’ in virtue of the shoulder bag that he always carried, and was consequently kept off college committees for many years. If he displayed unsoundness, we need much more of it, not necessarily in the form of shoulder bags.

I last saw Michael at a concert given by my partner, the pianist Ana Mladenovi, in the Holywell Music Room, a few weeks before his death. He was as full of life as ever. His wide knowledge of classical music deeply impressed Ana. He planned to take lessons to improve his flute technique.
Talking with Michael on the summit of Ben Ledi or the terrace of the Palazzo Pubblico in Siena: that is one kind of thing that has made life good.

Timothy Williamson

I never in my life met a mind as sharp as that of our friend Michael, an instrument so efficient and acute that sometimes it could be difficult to manage in everyday life as the two brief stories I’d like to tell here demonstrate. Michael - as everybody that has met him already knows - adored Italy and, as was typical of him, he wanted to know Italian perfectly and considered all normal tourists who limited their language to menu reading and a few travel words with a bit of suspicion. In short he studied Italian, and its grammar and pronunciation, with all his intelligence and cleverness, asking me a lot of questions. If I didn’t know the answer, as happened very often, never ending, acute and deep discussions started between us in order to find an acceptable and rational solution to the raised enigma. As you may know, in Italian there is no neutral gender. That poses an interesting question about why some English neutral words become feminine or masculine in Italian, according to rules absolutely undiscovered to me (I wonder if there are any). This is not enough! Some neutral words are in some cases masculine and in others feminine. Michael one day raised the fatal question: what is the rule that drives the word “hole” to be sometimes translated as the masculine “buco” and other times as the feminine “buca”? As expected I didn’t have the slightest idea. We spent more than one evening trying to find an answer and examining the disparate possibilities, not neglecting the most absurd and preposterous ones. Finally the answer came. From who? Obviously Michael. It was the following: the feminine gender “buca” is used if it is possible to see the bottom of the hole and the masculine “buco” is instead used when the hole has no visible bottom. Let me skip all the possible psychoanalytic, anthropological and linguistic meanings of
this but, up to today, I have not found a counterexample to that charming theory.

The second memory I have is of being in a restaurant. I can still see Michael’s mind studying the menu totally and deeply examining, all the various alternatives proposed in it. My personal opinion is that he was trying to make a rational calculation of the optimal choice. In the process he considered a very large number of variables: from 3 to 6 last meals, his personal fitness, that of almost all other people at the table, the weather and, last but not least, the menu on offer. After the rational choice theoretic calculation, the field observation phase started, trying to adapt his personal choice to the totally irrational and non optimal choices that all the others at the table had made meanwhile. Quite often a real loop occurred: no rational choice could be reached, then no choice at all was possible. All the table fell into a panic trying to help him. Michael made a choice and finally ordered. Then a first change immediately took place and he asked the waiter to change. A second one came when the food was served and Michael often made a bargain with someone else to switch dishes. A third change was possible between pasta and the main course, mainly regarding the still changeable dessert.

This is just to tell how difficult it sometimes is to have a sharp mind in a world made for those that are, as most of us are, a little duller.

Francesco Antonelli

Michael and I first met, socially, in Derek Parfit’s rooms in All Souls College. Others present were Elizabeth Fricker and Saul Kripke. We subsequently got to know each other on a more professional basis when I was a visiting fellow at Wolfson College, around the time my book *On Social Facts* came out in early 1989. Michael made me very welcome at a seminar he was giving at that time. I attended several of the meetings and much enjoyed the conversation both at and around the time that the official business took place.
Michael invited me to present papers to seminars he was leading on several occasions over the years, and I was happy to accept. He helped me to connect with economists and those in other fields in connection with my work on philosophical aspects of game theory and its applications and on social groups and the special kind of thinking - in terms of “us” - that relates to them. He was definitely a most supportive presence in my professional life.

Michael was always friendly and hospitable when I arrived in Oxford for a long or short visit. I would contact him and he would immediately invite me to lunch in Christ Church or to a meal at home. Conversation with Michael was lively and vigorous. I thought of him as a cultured, many-faceted, most charming person, a clear and supple thinker, willing to venture into relatively uncharted theoretical waters, and willing and able to expend considerable time and energy organizing research projects involving multiple investigators. One time I remember telling him a story that he had, I was disappointed to learn, heard many times before. I had been traveling on a boat up the Rhine when we passed a sign telling us that we were approaching the town of Bacharach. I had immediately resolved that I must tell Michael of this exciting fact…but, as I say, he was well apprised of Bacharach’s existence already. I had a vision of many travelers on the Rhine, year after year, seeing the sign and thinking of Michael.
My last meeting with Michael was in July 2002, not at all long before his unexpected death. I was staying in London for a short period and he took the bus from Oxford to London to meet with me for lunch at a place that he designated. He had sent me some chapters of his book in progress for comments in advance of our meeting, and I had pencilled in some notes. We settled down outdoors at a Café Rouge - it was a very pleasant, sunny day - and proceeded to talk for hours about matters of mutual interest. At some point he mentioned the conference he was planning for the following April and said I must come if I could. Eventually it was time for Michael to take the bus back to Oxford so I walked with him to the bus stop in Notting Hill, continuing our conversation for as long as was possible.

Margaret Gilbert

When people think of Michael, they probably remember the brilliant scholar, the man who first questioned the epistemic foundations of game theory, the crafty experimenter, the innovative thinker who believed that, whenever we are in a group-like situation, we start thinking as group members, and was determined to prove it.
Though I first met him through our mutual interest in game theory, it is not just as a fellow scholar that I will mostly remember him. I will always cherish the meals he cooked for me when I was his guest in Oxford, and the piano pieces he played especially for me, because he knew I liked them. The many summers we spent together in Forte dei Marmi, the long afternoons at the beach, the lazy lunches under the pergola, and the discussions about games, experiments and, more recently, the effects of group identification, always interrupted by the chatter and noise of our children. We shared a deep love for Versilia, for its beautiful beaches and hills, and I often accompanied Michael and Lizzie in their endless search for the perfect house on the hills. I will always remember and miss his enthusiasm, his shy and friendly smile, his unassuming intellect, his kindness and generosity.

Cristina Bicchieri

There will be no turn of the river
where we are all reunited
in a wonderful party
the picnic spread
all the lost found
as in hide and seek
(Thom Gunn, *Elegy*)

Whenever I mull over an argument of some analytical importance I still pretend to run it past Michael’s judgement. I simulate ‘Michael’ in my mind, or rather retain a simulacrum of his mind. I learnt a great deal from him – things that now shape my manner of reasoning and writing – but mimicking his thought processes feels hopelessly lame now. An unrivalled master of thinking things through from scratch, I cannot recall him voicing an argument just from memory. He almost compulsively re-thought things through every time, and in so doing he saw new links, pursued hitherto
unexplored possibilities, and found yet more refined terms to enunciate his thoughts, sometimes by coining graceful neologisms.

Michael – whom I had met at a seminar he gave in Milan in 1989 – was my closest colleague since I moved to Oxford in January 1992 (this was probably not symmetrical as he entertained close intellectual contacts with a varied group of scholars). I saw him at least once every two weeks, usually over tête à tête lunches, with the exception of one year in which I was abroad and of the holidays, which adds up to no less than 200 meetings over ten years. We had also a lively correspondence. From October 1996 until 29 July 2002 – his last e-mail message came less than a fortnight before he died (“Buone vacanze, and love to Valeria and the children”, it concluded) – I saved 97 of his messages because they were worth keeping. Many earlier messages from 1992 are in two folders where I keep the work we did on signalling theory and never published.

When we met he usually did most of the talking – so distinctive was his ‘voice’ and mesmerising his craftsmanship of language, including an uncanny ability to resort to elegant Italian expressions at precisely the right moment, that I was happy to listen. I chipped in the odd remark, contributed to the conversation by dipping in my collection of extravagant anecdotes, and occasionally ventured to express some argument of my own. He unfailingly responded, for contrary to what one can expect from highly intelligent people, Michael was not self-absorbed. He listened, charitably and patiently, to everyone, even to children and sociologists, never quick to dismiss. He listened so well in fact that one’s arguments came back in sharper shape – the dross tactfully ignored, the implications neatly drawn, and whatever solid core there might have been polished to a shine – as if one had put them through a de-muddling machine. He was rather shy of examining real world stories, not however for the reason economists are deemed to pay little attention to facts. He could deconstruct a simple anecdote, which to me seemed to convey just one theoretical message, and reveal its complexity. He was thus driven more to theory, and later to experimental work, for they both offer the purity denied by the messy richness of ‘real-life’ research. Yet, he remained refreshingly open-minded about other kinds of research and, for instance, thoroughly enjoyed the ethnography of taxi drivers’ trust
decisions in dangerous cities, which we were doing in the year before he died.

We spent a most memorable afternoon, in the spring of 2002, with his two children, Julian and Emily, and my then six-year old son Leo. We were playing a board game, “Belfast!”; which he had invented and on which we were working for the purpose of testing our theory of trust decisions experimentally. He had his children draw up the board and cut out the little token figurines – taxis, taxi customers, and villains who in the game can choose to pose as bona fide passengers. Playing was fun, and debating the fine-tuning of the rules intense and exhilarating. It also brought in full display a most loveable trait of Michael’s character: he treated the children’s opinions as those of peers, responding at once with simplicity and no condescending discounts. I cycled back home that evening with my son on the trailer bike whistling, and thinking that it was worth being in Oxford if only because of an afternoon like that. It was pure intellectual nirvana.

Knowing Michael has affected not just the life of my mind, but perhaps more profoundly my perspective on life. We did not have a chummy bond, we rarely shared our sorrows and joys. We never gossiped – he had an angelic touch which exerted a civilising influence by just entering a room. He loved his family as I love mine, and our views on politics were close. There was nothing much to say in those regards. Yet Michael was the kindred spirit I had dreamt of meeting, but whose existence as one grows old one begins to doubt. It feels natural enough now to know that such a luminous scholar and kind-hearted gentleman did exist, but still somehow implausible. One can hardly be so lucky twice. I feel immensely grateful for the gift of his company, the enduring memory of which will stand as a shield against the temptation of cynicism.

Diego Gambetta
questions in game theory and economics formed a seamless web with
the concerns of everyday life. Discussions of teamwork, American
politics, and upcoming Italian vacations would swirl around while he
was making a risotto or caring for the children. If a really good idea
emerged he would slip off for a moment to write it down, sometimes
endangering the risotto, but never the children (though sometimes,
perhaps, due only to Lizzie’s intervention). These conversations were
not idle tabletalk. Still less were they excuses for cleverness or
oneupsmanship. They were conducted with the same friendly intensity
with which Michael did everything; always with an eye on truth,
beauty, and goodness.

One of Michael’s most endearing traits was his optimism. He
simply refused to believe that the economics profession in America is
as dreary as it is; or for that matter that we humans are as greedy and
selfish as many academics believe us to be. Indeed, Michael’s work
was directed towards understanding and vindicating our better nature,
including how we work together to accomplish common goals and
purposes. This was not only a central theme of his work, but also of
his life.

I last saw Michael in May 2002, when I was in Oxford to
address the Philosophical Society. I stayed with Michael and Lizzie,
and although I tried very hard to devote myself single-mindedly to
fussing and fidgeting with my text, every day turned into a free-
wheeling seminar on the paper I was delivering and the book Michael
was writing. There was nothing invasive or stilted about this: It came
with the morning espresso and was as natural as breathing the air. The
discussion of my paper at the Philosophical Society was excellent, but
Michael’s comments were even better.

When I left Oxford we formed a tentative plan to meet in France
during the summer. Unfortunately my mother fell ill and I was unable
to travel. One day Michael’s manuscript arrived with a note that read
in part:

How are you? It seems strange even to address you, so engulping
is the silence that descends on all of us in between your nice
visits.
My world is darker knowing that this silence will not be broken.

Dale Jamieson

Michael never asked whether a phenomenon or a method was “proper economics”, he always wanted to understand why things were interesting and what could be learnt from them. He gave what is most valuable, his time and critical attention, to an intriguingly disparate group of doctoral students, researchers and colleagues. He never tried to make anyone in his own image. I remember first going to see him in his chaotic office in Christ Church when I needed to find a new supervisor for my doctorate. The reactions to my ideas had left me feeling very intellectually isolated. Very quickly, he saw what I was trying to do - better than I did myself at that stage - and made comments that really took account of what I had said. When I came out, I felt that he had both challenged my ideas and supported me by taking them seriously. Looking back, I realise that he led by example. The obvious pleasure he took in intellectual labour was the best possible advertisement for his chosen career. His kindness, patience and youthful (but thoughtful) curiosity provided a role model for teaching in the broadest sense.
Sharing his office for a year, I remember how, at the end of every day, he would make elaborate plans with Lizzie about who would collect the children, who take the car and who the bicycle and where various combinations would be left. Despite his expertise in decision theory, it always took longer to make the plans than to carry them out. Somehow, this seemed to symbolise the way he lived his life, with both work and his family foremost in his thoughts. Whenever I found something relevant to his work, I would make a mental note for the next time I saw him. Then, suddenly and without warning, there was no next time. I wish he could have been here to see the completion of the doctorate and the dissemination of the ideas he did so much to shape and develop.

Edmund Chattoe

I got to know Michael several years ago, in the rather prosaic context of putting together a ‘network’-style grant proposal. (The grant got top marks on academic criteria, which owes a lot to Michael’s input to it; but it was not funded on other, unspecified, grounds.) After that, Michael and I met a few times each year, sometimes at Christchurch, and sometimes, by extreme contrast, at Joe’s Café on the Cowley Road.

Talking to him, on any subject, was a pleasure - he always cut through to the core of the issue in hand - and set things out in a new crisp light In talking with many academics, one has the sense of receiving pre-packaged ideas. With Michael the situation was the opposite - he always seemed to be thinking the issue through from first principles, and in a way that was remarkably sensitive to the previous flow of discussion. He would play with new concepts; relate them to old ones; see what they were good for – if anything; but he never seemed merely to evaluate ideas against theoretical or ideological predilections. He had an unshakeable integrity in thinking things through with the utmost clarity, with never a hint of ‘loading the dice’ in favour of a cherished belief or theory. One had the sense
of watching the creation and analysis of ideas, from scratch. If only one could hold on to that clarity when thinking through the same issues alone!

Michael’s ideas on teams and co-operation were a revelation to me - and I hope, and I believe, that his work will provide an important foundation in connecting aspects of economics with psychology and sociology, and inspire some of the next generation of researchers from each of these disciplines. Finally, Michael had deeply humane values. It was clear that his family were the centre of his life. And that it was not ideas, however beautiful he might find them and however brilliantly he might shape them, that had his ultimate allegiance; but rather people, and particularly those who were closest to him.

Nick Chater

Michael’s formidable theoretical powers included an almost uncanny flair for conjuring mathematical models out of thin air. I observed this at his game theory seminars, which I attended sporadically from 1990 onwards, and especially during 1994-97, when we collaborated on a research project on framing effects and attended numerous workshops and conferences together. He could construct interesting formal models off the cuff, even during casual conversations. If a phenomenon could be described verbally, though vaguely, then he could usually model it, no matter how elusive it might at first appear to be. A remarkable and enduring example is his variable-frame theory of games, first published in 1993, which formalises the effects of players’ perceptions of a game on the strategies that they choose. Most of us had assumed that framing effects were beyond the reach of formal theory.

Other published products of Michael’s creative originality and technical skill include his analysis of the foundations of game theory using formal logic (1987), and his stochastic theory of interactive team reasoning (1999). Some of his other publications have been and will continue to be influential, but he was not prolific, and he often had
original ideas that he did not consider worth publishing, though others would have been proud to have published them.

I was not fully aware of Michael’s uncompromising intellectual rigour until I collaborated with him on research projects, grant applications, joint conference papers, and especially a long journal article, published in 1997. In ordinary conversations, and even in seminars and conference discussions, he wore his erudition lightly, but when serious goal-oriented thinking or writing was to be done, he switched into a ferociously critical mode of functioning in which his characteristic gentleness and tact were temporarily suspended as he hunted down errors, ambiguities and gaps in reasoning like a rat-catcher. Every sentence was exposed to the harshest critical inspection, whether it was someone else’s or his own.

He respected the pioneering game theorists but his own ideas were certainly unorthodox. He questioned Nash equilibrium as a solution concept for games and he even rejected the standard assumption that rational decision makers invariably pursue individual self-interests. These ideas arose partly from an intuitive aversion to methodological individualism. Furthermore, he was an exceptionally unselfish man and he rejected the orthodox economic view that hidden selfish motives lurk behind all seemingly selfless acts. I am sure that he did not get this from the Talmud (though he was half Jewish) but it is none the less worth quoting the Patriarch Jacob’s request to his son Joseph: “Do unto me kindness and truth; please do not bury me in Egypt” (Genesis 47:29) and a passage in the Talmud in which the medieval commentator Rashi explains that “kindness to the dead is the true altruism . . . as the doer does not expect any quid pro quo”. Robert Aumann cited this passage in connection with non-selfish game theory and I think Michael would have liked it.

Andrew Colman

I’ll try to just relay an anecdote that is one of my favourite memories of Michael. To relay the anecdote there are a couple of
background facts that you need to know. The first is a theory about rationality (and I think it’s fair to say that Michael knew as much about theories of rationality as anyone else). The technical term for this theory is evidential reasoning, but is also called magical thinking. An example would be that some individuals will assume that if they contribute to a public good, others will reason in the same way; that is, they take their acting in a particular way as evidence that others will do likewise. The other fact you should know, and most who knew Michael will know this already, is that he was a wonderful, loving father. As a friend and neighbour I had the privilege of spending a great deal of time with Michael and his family, and I learned a lot about what being a good parent involves. Especially I learned that Michael managed to do a wonderful job of treating his children like reasonable people, and in so doing he never forgot to see the world as a child sees it. I think that this was as good for Michael as it was for his kids. It certainly contributed to his being such a good father. Through my interactions with his family I came to also enjoy seeing the world as his children would see it.

The anecdote is this: there was a meeting of the experimental economics group, which Michael convened, where someone postulated that people use something akin to evidential reasoning in prisoner’s dilemma-type situations. I spoke up and said “but that is magical thinking!” Now, Michael is probably the last person that one would call mischievous, but I’m sure he had a somewhat mischievous look in his eye as he said to me, in his thoughtful, halting style, “but Shepley, don’t you…sometimes…think magically?” This remark surprised me, but now seems very much in character with Michael’s temperament in two ways. First, he was making the point, perhaps just between us, that he knew I certainly did at least like to think magically, even if I couldn’t always show why it was rational. I think it was his way of reminding me that if “magical thinking” perhaps meant that we could see things through a child’s eyes, it might not be such a bad thing. Secondly, the remark reminded me of how open Michael was in hypothesizing what might qualify as rational. Despite his extraordinary commitment to rigorous and formal modelling of rationality, that rigor never impeded him from thinking imaginatively and openly about human reason. If anything, that analytic rigor seems
to have demanded openness in his thinking, which it does not for many others with such powerful skill in formal analysis.

In summary, this anecdote reminds me of how much I miss Michael’s inspiration as a father and a thinker. Of course, I consider myself lucky to have had the opportunity to be inspired by such a good man.

Shepley Orr

Michael was quite firm about his requirements when he invited me to redesign his garden in 1995 and it took me by surprise: he wanted me to re-design it without interference from himself, and to guide and help him increase his knowledge of plants. The new garden was to reflect my ideas, designs and my interpretation of the space. The precision with which he described this professional brief that day left me both enchanted and full of apprehension.

During the time I worked to create this new garden and helped Michael in his garden generally over the next seven years, I appreciated two very special things about him. The first was that he trusted and respected the knowledge and skills I could pass onto him. The second thing was that he expected you to give your very best and that indeed you wanted to fulfil that expectation. As a result, he got the best out of one. Two or three times a year we would walk round the garden - which is really quite small - Michael would make notes about various plants, pruning techniques, timing of work etc. There was a genuine interest in the craftsmanship of gardening. He kept a little notebook for the names of plants to look out for; I tried to be exceptionally accurate with names of plants, especially cultivars.
In all, a lovely man to work for, his garden is an enduring reminder of this ability to trust and explore areas of expertise outside of his own, with an open mind.

Sally Tarshish

When I came to Oxford as a M.Phil. student in 1995, I was lucky enough that the development economist who had been chosen as my supervisor decided he was too busy. My M.Phil. interviewer, John Vickers, then asked me what I was actually interested in and persuaded Michael to take me on. My 1st year of the M.Phil. was a tough time for me, but Michael soothed my worries and gave me help where it was needed. Discussions with him always had a Socratic element, such that after the meeting I knew more about what I wanted to do with my own research than beforehand; and he was so incredibly open-minded while being conceptually rigorous. I could not believe my luck; so incredibly open-minded as to let me do an economic experiment for my M.Phil. thesis, something unheard of in Oxford before then. For my doctorate it was more of the same: I was given free rein to do whatever I wanted, with advice provided now and then to guide me in key steps. His open mindedness and kindness I will always remember, and so will I remember the time in which, in a meeting in the Summer of 1997, he told me something like “I do not just want to be a supervisor with my graduate students; I want them to become my friends”. Michael certainly achieved this with me. He was not just my teacher and collaborator, but also my friend.

Michael created the Bounded Rationality in Economic Behaviour (BREB) Unit and started off experimental economics here in Oxford. He believed that economics needs to take advantage of new research methods in order to better understand what makes people tick. Thanks to him Oxford is on the map of experimental economists in Europe. Our dedicated workshop series in experimental economics was the first of its kind in the U.K.. He has left us of BREB here in
Daniel Zizzo

The last time I saw Michael was in April 2002, in Rome, where he was on holiday with his family. On that occasion we had a conversation about music, which is one of the dearest memories I have of him. Michael was very proud of how good and passionate about music his son was. And, in order to involve him in the conversation, perhaps to further encourage him with music, he told him that the Bate Collection at Oxford had invited a cellist, a harpsichordist and me to give a concert with the Collection’s XVIII century instruments. This brought the conversation to my current dilemma concerning whether I should continue playing the recorder, which I have done since I was eight years old, or whether I should consider it a closed chapter in my life. Talking to Michael, who played the piano and had just started learning the flute, and perceiving the extent to which he made music part of his life had the effect of making me lean towards persevering.

I have been wondering why I somehow consider that conversation to be so representative of Michael. Learning a new musical piece entails interpreting the composer’s idea while making it one’s own. It requires the rigorous analysis of the piece, repeating the same ‘sentence’ again and again, trying to make it perfect - most of the times having the sensation of being far from it, rejoicing when feeling close to it. Thinking of it now, I find an analogy between learning music and Michael’s supervision method. His supervisions were almost philosophical, analysing in depth the meaning of words, the structure of phrases, the logical sequence of sentences. His objective was always going at the core of things, trying to understand the fundamental mechanisms that explain phenomena. In the short time in which Michael was my DPhil supervisor (in 1998-99), I formed the idea that he was more a ‘maestro’ than a supervisor. The relationship he had with his closest students reminded me of that
between the Greek philosophers and their pupils. He was always very encouraging, giving me a lot of enthusiasm about my research, as he did that last time in Rome about continuing to play music.

Sabrina Di Addario

Michael excelled at finding new and interesting questions to ask, and new and interesting ways to shed light on old questions. He also excelled at encouraging his students and colleagues to do likewise - to ignore constraining conventions. Of course, I did not know this when I first met Michael as he was being dragged out of thoughtfulness by a beeping, shaking, paper-spewing photocopier in the summer of 1999. But as I was trying to find new ways to explore several persistent issues in development economics and as Michael was always ready to share his latest ideas about human behaviour, I soon found out. As a result, Michael had a profound and very positive impact on the path that my research subsequently took and my resulting level of job satisfaction. From 1999 right up until his departure for his last holiday in Italy, he was always willing to carry on our discussion whenever we met in passing or I sought him out. I miss that discussion very much - his gentle and constructive criticism, his generosity in sharing new insights, and his willingness to consider issues dearer to others than himself. But most of all I feel deeply privileged to have known him and profoundly grateful that he serendipitously appeared in a sea of crumpled paper beside that photocopier just when I needed him most.

Abigail Barr

Michael had been coming to my Yoga classes for a long time before I discovered that he was a distinguished professor. Always
more than willing to participate with enthusiasm in a Yoga class full of persons less than half his age - indeed some could well have been his own undergraduate students - his modest, friendly and humorous demeanour was much appreciated by all. The weight of his achievements never prevented him from approaching this new realm of experience with lightness, openness and sincerity.

Michael’s most remarkable contribution to the Yoga classes that he attended was his idiosyncratic interpretation of what it is to be upside down. Well, perhaps that is a little unfair as his shoulder balance was sound and his head balance was likewise when supported by a wall; however Michael really came into his own when attempting the handstand. For Michael it was evidently not interesting enough to perform the pose with a straight and steady alignment. Rather he preferred to imitate a lightning bolt being sent down from the heavens by some barbaric god of the dark ages - with all the drama, zig-zags and thunder claps appended. Looking back though, the image that comes to mind is rather that of a knife balanced precariously on its point - graceful but surely mortal. My other Yoga students and I were shocked to hear that this lively and charismatic man had passed away so suddenly - we will all miss the twinkle in his eye and are glad to have known him.

Joe Burns

Some of my fondest recollections of Michael involve lunches with departmental visitors. The group would invariably become lost looking for the restaurant while discussing a difficult decision problem. For Michael, one of those difficult problems was quickly forthcoming: he would soon have to order a meal. Those of us who knew Michael would, along the way, pull the visitor aside, and forecast Michael’s choice for the meal. I think we developed something of a reputation because our forecasts were extremely accurate. It turns out that Michael had developed a simple decision rule to solve this particular problem: always go to the same restaurant
and order the same meal. I think we are all grateful for the fact that he developed this decision rule, which freed him to spend more time and energy thinking about and discussing our research. The first phone call I received upon arriving in Oxford was from Michael; from the very beginning he went out of his way to welcome and include me. I will always be grateful for the opportunity to have known him, and I will always miss him.

Jim Engel-Warnick

Shakespeare Sonnet, No. 65

Since brass, nor stone, nor boundless sea,
But sad mortality o’ersways their power,
How with this rage shall beauty hold a plea,
Whose action is no stronger than a flower?
O how shall summer’s honey breath hold out,
Against the wrackful siege of batt’ring days,
When rocks impregnable are not so stout,
Nor gates of steel so strong, but Time decays?
O fearful meditation! Where alack,
Shall Time’s best jewel from Time’s chest lie hid?
Or what strong hand can hold his swift foot back?
Or who his spoil of beauty can forbid?

O none, unles this miracle have might,
That in black ink my love may still shine bright.

Read by Elizabeth Fricker at a service of Thanksgiving for the life of Michael Bacharach, held in Christ Church Cathedral on 9th November, 2002.

Allegro Moderato from Concertino in D ‘In the style of Vivaldi’, Opus 15, by Ferdinand Kuchler was played by Emily Bacharach.

Prelude to Suite in G Major for Unaccompanied Cello by J. S. Bach was played by Julian Bacharach.