Memories of teaching a singular student: Victor Rothschild

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The excellent book by Kenneth Rose 'Elusive Rothschild' has prompted me to record my own memories of 'Lord R' (as I always thought of him) with whom I had professional contact as 'statistics supervisor', mainly in the early 1980's.
In fact Lord R first contacted my husband Jimmy, who is a philosopher, early in 1972, very soon after the birth of our elder son, as it happened.
The problem concerned was connected with Think Tank work. Then, in 1978 Lord R came to see me at home to ask me a small but important technical question related to his preparation for the 1978 BBC Dimbleby lecture on 'Risk'. This question was essentially the following: if one presents an estimate of a quantity, for example p, a risk, then one should always attach some kind of measure of uncertainty, eg a standard error, to this estimate, $\hat{p}$. Lord R was of course quite correct on this point, and I think we then discussed how one might reasonably construct $se(\hat{p})$. (Not at all easy, as we were talking about p as the probability of a very rare event.)

A note on the practical arrangements:
Lord R came once or twice to see me at home, firstly when we were in Canterbury Close, and then when we had moved, in 1979, to our (now ridiculously valuable, as is the way with Cambridge property) house near the railway station. Our two small boys had to be vigorously shushed, or even removed from the house, when he was consulting me, so his visits were not awfully convenient for me or for the rest of the family. Still, we all very much enjoyed the Lord R Christmas presents, often a SIDE of smoked salmon.
Each time he stepped into our dining-room, he looked sorrowfully around, and said gloomily 'How much do dons **earn** nowadays?': he was expressing sympathy at the lowliness of my abode. Of course each time I told him how much I earned (dons then were actually quite well off, by national standards) only to receive more expressions of sympathy.
Later he came to see me for his regular Friday 4pm supervisions in my office at the Statistical Laboratory, 16, Mill Lane, Cambridge. (Our Department was housed in this 'temporary' conversion of the old University Press warehouse from 1965 to 2000.) I was perfectly content in my little office there, but Lord R looked around it gloomily and pronounced it 'a Dump'. What a pity he did not live to see our palatial new surroundings at the Centre for Mathematical Sciences.
Eventually we settled into a pattern of my going to his house at 4pm on a Friday, mainly because the traffic made it difficult for him to get to Mill Lane, and I was very happy to go to the Rothschild home in Herschel Road, where we had our supervisions in the dining room (now part of Clare Hall's West Court).
He asked me at the outset if I would mind if he smoked, and somehow I had the nerve to say 'yes, I would mind' and so he never did smoke while we had our discussion. (Statistics supervisions with Dr PMEA are good for your health: new slogan.) To start with, because I was rather nervous about what he might ask me, I asked him to put his questions in writing to me a day or two before we met. Sometimes I ask people to do this because it is a way of forcing them to clarify and formulate their own problems carefully, before we meet. In Lord R's case, there was certainly no need for this precaution, but I asked for written questions in advance since I was worried that otherwise I would not be properly prepared for whatever he might throw at me.
So I would arrive on my bike on Friday afternoons, to be kindly received by Anne Thompson, his secretary, and shown in to the dining room, where Lord R awaited, together with delicious iced coffee and little *tiny* sandwiches, with the crusts cut off (never before or since have I had such

sandwiches, except possibly in 1960 when I had tea with my great aunt Florence at Gleneagles Hotel.)

What we talk about? We started with the underlying probability theory, which most young persons (ie among Cambridge maths undergraduates) of 19-20 years of age will take pretty much in their stride.
Lord R was not such an easy customer here. 'What do you really **mean** by a random variable?' ' What do you really **mean** by its expectation?' I could easily rattle off a little piece of calculus to demonstrate my point, but I was not really getting to the heart of the matter, and perhaps not really trying to do so. 'Just get on and use the concepts, and then you'll get a feel for them', I would reply (sometimes with slight exasperation, perhaps). But Lord R had a tendency to worry away about the fundamental points 'like a dog returning to its vomit' he would say, while I rather breezily suggested he would do better to try a few simple exercises, eg from Feller vol I.
There is no doubt that my manner slipped easily into 'supervision mode', so that I never felt the need to reply to obvious errors in the vein 'Up to a point, Lord Copper', to quote Evelyn Waugh, but would just say 'No, that's wrong'. I was impressed by Lord R's dedication to study: he really wrestled with the relevant bits of calculus, and as I wrote my supervision notes for him, he carefully numbered them and put them on one side to reread at a later time. He sometimes found an error, which he would point out to me, a bit gleefully, at our next meeting.
Eventually we moved 'up' to statistical inference. In a sense this is an order of magnitude more challenging to teach than basic probability theory, because of its 'inductive' approach, ie trying to reason from the *particular*, ie some data, to the *general*: estimating an unknown parameter, for example, and relying on the strictly *deductive* science of mathematics to do so. Thus I might have expected a rough ride with my very thoughtful mature student Lord R, but I do not remember any great difficulties, except possibly the perfectly usual problem of the interpretation of a confidence interval ('What do you really **mean** by a confidence interval?')
Many interesting problems arose for consideration. One such is described in the Essay 'The Shadow of a Great Man', in Lord R's (1984) book 'Random Variables'. The great man in question is Nathan Mayer Rothschild, who founded the English branch of the Rothschild family.
Under the heading 'A Million out of Waterloo?' Lord R says 'Although it is virtually part of English history that NM made 'a million' or 'millions' out of his early information about the Battle of Waterloo, the evidence is slender...'. The statistical question of interest involves a (rather short) time series here, with data given on p142 showing the Transaction prices for 'Consols for account' for certain days in June 1815, namely Wed 21 June up to and including Thurs 29 June (with no data for the Saturday, Sunday or Monday of that week). We discussed what constituted 'normal' random variation, and what constituted a 'significant drop' in this sequence of price data, but I suspect that this small dataset was too short to give any conclusive evidence. Lord R considers many other historical aspects of the case in his essay, and concludes 'however much NM made out of Waterloo, it must have been very considerably less than a million pounds, let alone 'millions'.
Lord R kindly arranged for me some brief visits to what is called the 'real world', involving a contract for 10 days consulting a year with Marks and Spencer plc, for about 2 years. There were particular problems in garment manufacture: when was the most effective stage in the manufacturing process to check for *flaws* in the components, of a shirt, for example (before or after the shirt has been made up)? I visited the factories of several M&S suppliers, for example in Barnsley, Peterlee and Mansfield. Considering my naivety and lack of relevant experience, I was received by the staff there with great patience and courtesy. The visits were certainly educational for me: how helpful my work was to M& S and their suppliers is open to question. (The work was of course helpful to our family's payment of school fees.) But I was later (1987) able to publish a paper in which the sampling inspection problem was formalised, and solved, and I programmed the solution in BASIC for my BBC computer. It seemed very dashing at the time (1985 I think) to take my own computer to M&S Head Office in Baker Street for a 'presentation' of my results. (Not quite the same milieu as a supervision with Lord R, or a lecture to my students, and I think perhaps the challenge of communication was too much for both me and my audience.)

Perhaps the pinnacle of our progress in statistics was reached in about 1984, when I helped Lord

R in his capacity as Chairman of the Remunerations committee at the NMR bank with some data-analysis on Directors' salaries. This involved a regression of the following type

$$y_i = \alpha + \beta_1 x_{1i} + \beta_2 x_{2i} \ ,$$

where y_i, x_{1i}, x_{2i} were current stipend, age and length of service, respectively. Thus we had a multiple regression problem, and attempted to see whether a salary 'scale' could be established on the basis of these data (all I which I destroyed, many years ago). The non-orthogonality of the parameters β_1, β_2 made interpretation of the estimates not entirely straightforward. This gave us some problems in terms of how Lord R was to present the results to his Committee: he later wrote to tell me that our report was received in a 'stunned silence'.
Of course it is hard for any student to make progress with multiple regression without a knowledge of matrix algebra, and this fact created a stumbling block for us. Nevertheless, it was instructive to identify in the regression those points of high 'leverage', and those with large residuals.
At that time the software I used was GLIM: extremely reliable of course, but with only very basic line-printer plots for the graphics. While these rather scruffy-looking plots essentially told you all that you needed to know, Lord R wanted something glossier to show his committee. Dr N.Logothetis, then at LSE, had greater mastery of computer graphics than I did, and he was able to help us.
With Logothetis's help for the graphs, Lord R. published in 1986 a brief text book on probability distributions. The search engine 'Ask Jeeves' showed me today that this book is a recommended text for the Penn State University course IE 424: Process Quality Engineering. I suspect that Lord R would have loved search engines.
Lord R. became very interested in distributions of word-lengths in 1986, and I remember discussing how to fit the negative binomial distribution. Although he wrote up a paper on this, I'm not sure it was actually published.
I had one final visit to The Bank in 1988, to discuss a statistical problem concerned with currency exchange. Needless to say I knew rather little about the underlying mathematics, which doubtless now features in undergraduate courses on financial mathematics. But I vividly remember meeting Amschel Rothschild, and the fact that our group discussion had to pause at 3pm when some of those present fixed the price of gold for the day, and they kindly allowed me to watch the process.
Regular conversations with Lord R more or less came to an end in 1986, as he moved on from statistics to the subject of probability as applied to number theory, for example the distribution of prime numbers. While I could just about go through a basic paper on the subject with him, the subject was really beyond my expertise. So I advised him that he should find another supervisor for this, without quite realising that I should be saying a proper 'goodbye', and of course this I now regret.

Discretion:
I am naturally rather a 'cagey' person, if not downright mute at times, and tried not to gossip to other people about my acquaintance with Lord R. After all, there was no need for me to write a supervision report on him for a Director of Studies, and in any case I had great respect for Lord R's desire to learn, and his understanding of the fact that in any subject one can only learn by making mistakes, and being prepared to make a fool of one's self.
I gradually came to realise that that Lord R himself was also a bit cagey, and on occasion liked to 'obfuscate', to borrow a word from Kenneth Rose's biography. Not that our supervisions themselves provided occasion for telling half-truths to one another, but one had to be quite careful in the context of 'idle chat while putting on one's coat' at the end of the supervision. Thus, Lord R: ' I did hear that you (ie Newnham College) have elected a new Principal, but I've forgotten her name' (questioningly). I was not deceived by this studied casualness, and briskly replied that the Fellowship had been requested to keep as strictly confidential the name of our pre-elected principal, Sheila Browne. (If her name had been made public, life in her current job at the DoE could have been made difficult, we had been told.)
Lord R was apt to tell me that he couldn't see me after Christmas because he was going to 'Wales'. I did think that Wales was a slightly implausible destination for him in January, but eventually worked out that 'Wales' probably meant South Africa: I expect he thought I might disapprove of holidaying in S.Africa.

Another conversation on the way to the front door was about Lord R's essay for the Trinity Prize Fellowship competition. He was telling me the statistical relevance of what he wrote about then. I think he said that when he did this (successfully of course, in the 1930's) candidates were expected to write a single essay, in 6 hours. I expressed surprise. Then, 'Fellow called Blunt wrote one on Poussin, you know' he said. 'Oh really?' says I, trying to be oh-so-casual, but of course really rather curious that the name of Anthony Blunt had been mentioned. Sadly for me, that conversation ended at that point (probably just because I could not decently hang about at the front door in the winter.)

I had decided at an early stage that it was Not My Place to ask any such questions, and I was happily almost unaware of all the Spycatcher, Peter Wright etc goings on, during the 1980's. These are carefully described in Chapter 12 of Mr Rose's book. Like many others, I was sad that these events blighted Lord R's final years, and wrote to him (perhaps in 1988?) to say I was sorry he was having such a hard time. He replied instantly to thank me, and said that he had been followed all the way in his drive from London to his Cambridge home by a photographer on a motor bike.

My final Rothschild memories are of his memorial service in the West London Synagogue in May 1989, attended by the Great and the Good, with richly operatic singing from the choir. I shall never again sit so close to 3 Prime Ministers (Callaghan, Heath and Mrs Thatcher) and the Israeli Ambassador, and I was even closer (within umbrella-poking distance, I reckoned) to their respective armed bodyguards. A truly surreal element of that day was having a cup of tea with Dr Dadie Rylands on the way to London (we were both passengers on the 'staff' coach arranged by Mrs Thompson). Tea took place in the charmless setting of the M25 South Mimms Service station, and Dadie with his exquisite diction, was the soul of cordiality and bonhomie, quite unfazed by the surroundings. Dr Rylands was of course a legendary Fellow of King's, who tutored Lord R in English as an undergraduate, and recently died at a grand old age. He and I do have at least one thing in common. We have both been lucky enough to teach a large number of interesting and able students during our careers at Cambridge University, and for each one of us, (whether in the 1930's or the 1980's) Victor Rothschild is surely one of the most singular such students.

References

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