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In whom can we trust?

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People need socially accredited but disinterested experts to give them reliable advice about risks. Traditionally, this role has been performed by academics, but academia is coming increasingly under the influence of commercial and political interests. How can 'post-academic' science be shaped to sustain its vital role as an independent organ of civil society?

The need for experts

For more than 20 years, it has been customary to talk about making risks 'acceptable'.[1] But who is supposed to be doing this 'accepting'? Not just, one would hope, the people whose actions generate hazards, or who have a duty to 'manage' the consequences for others. In an open, morally ordered society, risks can only be 'accepted' by those most endangered by them. Very frequently, this acceptance is tacit. If people voluntarily undertake activities that might obviously harm them, then we are entitled to assume that they know what they are doing. But our culture nowadays is so elaborate and interdependent that it is not at all obvious what perils we might be subject to even through our own actions, let alone the actions of others. To impose a known danger cavalierly on other people is clearly morally unjustifiable. And even when they have signified their 'acceptance' of the risk, this must be made on the basis of their being well informed of its nature and scope.

Needless to say, this requirement activates a vast amount of mental and social activity. Other papers tell about all the analytical and political processes that are now devoted to detecting, analysing and meliorating the dangers in which we put ourselves while maintaining our present life style, and about consulting individuals or their collective representatives about the dangers.

Unfortunately, it is in the nature of the human condition that hazards cannot be eliminated. The best that can be done, in the end, is to arrange things so that relatively uninstructed people can be given sufficient information such that they can decide for themselves that the residual risks are 'acceptable'. And very

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frequently, as Joan Solomon points out,[2] people seem rather perverse in their reactions to this instruction. My point here is that one of the considerations that enter into these reactions is that it comes ultimately from strangers. For the general public, the ultimate source of most information about risks is the specialized knowledge and skill of appropriate experts.

The diversity of expertise

Indeed, the assessment of risks is not a single province of expertise. It is precisely the virtue of the acceptability paradigm that it assumes an extended social process, in which a great many different people are involved, each exercising a different mode of expertise. Thus, in the first instance, a danger has to be *suspected.* Who could have even thought about climate change before Svent Arrhenius, a Swedish professor, used his expert knowledge of the absorption of radiation in gases to speculate about a 'Greenhouse Effect'? But then a much more intensive expertise in meteorology was required to perceive this effect in action. It took a somewhat wider view of historical climate change – a very marginal academic speciality, whose expert practitioners had no safe home in any established discipline – to formulate the possible consequences of not attending to it. As a result, experts from many different fields – astrophysics, marine biology, forestry, combustion engineering, etc, not to mention the powerful corps of computational model-makers – had to be brought together to analyse the system. Then the social and economic dimensions of the risk had to be assessed by the corresponding experts, and the results of all these exercises publicized by some people who had acquired from experience an uncanny understanding of the grand politics of the situation. And to close the circle, or advance the helices of consultation and decision, the various interest groups involved needed experts to acquire broad knowledge of the process as a whole and to advise them on the way it was going.

Because of its awesome implications, climate change is probably the most complex risk assessment process that has ever been attempted. But a great variety of expertise is required to suspect, perceive, formulate, analyse, assess, publicize and generally advise on risks that could affect less knowledgeable members of the public.

Contradictions and conflicts

The difficulty of talking about expertise is that it always claims to be uniquely authoritative. 'Thus and thus it is', the expert informs us, and who are we to question further? But that authority can never apply to risks. If risks were perfectly clear-cut and unequivocal, they would not be 'risky'! So none of our revered experts can be entirely omniscient.

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In practice, the situation is always much worse than merely opaque. Every step in a risk assessment, from initial perception to policy action, is open to theoretical or factual debate. That is inevitable, because all risk discourse refers to an unknown future. Its main product is the innate unpredictability of what one would like to foresee. The more seemingly precise one makes one's expert analysis, the more hostages it presents to deconstruction by other experts. In fact, it is their duty to find the holes in one's arguments, and pick away at them in the fond hope that they will fall to pieces. That is what 'being scientific' really means.[3]

Much of the time, of course, the information that leads people to accept risks is just the received wisdom of the day. Alcohol, so most people believe, is less dangerous than 'hard drugs', and tobacco less dangerous than cannabis, because, well, that's what everybody knows to be true, including the doctors whose expertise ought to have advised themselves not to drink or smoke if it were otherwise. So a whole chorus of critical, heterodox expertise is required to sing out that the established experts should not be listened to.

Above all, risk is not just a 'technical' parameter in the trajectory of our lives. In the crudest arithmetical sense, it is a number you get when you multiply a probability by a measure of value. Having envisaged an adverse event – not at all a trivial mental operation – you must try to work out how likely it is to occur. That is usually the factor on which the experts focus, because it is just within the bounds of technical reasoning. The value, however, typically a large negative quantity, to be assigned to this putative event is much more disputable. It not only involves diverse personal and social preferences, like being more or less healthy, more or less efficacious as a social institution, etc; it also requires an image of the general context in which this unfortunate future event might be supposed to occur – a world of competing, warring, nation states, say, or one that has achieved some degree of global coordination and wealth sharing. It would contradict our expertise as students of humanity to arrive freely at a consensus on what this number ought to be. Even the notion that it could always be expressed in dollars, or euros, rather than say, 'Quality Adjusted Life Years', is wide open to perfectly sincere and well-founded doubt.

'Interested' experts

In the real world, then, and in all virtual worlds that can seriously claim to mirror it, expert opinion on risky situations is typically controversial and contradictory. The supposition that it could ever be perfectly definitive or 'objective' is a mirage – for it is not generated by 'objects'. In its most vital parts, it is produced by human beings with human strengths and weaknesses. Certainly, we experts, in our particular fields, strive mightily to bring to bear on it our most powerful reasoning tools. Whatever the concept of 'being scientific' implies in our context, we

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endeavour to apply it honestly. And as we shall see, the social framework in which many experts operate can be a very effective guard against obviously 'subjective' deviations from a generally defensible communal view.

Nevertheless, genuine diversities of modes of rational argumentation, and genuine ambiguities of fact, theory and moral principle, always leave ample space for much difference of opinion, even amongst well-qualified experts. And because what happens in this space inevitably affects the material prospects of numerous individuals, groups and organizations, it is bound to be a field of operation for the commercial or political 'interests' vested in these outcomes.

The vulnerability of expertise to self-serving bias is fully appreciated by streetwise citizens of the world. Indeed, some of our societal institutions are designed to detect it and factor it out of the equation. In regulatory disputes, for example, it is customary, and in no sense illegitimate, for many of the experts to be chosen by the party whose case their testimony is likely to support. They may even be hired for just such employment. When a court of law is called on to pronounce on the degree of risk entailed in an activity such as running a railway, it transforms itself into an adversarial confrontation between the advocates of vested interests. Each strives to establish the assessments offered by their own experts and to demolish the testimony of the experts on the other side. No doubt such procedures force some of the more active sources of bias out into the open, but they seldom clarify or resolve the complex technical and social issues that make it so difficult for people to assess the risks to which they are being subjected.

How do we find experts we can trust?

The essence of my argument in this paper is that the general public and their representatives are in continual need of independent sources of well-founded, relatively unbiased, information about risks. I shall come later to some of the many situations where this need becomes salient. Suffice to say that a world of totally polarized expertise would be entirely chaotic – a Wild West where risk itself would be the ruling demon.

One could say, of course, that such sources do not exist. Everybody, we are told, is to some extent biased in his or her judgements. Nobody is capable of an entirely objective point of view. By the mere fact of their own membership of society, every expert has personal interests in societal matters. Eminent scientists who always travel by train have a different perspective on the risks of railway travel from those who normally go to work daily by car. Even those of us who are no longer gainfully employed are not entirely unconcerned about the fate of the corporations in which our pension funds are invested. And so on, *ad infinitum*.

But this objection is so trite that it is frivolous. It applies to every aspect of our lives. To act systematically on it would cut us off from entirely from our human

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contemporaries. The very possibility of social life is predicated on a reasonable level of trust in the honesty, sincerity and tacit benevolence of most of the people with whom we have dealings – the other drivers on the motorway not excepted. But we also know that not everybody who claims to be acting for us is actually motivated by just such benevolence. So we have to use our ordinary social savvy to pick out the ones who seem the most reliable in that sense. In the end, the acceptability of risks becomes the acceptability of the experts. We have to choose the ones whose advice or judgement we feel it wisest to follow.

How, then, can ordinary, uninformed, citizens identify genuine experts whom they can reasonably trust? By definition, such citizens are not equipped to examine the experts on how much they know of the subject. Not being personally acquainted with any such individuals, and being rightly suspicious of mere repute, people have to rely mainly on their public credentials. These might include, for example, their formal scientific standing (e.g. Professor, FRS), technical qualifications (e.g. MD, DSc), work experience (e.g. toxicology research), official position (e.g. Public Health Officer), institutional role (e.g. Dean of Engineering), or corporate post (e.g. Research Manager). In many circumstances, the best available information concerning the competence of a supposed risk expert is no more than what can be gleaned, from his or her professional CV or entry in *Who's Who*.

All too often, however, when the public most needs such advice, the whole issue is already in dispute. The complexity of risk issues usually means that many of the accredited experts have already become associated – by employment, official position, consultancy or research contract – with one or other of the organizations in conflict. However earnestly and scrupulously they try to exercise their scientific objectivity, they cannot hope to dispel suspicions of possible bias. Indeed, it has now become *de rigueur* for participants in peer review procedures to declare any 'conflict of interest' that might debar them from presenting their expert opinions on particular research projects or publications.

Academics as disinterested experts

For two centuries, independent public advice on risk has been one of the major social functions of 'academics'. Under that heading I include not only the teaching and research staff of universities, but also scientists and scholars working in institutions and organizations such as 'research councils', 'academies', 'foundations', etc, that are relatively detached from the primary activities of commerce, industry or government. People in these professional roles are available as experts on risk issues because they often combine two essential qualities:

(a) They are authoritatively knowledgeable, through their research and

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scholarship, on specific aspects of risk issues, often as a result of their own specialized investigations of particular classes of hazard.

(b) They are not connected, by the terms of their employment or other institutional linkages, with government, commerce or other organized 'interests'.

A quick glance at history soon reveals that academic experts have played a major part in suspecting, perceiving, formulating, analysing, assessing and publicizing the societal risks that now figure so largely in the public arena. Little would be understood about such grave dangers as tobacco smoking, climate change or AIDS without their expert knowledge. They make imaginative, sceptical, informed, public contributions to the remediation of ills such as crime, drug abuse, pollution, etc. But above all, they are in continual demand as independent, non-partisan witnesses, advisors, media informants, investigators, assessors, etc.

We have come to rely on our academic institutions and their individual members for trustworthy expert knowledge and fully informed but disinterested opinion on all matters of public concern. The public handling of risk now plays a major part on the political scene. As the Academia Europaea Symposium on Risk has shown, academic science is deeply involved in the whole process by which risks become visible and eventually acceptable. This role is now so customary and familiar that we take it for granted and yet it is vital to the maintenance of our pluralistic, democratic way of life.

The academic tradition

How is it that 'academics' are enabled to perform these functions? It is not because they are peculiarly well informed on the technical aspects of hazardous situations. The engineer in charge of the leaky chemical plant, the public health official fully cognizant of the statistics, the repairs manager on the railway, are probably much more aware of what has – and could again – go wrong. And there is always the problem of getting academics to understand some of the realities of life outside their ivory towers.

What is more, there is an immense amount of knowledge being produced by extremely accomplished experts outside of 'academic' science. Indeed, in terms of money, people and technical resources, the research and development work undertaken by industrial firms and governmental bodies dwarfs what is done under academic auspices. Much of what is studied and discovered in corporate research laboratories is almost indistinguishable from what might be contributed to knowledge from a university department or institute. Nevertheless, what might broadly be called 'corporate' science is organized along quite different lines. From its beginnings in the late 19th century, such 'corporate' science has been

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specifically devoted to the production of 'instrumental' knowledge; that is, to research findings that are capable of serving the material interests of its owners, in the form of patents, technological innovations and other exploitable 'intellectual property.

The real point is that academic scientists are induced, as if of their own volition, to become the most knowledgeable people in the world in their own specialized fields, without having to be answerable to any other authority than the considered opinions of their scientific peers. This unusual social accomplishment is not just a product of their sophisticated education, or of a systematic organizational chart. As I have explained at length elsewhere,[3] it is achieved by the operation of a number of traditional norms and institutional practices, such as 'publish or perish'; meritocratic employment and preferment; research autonomy in 'tenured' posts; transnational 'invisible colleges'; peer review of projects and publications; meetings for open critical debate; competitive rewards for original discoveries; and funding by quasi-autonomous non-governmental organizations (quangos).

Once again, for most readers of this journal, these practices are so familiar that we take them largely for granted. Being able to follow them is of the essence of being an 'academic'. They are internalized as personal values, under such headings as 'academic freedom', 'doing our own work', 'pure research', 'satisfying curiosity' or 'the pursuit of knowledge for its own sake'. That is to say, what seems like personal identity as a 'scientist' is actually a social role shaped and defined by communal norms. And it is in this role, rather than for any individual qualities of intellect or character, that academics are accredited as independent experts on matters of risk.

Post-academic science and its contradictions

Post-academic science is now being compromised by an alliance of commercial and political interests. This alliance is driven by a number of forces, such as global economic competition, the increasing sophistication and scale of research projects, and the intermingling of supposedly 'basic' and 'applied' research endeavours and outcomes.[4] Put simply, in many fields of science and technology, governments want to offload research funding whilst corporations want early access to exploitable results. As a result, all modes of knowledge production are merging into a new, 'post-academic', research culture, ruled primarily by commercial and/or political considerations.

But even this so-called 'triple helix' – governmental, industrial and university institutions, organizationally intertwined – cannot contain within itself the innate contradictions between modes of knowledge production dedicated to two different social functions. On the one hand, it seeks to incorporate academic science, whose

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'non-instrumental' functions go far beyond risk perception and assessment. To perform these functions research activity must be:

- Public – for open use in law, politics, and the discussion of social issues (especially where risks are envisaged).
- Universal – for public access and understanding (typically, of the general framework of ideas within which risks are analysed.
- Imaginative – to explore and map all aspects of the natural world (including the identification of unsuspected hazards!).
- Self-critical – validated by experiment and debate (e.g. to become competent to foresee dangers theoretically before they are, unfortunately, encountered!).
- Disinterested – i.e. not tied directly to the social trajectories of other bodies (particularly those that might be imposing risks on the public!).

On the other hand, the instrumental requirements of industry and government are best met by the style of scientific activity labelled 'Mode 2' by Gibbons *et al*.[5] This is designed to produce knowledge and expertise that is:

- Proprietary – to exploit as intellectual property.
- 'Local' – to serve technical elites and power groups rather than the public at large.
- Prosaic – directed towards and limited to foreseen problems and needs.
- Pragmatic – tested in the short or long run for, and by, practical success.
- Partisan – beholden to, and morally bound up in, the interests and agendas of specific groups in society.

Juxtapose these two lists of requisites, and you will see that they are piecewise inconsistent. In effect, these two ways of doing science, however technically identical and epistemically interwoven, are institutionally incompatible. As a consequence, many professional research scientists are now being put into a social situation where they are expected to follow quite contrary courses of action. However hard they may try, they cannot reconcile these contradictory norms, practices, managerial dictates, resource constraints, career goals, etc into a coherent way of life.

Control by interests

What is happening, of course, is that the more powerful of these modes of knowledge production is driving out the other one. Here, as elsewhere, money talks. The simple fact is that post-academic science is coming increasingly under the control of the biggest spenders on the block – typically by the commercial and governmental organs that invest so heavily in its outcomes. This is not the place

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to undertake an anatomy of these organs, their modes of operation, the policies and corporate plans that supposedly guide them, the responses of universities and other academic institutions to their carrots and sticks, the extent to which public concerns mediate in these relationships, and so on. Science is clearly undergoing a major transformation, making obsolete much that is written about it even by its most earnest students.

The plain fact is, however, that the goals and practices of research and of researchers are being set increasingly by organizations with specific material interests in what is found out. Even when they are not personally on the payroll of such organizations, university scientists become linked to them by research contracts, consultancy agreements, patent licences, sponsorship deals, patronage promises, and so on. However sincerely they strive to be entirely objective, their impartiality as experts in risk controversies can then be called into question.

The pool of 'disinterested' scientific experts is thus being depleted. This development puts at risk the performance of the many 'non-instrumental' social functions of science, including the satisfactory resolution of the particular risks that are inseparable from technological and economic change in modern society. In the absence of detailed information about the scale of this development, it is impossible to estimate its overall effects, but there is certainly substantial anecdotal evidence[6] that it is already noticeable in certain fields of science and technology – for example in the assessment of pharmaceutical innovations. So the precautionary principle would advise us not to proceed further without serious consideration of possible dangers!

The conventional view nowadays is that what used to be called 'science' is really just a component of 'technoscience', and that this compounded with technology should be supported primarily for its immediate or prospective practical utility. However, society has always required scientific knowledge and expertise for much more than its material benefits.

In the future, even more than in the past, the health of our pluralistic, economically advanced, democratic polity will depend on the existence of a thriving civil society, able to countervail the excesses of corporate business and bureaucratized government. Thus, one of the major responsibilities of civil society is the provision of independent advice on public risks.

This function has traditionally been performed by academic scientists, who are trusted by the public for their unique combination of accredited technical knowledge and professional autonomy. Their role as independent experts is enabled by the informal system of norms and practices that has formed the structural base of 'academia' for some 200 years.

However, commercial and political forces are negating these norms and practices. There is now a serious risk that society will soon lose access to the indispensable functions that they enabled.

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The changes that are taking place in the scientific enterprise are irresistible in their broad sweep, and certainly not all to be deplored. There is no going back to the 'pure' academic science of times now past. Nevertheless, the trajectory along which we are driven by these forces is not preordained. As active participants in the processes of change, working scientists and their leaders are continually making decisions that affect the future they will then have to live with. These decisions should be taken in full knowledge of the general societal risks that their implementation might incur.

So it is up to us all to answer, by our actions, the question that I pose: how can post-academic science be shaped to sustain the traditional role of academic scientists as trustworthy experts on matters of public risk?

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John Ziman was Professor of Physics at the University of Bristol with a special interest in the theory of condensed matter. He has written many books including *Reliable Knowledge*, *Knowing Everything about Nothing* and recently *Real Science: What it is and What it Means*.

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