

## David Sherrington as a mentor of young scientists

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## INTRODUCTION

## David Sherrington as a mentor of young scientists

How deeply honoured I am to have the opportunity to express my thoughts at this delightful celebration of David's achievements, so far, in his remarkable career. I have been asked to center my remarks on David's contributions to the mentoring and professional development of scientists early in their careers. This is a topic that I am more than happy to reflect on, because it gives me the opportunity to recall the exciting period I spent as one of David's postgraduate students at Imperial College in the early 1980s. It also gives me the chance to publicly express my gratitude to David for the opportunities he created for me at that time, as well as for the interest and care he has shown in my career and well-being ever since, as we have met up and exchanged news and ideas around the world: in New Mexico and Colorado, in Cancun, Paris and Trieste, at numerous March Meetings of the American Physical Society and, of course in London, Oxford, and my home town, Champaign-Urbana, location of the University of Illinois.

I have been a member of David's circle for 25 years now, and I would like to tell you a little about how this came to be. Not because of what this says about me, but, rather, because of what it tells you about David and the rich generosity of his spirit and effort when it comes to supporting the underdog. I was indeed one such underdog—and that's putting it charitably—when I first met David in September of 1982, not long before the academic year was to begin. I had heard about the exciting circle of physical and mathematical ideas swirling around the spin glass question during the previous year, which I had spent at the University of California's Los Angeles campus, through an opportunity kindly arranged, as it happens, by Sam Edwards. But I was eager to return to the UK for postgraduate studies and to work on spin glasses, so I simply showed up at David's Imperial College office, unannounced (if I remember correctly). And with his characteristic courtesy David kindly invited me in and we chatted about physics. After a while, I summoned up the courage to ask if I could do postgraduate research. At Imperial College. Under David's supervision. That term! And, to my eternal delight, he agreed. And even more than that, shortly thereafter he set about the task of finding a studentship to support me.

This generosity of spirit towards people at early stages in their careers is by no means confined to members of David's own research group. One of David's most remarkable and impressive qualities is his ability to recognise and be an early proponent of exciting work being done by young and not yet widely known researchers, and to enthusiastically foster the dissemination of this work. Jorge Kurchan has told me how David was one of the very first established scientists to take a close interest in Jorge's now-famous work, done jointly with Leticia Cugliandolo, on the dynamics of spin glasses, and that this interest and the invitations, discussions and talks that followed from it, were a tremendous source of inspiration and encouragement to Jorge and Leticia. Jorge is but one of several people who have told me how grateful and impressed they have been by David's similar treatment of them, and for his invitations to visit Oxford and benefit from interacting with and being stimulated by the theoretical physics group there. But David's dedication to others is by no means restricted to his juniors. All of us who have got to know David are deeply aware of the devotion he has to his scientific mentors, Sam Edwards and Walter Kohn, and the rightful pride he takes

in being a member of their scientific families. With postgraduate and postdoctoral advisors in Sam Edwards and Walter Kohn, with professorships at Imperial College and then Oxford University, with election to Fellowship at the Royal Society and an invitation to deliver its Bakerian Lecture, and with the Dirac Medal from the Institute of Physics, David more or less defines ‘the scientific establishment’. But I don’t think he sees himself quite in this vein, and this is but one facet of his charm, one that—I presume—engenders his eagerness to welcome and encourage outsiders.

What about actually working with David? Well, right from the outset it was crystal clear to us that David took the responsibility of supervising and inspiring his postgrads and postdocs very seriously indeed. The problems he suggested were fascinating and timely, and he seemed passionately interested in how they developed. Still, we were given just the right amount of space to feel like we had a hand in shaping what we did. We felt as if we were being groomed to be collaborators, working more with David than for him. David made sure that we were aware of visits from scientists whom he admired, and encouraged us to attend their talks and even to meet them. He recognized the potential value of conference and summer school travel for enthusiastic students, and he generously supported it. But there were two important elements of David’s knowledge that we weren’t steered towards: good food and fine wine. Perhaps these were part of the postdocs’ curriculum, but not the postgrads’. Whilst David was always keen to discuss the motivation and set-up of a problem, as well as any results that had begun to emerge, I think it’s fair to say that his patience for the technicalities had an interesting rhythm to it, which we gradually discerned. I didn’t understand it then, but as I head towards fifty years of age it’s becoming all too clear: too close to lunch might occasion a little watch-glancing; too close to the end of the day and the conversation would dissolve into the Imperial College hallway, with David sprinting to the lift and apologizing with—as Michael Wong reminded me—the cry: ‘Gotta rush; my wife will kill me!’.

I have mentioned David’s legendary courtesy. But I have not yet mentioned his straightforwardness, which is also legendary. And, I might add, unforgettable to the recipient. I usually appreciate the honesty and clarity that this straightforwardness embodies. But not always. Some years ago, I had the good fortune to spend a month in Oxford, thanks to David, and my family came with me, my son Ollie being about six years old at the time. One evening, David and his wife Margaret joined us for dinner and, some time after the meal was over, Ollie—who was still young enough to still regard his Dad as something of a superhero—wandered over to David and struck up a conversation: ‘Tho, Profethor Therrington. Wath my Daddy a good thtudent?’ he asked. I can still see the look of horror on David’s face. Should I lie and let the child find out the truth later? Or should I tell him what I really think? Well, as you might expect, honesty—delivered gently—prevailed. David rubbed his forehead, scrunched up his nose as if about to take a dose of medicine, and did the very best he could: ‘Well, lad, fairly good,’ he said, ‘your Dad was a fairly good student.’

I’d like to conclude with a reflection that often comes to my mind when I think of David. Not long ago, I happened to be in Trieste at the Abdus Salam International Centre for Theoretical Physics, a favorite destination of mine. Not so much for the scenery—although when you’re coming from the heart of East Central Illinois, the Trieste scenery is not to be sniffed at. But, rather, I love ICTP for its palpable spirit of international and inter-cultural cooperation. While I was in Trieste it so happened that there were three workshops going on at the same time. One was on information processing and the visual cortex; another was on algorithmic complexity and combinatorial optimization; and the third was on glassy states of matter. I cannot have been alone in having the truly staggering realization that all three workshops were, to put it bluntly, exploring equivalent phenomena encoded in a common mathematical structure, and that the corresponding systems of equations were the ones first developed in the setting of

the Sherrington–Kirkpatrick model of spin glasses. What this small anecdote hints at is the vastness of the terrain over which research on spin glasses is having a deep and lasting impact.

As scientists we are, I think it's fair to say, at least partially motivated by a desire to receive some recognition for our work, some evidence that it has been engaging and stimulating to others in the field. But David's work far transcends this model, being pivotal not only to researchers in the originally-intended domain of rather obscure magnetic alloys, but also far, far beyond: from neuroscience and biological information processing, to the social sciences, including economics, and on to probability theory, computer science, the next generation of optimization algorithms, and the entire field of complexity theory. Indeed, one can regard spin glasses in the guise of the Sherrington–Kirkpatrick model as a conceptual version of the silicon revolution: a curiosity-driven scientific endeavour that continues to catalyse utterly unanticipated progress over far-flung domains. David captured it all perfectly in the title of his 2001 Bakerian Lecture: 'Magnets, microchips, memories and markets: [the] statistical physics of complex systems.' Many of us would consider ourselves wonderfully fortunate if our work were to have just a small fraction of the impact that David's has. Moreover, the scientific panorama revealed by investigations stimulated by David's work is beautiful, shocking and inspiring, a panorama broader still than condensed matter theory or even physics itself. So, when our spirits are down and our brows furrowed by some painful integral or a bug in our computer code, let us remember to pause and revel in the astonishing confluence of scientific themes that the Sherrington–Kirkpatrick model and its associates capture. To echo a view I first heard from Giorgio Parisi: I'm not sure if there is anything more rich or surprising in all of contemporary science.

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