the task through for several decades, his mind being in good condition to the end.

The first volume appeared in 1954 (priced then at 52s 6d!) and it contained a list of the contents projected for the future volumes. Today, this same volume costs £70 and there are now about 15 further volumes, although the original syllabus has been closely followed. The material has steadily expanded and in later volumes co-authors, some of them hardly born when the project started, have appeared.

Chinese studies 50 years ago were small-scale, but China is now rapidly expanding to fill our future and it is important that we should understand the Chinese world. Now far more Europeans speak Chinese than when Needham began work, and the research, for example on the Chinese pharmacopoeia, is ever more professional. Needham's actual writing is masterly and is a model for literature.

*Science and Civilisation in China* is fully comparable with Diderot's *Encyclopédie Raisonne des Sciences, des Arts et des Métiers* which did the same for the science and civilisation of France in the 18th century. The Cambridge University Press, even before computer typesetting became available, did typographic justice to this masterpiece, producing books which are a pleasure to use as well as to read.

Needham shifted the whole framework of Chinese studies from being solely concerned with language, literature, arts and philosophy to include science and technology which sustain the rest. He has forced future historians to consider matters which they thought they need not understand. The study of science in China has now become institutionalised and The Needham Research Institute, containing a unique library, occupies a beautiful building in a secluded part of Cambridge; the present generation continues the work. It is now the centre for all concerned with East Asia and its science and technology.

One reason for which Needham remained an outsider was his participation in the commission which examined allegations that bacteriological warfare had been attempted in the Korean war in 1951–52: it was the commission's belief that this had been so. Although much supporting evidence has appeared since, official circles have consistently denied this, even in recent memorial meetings. However, official statements of this type have become less trustworthy, following various nuclear and other incidents.

Only at the very end of his life did Needham receive the official honour of the title of Companion of Honour — a gift of the Crown rather than of the government of the day. He never became a professor but was President and then Master of Caius College in Cambridge — a place with which he will always be associated. He left us our intellectual world a changed place.

Needham's printed works stand as his permanent memorial; his influence remains in UNESCO, in Chinese studies and in biochemistry but chiefly in the way in which he was able to unify the whole of culture. However, his character, its formation and the personal influences on other people remain only in the memories of those who knew him. It is these, in particular, which Maurice Goldsmith has been able to capture and preserve in this small book as an indispensable companion to the huge volumes.

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True or not, how relevant is the question?

Simon Shackley

*But is it True? a Citizen's Guide to Environmental Health and Safety Issues* by Aaron Wildavsky


This large tome is really two books in one. The springboard for the first book is the long-lived tensions between expertise and democracy which have emerged in the last few decades, especially in debates over risks to health, safety and the environment. At issue is the extent to which the often implicit delegation of authority to experts does and should constrain individual or collective decision-making and actions.

In the first book, the late political scientist Aaron Wildavsky addressed this tension by welding together a characteristically individualistic and rationalist view of the polity with a strategy for citizen engagement with scientific expertise. As he puts it (page 395):

"Our society is in fact so polarised over these issues that widespread citizen understanding and participation appear to me the only hope of narrowing the gap between knowledge and action. If that is so, the standards for understanding these matters must now include firsthand
acquaintance with the original research reports around which the controversies continue to swirl.”

Critical to his vision was a model of science as an activity driven by certain universal norms of rationality, openness, honesty, competition and so forth (even if individual scientists err).

The suggestion that citizens can usefully understand, and engage in, often detailed scientific debate on environmental and health issues to allow them to make better decisions is important and timely. It is a sentiment which accords well with research in sociology of science and technology, technology assessment, science policy and futures studies, which has argued against the dominant view that the public is ignorant of, and unable to understand, science, or that science is a unique form of knowledge and hence, to use Lewis Wolpert’s word “unnatural” and opposed to “commonsense.” The idea that citizens take greater “ownership” of science, as a body of knowledge and set of institutions, is to be welcomed.

The bulk of the book consists of detailed case studies of the scientific arguments surrounding selected issues (including dioxins, hazardous waste storage, pesticides, toxicology, ozone depletion and global warming) which attempt to illustrate that non-scientists can indeed gain some reasonable grasp of the scientific issue at hand, enough to form a reasoned judgement about what to believe, as well as indicating how to pursue this process. The case studies alone make this a useful reference volume for those willing to gain a succinct, critical and up-to-date review of some of the key scientific arguments in these fields.

Several major presuppositions which underlie the argument receive little attention, though this may well be due to Wildavsky’s untimely death. To begin with, there is the simple question of the practical feasibility of trawling through original scientific papers and contacting the relevant scientists for further elaboration; a task which apparently takes 100–200 hours for a ‘run-of-the-mill’ environmental problem. Not only is this likely, in practice, to be a huge deterrent to most people, but the book barely considers the barriers to public engagement from the institutions and body language of science.

A universal rationality and vocabulary in which to debate scientific matters cannot be assumed. And whilst the author found scientists “willing to be helpful if the lay analyst has taken trouble to become informed” (page 397), it was no doubt a great advantage to be a professor at a pre-eminent academic institution.

However, even more seriously, the book also assumes that the issue at debate is indeed where the scientific truth lies. Yet, sociological studies of risk have now shown that trust in institutions and perceived agency vis-à-vis those institutions is frequently more important than debates over ‘the real risks’. This is a reflection in part of the indeterminacy and complexity of much scientific debate, especially when that knowledge is used in policy.

Wildavsky seemed unwilling to accept that there might not even be a true answer from science, now or in the future. But it also reflects the unavoidable relations of trust in which accounts of knowledge are embedded and which make them credible or otherwise, and which affects Wildavsky’s text as much as any other.

For example, although I tried, I could not put out of mind Wildavsky’s well known right-wing political position when reading his accounts of scientific knowledge which underpins government regulation of industry. Short of just trusting Wildavsky, I was left wondering why certain scientific arguments and not others had been emphasised, and whether other relevant arguments had not been included at all.

The account of the one scientific debate about which I felt most knowledgeable — human-induced global warming — left me feeling ambivalent. On the one hand, the chapter usefully challenged the rather monolithic, and over-tidy presentation of the scientific case that emerges from leading scientific advisory bodies; for example it revealed some of the underlying assumptions and fragilities of the methodologies typically used.

On the other hand, there was a tendency to swap one set of paradigmatic assumptions and certainties for another, so that the subtlety and complexity of scientists’ reasoning went largely unrecognised. In addition, only one interpretation of the shape of scientific argument and debate, and its relation in policy, was presented, as if ‘naturally’ given. Yet such interpretative frameworks inform how scientific argument is understood and analysed and hence need to be clarified and compared to alternatives.

In any case, the point of greater public engagement in science might well be less about deciding which account of ‘the facts’ is better or worse, and more about allowing better-informed judgements to be made about the trustworthiness of institutions and individuals who supply scientific knowledge for policy. The prior question of what citizen participants might decide to be the salient issues (trust, ‘the scientific facts of the matter’, or whatever) is ignored, as is the issue of what sorts of new institutions might be necessary for such a discussion to occur at all.

This is partly because of the dominant model of political culture Wildavsky adopted. In this, highly motivated, entrepreneurial individuals, driven by instrumentally and materially defined ‘needs’ and ‘wants’ are the prime mediators of politics. So, the polarity, multivalency and incommensurability of political cultures is boiled down, and the leading question simply and reflexively imposed.

What is more, Wildavsky never made use of sociological insights which challenge the notion of sovereign and universal standards in scientific practice of reasoning, evaluation, openness, honesty, and so on, as if devoid of any social or policy commitments. An approach rooted in those insights could allow an even more radical version of public engagement in science,
one which allows for public feedback into what is validated as ‘good science’ and into the research policy and knowledge-use processes. In this way, the rather one-dimensional obsession with “is it true?” could be put in perspective.

The second book in this volume is much more polemical and a feisty challenge to the ‘environmental paradigm’ and its adoption of the ‘precautionary principle’. Wildavsky warns here against an over-bureaucratised, “preventive society” in which caution and alarm always overrule, even though we can rarely know in advance of the risks or their implications, good or bad. Whilst there is a case to be answered here, I think Wildavsky seriously misread the environmental movement — in its wider sense — as being concerned solely with tangible material costs and benefits, so ignoring the cultural, political and spiritual dimensions of its challenge (as well as relying on a rather suspect distinction between perceptions and risk consequences).

I cannot help thinking it was a mistake to attempt to combine these two books, as the polemical one distracts from the more important message about participation. Nevertheless, this volume stands as a fine tribute to a highly creative, adventurous and influential thinker.

Scientists in retreat?

Paul Dufour

_Science and Power_ by Federico Mayor and Augusto Forti


The contemporary hand-wringing over loss of power, prestige and influence that is plaguing the scientific community has many roots. Some blame the climate — the inability of science to predict and control its own funding environment. Others blame the media — a favorite whipping boy for an often politically naive and disenfranchised knowledge community.

Still others would have us believe that ever since the Manhattan project showed the global deadly power of knowledge over nature, the scientific community has fought an uphill battle to re-establish a sound, civic, responsible link to the democratic societies that still see much value in the fruits of research. Then there are those that blame it on witches, shamans, the stars and superstition. According to this discouraging perspective, we are entering a dark period where rationality and the scientific method will be left at the mercy of the forces of anti-science, creationism and neo-Luddism.

Yet it does not have to be this way. Countless campaigns around the globe continue to seek to enlighten and illuminate on the benefits of knowledge and science. Scientific societies, academies of wisdom, media blitzes and even economic analyses continue to demonstrate that science still has economic and societal value, holds public imagination and provides insight, political support and attraction in the press, radio and television.

Merely because Mad Cows, Unabombers and rogue asteroids splash the headlines about knowledge gone awry (again), does not mean that the general public and decision-makers have little time for science. Simply because research is still seen by most civilizations as a discretionary investment that can be increased or cut at whim does not mean that the scientific boffins of the day have lost glamour or public appeal. Times change and pendulums usually swing back. Knowledge remains power.

This little book of essays by Mayor and Forti reminds us of these lessons of history and contemporary responsibility for the scientific community. The lessons, written from a decidedly historical and non-American perspective, remind us all that science has tasted, and continues to taste, power, albeit in a much more constrained and responsible manner. The four sections in this book provide the reader with a useful roadmap through some of the historical antecedents to this power through to the current debates of genetic engineering and public policy clout.

The first section provides two rich essays by Augusto Forti on science and power in classical antiquity and the birth of modern science. Classical antiquity of course had little time for scientific explanations of natural phenomena despite the travails of the Epicureans, since, as Forti reminds us, such explanations were regarded as treats to the powers of the astrologers who served the ruling class. With the Renaissance, of course, things changed. Despite continuing resistance to the scientific method, the efforts of Galileo, Copernicus, Bruno, Descartes and Newton served as the original titans of science; of reason over irrationality; of power through wisdom.

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