



The tyranny of success

It is almost axiomatic that man needs to explore, the objects of his exploration ranging from his innermost self to the farthest reaches of the universe. As the Earth's geography has by now been almost completely mapped out, today's explorers are professional scientists. In the early days of science, which we can trace back to Robert Grosseteste (Oxford and Paris), Roger Bacon (also Oxford and Paris), Jean Buridan (who became rector of the Sorbonne in Paris) and similar figures in the 12th to 14th centuries, it was largely a matter of personal inclination whether one devoted some of one's leisure time to scientific investigation. This attitude persisted largely until the end of the 19th century. By that time science had become strongly professionalized, doubtless driven by the extraordinary economic impact of the results of discoveries such as Perkin's synthetic "Mauve" dye (which so completely displaced the natural indigo imported from India that over a million Hindus connected with that industry are estimated to have died from starvation). In Germany, the Kaiser Wilhelm Institutes (renamed the Max Planck Institutes after the Second World War) became a state-sponsored powerhouse of scientific investigation, the most prominent example of such state sponsorship until the advent of the Soviet Union. The system was not without its critics, Frederick Scott Oliver in particular pointing out that "the close alliance between learning and the bureaucracy does not seem to be altogether satisfactory. For thought loses its fine edge when it is set to cut millstones of state. It loses its fine temper in the red heat of political controversy. By turning utilitarian it ceases to be universal; and what is perhaps even worse, it ceases to be free. It tends more and more to become the mere inventor of things which will sell at a profit..." [1]. The critics' arguments did not stem the movement, however. Nevertheless, in those countries such as, most notably, Great Britain, with an ancient tradition of private universities such as Oxford and Cambridge, the early mode of scientific investigation was able to persist longer than elsewhere, doubtless to the chagrin of the state authorities. By the time we reach the last quarter of the 20th century, however, these universities had become greatly beholden to the state for their finances, and experimental science had become very expensive, not least because of the growth of the scientific instrument industry with the concomitant

atrophy of the ability of research laboratories to construct their own instruments, much more cheaply than the commercial varieties. The state was thereby able to effectively control the finance for scientific research, and the main instrument for achieving this became the national funding agency (variously called science research council, science foundation etc.).¹

These national funding agencies issue "calls for proposals" specifying the areas of science that they wish to support and a scientist wishing to undertake some research for which he lacks the resources can submit a research proposal to the agency, which may grant the scientist the requested funding. When the system was first introduced (in the 1960s in Great Britain) it seems to have been benign enough to have been largely accepted (although it was strongly criticized by prominent scientists such as Sir Peter Medawar); at that time it might suffice for the description of the research to be undertaken to be limited to a few words, such as "investigations in theoretical physics"; one could presumably safely assume that a university professor was not likely to waste his or her time on pointless research and that the money would be well spent.

Nowadays, however, a proposal has to be so detailed (that is, the research work to be done has to be described in great detail) in order to have a chance of being accepted that all the worthwhile exploration has already been done during the preparation of the proposal. If the grant is awarded, the scientist in consequence has little interest in pursuing the work, which could, indeed, be carried out by technicians following the prescriptions contained in the proposal. Furthermore, if the proposal envisages recruiting a doctoral student to work in the area, the existence of the detailed plan imposes a terrible constraint on the creativity of the student, who will almost inevitably be severely hampered in his or her avowed aim of becoming an independent research scientist.

The reason for this insistence on details is, apparently, the desire of the research councils (whose officials are beholden to a government department) to be seen to be successful. For the bureaucrat, it is difficult to determine, at the conclusion of the project, whether "investigations in theoretical physics" have been successful. Any published papers are likely to be incomprehensible to him. On the other hand, if the aims and objectives are made explicit and if the project is

¹ In Switzerland, the Federal Government is able to control the scientific affairs of the ancient cantonal universities, which, though also of course "state" (at the level of the city state) enjoy considerable autonomy, by a similar mechanism.

fragmented into numerous milestones and deliverables, each small enough for the outcome to be unambiguously determinable, then each of these items can be provided with a box to tick if the item has been successfully achieved, and assessment of overall success is simply a matter of totting up the ticks.

This approach has the extremely deleterious consequence that the balance of types of research undertaken is heavily weighted towards a pedestrian style of investigation in which not only the problem but the entire pathway to the destination is mapped out in detail. The relationship of this type of investigation to real exploratory research is about the same as the relationship of “painting by numbers” to the work of a Picasso, a Segantini or a Rembrandt. Bertrand Russell once sagely remarked, “I do not pretend to start with precise questions. I do not think you can start with anything precise. You have to achieve such precision as you can, as you go along.” This sagacity is ignored by the research agency. Hence, since the great bulk of the financial support available for research outside industry

comes from research agencies, it follows that only theoretical work requiring no significant resources can afford to be truly innovative and exploratory. Perhaps this explains why so many papers in the contemporary scientific literature appear to be tainted by a certain dullness. Herbert Dingle has pointed out that by sacrificing completeness for the sake of attaining certainty, the knowledge thereby obtainable was not “soul-shaking”, but it could be checked and confirmed [2]. By extending the checking and confirming to the minutiae of the process whereby the knowledge is obtained, one has made it, perhaps, almost soul-destroying.

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References

1. F.S. Oliver, *Ordeal by Battle*, 2nd edn. London: Macmillan (1915).
2. H. Dingle, The missing factor in science. *Nature* **160** (1947) 108–110.