



## Julian Besag FRS, 1945–2010





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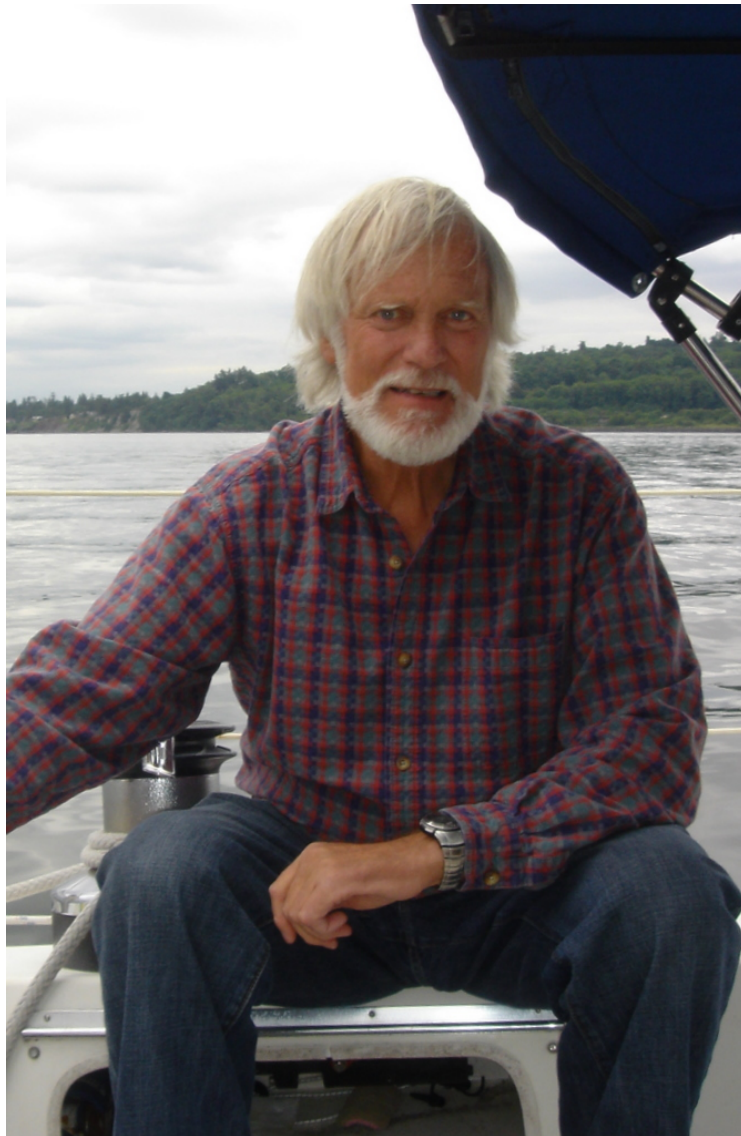
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**Stan Zachary (Heriot-Watt)**

I was very shocked and saddened to see your mail about Julian, of whom I have nothing but the fondest of memories, and who was a very good and supportive friend to me and to many others.



## **Preface**

Julian Besag will long be remembered for his many original contributions to statistical science, spanning theory, methodology and substantive application. This booklet arose out of a two-day memorial meeting held at the University of Bristol in April 2011.

The first day of the memorial meeting was devoted to personal reminiscences from some of Julian's many colleagues and friends. These collectively paint a vivid portrait of an unforgettable character who could infuriate on occasion, but was universally admired and much loved. Their informality also complements the scientific obituaries that have been published in the open literature, for example in the April 2011 issue of the Journal of the Royal Statistical Society, Series A.

Peter Green, Peter Diggle, September 2011



### **Sonia Petrone (Milan)**

I am so bad at expressing thing in words, especially in English! I met Julian only a few times, after all, but when I met him in Bristol after so many years, it was amazing how we were still good friends. I think Julian was like this, he had such a strong and direct way to communicate his torment and passion for living, with no filter. Life in its essence, joy and drama. His intelligence in research was also like that, I think, essential and deep.

There is another thing about Julian I liked so much: his passion for water, for the ocean. Perhaps you could post a little line from me, it's a line by Baudelaire, but I would like to say it to him in Italian:

Uomo libero, amerai sempre il mare.  
(Free man, you will always love the ocean.)

Homme libre, toujours tu chériras la mer!  
La mer est ton miroir; tu contemples ton âme  
Dans le déroulement infini de sa lame,  
Et ton esprit n'est pas un gouffre moins amer.  
*Charles Baudelaire, Les Fleurs du Mal*

### **Eric Renshaw (Strathclyde)**

Very sad to hear about poor old Julian. The last time I saw him was at the Royal Society of Edinburgh some time ago and he seemed to be pretty shaky then. By all accounts he was slowly getting more poorly thereafter so the news has not come as a complete surprise. I just hope that following the major surgery he was able to be kept sufficiently sedated not to suffer any pain.

### **Christian Robert (Paris)**

I have just learned that Julian Besag passed away yesterday morning in Bristol after being admitted to the hospital two weeks ago. He was a leading figure of our field, a fiercely independent thinker, a brilliant statistician, and undoubtedly the clearest pretendent to having fathered MCMC. His influence on the field of spatial statistics will be felt for years, but he will be sorely missed. My first meeting with Julian was in 1993 in Laramie, Wyoming, and my last memory of him will be the visit George Casella and I made to Bath and Bristol in October 2008, and where Julian attended both of our talks as well as the dinner in Bath and the after-seminar beer in Bristol. He will be missed.

**Chris Glasbey (Edinburgh)**

I am saddened to hear of Julian's death, though I knew he was seriously ill. I greatly respected his work, particularly his "read papers", and his FRS was well deserved. Although he could appear irritable, I found him kind and considerate. I recall him emailing me after Rob Kempton's death – words which I then quoted at Rob's funeral.



**David Madigan (New York)**

The news of Julian's passing was a big shock. I just read your (Peter Green's) wonderful obituary on the SuSTaIn website. My relationship with Julian was indeed stormy, including a particular moment on his boat where he called me a "stupid paddy!" He was a gifted teacher and I learned much from him in the years we overlapped in Seattle. It was wonderful to spend the few hours with him at Bristol last June.

**Judy Nasmith (Seattle)**

While saddened, I know how much he has gone through over the past several years and I take solace in the fact that he is at peace now. He was a good friend to me and I will miss communicating with him.

## Hilde Übelacker-Besag

Dear Julian,

This is a letter to say farewell to you. For the last time I want to talk to you and to be near to you at least in my thoughts. They go back to your start in life, the 25th March 1945. We were living near Basel at that time, my mother and my grandmother hoping to join the family in England soon. But my grandmother was lying on her deathbed after a stroke when we got the news of your birth. She had been looking forward so much to that event: her beloved grandson's first child. She was unconscious, but we told her the news, and I have always hoped that she heard it. So your birth for me was linked with my grandmother's death. Was it a forecast of what you would have to experience as a little boy? Because there was the shadow of death.



Your mother was taken away when you were four years old, but you found a new loving home with your grandparents near Birmingham. Then, after two years your grandfather died whom you had dearly loved. You stayed with your grandmother until your father married again when you were nine years old and, again, you had to leave a beloved home and a second mother.



I always have thought that all this really was too much for a little boy and that it was at least part of the reason for problems you had later in your life.

So my love for you has always been joined with feeling sorry for that hard beginning of your life. And we two have always been very close to each other. I remember how you explained your work to me and I understood that mathematical statistics is by far not so abstract as I had thought, and I could very well imagine your teaching.

A highlight of our meetings was my visit at Seattle when you took me out on a magic trip with your boat on the lake in the evening, with good talks and the lights of Seattle around us. And the next day our wonderful hike in the mountains above the city.



Then the last time we met, a few years later. You came to me without having told me before. You just stood there at my door and I took you in my arms, so delighted to see you again. The next day we hiked to the Yburg as we always did when you were here. We stood a long time on the terrace of the old castle, looking down on the villages between the vineyards and on the wide Rhine valley. We didn't talk much, we quietly stood there together, feeling very near to



**Ian Dryden (South Carolina)**

I was very sorry to hear the news about Julian. He was extremely creative and influential, making many pathbreaking discoveries. He was a great innovator in spatial statistics, statistical image analysis and Bayesian statistics. I do think he was way ahead of his time.

**Ashley Ford (Warwick)**

I was sad to read of the death of Julian but privileged to hear what was presumably his last talk at the Statworks workshop. It is particularly unfortunate that he missed seeing a reference to his 1974 paper in Deolalikar's recent (August 6th, 2010) paper claiming to prove that  $P \neq NP$  which says: "This field started with Besag (1974) and ..."

**Stuart Geman (Providence)**

Oh My God. In my mind I had him still working with students in Seattle. I didn't know he was seriously ill. Poor Julian. He struggled with so many demons. And I recently found this incredibly clever way to build Markov samples with fixed transition numbers that he worked out with Debashis Mondal. Never got to tell him.



evidently that visit had made a lasting impression on him. Our class was treated to images of Taj Mahal in the moonlight, Julian on a boat in the Ganges, etc.

My tribute to Julian would be incomplete without a particular photograph. This photograph is remarkable not only for showing Julian in Indian attire, but also because it gives a rare glimpse of a clean-shaven Julian.



### **Anonymous (“Portia”)**

Dear Julian, thank you for your stimulating and thought-provoking talks, for our exchanges on art and Shakespeare, for confiding your troubles with me, for your humour and for your temper. You will be missed.

### **Elja Arjas (Helsinki)**

I only learned today about Julian’s death. It was a great loss to all of us. But I am happy about having had the opportunity to meet Julian many times during my stay in Bristol, and talking with him about things such as the future of our discipline, and of the world. Julian may well have been right about the former, but I sincerely hope he wasn’t about the latter.

each other, and somehow we both knew it would be the last time. But I thought I would be the first to go. I shall never forget that.

Good-bye Julian. You will always stay in my mind. And I pray that you have found peace now in the light and mercy of the Lord. May God bless you and take you in his arms.

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Julian's father, Emile Besag, was my brother. He was born in Frankfurt/Main in 1913 and died in 1987 in Loughborough. He was an engineer. He studied in Munich and left Germany after his graduation in 1936. He went to England and worked with a firm at Birmingham – Crabtree – until the war broke out. Then he was interned as German for some time. When he came free he was no longer allowed to work in the industry. So he started teaching at Loughborough University, at first as lecturer, then as professor and specialised in techniques of measurement. He stayed in Loughborough until his retirement.

Julian's grandfather was born in Bühl, a little town near Baden-Baden, in 1878 and died in Birmingham in 1951. He studied in Karlsruhe and was one of the pioneers of automatic control. He invented the first automatic protective switch (Schutzchalter in German) worldwide in 1912. Since this was absolutely new he could realise his invention only after the first world war, in 1921, with a firm in Hornberg in the Black Forest. He was very successful and had many patents for his invention. But as he was of Jewish origin he had to leave Germany and went to England in 1939, just before the war. He started work in the same firm as his son, with Crabtree in Birmingham, which had already a licence arrangement with the firm in Hornberg. When the war broke out, my father also was interned for some time but, afterwards, he was allowed to continue his work for Crabtree.

My mother was born in Frankfurt/Main in 1891 and died 1963 in Baden-Baden.

When my father had left Germany we, his wife and four daughters, were thought to follow soon. But we did not get our passports because the Nazi authorities wanted my father to come back to Germany because he was an important person for the industry. Then the war broke out and we had no possibility to emigrate. We were deported to the camp of Gurs in southern France in October 1940 and stayed there until July 1942, when we were liberated by the protestant church of France who claimed us as members of the church, and they helped us to escape to Switzerland in October 1942. My mother joined my father in England in May 1945. After studies at Geneva I went back here in 1946 to work in the protestant church.

I know very little of Julian's mother. When I came to England for the first time in 1946 she was already very ill from cancer and knew that she would not live much longer. She had wanted her child even knowing that it was a risk for her own life. But she was very brave.

Julian has often visited me. He liked to come here into the old family house. We were very fond of each other, and it was also the link to his grandparents whom he had liked so much.

I hope you don't mind this long letter, but I thought you should know the family story to know the background of Julian's life. I am very sad that he had to go so early.

My daughter told me yesterday that you can find Julian's grandfather Ernest and his father Emil in the internet.

### Valerie Besag (Newcastle)

Julian's bumpy start in life was influential. His mother died when he was two. An aunt came over from Germany to care for him but she eventually had to return home. His grandparents looked after him until his father re-married. Julian's perception was not that he had gained a new family but that he had lost his grandparents as well as his father. By the time he was 19 when I first met him, he felt he had lost the most significant people in his life. Early loss can be a contributing factor to later depression and Julian suffered greatly from depression, often finding it difficult to face a new day.



Julian enjoyed much of his childhood, as can be seen in the photograph of him in a dress with one of his two step-sisters and a cousin. The Besags were enthusiastic mountaineers and Julian spent many family holidays climbing in the Alps. The photo shows him at the family house in Baden-Baden which backs onto the Black Forest. I understand that in his teens he held the record for the longest survived drop from rocks in the UK.

2. On the trip to India (I think it was the first one with Val and David), he caught a mild form of dysentery. It didn't really bother him so that he didn't even know he had it till he got back to the UK. In the process, he lost quite a bit of weight and got back into his hockey shape, so he was rather pleased with the experience overall.
3. When talking about ice hockey with him, you have to say it explicitly because by default, hockey meant field hockey.
4. He was critical of Israeli policy and their exploit of the Holocaust. He said he has every right to hold his views since he was from a Jewish family and many of his relatives perished in the Holocaust.
5. He admired John Tukey, but said on the personal level they were not a good match
6. He was lodging at the boating house when interviewing at the University of Washington, which in the end was a strong motivation to accept the offer from Seattle.
7. By his own words, he could not read books and papers written by someone other than him.
8. He preferred rugby to American football because he thought that too much in the football game depends on the quarterback.

### **Debashis Mondal (Chicago)**

Julian Besag was my professor and mentor at the University of Washington, Seattle. I heard of Julian long before I actually met him as a graduate student. My professors in India spoke very highly of him, and encouraged me to go to Seattle and work with him. I remember Julian most as an inspiring and dedicated teacher. Not surprisingly, given his reputation in the department, I ended up taking five courses with him in a period of two years. In particular, I will always be grateful to have learned spatial statistics and Markov chain Monte Carlo (MCMC) computations from him. His lectures on stochastic modeling and statistical calculations have shaped my research ideas. I had the privilege to work with Julian on a couple of research projects (one on spatial statistics, another on MCMC p-values), and because of our collaboration I had the opportunity to read all his fine, scholarly works. Moreover, as our research collaboration went on, I learned more about Julian as a person, including his passion for sailing, his fondness for seafood, particularly fish, and his weakness for alcohol. Julian enjoyed telling us stories about his days as a competitive hockey player and amateur cricketer. He cherished the memory of a cricket game when he took six wickets without conceding a single run. All these dimensions made him a hugely interesting personality, who could both educate and inspire his students. One of my enduring memories of Julian is the way he used to end his courses every quarter by showing the class a slide of his trip to India. Julian visited India more than thirty years ago and



## Larissa Stanberry (Seattle)

I'll try and remember more things, but the first one that comes to mind is that story of a field hockey match in Ireland. I think Julian was a goalie. It was a really hot day and someone offered him a glass of Guinness during the match, so he took a sip and spat it out, because he just wanted a bit of refreshment. Needless to say, there was a huge uproar from the stands when they saw him doing that.



He taught a stochastic modeling class in the University of Washington for many years. When I took it from him, he was pretty ill by then, so I'd expected him just to be using his old notes. That's what he did for the most part, but pretty much for every class he had some amendments, additions and corrections. I was pretty impressed by the standards he set for himself. I've been thinking about him lately, and miss not having him around. I wasn't corresponding with him frequently lately but just knowing he was there was enough.

We happened to drive by the marina where Julian kept his boat and where it still is probably. I don't know if this is the place, but I had a few sudden recollections about Julian:

1. He wasn't afraid of flying. Said it used to bother him until he took a beat-up turboprop somewhere in India. They got into a huge storm and the plane was just tossed and turned. All ended well and they landed safely, but after that the fear/concern of flying never bothered him anymore.



Julian was a passionate hockey player. Although not Welsh, he played for North Wales and had a trial for Wales. One time he was taking his not unusual early exit from the field when, looking back to give the referee the benefit of his advice, he suddenly disappeared from view. He had fallen into the footings dug for a new clubhouse. He was a member of the North Wales team that played in the final of the European Cup in Lyon.

The day before Julian was to present his work at the famous 1974 RSS meeting in London, he had an extremely high temperature. The doctor said he must remain in bed for a couple of days. I put cold compresses on his forehead throughout the night and he was up and out the next day to go to London. Once he had given his talk, he was fine. The doctor said it was the worst case of panic he had ever seen. Around that time, he had the only nightmare I am aware of. He shouted out in his sleep that he was being chased. When I asked by whom, still asleep he shouted, "The Markov Chains are strangling me". Julian was a nervous, shy and vulnerable



man. At any gathering, I did the meet and greet while he “parked the car”. He was often tense in social situations saying he had no small talk.

Julian became a passionate sailor. David and I were in Seattle when he bought his first boat. Julian always said he couldn’t be taught anything. He had to find his own way through a problem whether it be statistics or sailing. Determined to frighten me, he had the boat rocking and rolling. On collecting my developed photographs, I saw that one showed the boat lop-sided. I asked the shop assistant if he could correct my bad photography. He looked quizzical and said “Look at the horizon, Pet. The boat IS on its side.” Even after renal failure, Julian sailed alone from his house up to the small islands off Canada, an area he loved.



Julian also loved Italy. By the time he last came in 2009 he was very tired, weak and not as seen in the photo, which was taken on an earlier visit. He hung his dialysis bag from the dresser as usual and a nurse came each day to pack his foot wound. He no longer wanted to do anything but sit in the garden. We both knew he would not see Italy again.

It is impossible to sum up such a complex man as Julian. One word I would use is passionate. Julian was passionate about everything he allowed on his radar. He faced several hurdles that could have been insurmountable but his passion allowed him to overcome them and excel in many different areas.

single-handedly that an extended discussion about one presentation was appropriate instead of moving on to the next talk. Given that this incident is the only recollection I have of the meeting, including its location and precise topic (though statistical image analysis was involved), I think it's fair to say that Julian made quite an impression.

I also feel honoured that I was allowed, as visiting professor, to teach the first course in statistical image analysis in Seattle after Julian had withdrawn from work there, in 2007.

Håvard tells me that Julian was aware of our SPDE/GMRF work, and I would have enjoyed (though with some trepidation in anticipation!) hearing his opinions about it. Peter Guttorp has told me that they had a long-standing discussion about GMRF models for non-lattice problems, and is happy that we “have proved that Besag was right”.



### **Honey Vincent Valle (Mindanao, Philippines)**

I'm sad to hear this news of Mr. Besag. Although I haven't met him nor seen him, I'm forever grateful to him. I corresponded with him way back in 1999 during the conduct of my undergraduate thesis on autologistic regression. He incessantly provided me with information on applications of the autologistic regression. He was a kind and understanding man, knowing that I had no previous knowledge on the subject.



talk, subsequent speakers presented their work referring to his publications (especially the BYM paper) and many of the younger scientists were revolving around him. He clearly enjoyed this and felt himself totally at ease. We did not have much contact, though.

My next memory is my visit to Seattle in 2000, during the same sabbatical when I visited Bristol. He took me on his boat and we had a delightful day. On the road to the boat with his old Jaguar he had to pick something from his house-boat, and left me standing outside, as he did not want me to witness the mess inside (according to his own words).

Some time later he visited the Netherlands, attending the Lunteren meeting. Our university facilitated this trip and he did an excellent job discussing science with some of my PhD students. Later that day we invited him to our house where we had a drink, and we took him to a Greek restaurant in the vicinity. He took a delightful pleasure in identifying the words, the language of the dishes on the menu, and to see whether he could grasp the roots of it. We discussed Maurice Bartlett, we discussed field hockey (my wife is an enthusiastic field hockey player herself) and we touched upon his private life that he was not inclined to be willing to discuss. The evening was a long one, and my wife and my then 9-yr old daughter, who also were there, had to leave during the dinner. My daughter still very well remembers this event. During this visit Julian invited me to spend a longer time with him, e.g. for a sabbatical, but this never materialized.

When Julian started having serious problems with his kidneys, I had my last contacts with him. That must have been around 2003. I somehow made the wrong remark in an email and that upset him so much that we had no further communication. I only learned later that he retired and that he had a part-time position in Bath, and heard only recently (just before his untimely death) that he had a similar position in Bristol.

I was really shocked when Marie-Colette van Lieshout communicated his death to me when I had just passed through Seattle, where I thought he was still around. Marie-Colette and I wrote a scientific paper that we have dedicated to his memory. It is currently being reviewed for Mathematical Geosciences.

We lose with Julian's death an outstanding, original, independent, unique, deep scientist who has really contributed to the development of our field of science.

The world will never again be the same.

### **Finn Lindgren (Trondheim)**

Julian's work has had a profound impact on my development as a researcher, and I remember his 1974 JRSSB paper (as well as his later work) still being the major source of useful information about Markov random fields well into my time as a PhD student in the late 1990s and even early 2000s.

I only met him in person a handful of times, the first being at a small workshop somewhere in Sweden more than ten years ago; his reputation preceded him in the form of anecdotes related to me by intimidated students from the UK, and their characterisation of him as "harsh but fair" was proven correct. Sitting in the audience, he took command of one session, deciding

## Peter Diggle (Lancaster)

*Julian Besag, FRS 1945–2010*

I knew Julian for forty years, first as his student, later as an academic colleague, always as a friend. And I owe him my career – for two different reasons, the one conventional, the other less so.

The conventional reason was that Julian was an inspirational teacher. I took two universities (Edinburgh and Liverpool) and five years to acquire my BSc, and the differences between the organisation of the statistics programmes in the two places probably explains why I found myself taking a succession of statistics courses which seemed to consist of more or less the same material taught with increasing degrees of sophistication. By my final year, in Liverpool, I was ready to finish studying and embark on a career either as a civil servant or an actuary when I took Julian's optional course in stochastic processes. This was a revelation. The material came across as intellectually challenging but always with a clear relevance beyond its technical content. We were taught about the extinction of family surnames (aka branching processes), social mobility (Markov chains), avoiding congestion at oil terminals (renewal theory) and much more. The end result was that I set my heart on an academic career and, in September 1972, went to Oxford to embark on DPhil studies under the supervision of Julian's former supervisor, Maurice Bartlett.

Which brings me to the less conventional reason. A few months later, Bartlett announced that he would be going to Australia the following academic year. Feeling somewhat disenchanted, I wrote to Julian to ask if I could continue my studies under his supervision in Liverpool. Julian visited me in Oxford, took me to dinner, satisfied himself that my request was “not just that you want to come back to Liverpool” and all was agreed. Shortly before I left Oxford, Julian called me to say that he had been asked to apply for a position at Newcastle upon Tyne but that “I told them I'll apply if they also have a job for you”. To make a long story short, a job ad duly appeared, I applied for and got a lectureship – and Julian didn't apply at all! I'll never know now whether there really were two jobs on offer, but I suspect not. Happily, Julian did get a senior position at Durham soon after this, and I continued to benefit from his wisdom for many years, until we went our separate ways, Julian to America, I to Australia.

A regular highlight of our academic life was the trip to London for the Royal Statistical Society read paper meetings. These invariably ended up with a few hours of earnest debate in the White Hart on Tottenham Court Road before a dash to Kings Cross to catch the sleeper north and a few hours of alcohol-fuelled sleep. As to the time when I was awoken at Newcastle by two policemen inquiring about the identity of the gentleman who has shared my sleeper compartment until Durham... well, we had better draw a veil over that. Another memory is of the time we agreed to share our sandwiches on the way down to London. After we had demolished Julian's rations, I opened the re-cycled margarine tub in which I had packed my sandwiches to reveal ... a kilogram of margarine. The rest of the journey passed frostily.

Julian was known as a razor-sharp critic. He had an unerring eye for a sloppy argument,

and when he saw one he wasn't afraid to point it out to the perpetrator. But if his criticism of others was sharp, his self-criticism was sharper. One of my greatest regrets, shared with other statistical colleagues, was that he refused to allow us to hold a celebratory meeting for him on his 65th birthday because he felt unworthy of it.

Paul Erdos used to say when he was ready for work "my brain is open". Julian's brain and heart were always open to me and to many others. And there was an awful lot inside both of them.

### **Raj Bhansali (Liverpool)**

I am sorry that I am unable to be present at the conference in memory of Julian Besag,

I first met Julian in October 1971 when I had just submitted my PhD thesis at the London School of Economics and came up to take up my appointment as a Lecturer in Statistics at Liverpool University in the Department of Computational and Statistical Science; Julian was also a Lecturer in Statistics in the same department, and had come up only a year earlier from Oxford University. We were both rather young then, in our twenties, and drinking buddies. Apart from the similarities in our respective ages, we also had much in common in terms of our academic backgrounds; for example, our undergraduate degrees were in Statistics and we were both fortunate enough to be taught by some highly distinguished statisticians, Julian by Henry Daniels and his colleagues at Birmingham and I by Alan Stuart, Jim Durbin, David Brillinger and others at LSE.

We thus used to have a lot to talk about while having a pint or two on occasional evenings, or coffee in the staff common room in afternoons; we were often joined by other colleagues like Alan Veevers and David Downham and sometimes by Valerie, Julian's wife. We also used to see each other socially. He was kind enough to invite me to his home several times, and he and Valerie had been to my own home. Julian lived in North Wales and from time to time I would take a lift from him to my own home on the Wirral, which was on his way.

Our conversations were wide-ranging, covering teaching, research, personal life and the statisticians we admired.

Julian used to teach a module on Statistical Distribution Theory to second year undergraduates at Liverpool while I used to teach a module on Statistical Methods to the same group of students. A "bee in Julian's bonnet", as it were, was that the distribution theory was best taught by introducing discrete distributions and the associated ideas of Generating Functions. Julian was also behind some of the innovations in the undergraduate teaching that were introduced about the same time, including a final year undergraduate project in Statistics and a module on Applied Probability.

In terms of research, Julian was at that time working on developing his famous 1974 read paper. He used to talk a lot about the Hammersley-Clifford theorem and the conditional vs simultaneous approach for spatial autoregressions. I had brought to his attention a paper on the frequency domain approach to analysis of spatial data but, I suppose because he was working

No doubt, Julian's statistical legacy as well as our personal memories will continue to inspire generations of scientists.



### **Alfred Stein (Enschede)**

To my sincere regret I cannot make it to the Julian Besag memorial in Bristol. I also do not have any pictures of him or us, only a vivid memory.

Julian has been what one may call one of my “scientific heroes”. I have learned a lot from his papers, discussions with him, and listening to his presentations. They have deeply influenced my own thinking.

We share Jewish ancestry, his ancestry is direct, mine is somewhat more remote (third generation) and his has been more violent than mine. During several communications this has become obvious, and it has made me feel somehow more in a similar way.

Our first meeting was at the Luminy workshop on Highly Structured Stochastic Systems (I think that this was in 1999). I remember him there as the key scientist. He gave the first

Quite recently, two of my colleagues, Tim Swartz and Derek Bingham, visited Bristol and told me that Julian asked after me. I appreciated this very much, although, mindful of the last paragraph of Peter Green's very complete obituary, I did not dare to ask how Julian's question was phrased.



### **Tilman Gneiting (Heidelberg)**

On my way from the city centre to Goldney Hall I was passing by Lime Kiln Road, where a little over a year ago I had the privilege of visiting Julian in his apartment. While he felt weak then, his mind was as sharp as ever, and we enjoyed the views of SS Great Britain across the river, much like Julian had enjoyed living on the water throughout his life.

We've lost a colleague who was an intellectual giant, with an ever-enquiring and at times inconvenient spirit, constantly on the search for truth and perfection, potentially harsh on his environment, though much more on himself.

Julian and I met first in spring 1997, when I was about to receive my PhD and interviewed for a faculty position at the University of Washington in Seattle. We subsequently co-taught special topics courses in spatial statistics at the University of Washington, in winter quarters 1998, 2000 and 2002, and autumn quarter 2003, arguably the highlight of my teaching experiences. As in his research, Julian was striving for perfection in his teaching; as in his research, he succeeded in unprecedented ways. As an aside, I recall vividly Julian grumbling about class preparation, in that most of his time was spent in more or less futile attempts to locate teaching materials in his famously messy office!

I'm hopeful Julian would be pleased to know that we recall him as an eminent scientist and truth-seeker, a unique character, and in many ways the most generous British gentleman.

on developing parametric models for spatial data, he had, wrongly in my view, dismissed it as “classical”. I also remember asking him about the spectral density of the model he was proposing and asking whether this was equivalent to specifying that the inverse correlations of the model should vanish outside a finite region.

At one point, out of sheer frustration at having to get on top of some rather technical literature in this area, he offered me joint authorship of his 1974 paper, but I declined on the grounds that my own contribution was not substantial enough.

I was in the audience when Julian had presented his 1974 RSS paper. The meeting was chaired by Jim Durbin as the then Chair of the RSS Research Section. I still remember Peter Whittle getting up and urging that one should avoid being partisan about the conditional vs simultaneous approach, and David Cox remarking that the paper represented a major advance in the analysis of spatial data. In fact, Julian had originally submitted his paper to *Biometrika*, but David Cox had written back to suggest that it should be submitted for reading to the RSS instead.

Julian had of course “arrived” after the success of the 1974 paper. He was offered a job at Durham University as Reader in Statistics, which he took up. He was also invited to visit Princeton and came back infused, indeed inspired, by John Tukey’s ideas on Exploratory Data Analysis. I also remember the sense of elation he had felt at being asked by Pat Moran to be a joint author on their *Biometrika* paper and the sense of dejection when he was ignored in favour of another person for organizing a session on spatial data at an ISI meeting.

Underneath a tough exterior and an admonishing, if not adversarial, style, Julian was a very kind person. An episode that I distinctly recall concerned a former colleague, who was on a fixed term contract in the OR section of the department. and was about to be denied tenure. Julian had organized a petition in support of this person and helped to secure his tenure. Julian was also very kind towards me personally and helped to instill in me the importance of pursuing research in academic work.

Like many of his friends and colleagues, I am indeed glad to have had an opportunity to come across Julian and to share with him a part of my early career in the academic world.

### **Frank Kelly (Cambridge)**

For me, personally, an influential paper of Julian’s was:

“On spatial-temporal models and Markov fields” published in the Transactions of the Seventh Prague Conference on Information Theory, Statistical Decision Functions and Random Processes, and of the 1974 European Meeting of Statisticians (1974, Czechoslovak Academy of Sciences). It linked reversibility, local dependence structure of the spatial-temporal model, and Markov field stationary distributions.

In those early days I was privileged to have been on the receiving end of Julian’s intense questioning, and very much encouraged by his fierce interest and special charm.

## **Bernard Silverman (London)**

Others will have written appreciations of many aspects of Julian's work and life, but I wanted to say a few words about the way he encouraged a whole group of us who were graduate students or new PhDs in the mid 1970s. In those days RSS read paper meetings one Wednesday a month were a kind of "gathering of the clan" of a group who came from various parts of the country, whatever paper was being read. We used to hear the paper discussed at the London School of Hygiene, then go to the original Bertorelli's in Charlotte Street for dinner, and then on to a pub near Warren Street Station whose name I regret I can't remember. Bertorelli's was probably the same as it had been in the 1920s ... white tablecloths and white-coated waiters, traditional Italian food at what would nowadays be very moderate prices, and so on.

There was a regular group of us there, of whom Julian was probably the senior and I the most junior. Some of the others are also here today, but I am probably the only one who still had to pay his bus fare to get here from the station (and that won't be for much longer!). It was at these meetings that I first got to know Julian, and there were all sorts of ways in which he was enormously encouraging to me at that time.

Julian often contributed to the discussions of the papers himself and encouraged others to do so. It's not surprising that one of his discussion contributions has attracted over 200 citations. He set an example of genuine intellectual curiosity and the desire to get to the truth of the matter through straightforward discussion. His public approach during the meetings themselves of course spilled over into all the informal conversation afterwards. And of course the networks started off at RSS meetings grew into the lifelong friendships that have brought so many of us here today.

To me, Julian was always engaging and encouraging. There were a number of people at that time who gave me the impetus to pursue research in statistics as a career but Julian was one of the foremost. I am very grateful to him.

It's perhaps inevitable, given the specialisation within the subject and the pressures on people's time, that RSS Ordinary Meetings aren't the more universal networking opportunity they used to be. I remember a distinguished American colleague once saying at that time that if you wanted to know everything about what was going on in the subject, all you had to do was to read the published discussions in the RSS journals. What made it work was a combination of factors: the willingness of editors and committees to take risks and publish often controversial and unfinished papers; leaders in the field like Dennis Lindley and David Cox who brought insightful comments to almost every topic; but perhaps above all what I now realise were younger researchers like Julian who often spent a lot of time thinking about the particular paper under discussion, and who also made the meetings far more than just the discussion of a paper!



So the second part of my visit in Seattle finally gave the expected result, some joint work on space-time models for count data, which we eventually published a few years later in *Statistics in Medicine* (2008). Our relationship was always very intense, and it was not a good idea to argue with him. He easily got quite personal, but he was always very honest and supportive and also helped me in editing one or two other papers that I wrote during my visit.

Perhaps the most impressive feature of Julian was his passion for research: he allowed no compromises. But during my visit in Seattle I learned very quickly that he was not a happy man at all, he seemed lonely and – quite bizarrely – even complained that he had also been unsuccessful in research. “Nobody reads my papers!” were his words. One lesson I learned for myself was not to sacrifice my life for research.

After I left Seattle I saw him at several occasions, twice in Munich, once in Luminy and once in Ambleside in the Lake District. Things were not as difficult as in Seattle and we generally had a good time. The second visit in Munich was the last time I saw him, and he was already very ill. He could barely walk, but I still remember an inspiring talk he gave. Among many other things he was illustrating how a simple MCMC algorithm can solve Sudoku problems, which were becoming quite popular around that time. I had already a family and a kid and I took him to a trip to Lake Starnberg. We visited the Buchheim Museum in Bernried, of course by boat leaving from Starnberg. I think he was glad to see me settled and happy, with a life that was also interesting and challenging outside work. I still can see him leaning over the railing and looking quietly over the water, just as he had done ten years earlier in Puget Sound.

### **Michael Stephens (Simon Fraser)**

I did not know Julian well, but of course knew of his outstanding work. I had heard of his health problems, but did not know they were so serious. When he returned to England, I was glad that he went to Bristol, my own home-town and university.

My best memory of Julian was at a meeting on spatial statistics, organised by Charmaine Dean here at Simon Fraser. Julian spoke about his work on disease modeling, where he had named a town in the north of England where the disease in question was most dangerous. This had raised the furies from the worthies on the council, and headlines in the tabloids. Julian’s account was quite entertaining but the surprise and indignation came through loud and clear, with a warning to us all about unexpected feedback from our best intentions.

On a more personal level, I once recommended a Mexican student to Julian. The student had done some quite good work at the Master’s level on the spatial variation of fish in the Caribbean, and I thought he would benefit greatly from working with Julian. It did not work well, although I don’t exactly know why, and another colleague, perhaps Elizabeth Thompson, took over after a while. Thereafter, I ceased recruiting for Julian.



somebody at the University where I wanted to go would agree to take care of me during my visit. The only person I knew was, of course, Julian, so I dropped him an email asking for a supporting letter. It took some time until he replied, but eventually he did, and he said that he did indeed remember me and that I would be more than welcome. Some weeks later an official invitation by Elizabeth Thompson, department chair at that time, arrived.

I got the grant and in August 2005 moved to Seattle. I did not see much of Julian during my first weeks, but suddenly he appeared and invited me to a ten-day sailing trip in his boat, together with two other graduate students. At that time I was warned that Julian was a somewhat demanding character. So I thought, for a ten-day trip it would be perhaps appropriate to bring a bottle of single malt whisky that would serve us for the trip and would perhaps help to make the trip more pleasant. When I arrived at the boat, Julian was waiting for me and I handed over the bottle of whisky. Quite surprisingly, Julian got angry at me and shouted “Are you crazy? No spirits on the boat!”. Somewhat irritated I went back to my car, dropped the bottle there, and then we left for the trip without any whisky. Later I found out that there were fairly large reservoirs of beer and wine on the boat and I am still wondering why whisky was forbidden.

Julian was very quiet during the first few days and I was glad that the two other graduate students were with me. After a few days I thought it was time to start some conversation about statistics. So I went to Julian while he was steering the boat and said “Julian, can I ask you a scientific question?” Without even looking at me the answer was short and brutal: “No!” I tried to insist and added: “But it is only a simple one”. He replied: “Those are the worst ones!” and the conversation was over.

He had a point, but this incident was not particularly helpful for our relationship. I decided to avoid Julian after we arrived back in Seattle and looked at other options what to do: I took a class with Werner Stuetzle on Statistical Computing, one by Finbarr O’Sullivan on Imaging and also joined a research group on Generalized Linear Mixed Models in the Biostatistics Department, with Norman Breslow. I also successfully completed a test to obtain a motorcycle driving license and eventually also bought a bike.

I saw Julian only from time to time, but at some stage he invited me to give a seminar in the Statistics Department, about my PhD work so far. That seminar took place just after the Christmas break and I had been working hard over the two weeks prior to the seminar to prepare my presentation. I think that I did not perform too poorly. Shortly afterwards Julian came into my office and suggested that we do some work together. He suggested a few topics, Bayesian image analysis being one of them. However, I got interested in a paper on space-time modelling of epidemiological rates and said that I would like to work on this topic. He was happy with that, and a few days later I got a very long email with his comments about the paper. I do remember that the email was sent off at night-time, somewhere between midnight and 6am, which somewhat irritated me. This email was only the first one of a whole series of hundreds of emails by him and, looking back, it seems that many of them were sent at night time. I started to wonder about his life-style, also because he often mentioned his (quite worrying) health problems.

## Kanti Mardia (Leeds)

### *Julian Besag and Leeds*

Julian Besag was a good friend to me and to our Statistics Department, and supported activities at Leeds including our Leeds Annual Statistical Research (LASR) Workshops.

I met Julian in 1973 while, I think, giving a seminar in Liverpool University. I recall he had shown me what he was working on for his RSS discussion paper; he mentioned about Markov Random Fields (MRFs) with great enthusiasm but I did not have a clue what he was talking about until he mentioned its connection with some of Bartlett's work which was a hot topic then. I thought he would be a great presenter at the International Statistical Conference in Delhi in 1977, and I was really delighted that he accepted the invitation. We enjoyed his presentation on spatial point processes (Besag, 1977, ISI) and learnt that still there were a few things needed. I could see even then that he was already doing his own computation (in APL); his computational skill became an important point in developing modern statistics. I always found him very focussed and could see him using the same data in different ways so as to extract the hidden truth.

Julian enjoyed his trip to India in 1977, and in LASR 2000 he showed the group photograph (especially pointing out my absence from the photograph) saying humorously that perhaps I had disappeared to a Jain temple. I later edited two volumes on statistics and images. In Volume 1 (1993) he revised his paper, previously published in 1989 in the Journal of Applied Statistics, which I also edited. Also in the same volume, I reproduced his discussion paper from JRSS B in 1986, for which, if I am not mistaken, he made some corrections. He declined the invitation to contribute to the second volume (1994), but suggested whom I might contact.



I learnt more about MRFs in 1979 and thought there was great scope for future development, so invited Julian to our LASR workshop in 1981, 30 years ago! At that time the Workshop meant

that the speaker had to give an instructional course for three days; he gave a very thorough review. Julian stayed with us in our house in Ilkley, very near the Cow and Calf Rocks, and I am sure he went up the Rocks.

I was already teaching an MSc course in Geostatistics (Kriging) in 1979, but he was never happy with Kriging; in my notes of 1981 I recorded his comment that a continuous system cannot be self-consistent, in that “what is observed and what is to be predicted cannot be on the same footing”. In fact he told me many times that one should use MRFs even for irregular data. However, I thought MRFs were alright for lattice data but had challenges for irregular data.

Now and then he would pose deep problems, that were not easy by any means. In 1991 we went to an interface meeting in Seattle and he kindly agreed to be a discussant to a paper by Michael Miller and Ulf Grenander. I recall when we were coming back I had a lot of luggage (antiquarian books that I had acquired, in particular). He was kind enough to carry a very heavy suitcase at Heathrow, on the underground train, and subsequently until I was on the train at King’s Cross. I think in 1981 he said to me that he would come to LASR if I invited him – a promise he kept! This led to invitations to LASR 2000 and LASR 2006, which he attended although he was not well. In LASR 2000 and LASR 2006, as usual he had new topics, generating a great discussion in both workshops.

The proceedings of LASR 2000 were special in that all the participants signed the copy presented to me; on his joint abstract in his own style he simply wrote “With every good wish, Julian”.

Two problems in particular arose from the 1981 LASR Workshop:

1. How should one formulate multivariate MRFs?
2. When is pseudo-likelihood exact?

The first problem led to my paper in the Journal of Multivariate Analysis (1988), and the second to my joint paper (Biometrika, 2009). The second topic has also become important, eg. in certain directional problems the full probability density has an awkward normalizing constant, but the conditional and/or marginal distributions are much more tractable. The main emphasis in the paper is on  $n$  independent, identically distributed multivariate observations. In 2006 at the LASR workshop I gave him the manuscript for his comments, reminding him that we had discussed the problem in 1981. I warned him that as yet there was no spatial context, and he said he would definitely look at it, but I am sure his health problems prevented him sending comments to me, though he might have been a referee!

He was always generous in quoting my work, for example the intrinsic random field (IRF-0) which John Kent and I used for fuzzy classification (1988, IEEE PAMI). I believe we at Leeds learnt a lot from him about spatial statistics. Julian impressed me as a kind and generous person, always full of ideas, very focussed and innovative; he was ahead of his time. He was a man of quality who went for perfection, and will be missed as a great friend.

of Nirvana and grunge music, and I decided to take the American option and to make a stop in Seattle.

So after my visit to New Zealand I arrived in Seattle and, somewhat spontaneously, thought I should go and visit the Department of Statistics. I was vaguely playing in my head with the idea of doing a PhD in the US, so I went up to the campus, without any appointment, and eventually entered the department. I ran into Heike Bickeböllner, at that time a PhD student of Elizabeth Thompson, who asked me who I was and what I was looking for. I told her about my previous work on Gibbs sampling and my interest in doing a PhD, so she suggested that I talk to Julian Besag. By another complete coincidence, Julian was at that very moment just sitting next door in the common room, and Heike introduced me to him. I do not remember much from our first conversation, but I do recall that during it Julian got up and went to his office, coming back with offprints of two or three of his papers, including his 1991 “BYM” paper and a paper entitled “Towards Bayesian image analysis”. So I took the papers with me and eventually flew back to Munich.



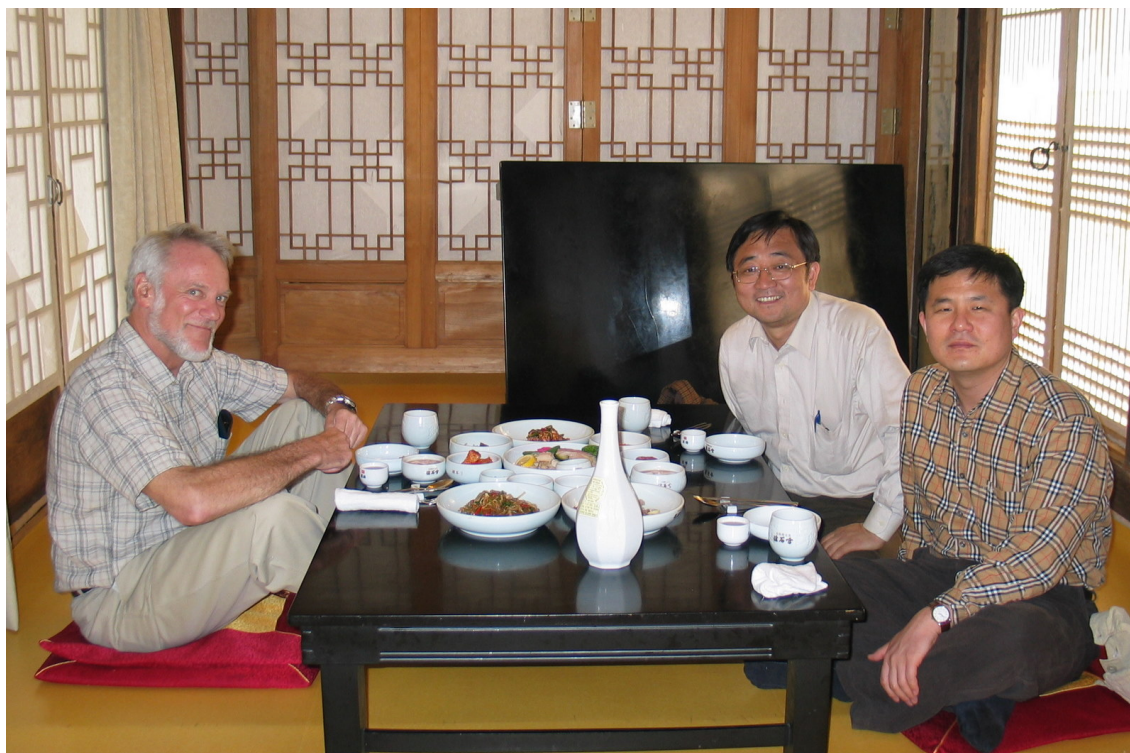
Later on Ludwig offered me a PhD position in his group and I decided to stay in Munich. However, Ludwig knew of my initial intentions to go to the US and encouraged me to apply for a grant that would finance a one-year stay at a university of my own choice during my PhD. The funding agency, the German Academic Exchange Service (DAAD), required, however, that



style was very different from Julian's – probably he thought something like “lots of superficial mathematics and not so much important statistics”. But socially we had a great time together that summer in Seattle. I'm also indebted to Julian for having introduced me to many of his great colleagues at the University of Washington, in particular Charles Geyer who was another summer guest at that time, and with whom I started to collaborate.

I would like to tell a small story from one of the many parties we had during that summer in 1992. It was at Julian's house-boat, where my three-year-old son was standing outside at the upper floor, dropping wine glasses one by one into the water. Those who have referred to Julian's temper may perhaps think that Julian now got very upset. No way. In fact he was very understanding – and it was not because of too much wine.

This illustrates only partly how much I'm indebted to Julian. It is not only all the wine glasses I owe him. I simply owe a debt of gratitude to Julian for being a role-model, for stressing to me the importance of solving well-defined problems – as he said when I suggested some of my crazy ideas – and for all the pleasant and stormy times together. Indeed he is much missed.



### Leo Held (Zurich)

I first met Julian in 1992 by a complete coincidence. I had just finished my Diploma thesis at the University of Munich under the supervision of Ludwig Fahrmeir on “Gibbs sampling in non-Normal state space models” and needed a break. I had some money left, so I decided to travel to New Zealand. I went to a travel agency (the Internet had not yet arrived) and the travel agent offered me two options: a flight via Asia or a flight via America. She mentioned that a flight via the US had the advantage that I could stop for free at any city in the US. Those were the days

## Noel Cressie (Ohio)

I first ran into Julian at Princeton University, during the 1974–5 academic year. He was visiting the Department of Statistics there (with his wife, Valerie, and their young son David), on his way to Durham University and the next stage of his career. I was a PhD student in the Department. Julian had written a remarkable paper the year before, on Markov random fields, and it had just been read before the Royal Statistical Society. I took his course on stochastic processes and had the amazing good fortune to learn this material directly from the master. He prepared meticulous notes in a way that only those who knew Julian would understand. When I came to know him better, I sometimes saw him tear up two hours of preparation and start again. The course was fabulous, but I confess that I didn't fully understand the material until a few years later. Julian was also an examiner of my PhD dissertation, written under the guidance of Geof Watson, although the research was on goodness-of-fit testing, not spatial statistics.

We bonded on several fronts, through statistics, our Commonwealth roots, and our love of hockey. I played for a team called the North Jersey Field Hockey Club, and Julian quickly became a regular on our team. We suffered long hours of travel, rough pitches, awful referees, and crazy weather, all for that “hockey rush”. In the years that immediately followed, we found ourselves together on various continents, and we were both fanatical enough to have packed our hockey sticks. We would boast sometimes that we had played hockey on every continent except Antarctica – that was probably a stretch, but anything is possible when you're telling stories in a pub.

Julian's research on Markov random fields and spatial point processes was path-breaking. He was my teacher; at times we disagreed about things that seemed small to me. They weren't small to him, and our relationship suffered. I had always hoped for it to improve.

We are the poorer for his passing. Vale Julian.

## Allan Seheult (Durham)

Julian was appointed in 1975 to the established Readership in Statistics at Durham University and eventually to a newly established Chair in Statistics. During this period, Peter Green, Chris Jennison, Bruce Porteous, Nick Fay and Ian McPhee were appointed to Lectureships, Stephen Duffy and Richard Hayes to Temporary Lectureships, while I had been there since 1970. He left Durham in 1989 for Seattle.

Nick Fay had been at a very difficult school in a rough area of Newcastle. Nick used to refer to himself as the “YTS boy”. Julian, demonstrating his thoughtful and caring qualities, wrote to Nick's headmaster to tell him about the appointment and received a very appreciative response. Sadly, Nick died at a young age of multiple sclerosis.

Julian arrived at Durham from a research post at Princeton, enthusiastic about John Tukey's Exploratory Data Analysis and its implementation in APL. This was quite distinct from his seminal work in spatial statistics, so much so that when he gave talks on EDA at a joint applied probability and geography meeting in Bristol and later at the Royal Statistical Society confer-

ence in Oxford he worried about his reputation as an applied probabilist. However, interest in EDA and computing illustrated the importance of the analysis of real data to his whole approach to statistics. EDA became a distinctive feature of statistics courses at Durham, possibly the first such implementation in the UK.

Julian's research is well documented, but his applications of spatial modelling to image analysis, agricultural field trials, disease mapping and the significance of proximity of cancer cases to nuclear reactors were initiated while he was at Durham. Markov chain Monte Carlo methods, which he developed in the context of image analysis, were always a sensitive issue for Julian, as he was always very careful to acknowledge and give credit to the work of others. As with MCMC, his work on Monte Carlo significance tests, while initially developed in a spatial context, turned out to have much wider applications.

Julian was passionate about research and very supportive of the work of staff and students at Durham. There is no doubt he had a significant influence on the research careers of Peter, Chris, Bruce, Stephen and myself. He was an RSS enthusiast, a member of its Research Section, and encouraged discussion contributions and regular attendance at meetings; and his brinkmanship which involved almost missing trains back from London was a distinctive feature of these trips!

Then of course there was lunchtime running, where research, teaching and departmental issues were discussed. It was sometimes suggested that you couldn't get appointed to a statistics post at Durham unless you had running on your CV!

Julian also cared passionately about teaching. His notes were meticulous. However, a lecture in which he introduced robust regression didn't go well. To offset his disappointment, he produced a carefully written, detailed, printed version which he made available to the students the very next morning.

Julian instigated computer practicals, written in APL, which centred on EDA, simulation and Monte Carlo significance tests mostly for analysis of variance. He was concerned about the dearth of statistics courses available to undergraduate mathematicians and succeeded in getting the Board of Studies to agree to a final-year double option in statistics. He wrote the syllabus and delivered the course, which included statistical analysis practicals, unlike the mostly theoretical third-year statistics option it replaced.

Julian's examination questions and solutions were always very carefully written, making the checker's work a simple task. There was often a humorous or politically inspired twist to a question. One such question involved three chimpanzees breaking a twig and then calculating the probability that the three parts formed a triangle. The names of the chimpanzees were italicised Greek transliterations of the first names of the three department professors! The external examiner did not comment.

A number of contributors have commented in their reminiscences on Julian's sometimes difficult, abrasive manner, which often resulted in his falling out with those closest to him. These aspects of his complex character apart, Julian was passionate about statistics, hockey and life. He was punctual, very hard working (early to work and late to leave), exacting, always honest with his research, which he wrote up in meticulous, tight prose.

## **David Mason (Delaware)**

I just read your (Peter Green's) obituary of Julian Besag, written with Peter Diggle for the IMS Bulletin. I believe that you caught much of his essence. Yes, Julian was always quick to repudiate any suggestion that he was a "mathematical" statistician. He once threw a pint of beer in my face in the College Inn Pub near the University of Washington for improperly introducing him to a group of fellow drinkers as a statistician. He preferred to be considered a "statistical scientist". Yes, he was certainly a difficult, but also unforgettable character. If I remember correctly, Peter Green, Julian and I hiked up to Lake Ann, near Mount Baker sometime in the early 1990s.

## **Jesper Møller (Aalborg)**

The first time I met Julian Besag was at the 1985 Edinburgh Workshop on Statistics and Pattern Recognition, where Julian presented his highly cited paper "On the Statistical Analysis of Dirty Pictures". Apart from myself and another PhD student, many glorious statisticians attended, including Stuart and Donald Geman, whose celebrated paper on simulated annealing, Gibbs sampling and Bayesian restoration of images had appeared the year before. Julian and the Geman brothers had a long dispute on their different approaches for Bayesian image restoration problems, and I was very impressed by all of them. What I liked in particular about Julian's research was his effort on finding simple useful solutions to complicated and computationally demanding problems in spatial statistics. I was well aware of Julian's previous important work on local specifications of Markov random fields, but his paper on Dirty Pictures was an eye-opener for me on how useful this approach is.

So in 1985 I was impressed by meeting Julian in person. On the one hand he left me the impression of being a very intellectual and influential researcher – which of course was a correct impression. On the other hand he also appeared to me to be a bit wild, which of course appealed to me as a young person. What surprised me was his interest in me, a completely unknown PhD student. As I later realized, Julian was often a very generous mentor to younger researchers with whom he would spend lots of time, asking your opinion about things you had never heard about.

If I should characterize Julian's research with a few words it would be "innovativeness", "simplicity", "usefulness", and of course "passion". One good example is Julian's invention of the pseudo-likelihood for a lattice process in his famous 1974 paper. Three years later in another paper by Julian, he derived a pseudo-likelihood for the Strauss point process as the limit of the pseudo-likelihood for the auto-logistic lattice process approximation. In 1991, Jens Ledet Jensen and I published a paper in Annals of Applied Probability where we gave a direct argument for obtaining the pseudo-likelihood for a general spatial point process and established consistency of the maximum pseudo-likelihood estimator.

Perhaps this was one reason why Julian invited me for a longer stay in Seattle in the summer of '92. I offered to give a series of "Lectures on Random Voronoi Tessellations", resulting in a booklet with the same title. I'm not so sure how successful I was with my lectures. The



## Shirley Coleman (Newcastle upon Tyne)

Julian was great fun. I first got to know him at the Guy Fawkes night bonfire and fireworks party at Close House, then owned by Newcastle University, in the Tyne Valley. My friend and I bundled Julian and two other Durham Professors into the back of my Moskvich estate car and gave them a lift back to Newcastle. Later Julian came to my wedding party bringing two bottles of red wine and ending up sleeping the night on a chaise longue in front of the open fire. We met at the Spatial Statistics RSS conference in Scotland where, as always, he was very gracious with all the contributors and very modest whilst presenting his own brilliant work. I last saw Julian at Bath University and, although clearly unwell, he was his same warm self. He was a great person and I am very sorry not to have him around.



Julian confronted things head on, spoke his mind, rarely shirking the possibility of any resulting difficult conflict. After a talk by Stephan Morgenthaler to a research student conference in Durham a few years ago, Julian started the subsequent discussion by remarking that “there were so many things wrong with the talk, he didn’t really know where to start”, but he did anyway. Fortunately, Stephan didn’t take it personally but dispassionately addressed the issues Julian had raised.

At a social level, Julian could be either up or down, either centre-stage or in the background. On many occasions after parties at their house, when Julian would consume a fair amount of alcohol, Valerie would telephone guests the next day to apologise just in case Julian had been rude to them!

I remember with great affection a lunch with Julian at the New Inn when, after having hamburger and chips, a packet of salted peanuts, a Mars bar and of course at least one pint, he suggested we repeat the menu, which we did; and then we repeated it a third time! After these excesses, we walked back to his house for tea and cheese sandwiches! Needless to say, both of us were a little the worse for wear.

At a personal level, it was a privilege to work with Julian. It was a result of his influence that I had a twenty-year inspirational collaboration with John Tukey on robust analysis of variance. Also, my contributions to image analysis and agricultural field trials were a direct consequence of Julian’s ground-breaking research in these areas.

Julian Besag was a great statistician. He will be sadly missed.

### **Julian Wolfram (Falmouth)**

I’m perhaps unusual amongst you as I met Julian through a baby-sitting circle. This was shortly after he arrived in Durham in the mid-seventies. However we did have a common interest – pubs, beer and wine.

Although I’m not a statistician I was beginning to use some statistics in my work and ad hoc conversations with Julian in the New Inn, Half Moon, Colpitts, Rose Tree and Dun Cow gave me insight into a range of techniques including exploratory data analysis, robust regression and the jack-knife – never mentioned in my physics undergraduate stats course. As long as I kept my brain in gear I found him an excellent, informal tutor – let your brain slip out of gear and he could get pretty pissed off. He set the highest standards and could be brutally honest. I remember, later, asking if he could recommend a statistician to consult at the university I was then at – the phone went quiet for a minute and then he said “No”. Same thing when I asked to recommend a good fish restaurant in Seattle.

Anyway, it is largely down to Julian that I’ve used stats frequently, and more rigorously, in my research over the last thirty-odd years and I will always remain indebted to him.

Julian also introduced me to mixed hockey. I should have known what to expect when he told me it was a strict rule – no glasses, cans or bottles on the pitch. Julian was pretty good at hockey then – at 30, and with a pigeon-toed gait, not the quickest on the pitch but very



determined and quite aggressive. To reciprocate I invited him sailing. I remember in particular an overnight race along the North Sea coast down to Whitby. It started well enough with a gentle, warm offshore wind and he sat happily with the rest of the crew on the weather deck with his feet hanging over the side and a can of beer in his hand. The weather soon changed, the wind swung around onto the nose, the sea got up and the moonlight disappeared as the clouds came over. As the shout “ready about” came the cans were jettisoned and the crew ran across the deck. As the boat heeled the other way Julian was still struggling to get topsides, dragging himself up with one hand as he was determined to hang on to his beer. The beer soon ran out and we the spent the next 5 hours beating into a cold North sea – the sort of thing that puts people off sailing for life!

Not long after this I moved from Durham and had little contact with Julian until I went to a conference in Seattle and Julian met me at the airport with a Jaguar sports car and, to my surprise, whisked me off to see his boat – a very nice forty-four foot sailing boat. So he hadn’t been put off sailing, and he lived in a house-boat!



He was a little disappointed that, apart from giving my own paper, I was actually planning to attend other sessions. He explained what you should do is present your paper, ideally as the keynote speaker, say hello to everyone and join them for lunch and then quietly slip away. As the weather was good, after a day and a bit at the conference I followed his advice and we spent a couple of days sailing around the Puget Sound, drinking Burgundy and beer and discussing what was wrong with the world. I was alarmed when we brushed against a large whale but

Alan (now Sir Alan) Craft, the paediatrician who had collected the data now being scrutinised. In due course a research grant was obtained to employ an RA, James Newell, and then the matter of where James should be located arose. Should he be in Durham, where Julian was, or in Newcastle, where the data were? Although Julian worked in Durham, where his University was, he lived in Newcastle, where his hockey was. The delicate negotiations over the location of the RA were finally concluded when David pointed out that Visiting Professors at Newcastle were entitled to a car parking permit. For those of you who do not know the place, the University of Newcastle is conveniently located in the centre of the city.

The research project now proceeded to a successful conclusion, both in terms of the relationship between Julian and Stan, which developed into amity and a considerable degree of mutual respect, and in terms of the work, which resulted in a paper by Julian and James (JRSS(A), 1991, 154, 143-155), which has been cited 442 times (Mar 2011, Google Scholar).

It was almost always a pleasure to have Julian around the Department and, as he lived in Newcastle, we saw him quite frequently. You need to remember that this reminiscence harks back to the days of mainframe computing and, in the Universities of the North East of England, this meant NUMAC, a consortium that allowed academics at Durham and Newcastle to log on to their mainframe from either institution. The attractions of the Department were further enhanced because David Appleton always ensured lavish, indeed some would say inconveniently excessive, provision of APL keyboards. So attractive was the Department that Julian often came in to work on things other than the Sellafield project. A good deal of his collaboration with Annie Mollié (Besag, York and Mollié, Ann Inst Math Statist, 1991, 43, 1-20, cited 1145 times) happened in the Department and through this we got to know Annie quite well.

Indeed, when it came time for Annie to return to France we all went out to a local Indian restaurant. I say “local” but it was a mile or two from the Medical School. About half way through the meal someone said “Any idea where Julian has gone?” Looking around, a lonely chicken bhuna could be seen unattended at the end of the table. Then Annie said that she thought Julian might have gone to check the computer, as he had set some simulations running before coming to the restaurant. There was a degree of dismay that someone could have gone over a mile to look at his simulations in the middle of dinner, but we soon came to our senses, as we realised this was Julian and we all laughed in admiration of this mildly eccentric dedication to his research. All of us except David, who had gone rather quiet. He then said “Do you really think he has gone to look at the computer? It’s a pity if he has because I turned off all the terminals before leaving the Department”. About thirty minutes later Julian jogged back in to the restaurant, looking a little hot and bothered, and said that he had been to check his simulations but had been disappointed to find that the terminal had been switched off. These may not have been his exact words.

interest in drinking too much pop. Also, he was very encouraging, indeed flattering, about my applied and data analytic work, despite its being theoretically trivial in comparison with the sort of research Julian did. Along with the bear with a sore head persona went a great generosity of spirit.

### **Kerrie Mengersen (Brisbane)**

Here at the other end of the world, I am reading a draft of a paper by a student on spatio-temporal analysis of data from an agricultural experiment on greenhouse gas emissions, and I have at my side a brand new copy of the first Queensland Cancer Atlas produced by another student. Both of these are based on models and methods developed by Julian and they are testimony to the living legacy of his contributions to Bayesian statistics. But they are more than this: just as Julian invested time to teach me about Bayesian modelling and MCMC in my early career, so his work continues to boost the careers of these young people. Julian taught me the principles of MCMC in the sand on the beach at the Gold Coast in Australia. He then taught me the principles of Bayesian modelling and allowed me to participate in a paper on the topic that acted as a surfboard for the wildest ride in applied Bayesian statistics over the last two decades. He taught me rigour in writing, ways of seeing problems and models, confidence in asking basic questions, and a desire to answer them. He is missed.

### **John Matthews (Newcastle upon Tyne)**

I am sorry that I cannot attend Julian's memorial meeting but the email to those unable to attend mentioned the possibility of written contributions. This has given me the opportunity to set down some reminiscences about one of Julian's lesser known appointments. For several years from the late 1980s, Julian was Visiting Professor of Medical Statistics in the Medical School at the University of Newcastle. He held this appointment towards the end of his tenure of his Chair at Durham and it arose because of a high-profile issue in spatial epidemiology.

Around that time there had been speculation about the possible role of emissions from the Sellafield nuclear facility in the aetiology of several "clusters" of cases of childhood leukaemia in West Cumbria. The matter had received national attention through a television programme (Windscale – the Nuclear Laundry, Yorkshire TV) and some confirmation of the role of the facility was claimed following an analysis by a Newcastle geographer, Stan Openshaw. The analysis was a genuine attempt to address the problem, and was not without merit but, to a statistician's eye, it certainly lacked a great deal in professionalism and, possibly, a good deal in validity. Julian put this succinctly when he attended a meeting of the North East local group of the RSS and asked me "What the hell is Stan playing at?" It was only later that I learnt that Julian had for a long time had a love-hate relationship with geographers, and not one that was equally weighted on these two components.

David Appleton, then Head of Medical Statistics in Newcastle, managed to arrange a collaboration to re-visit the analysis of the Sellafield data, the principal players being Julian, Stan and

Julian wasn't in the least perturbed. He was in good form and fascinating to listen to. We really enjoyed our sail and started to plan a longer, future trip up to Canada – it never happened.

I'll remember him as a demanding friend who could be great company, a brilliant statistician and a not half bad sailor.



### **Liz Green (Bristol)**

I am not a statistician, so this is a personal note.

I first met Julian and Peter Diggle on the same occasion, at Allan Seheult's house in Durham. It was a long time ago, possibly early in 1975, before Julian came to Durham, and when the only Peter Green I had heard of was a guitarist. In Durham I remember Julian as a regular lunchtime runner with other members of the maths department, to keep him fit for hockey which he played to a serious standard. I remember that he fought vigorously and vehemently for the third chair



in maths to go to statistics, rather than alternate between pure and applied, so it was probably only fair that he was the first professor of statistics at the University of Durham.

One summer Peter and I visited Seattle and sailed in at least two of his many boats. Julian loved the water and lived in a houseboat. Peter took me out in a tiny dinghy across Lake Union, which I found terrifying and did a lot of bailing out, but later during that trip we had a great adventure on Julian's yacht, sailing under the bridge and away into the ocean, drinking beer in the sunshine. This was a wonderful experience which stays with me.

It was sad to see Julian's physical strength leave him in his last years. At first, he was frustrated by some of the technology that would make it easier for him to enjoy living in his flat in Bristol, but eventually he got the hang of it and at long last he discovered internet shopping. This was a huge breakthrough and saved us all many frustrating expeditions to Sainsbury's. Julian was not a good shopper and hated every minute of it.

Peter and I visited him when we could while he was in hospital here and saw him the day before he died. He knew he was dying but was very clear on some points and not in pain. The nursing staff was kind and caring and he was in good hands. We are sorry we could not attend Julian's funeral, so I am pleased to have this opportunity to contribute in his memory.

Julian was a huge, larger than life character and the scientific community must mourn his loss. We must take people as we find them. Whilst Julian could be very tetchy, through pain or frustration, and I know he upset many people with his brusque manner, to me he was always kind and courteous and this is how I shall remember him.

### **Anonymous**

Julian, I disappointed you many years ago, and I'm doing so again now as I am sure you would expect me to be at this meeting. As before, I have modest excuses, but again they would not satisfy you.

We met and communicated quite a lot for a couple of years, and then intermittently for several more years. Our interests diverged, and after 1988 I only saw you twice, very briefly – once in 1992, and lastly in 2000. We had a brief e-mail correspondence in 2004, when you said "All the very best for the future". I didn't hear from you again.

We were never very close – I didn't share any of your other interests. Although I could never be sure how I would find you, the generous you far outweighed the grumpy you (and usually I sympathised).

I am grateful to you for many things, and I have always appreciated your early regard. You were a great inspiration to me, and, although we hadn't been in recent contact, I feel a huge loss that you are gone.

I would like to finish with some (slightly adapted) words of Tom Paxton, which seem very appropriate to me:

Are you going away with no word of farewell?

Will there be not a trace left behind?



Gidas had done that Julian said must have a bug). Without a doubt, Julian was one of the most remarkable people I have ever encountered and I dearly miss having him in our world.

### **Bruce Porteous (Edinburgh)**

I was a member of the Durham University Statistics Department between 1985 and 1988 and had the very great privilege of working with Julian, Peter and Allan over this relatively short period.

When I went up to Durham from Cambridge for my interview, Julian already had a very well established reputation as a fearsome character who did not suffer fools lightly – I travelled fully expecting my inadequacies to be thoroughly exposed. I think that what helped me through was some practical knowledge of a spatial data set that Julian knew well.

I found Julian (and Peter and Allan) to be straightforward, hugely committed to their subject, fun to be with and, despite reputations that were already reaching the heights, completely lacking in pretension. A Julian inspired approach based on genuine scientific insight, and not just highly technical mathematics, was hugely refreshing and I soon realised that I was a novice in their company.

Looking back, I have a very large number of fond memories of Julian that, for some reason, still remain fresh in the mind – probably due to his unique and somewhat unconventional character and style. Two examples, from many, are:

1. I was running a simulated annealing experiment one evening when Julian came in, sat down and started chatting. As he watched the image pixels change, he began to stare intently at the computer screen. After a few minutes he informed me that there was a mistake in the programme and what it was. On inspection we found that he was right and had somehow identified a very subtle coding error.
2. Having read the other contributions, I now realise that the RSS train ride to London with Julian was, should we say, often colourful. On one trip back to Durham I got caught up in a “discussion” between Julian and the ticket collector and which also involved a large number of other passengers including Peter Green. The Besag view prevailed.

The last time I saw Julian was at Allan’s retirement a few years ago. I entered the lecture theatre unseen as Julian was preparing his presentation – when he saw me he rushed over, using a crab-like gait due to his mobility constraints, to say hello and shake my hand – it felt really good to be welcomed like that after 20 years.

Although I knew Julian for a short period of time many years ago, he is someone I have not, and certainly will not, forget. I feel immensely proud to have known and learned from him.

### **Stephen Duffy (London)**

I worked in Julian Besag’s group in Durham in 1986. When I first met him, I was struck by his rather grumpy manner. However, I always got on well with him, partly because of a common

I never knew what to expect on those visits. We had conversations about work, life, and the world. It is hard to accept that these are over. Science has lost a creative thinker: we have lost a great colleague and a good friend.

### **Adrian Baddeley (Perth)**

One balmy evening in Spain, a bus waited to pick up the guests from a conference dinner to take them back to their hotels. A young man, with a troubled look about him, sat at the back of the bus, gazing vacantly at the city, and contemplating the mess that was his personal life. His eyes came to rest on a spray of bullet holes from the Civil War, still clearly visible on the facade of the historic restaurant.

Suddenly a figure loomed – bustling, animated, courteous – and took the next seat, introducing himself as Julian Besag. Perhaps it was the instinctive recognition of another troubled soul; perhaps there was some alcohol involved; but within a few minutes, Julian Besag had confessed to me like an old friend that his scientific career was a failure. Yes, Julian’s early flashes of talent and promise, and the high regard in which he was held by Maurice Bartlett, had ended in disappointment and burnout. The brilliant career of J.E. Besag was over by 1983. Gloom descended. I gazed back at the bullet holes.

But there was one thing, Julian said, almost as an afterthought, his voice brightening: there was one new curiosity that was keeping him entertained. Something to do with digital images. I expressed an interest, and Julian began to explain, succinctly, clearly and with increasing animation: lattice data; agricultural field trials; Markov random fields; conditioning; pseudo-likelihood; digital images; Don and Stu Geman; Bayesian inference; conditional modes. And where it all might lead: spatial statistics; conditional simulation; a rich vein of elegant scientific ideas, and a far-reaching research programme, stretched out before us like a promised land. It was wonderful, exhilarating. “Well, here’s my hotel”, said Julian abruptly, shaking hands and bolting for the door, gone as quickly as he had come. I sat, stunned, as the bus drove off. Thus ended the most important ten minutes of my life.

### **Don Geman (Johns Hopkins)**

Among many other anecdotes I could recall, Julian was at the source of the most amazing coincidence of my life. One winter evening many years ago in Cambridge (UK) I was trying to find the location on a city map of the house where I was going to dinner. I could barely read the map. A kind stranger came to help me and we moved together under a street light. We were both looking at the map. After some time, I said “Julian?” and he said “Don?”. Incredibly, as well as we knew each other, neither of us immediately recognized the other. And neither knew the other was in Cambridge.

Anyway, there are other stories I could tell, some more controversial, and some attesting to his astonishing intuition (Peter Green was there for one of them in 1986 involving an experiment

I could have served you better – didn't mean to be unkind,  
you know that was the last thing on my mind.

Goodbye Julian, I miss you.

### **Peter Green (Bristol)**

I first encountered Julian in 1972, during a seminar in Manchester. Ten minutes into the talk there was a commotion, and two young men came in. One might have been Peter Diggle, but the other one clearly stuck in my memory by reminding me, by his features and air of bravado, of Alex, the protagonist in the Clockwork Orange. I learnt that this was Julian, and I first met him properly, along with Denis Mollison, on a mountain walk in the Vercours in 1976.



A few years later, a lectureship was advertised in Durham. I was ready for a change and applied and, in spite of a terrible interview under the influence of the excellent pre-interview hospitality from Julian and Allan Seheult, got the job. Thus, in 1978 began a roller-coaster 11 years that changed my life. Looking back, it seems that everything I now know in statistics

I learned then, from Allan, Julian and, later, Chris Jennison. In research, Julian influenced everything I did from then on, and which has given me a fortunate and happy career, one that he supported and encouraged in many ways.

It was tremendously exciting to witness a bumpy but very productive stage of Julian's career. Julian's attitude to me was complicated, but I think my main role was as a sounding-board for his ideas. He would come into my office with a stream of consciousness about his current preoccupation, not I think to show off, but to practise explanations, and often to seek reassurance. He was very insecure about his lack of formal mathematical training and he hoped that I would somehow authenticate his ideas. In reality, although I sometimes found a useful counter-example, and occasionally made a more positive contribution, almost always he was right and I simply agreed. His intuition was outstanding; he always repudiated any suggestion that he had mathematical ability, and while it's true that he was never going to submit to the *Annals*, I maintain my belief that he had very deep understanding, as well as great perception and originality.

18 years after we both left Durham, Julian returned to my neighbourhood in 2007, to his post in Bath. We encouraged him to visit the group here in Bristol, and to the extent his poor health allowed, he did so, driving over in his glamorous Mercedes cabriolet. For many months between December 2008 and October 2009 he was in hospital in Bristol, and I tried to see him regularly. Ultimately he was discharged, basically for refusing the radical treatment recommended for his infected feet. He had come to like being in hospital, and rather dependent on it, and we were concerned and sceptical how well he would thrive living on his own. But he did remarkably well, and in some ways his last months were rather contented, although lonely. He had a wonderful rented apartment right on the harbour-side in Bristol, just half a mile from here. There he would look out at the sailboats and other activity on the water and the banks, and in spring he took an intense interest in the fortunes of the fledgling ducks.

Julian's last public appearance was here in the Orangery at Goldney, at one of our research workshops. He was not actually supposed to be on the programme. At the end of the keynote lecture on day 1 of the meeting, he challenged the speaker rather bluntly, on the grounds that the exponential family random graph model presented did not actually fit the phenomena in social networks that was claimed. This challenge went unanswered, and in the coffee break that followed Julian offered to give a talk on exact  $p$ -values for networks, and this he did on 1st July 2010.

At the end of the month, however, his condition worsened and he was readmitted to hospital, where, too little and too late, he had his operation, and died within 2 weeks. He had until his last couple of weeks been optimistic, and was on the brink of exchanging contracts to buy a bigger flat in the same block, one with an even better view over the harbour.



changing the ones to zero and the zeros to one preserves the row and column totals. Will such moves take you to all possible tables with the given row and column totals? I thought for a while and went to the blackboard and outlined a proof that the answer is yes. I realised later that Julian was impressed by this. About ten years on, when I had moved to Bath and Julian to Seattle, we met at the Interface Conference in Michigan and Julian asked me if I could reproduce my proof. By about four o'clock in the morning, I had managed to re-create it: I committed it to paper this time. Another eight years later, when I visited Julian in Seattle he told me "You know your proof for the Rasch model. It's not new. I found a version published in the 1950s".

On that visit to Seattle, Julian took Debbie and me on a two-day sailing trip. At one point, with the sun shining and the wind blowing strongly, he gave Debbie the helm: while she stood terrified as the boat leaned at forty-five degrees, he grinned, knowing there was no danger of capsizing (at least I hope that was the case). Later, we learnt something about Julian's musical tastes while enjoying a drink in a bar. As the live music started up, Julian took out his hearing aid, put it in his pocket and stated "I hate xylophones".

Julian came to Bath in 2007. He took his place in the Department but his health was poor and he was frustrated by how easily he became tired and the difficulty in concentrating on new work. He spent periods in hospital, where he was not the most conventional of patients. On one visit, while I was still taking off my coat and finding a chair Julian picked up a notepad and drew points and triangles. Pointing to the Voronoi tessellation he had just produced, his words of welcome were "What happens to these triangles as this angle goes to zero?"





After he moved to Seattle, we maintained email contact. He could go for months, or more than a year, without writing; but, when he did, it was always with the same great friendship.

His intuitive side often generated very interesting subjects for thought, sometimes apparently bizarre – until one had seen them develop by arguing about them with him! Shortly after his return from Seattle to Bath in 2007, and a very bad experience with a bout of shingles, he wrote:

“The good news is that I seem to have surfaced in a different place mind-wise and ... I’m positive, am thinking again and coming up with new ideas, in particular on animal behaviour”.

“My hypothesis is that some animals possess senses that we simply don’t know about but that we can learn about through experimentation. This is exemplified by “Besag’s (blind) mole” which performs simple experiments on humans to extract the properties of what we call “sight”. Probably not new but quite fun anyway. It has always seemed to me to be arrogant to assume one can explain animal behaviour in human terms: I take my lead from watching the ducks on Lake Union [Seattle] from my house”.

This led us into discussing the sorts of senses we might not be aware of, mechanisms that other creatures can exploit but we cannot, e.g. sensing the Earth’s magnetic field, or even being able to “see” it, how wasps find their way to the honey-pot (possible odour gradient detection by differential perception in the two antennae, along with their characteristic side-to-side motion while flying up-wind), and so on.

Almost in defiance of his great abilities, Julian could be intensely self-doubting, yet paradoxically exploit his own self-doubt. As he once wrote:

“I’ve had new ideas because I can’t understand what other people do (unless I spend an awfully long time at it). I have absolutely no powers of (conventional) abstraction. There are advantages in having bugger-all knowledge (I’ve long told my students I do research because I understand so little about what other people do).”

His last few years at Bath were a sad, painful progression to the physical failure of his body, yet borne with a resilient courage. I treasure my memories of his friendship, and of my glimpses of a fascinating personality.

### **Chris Jennison (Bath)**

When I completed my PhD and applied for jobs I was fortunate to be appointed to a lectureship in Durham. There I joined Julian, Allan Seheult and Peter Green. Not having much experience, I assumed this was a normal group of statisticians. I was, of course, in an extraordinarily stimulating environment. In my three years in Durham, Julian introduced me to spatial modelling, Markov random fields, agricultural field trials, Monte Carlo simulation based on Markov chains, and image analysis.

Julian recognised my liking for mathematical puzzles. While he was working on the Rasch model, he posed a problem one day over coffee. Suppose you know the row and column totals of a two-way table of ones and zeros. Given one example of such a table, you can create more examples by taking four cells on the corners of a rectangle containing 0, 1, 1 and 0, then

## **Robin K. Milne (Perth)**

I first met Julian at the University of Western Australia during a visit of a few weeks that he made here early in 1976 at the invitation of Terry Speed. Julian gave several seminars and a very interesting short lecture course on spatial processes to our honours class of that year, based largely on the content of his JRSS B (1974) paper. That class was, incidentally, the largest and perhaps best honours class in statistics of all my 37 years in Perth, whilst Terry Speed, Mike Thornett and I were amongst others who also formed a part of Julian's audience.

I did spend considerable time with Julian during that visit, in particular because he made it clear that he would welcome the company. I can remember vividly one colourful evening when Julian and I demolished a significant portion of a flagon of port, which Julian had decided was his drink of choice for that evening. We had a very pleasant evening, but that experience taught me that I did not have quite the same resilience as Julian!

Early in 1980 I spent about five weeks in the Durham-Newcastle area, visiting especially Julian. He was very hospitable, inviting me to stay initially at his house and insisting on personally cooking what seemed to be his staple meal –steak and chips with green peas! Later he believed that I should be better looked after, and arranged that I would board for the remainder of my stay with his wife Valerie, who by that time was living separately, along with their son David.

Julian decided that my expertise would complement his and that of his research student Stan Zachary, and that I should work with them to write a paper. This became "Point process limits of lattice processes", published in JAP (1982). To facilitate this work Stan visited Durham during this period and somewhat later in 1980 I visited Stan at Heriot-Watt.

I remember fondly Julian and many others whom I met in the North-East on that visit. In particular I remember Julian for his tremendous mathematical and statistical insight. Despite this, in personal conversation he readily confessed to feeling mathematically ill-equipped to deal with some tasks. In such ways he was disarmingly honest and had an intense dislike of what he usually called "humbug". He was direct and sometimes rather confronting in his personal style, yet I think that this directness did earn him lasting respect. I was very sad to hear of his passing, but I am pleased to have the opportunity to contribute these words in his memory.

## **Mike Titterington (Glasgow)**

My contribution takes the form of non-technical reminiscences, while acknowledging the profound and continuing influence that Julian's writings have had over the last close-on four decades.

I first encountered Julian in a bar in Leuven at the European Meeting of Statisticians in 1977. He was rather subdued but, I hasten to add, as a result mainly of jet-lag from Australia rather than of what the bar had to offer. Another warm, indeed weather-wise distinctly hot, European-Meeting memory comes from the 1987 event at Thessaloniki. Julian was on the organising committee and ensured that there were long afternoon breaks to allow for expeditions, by coach, to a suitable beach away from the polluted sea near the city. More personally, I recall a hot but

enjoyable walk in the hilly area surrounding the city, with Julian and my colleague, Ben Torsney, during the weekend preceding the Meeting.

I always felt that I got on well with Julian and I recall very generous (possibly misguided!) words from him about things I had written and the occasional milestone that I passed. He always asked kindly after my son, also a David, especially when he discovered that David was learning to sail, a former passion of my own.

Finally, I'd like to mention a particular kindness. A few years ago I sent him a full-page article from the (Glasgow) Herald newspaper, written by Jonathan Raban about sailing in the Puget Sound, near Seattle. I thought no more of it until, some time later, I received in the post from Julian a copy of "Waxwings", which was Raban's latest book based on life in Seattle; the book was signed – by the author! Since then, from time to time I tried, unsuccessfully I'm afraid, to think of an appropriate gesture I could make in return; the last time I wracked my brain about this was on about August 3rd, 2010.

### **Sheila Bird (Cambridge)**

*Julian Ernst Besag FRS: ABC and more? – Farewell, friend*

Aberdeen, 1978 is where I first met David Andrews, Julian Besag and David Cox, our three guest speakers at a Scottish and Northumbrian Academic Statisticians' meeting.

Bristol is where Julian and I last met: Julian – from his hospital bed – had arranged to take me to lunch at Fishers, not far from the suspension bridge. After lunch, I delayed fetching the car to give me time to pick up literature on flats-for-sale in Bristol (and to buy a birthday present): Julian was furious with me, as he had come out to wait and had waited too long. But the last emails I had from him, around his 65th birthday, included an eloquent description of the harbour view from his flat in Bristol.

In between, Cambridge: where Julian would appear from time to time, usually in a spectacular motor, sometimes unhappily, sometimes mischievously, sometimes whimsically, often challengingly. Of course, Julian took on challenges himself. Little knowing how much boats and his Union Lake boat-house (as I called it, to irk him) would come to mean to him, I'd challenged Julian to a very cold swim in the North Sea off Durham/Newcastle!

Finally Donation: I had worked on kidney transplantation, "matchability", and the first audit of UK's potential for cadaveric solid organ donation. Julian was a well-informed patient, but I was never quite sure whether he had gone through the procedures to be listed for kidney transplantation, or knew his "matchability". Conversation in hospital turned to a paper on presumed-consent for cadaveric organ donation which I was working on with ethicist Professor John Harris. Both of us as authors were dismayed that the Organ Donor Taskforce had set its face against presumed consent without properly quantifying how many additional kidney, heart, liver, lung transplants there could have been – had the UK's presumption been that organ donation would proceed unless, in life, the deceased had opted-out, or a family over-rode the presumption. This could have benefitted Julian. But – selflessly, righteously and passionately

– Julian inveighed again me to be so unfeeling for the relatives of the deceased, and to be so cavalier as to risk bringing the whole of medical statistics into disrepute. He appealed to Peter Green to avert me from my course, and me not to publish.

I did pay some heed to his reaction, which the British Medical Journal feared its readers might share. After (much) editing, the published paper attracted more correspondence than any other I have been associated with – the majority of correspondents again it in such phrases as “cold statistics”. Sadly, I never gave Julian the satisfaction of telling him how rightly, as well as selflessly, he had anticipated reactions!

In reflective conversations in hospital – often less private than ideal because louder on account of Julian’s tinnitus – I heard about unsung good deeds. Only at Julian’s funeral, for example, did I realize that he’d never explained to Valerie his principled stand, on being awarded the RSS Guy Medal in Silver, that he would not accept an invitation to celebrate with the Statistical Dining Club because his wife had not been invited. He remained very proud of Valerie’s books and of David as local councillor.

## **Ted Harding (Ely)**

I first got to know Julian when he visited Henry Daniels in Cambridge in the late 1970s, where Henry had an office in the Statistical Laboratory following his retirement as Professor of Statistics at Birmingham. The link between Julian and Henry would have gone back to Julian’s transition from studying Engineering at Cambridge to studying Statistics at Birmingham in the 1960s. In his own words: “I started off in statistical ecology with MSB[artlett] and initially that interested me (indeed since a first-year undergrad course from David Wishart at Brum)”. But, later on: “I quickly realized that statistical modelling had little to offer such a complex subject”.

Julian and Henry’s discussions, I believe, revolved around merging Julian’s original ideas for modelling stochastic processes, especially spatial, and Henry’s gifted skills in analytical formalisation of such processes, especially asymptotically. I was invited to join in occasionally, particularly on the computational front.

I was struck by the intensity of interaction between Julian and Henry. While it was not antagonistic, each could be sharply critical of the other’s ideas and methods. Julian, in particular, displayed constant intense critical alertness. He would instantly absorb what was being put to him, form a vivid intuition of it, and rapidly throw back the implications of his view. This was also coupled with an ability almost instantaneously to formulate a mathematical expression of his intuition.

These first meetings were the beginning of a long friendship with Julian. Just as with Statistics, friendship for Julian meant intense involvement. Indeed, if he was going to take an interest in anything – whether it were modelling childhood leukemia, pursuing a tangential side-issue (which would unexpectedly lead back to the main topic), sailing, observing nature from his boat, or enjoying a good meal and a very good bottle of wine with a friend – it would involve his whole attention.