

Disturbing reading.

“There’s really weird stuff on this shelf”, observed a visiting student, as we were combing the lab’s ‘library’ for a book I had recommended as a source of advice on design of informative graphs. Here, ‘library’ is being used as a euphemism for a loose collection of books for everyone’s communal use, shoved in no particular order on a bookshelf in the middle office, and identified with stickers that indicate they are for everyone.

“Like what?”, I asked as I continued rummaging.

“Like instructions about how to fix a motorbike!”.

I looked round, puzzled for a moment, and then saw the familiar cover.

“That’s not what it is:”, I said “it’s a ghost story. Well, two ghost stories really, one about a ‘ghost’ that haunts a man, a ‘ghost’ the existence of which will stand any scientific scrutiny, and the other about ‘ghosts’ that haunt the intellectual process of science”.

He frowned, and flicked through it. Then he looked along the rest of the shelf. He found the usual books of lab recipes, books of statistical methods, histology books and embryological atlases that might be found in any lab. But he also found a few other things, and started to read the backs of them as I carried on searching for Tufte’s *The visual display of quantitative information*. By the time I found it, on someone’s desk under a load of other things (of course!), the student was putting back the books he had pulled out, and faced me with the direct question “Why are these even here?”.

Because I wanted to get on with the discussion about graphs that started our hunt in the first place, I gave him a short answer and moved on. This blog is a longer version of the answer.

Of course, the lab library contains the usual sorts of books, put there by me or contributed by previous generations of students, to help with the day-to-day business of doing things at the lab bench, looking at them under microscopes, and analysing and presenting the data. Some of these books, such as the Tufte one I mentioned above, and Bremer and Doerge’s *Statistics at the Bench*, are almost standard reading for graduate students here, while others serve the same purpose as Mrs Beaton’s cook-book does in a kitchen, acting as an aide-memoir about how to do all of the routine protocols that we do not perform quite often enough to remember. But I have deliberately ‘spiked’ the collection with copies of books connected to science that have meant a lot to me (especially when I was a student, though some are newer), in the hope that at least some are picked up and

perhaps make their readers think in new ways. Many are in a sense ‘forbidden pleasures’, in terms of deviating from standard scientific training, and that is the real point of them – not to drive home the same ideas to which people will have been exposed through years of undergraduate biomedical training, but to encourage them to question the very foundations of what is scientifically polite behaviour. In leaving them around, I am reminded of the practice of the journalist-novelist Rachel Johnson, who said in an audio-essay broadcast on Radio 3 that she left sexually explicit novels, especially those that might be considered ‘deviant’ by the more straight-laced members of society, around her house specifically in the hope that her children might find them and read them in secret. There was a good reason: she hoped this would ensure that her children learned of such intimacies from highly intelligent literary authors presenting the inner lives of their characters, instead of, or at least before, meeting them in a debased and meaningless form on some low-budget pornographic video on some other teenager’s mobile ‘phone.

Here are some of the ‘surprising’ books on the lab library shelf:

One that I met as an undergraduate, and grew to love very much, is deviant only in the sense that it addresses serious topics in logic and reasoning in a playful way rather than a serious one. The book is by the US philosopher Douglas Hofstadter, and is called *Gödel, Escher, Bach* (in later editions, *Gödel, Escher, Bach: an eternal golden braid*. I have no idea why the title was changed). Hofstadter uses the work of these three people, a mathematician, and architect-artist, and a composer, to explore the same themes of thought and the organization of thought, and he does so with the aid of a mixture of normal text, drawings, music scores, and playlets featuring Achilles, the Tortoise, and a few other characters. The book begins with logic, and ends up mainly with biology. One of the reasons I bought a second copy to put it on the shelf and stick a ‘Davies Lab Library’ sticker on it (my own copy has been read so often it is almost falling apart!), is that it explains Russell’s set theory paradox, and Gödel’s theorem, and Turing’s halting problem, in a very accessible way. Why does this matter? Because these things are all variations on a basic theme – logical systems have inherent limitations (provably, and in a way for which there is no work-around within the logical system). That logic is limited, that all systems contain statements that cannot be evaluated using only that system is, I think, an important thing for a scientist to know.

That book looks serious, but is surprisingly playful. One much simpler book that looks playful but that contains a surprising range of serious points is a book of the IgNobel prizes. Each entry is the

sort of length that can be read waiting for a centrifuge to run, and be thought about while retrieving the test tubes from it.

The volume that provoked the conversation at the beginning of this piece is, as I am sure you have guessed, Robert Persig's *Zen and the Art of Motorcycle Maintenance*, which is not really about maintaining motorcycles and does not contain that much about Zen either. As it has the form of a novel, I can't write very much about it without giving away the story, but one very important thread that runs through the book is the question 'why do we (scientists) think and view the world the way we do, and what would happen if the history of thought had taken a different turn?'. There is a great deal more in the book, about families and friendship and teaching and growing up and many other things. Also, if you do happen to ride a motorbike, there is genuinely useful material about preparing one for a really long road trip.

Much more mischievous is my inclusion of Rupert Sheldrake's *Morphic Resonance*. This is an update of the same author's earlier work *A New Science of Life*. When I was an undergraduate, I read a review of that book in *Nature*, where the reviewer described the work as an 'infuriating tract' and 'the best candidate for burning there has been for many years'. I felt that if anybody had caused such an unhinged reaction at the heart of the scientific establishment, I really wanted to judge for myself so rushed out to Heffer's to buy a copy. That copy is still on my own office shelves. The book is essentially vitalist, and attacks materialist science, especially in embryology. It is written by a knowledgeable scientist, who provokes the reader into questioning carefully what evidence there is for our conventional views, where we are on solid ground and where we just assume we are without checking. I was not the only person intrigued by the book – we held a special meeting of the Cambridge University Natural Science Club specifically to discuss it, taking one chapter each. (Alas, this club – limited by statute to just eight carefully chosen undergraduate and seven graduate members – is now defunct. I am told it was wound up a few years after I left the university, because it violated some new end-of-twentieth-century policy on university clubs being open to all. In its 116 year history, it provided the most amazing peer-education, its alumni having an impact on science great enough that, in 1974, *Nature* devoted a 3-page article to celebrating its centenary).

So – getting back to the book – the reason Sheldrake's updated work is in the lab library is that I would love young embryologists here to read material that tries to demolish the very foundations of their field, so that they have to think hard about why they work and think the way they do, and what

they really know. Which of Sheldrake's arguments do they feel they can demolish with real data, and which are impossible to knock down with the data we currently have? Or, will they end up agreeing with him? Or take some alternative vitalist line? That would not bother me at all – I would far rather work with a vitalist who has really thought about the foundations of biology, than someone who takes a materialistic line just because that's what the textbooks say.

There are also a few books about science-gone-wrong, including Broad and Wade's *Betrayers of the Truth*, about fraud, and Ben Goldacre's *Bad Pharma*. Some years ago, just after the latter book was published, I left its distinctive cover showing rather obviously from a coat pocket as I walked through the corridors of a certain Pharma company in Basel, where I was about to give a talk. I am not naming that company here, but Goldacre certainly does: it was fun to watch the reactions to the book as I walked through the audience gathering in the hall outside the lecture theatre! Because some people who come to study here are clinicians, there is something for them too – James LeFanu's *The Rise and Fall of Modern Medicine*. Again, this provides a thoughtful challenge to triumphalist thinking.

I hope that some of these books are read by at least some of the students and post-docs here. I do not have them on the shelves to denigrate science in any way, but rather to encourage people to see the subject as it really is, in all of its creative messiness, to see its rogues as well as its heroes and its limitations as well as its magnificent achievements. Rather than place it on a pedestal, I would rather that the young scientists recognized their subject as what it really is: not as intellectual perfection but, to parody Churchill on democracy, *the worst way of finding stuff out, except for all the others*.

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