

Deception beyond measure

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False Prophets: Fraud and Error in Science and Medicine. By Alexander Kohn. Basil Blackwell: 1986. Pp.221. £14.95. To be published in the United States in January 1987, \$24.95.

AS THIS book and its chief rival, William Broad and Nicholas Wade's *Betrayers of the Truth** both remind us, Charles Babbage distinguished three unorthodox ways of dealing with data. These he called, in increasing order of impropriety, trimming, cooking and forging. Are such behaviours more common today than they were in Babbage's time? In his very first sentence Alexander Kohn states that the exponential growth of science has been accompanied by the "appearance" of deviant scientists, as if a rectilinear growth would not have given rise to the problem. It is not clear whether he thinks that there has been an increase in the number of such individuals, as Broad and Wade imply; and, if so, whether this is absolute or proportional. In fact, there have been more attempts than Kohn realizes to answer the question, but it is not an easy one to tackle, requiring as it does methods learnt from the confessional, the KGB and Social Audit. But whether or not the wickedness has increased or is increasing, we are sure that it should be diminished.

When a question arises in the science of science (a respectable discipline, the methods of which have been successfully applied to the growth of science as a whole), one would expect scientists to try to answer it scientifically. Too often, however, they fall back on dogmatic or wistful assertions of belief. If public attitudes to science were still as starry-eyed as they were even 25 years ago, such piety might suffice. But reassurances that there is nothing to worry about — because the scientific process is self-corrective, and that mistakes, deliberate or accidental, will be found out sooner rather than later — are no longer enough. Such reasoning belongs to the "tap-dancing and dinosaurs" class ("I'm tap-dancing to keep the dinosaurs away!"). "But there haven't been any dinosaurs for years!". "There! You see?"). That the only examples of fraud that have been discovered are the ones that have been discovered is not like-

*Published in 1983 by Simon & Schuster, and reviewed in *Nature* 302, 774 (1983).

ly to convince the critics of science, and should not satisfy scientists either. Even Popper considers only that errors are "fairly often, in time, corrected".

How much time is needed for the purpose? Seventeen years or so between deed and discovery in the case of Cyril Burt, or 40 for the Piltdown hoax or Gregor Mendel? There are even more important questions to ask about the ethics of scientific discovery than this, but they are seldom examined systematically. One obvious framework is: What is scientific fraud (definitions)? How much of it is there (estimates, including trends)? Why does it occur (reasons — social as well as individual)? Does it matter anyway (costs — and possible benefits: see below)? And what is being and should (or can) be done about it?

TRICKS OF THE TESTING TRADE

Pivate testing laboratories live and die by the positive results generated on products they test for safety. Your future as a laboratory owner or administrator is in serious jeopardy if you find too many products unsafe. But fortunately, manufacturers rarely run their own audits on tests contracted out to private labs. That way, they can claim ignorance of wrongdoing if protocol is not followed. So here are some tricks you can use to help that drug, chemical or product meet approval standards.

THE HAPPY ENDING. Bureaucrats rarely seem to have time to read more than summaries and conclusions. So you can do your manufacturing client a great service by having the conclusion bear minimal relationship to your findings, particularly if the findings are negative. Remember that statistics are at the service of those that use them.

THE SHRED. Keep a paper shredder near your records at all times. If you hear that a government inspector or auditor is about to visit, use the shredder quickly to rid your files of embarrassing or incriminating data. For fast shredding techniques, call Industrial Bio-Test Laboratories.

THE BENCHMARK BOOGIE. If you have to create benchmarks to substantiate

hiring untrained technicians, you can always use them as an excuse when the scientific method is inadvertently abused or abandoned. You can contact almost any testing lab in the country in your search for undereducated, unqualified and incompetent staff. Move your staff around the lab constantly throughout experiments. If someone is leaving your firm, have that person sign all the benchmarks. That way the "responsible party" will be absent should an inspection ensue.

Kkeep a scalpel in your lab, a shredder near your files, and don't tell the Feds your data caught fire.

THE SPEEDUP (OR THE TIME-LINE FUDGE). Many safety tests require long exposure of the product to hostile environments like extreme heat, dryness, cold or wetness. Take semiconductors, for

on the creative use of the scalpel contact the G. D. Searle Company and ask about the tests it performed on Aldactone, a diuretic prescribed for high blood pressure and fluid retention. Or write to Syntex Corporation and ask about the research it contracted for on the antiarthritis drug Naproxen.

THE POSTHUMOUS APPEARANCE. Should laboratory animals die, replace them with live, healthy relatives. Again, contact G. D. Searle and Industrial Bio-Test Laboratories in Chicago to learn how some of their rats, monkeys, rabbits and dogs, which died during tests, later appeared alive in test data. Animals can also be recorded as gaining weight and recovering from tumors after their death. Use your benchmark creatively.

THE DATA MESSAGE. Also known as "Graphiting," data massaging is probably the most common fudging technique used in labs today. Motivated by what scientists euphemistically call "intentional bias," it is really the easiest way to get the results you want once the experiment is completed. There is no one way to massage data. Just take those long computer reports home with you, spread them out on the kitchen table and gently apply rubber and graphite.

SOME EXTRA ADVICE: If the validity of your study is questioned, do not under any

How to buck the system — a tongue-in-cheek article by Irene Moosen and Mark Dowie which appeared in Mother Jones in 1982. (Reproduced from False Prophets.)

Of course, Kohn is aware of these problems but, as is common among popularizers of science, he seems to believe that readers prefer a stream of hair-raising stories to a serious discussion of ways to identify and prevent fraud in the future. Thus it would serve little purpose to quote the table of contents; the divisions between subject areas often seem to be arbitrary and the chapter titles usually promise more than the text delivers. Even though his final chapter is entitled "What Can Be Done about Fraud in Science?", and might have been expected to bring together and add to suggestions scattered about the book, it is only three pages long and one of them is taken up by introducing two further anecdotes warning would-be whistle-blowers that theirs is a very chancy and perhaps even dangerous activity.

The most relevant point is made in the very last paragraph of all: "To understand deceit in science, one has to study first the ethics of the society within which the scientists work and live . . .". A useful book

on scientific fraud would begin, instead of ending, at that point. Given one society (Britain) in which the world's largest advertising agency can switch from helping a national health campaign to promoting the very product whose use it had previously sought to diminish; another (the United States) in which 25,000 unnecessary cardiac pacemakers are inserted per year; a third (the Soviet Union) in which . . . The list can be continued to infinity.

One should not, of course, criticize an author for writing the book he wanted to write; but it is fair to suggest that Kohn has not carried out his own expressed intention. His sub-title is *Fraud and Error in Science and Medicine*, less alarmist than Broad and Wade's *Fraud and Deceit in the Halls of Science* more open-minded too. It also allows Kohn to mention Mendel and Newton more properly in his book than Broad and Wade in theirs. But though with these references, as well as elsewhere (for example, in the attractive dust-jacket of Wyck's "Alchemist") Kohn implies that error may sometimes be only an idea whose time has not yet come, the theme nowhere receives the discussion its importance requires and the title of the book promises: When is an error not an error but a flash of inspiration? Not only do our hypotheses depend upon our perceptions, but perception is itself a prisoner of hypothesis. Even good scientists have sometimes been so sure that they were right that, in Alan Franklin's words, they "manufactured data . . . until real data became available" — even one of Darwin's retracted papers has already been de-retracted!

Perhaps Kohn fails to deliver because, understandably, he is as uncertain about the matter as the rest of us. In fact, he is at times so uncertain in his handling of certainty in general — for example, the meaning of correlation, and the relationship of truth to the laws of chance; not to speak of his confusion between experimenter (or cognitive) error and experimental (or statistical) error — that the reader is sometimes driven to doubt his grasp of the matters of which he writes.

According to Stephen Toulmin, "medicine has saved the life of ethics" (*Perspectives in Biology and Medicine* 25, 736–750; 1982), producing "spectacular and irreversible effects on the methods and content of philosophical ethics". It is high time for at least a first instalment towards repayment of the debt. □

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