

## REVIEW

## Risk, uncertainty and regulation

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This paper reviews the relationship between scientific evidence, uncertainty, risk and regulation. Risk has many different meanings. Furthermore, if risk is defined as the likelihood of an event happening multiplied by its impact, subjective perceptions of risk often diverge from the objective assessment. Scientific evidence may be ambiguous. Scientific experts are called upon to assess risks, but there is often uncertainty in their assessment, or disagreement about the magnitude of the risk. The translation of risk assessments into policy is a political judgement that includes consideration of the acceptability of the risk and the costs and benefits of legislation to reduce the risk. These general points are illustrated with reference to three examples: regulation of risk from pesticides, control of bovine tuberculosis and pricing of alcohol as a means to discourage excessive drinking.

**Keywords:** risk; uncertainty; safety

### 1. Introduction: what do we mean by risk and uncertainty?

My theme is succinctly summarized in a comment from a Leader in *The Economist* [1]. ‘The ambiguities of science sit uncomfortably with the demands of politics. Politicians, and the voters who elect them, are more comfortable with certainty. So “six months to save the planet” is more likely to garner support than “there is a high probability—though by no means a certainty—that serious climate change could damage the biosphere, depending on levels of economic growth, population growth and innovation”’. I made a similar point in an article in *The Times* [2]. ‘Ministers look to their expert advisors for clear-cut answers, a unanimous view, and preferably one that is politically convenient. Scientific advisors are prone to disappoint on all fronts’.

First, let me say something about terminology. Scientific advisors are called upon to assess risks and uncertainties. Risk and uncertainty have technical meanings. Risk is the probability of an event multiplied by its impact, and uncertainty reflects the accuracy with which a risk can be assessed.

But the word risk is also used in everyday parlance in many different ways. It is used to express ideas of *danger* (hang-gliding is too risky for me); *probability* (there is a high risk that England’s athletes will not win as many medals in the

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2012 Olympics as they did in 2008); *uncertainty* (I am not travelling by train—you can never be sure they will run on time, it is too risky); *variability* (investing in small companies is risky, but the potential returns make it worthwhile); and *dread* (I would not live near a nuclear power station—it is too risky). It is worthwhile bearing in mind these different everyday nuances when it comes to telling people about risk and uncertainty.

Equally, if you turn to the literature on risk, you find many different meanings. Beck [3], in his book *Risk society*, defines risk as a ‘systematic way of dealing with hazards and insecurities induced and introduced by modernisation itself’. Gigerenzer [4], in *Reckoning with risk*, describes risk as ‘learning to live with uncertainty’, while Hood *et al.* [5], in the *Government of risk*, consider risk to be ‘the probability of adverse consequences’, and Bernstein [6], in *Against the Gods: the remarkable story of risk*, states ‘The actions we dare to take, which depend on how free we are to make choices, are what the story of risk is all about’.

There is an extensive body of research in psychology and behavioural economics that reveals how people’s interpretation of risks and probabilities of events is subject to a range of biases.

For instance, Slovic and others (summarized in [7]) have documented in detail how risks that have two kinds of property (revealed by principal components analysis)—‘dread’ and ‘unknown’—are perceived as higher than those with opposite characteristics. ‘Unknown’ risks are those that are not observable or have not been observed to date, have delayed effects or are poorly understood, while ‘dread’ is typified by risks that are catastrophic, out of an individual’s control or inequitable. It is easy to parody as irrational the eco-warrior who, in the face of scientific evidence that cycling is very risky and genetically modified (GM) food is not, happily rides her bike through a busy town centre while believing that GM food is too risky to eat (except when on holiday in the USA). But one can construct an argument that there is a certain logic, at least in our evolutionary past, to exaggerating risks that are unknown and have dread, such as whether or not there is a sabre-toothed tiger lurking in a particular bush.

One element of interpreting risk is understanding probabilities. The extensive literature is summarized by Gigerenzer [4], and shows that, on the whole, people are bad at dealing with probabilities (the old quip that 10% of the population understands what is meant by 10% may be not too far off). Gigerenzer and others have shown that people are better able to digest the same information in frequencies (one in a hundred) than in probabilities (0.01).

Even then, most people have difficulty in interpreting the evidence. Consider the following example. ‘Linda is 37 years old, outspoken, and very bright. She studied philosophy at university and as a student she was deeply concerned about issues of discrimination and social justice. She took part in anti-war demonstrations’. Now you are asked whether you think it more likely that (i) Linda works in a bank or (ii) Linda works in a bank and is active in the workplace against sex discrimination. Many people plump for (ii), although this cannot be the case since (ii) is a subset of (i).

Where does all this leave us? It does not lead to a suggestion that risk assessments should be carried out in a different way, but it does offer a cautionary tale about the communication and interpretation of risk.

## 2. Comparing risks

Regulators are set up by government to manage risks and thereby protect the public from undue risks. A key question for the politicians, who set the legislative framework, and the regulators themselves, is ‘What is an acceptable level of risk’?

The £27 million, 16-volume Phillips inquiry into bovine spongiform encephalopathy [8] remarked that ‘The Government does not set out to achieve zero risk, but to reduce risk to a level which should be acceptable to the reasonable consumer’.

The challenge for regulation, therefore, is to decide what counts as acceptable and reasonable. There are always pressures in both directions. When there is a rail accident (and rail travel, while much less risky than walking, cycling or driving, has high ‘dread’), the cry goes out from the media and others for more rules to ensure safety (‘Tragedy sparks call for level crossing ban’, *Morning Star*, 22 January 2010). On the other hand, the same media are often vociferous in wanting less regulation and interference by the nanny state (‘Banning conkers in schools makes me furious: Judi Dench rails against health and safety killjoys’, *Daily Mail*, 11 December 2009). Furthermore, many of the stories (e.g. banning egg boxes from school arts and craft lessons, banning conkers) are classic urban myths spun up by journalists. For a useful review, see [http://www.tuc.org.uk/h\\_and\\_s/tuc-12556-f0.cfm](http://www.tuc.org.uk/h_and_s/tuc-12556-f0.cfm).

One starting point for deciding whether or not a risk is acceptable is comparison. There is no generally agreed metric for comparing risks, but Smil [9], in his book *Global catastrophes and trends*, offers one option: mortality per person per hour of exposure. Imperfect though it is (for instance, it does not include morbidity), Smil’s metric reveals some interesting comparative figures. He estimates the baseline mortality rate as  $1 \times 10^{-6}$ , and that the average excess above the baseline from driving is 50 per cent, smoking 100 per cent and air travel 1 per cent. In even more striking comparisons, Smil’s analysis suggests that the risk from terrorist attack is three orders of magnitude less than that from driving, that the risk to US military and civilian personnel during the war in Iraq was one order of magnitude less than the risk of being a black male in Philadelphia and that the risk associated with 9/11 was comparable to that of two weeks’ worth of hospital errors leading to deaths in the USA.

Another, more qualitative, attempt to compare risks is the UK Risk Register (figure 1) prepared by the Cabinet Office [10]. When I was Chairman of the Food Standards Agency, I compiled a table of relative food risks by estimating the number of deaths per year attributable to various causes [11]. The big risks associated with the food you eat are the dietary contributions to chronic disease: heart disease, stroke and cancer. These risks, estimating the dietary contribution from admittedly approximate epidemiological studies, are of the order of 100 000 food-related deaths per year, while food poisoning accounts for fewer than 500, and the classic tabloid ‘food scares’ such as genetically modified organisms, pesticide residues and additives contribute approximately zero deaths per year.

## 3. Risk and regulation

Where does this leave the regulatory system? Should it be focused on improving the safety of the biggest risks and relaxing its attention to relatively trivial

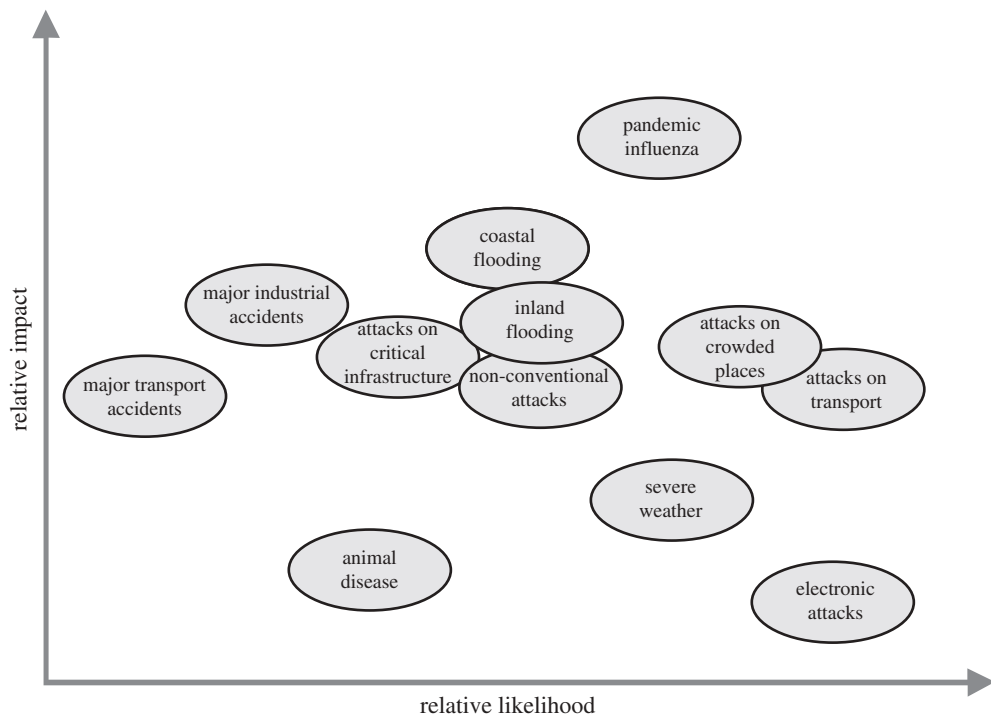


Figure 1. The UK risk register [10].

risks? The answer is not straightforward. First, political decisions about risk management involve weaving together scientific evidence, economics and public acceptability of risk. Second, governments will vary in their view about the extent to which the state should manage people's risks for them, as opposed to citizens being told to get on with their own lives and accept responsibility for their own risks.

The recent change in the discourse about obesity in the UK illustrates the latter point. While the Labour government prior to May [12] took the view that the state has a role in helping individuals to tackle their risks from obesity (for instance by improving children's diets and providing better labelling on food), the post-May 2010 Coalition's view, articulated by the Secretary of State for Health, is 'We talk too much about people "being at risk of obesity" instead of talking about people who eat too much and take too little exercise ... the buck stops with them. They cannot shuffle off the responsibility', while his Junior Minister encouraged doctors to tell patients straight that they are fat rather than what she presumably saw as the mealy-mouthed term 'obese'.

Public and political attitudes towards regulation of risk change over time, and, just because intervention is seen as too heavy-handed today, we should not assume that the same view will be held tomorrow.

In 1938, the House of Commons rejected a Bill to make pasteurization of milk compulsory. The scientific estimate of the risk by Prof. Graham Wilson [13] was that, over the previous 25 years, an average of 2600 people per year died of milk-borne bovine tuberculosis (TB) [14]. Wilson concluded that

‘raw milk is probably the most dangerous article in our dietary’. When the successful Pasteurization Bill was introduced in Parliament in 1949 by Dr Edith Summerskill, she said that pasteurization had been prevented by ‘ignorance and prejudice’. Even the most libertarian lobbyists would probably find little support today if they argued that legislation to prevent 2600 deaths per year from drinking milk would constitute unnecessary ‘nanny state’ interference.

Similarly, when compulsory wearing of seat belts was proposed, there was powerful opposition from libertarians who saw the legislation as ‘ill-informed and illiberal’ (Ivan Lawrence MP) or ‘a wicked, evil, horrific bill that offends against the ark of the covenant of a free society’ (Ronald Bell MP). In 2005, the Royal Society for the Prevention of Accidents cited official statistics showing ([http://www.rospa.com/RoadSafety/info/seatbelt\\_advice.pdf](http://www.rospa.com/RoadSafety/info/seatbelt_advice.pdf)) that, since the law for front seat belts was introduced in 1983, it has prevented, *annually*, an average of 2500 deaths, 29 500 serious injuries and 750 000 minor injuries. To put these numbers in perspective, they are larger than the total number of deaths, serious injuries or minor injuries recorded in 2003.

There are methods of analysing what an objective approach should be towards risk management. A central economic concept in balancing the explicit or implicit costs of regulation with the benefits in terms of reduction of risk is proportionality: what level of expenditure in reducing risk is proportionate to the risk itself? One approach to this is based on the notion of ‘value per fatality’, or how much it is worth spending on preventing a death (or, more precisely, in reducing the risk of a death). This kind of analysis is used, for instance, in determining the degree of investment in improving the safety of road intersections. There are two ways of approaching the question of value per fatality. One is to ask people what they think it is worth paying to save a life or prevent an injury (‘willingness to pay’). This typically reveals that, varying greatly with the particular situation, people think that saving a life through state action is worth less than £10 million, often considerably less. On the other hand, one can look at the implicit value per fatality, by asking how many lives are saved per pound of investment in complying with safety legislation. In one analysis in the USA [15], the range was from \$0.1 million per life for seat belts to more than \$250 billion per life for occupational exposure to formaldehyde.

#### 4. Three recent examples

Now I want to turn to some ‘corroborative detail, intended to give artistic verisimilitude to an otherwise bald and unconvincing narrative’ (from Gilbert & Sullivan’s *The Mikado*). Each of the three examples illustrates a different point about the complexity of the relationship between scientific advice on risk and government action.

##### (a) *Should people living near farms worry about pesticide spray drift?*

Between 1.0 and 1.5 million people in the UK live next to farmers’ fields, and 253 000 km of paths, tracks and road are next to fields. Does the 30 million kg or 30 000 tonnes of pesticide sprayed on these fields pose a risk for people living or travelling nearby? Campaigning groups, such as the Pesticide Action Network, say yes, many hundreds of people suffer from ‘chronic fatigue syndrome’ or ‘multiple

chemical sensitivity', as a result of spray drift (the so-called 'bystander effect'). On the other hand, the Health and Safety Executive estimates that very few (in the range of 1–14) people are affected each year.

In November 2008, the High Court ruled in favour of the campaigners' view, although less than a year later the Court of Appeal overturned this decision, and the lead campaigner, Georgina Downs, said she would take her case to the European Courts (<http://www.guardian.co.uk/environment/2010/jan/11/georgina-downs-pesticides>).

But what do the scientific experts conclude? The Royal Commission on Environmental Pollution (RCEP) [16] concluded that it is 'plausible that there could be a link between pesticide exposure and ill health' and they recommended 'a more precautionary approach', specifically that there should be a 5 m wide cordon sanitaire around fields where spray drift could be a problem. However, the government's statutory committee, the Advisory Committee on Pesticides ([http://www.pesticides.gov.uk/acp\\_home.asp](http://www.pesticides.gov.uk/acp_home.asp)), took a different view. They responded by saying that 'the RCEP's recommendation for a 5 m buffer zone is disproportionate', 'pesticide toxicity is unlikely to contribute importantly to chronic fatigue syndrome or multiple chemical sensitivity', and 'The RCEP's conclusions were reached ... after ... incomplete consideration of the evidence'.

Two groups of experts disagree: what should Ministers make of it? In part, the disagreement arose because the scientific evidence is not neatly cut and dried. There is uncertainty in the interpretation of epidemiological data on the incidence of claimed adverse effects, the toxicological evidence and the assessment of exposure. The methods of risk assessment take into account these uncertainties (usually by allowing substantial safety margins in exposure), but there is an element of judgement, in the end, about what constitutes a proportionate response. As we saw earlier, the aim of the government should be to reduce risk to a level that is acceptable to most people, and this cannot be tightly quantified.

### *(b) Bovine tuberculosis and badgers*

In 1996, I was asked by Douglas Hogg, then Minister for Agriculture, Fisheries and Food, to advise on the problem of TB in cattle and badgers [17]. Mine was the third review in a little over 20 years, following the Zuckerman Review in the late 1970s [18] and the Dunnett Review in the 1980s [19]. Two facts are relatively uncontroversial. The first is that bovine TB has increased substantially in the past three decades: it is now a major animal health problem, particularly in the southwest of England and in South Wales. The number of cattle slaughtered under the TB control policy nearly doubled between 2004 (22 000) and 2008 (40 000, provisional figure), although the numbers fell back somewhat in 2009 (35 000, provisional figure) (<http://www.defra.gov.uk/evidence/statistics/foodfarm/landuslivestock/cattletb/documents/tbnp.pdf>). Second, badgers transmit TB to cattle, both under laboratory conditions and in the field.

However, at the time of my review, it was not clear whether or not killing badgers helps to control the disease in cattle and whether or not it does so in a cost-effective way.

Zuckerman had recommended killing badgers by gassing (subsequently abandoned on animal welfare grounds) and Dunnett recommended the removal



of infected animals (which proved difficult because of the problem of detecting the infected badgers).

In my report, we acknowledged that the scientific evidence to justify killing badgers was not strong, and recommended a large-scale field experiment. The experiment was implemented, and it consisted of 10 'triplets' of areas of 100 km<sup>2</sup> in which three treatments were applied: no killing; proactive killing—attempting to remove all badgers irrespective of whether or not cattle in the area were infected; and reactive killing—removing badgers from an area when cattle became infected. The aim was to determine (i) whether or not either culling policy reduced the incidence of TB in cattle and (ii) an estimate of the cost-effectiveness of the policy. It was envisaged that, while proactive culling should be included in the experiment in order to test whether an extreme policy could produce effects, reactive culling would be more plausible in terms of cost-effectiveness and feasibility if it worked to reduce disease in cattle. The experiment was originally expected to last for 5 years, but, because of the interruption caused by the 2001 foot and mouth disease outbreak, it ran for about 7 years.

The initial analysis of the results [20] showed that reactive culling increased the incidence of TB by 27 per cent, while proactive culling decreased TB in cattle by 23 per cent within the 100 km<sup>2</sup> area, but at the same time there was a 24.5 per cent increase in TB just outside the area. This last effect, referred to as the 'perturbation effect', might be a result of disturbance of the badgers' territorial system, with infected wandering animals increasing the risk to cattle.

These results led to the conclusion that (i) reactive culling would not be an effective policy and (ii) in order for the benefits of proactive culling to outweigh the perturbation effect, culling would have to be on a large scale and over a long time period. If badgers were culled in all the highly affected areas in the southwest, this could amount to nearly half the estimated UK badger population.

Jenkins *et al.* [21] have analysed the number of incidents of TB in cattle after the end of the culling experiment, and the picture has become less clear-cut; nevertheless, the overall headline conclusion is that for culling to be effective it would have to be large scale and persistent (and costly in terms of both public opinion and money).

However, as with the issue of pesticide spray drift, different scientific experts offered contradictory advice to the government. The expert group overseeing the field experiments, as well as almost all other experts on disease epidemiology, advised that a cull would be neither efficacious nor cost-effective, and that effort should be put into the alternatives recommended in my report, vaccination and biosecurity [22]. However the then Chief Scientific Advisor, Sir David King, took the opposite view and advised the government of the day to cull [23]. His advice was based on a rather cursory examination of the evidence and included the assumption that it would be possible to choose areas for culling bounded by habitat sufficiently unsuitable for badgers to prevent immigration. In the event, the Labour government (in my view correctly) decided not to cull, but the Coalition has said that it plans to go ahead with a cull. The scientific evidence has not changed in the meanwhile, but the political judgement has. If a cull goes ahead (and at the time of writing no final decision has been made), any putative beneficial effects (and these benefits are far from certain) will not manifest themselves for many years, during which time an effective vaccine for cattle that will allow discrimination between vaccinated and infected animals is

likely to be developed. A vaccine for badgers has already been licensed for use, although it poses the challenge of catching badgers in sufficient numbers. Current work is aimed at developing an oral vaccine for badgers.

In September 2008, the Welsh Assembly Government decided to go ahead with a cull in a 288 km<sup>2</sup> part of southwest Wales (mainly in North Pembrokeshire). The geography of this area was thought to favour a positive benefit from culling, because the surrounding habitats (sea and mountains) are inhospitable to badgers, which would reduce the likelihood of immigration of new, infected badgers and the resultant perturbation effect. Nevertheless, the Welsh Assembly Government lost an appeal against an earlier judicial review, which had supported it, brought by the Badger Trust. The three appeal judges supported the appeal for different reasons. Two of them accepted the Badger Trust's argument that the Welsh Assembly Government's expected outcome—that culling would reduce the incidence of TB in cattle by 9 per cent—did not count as a 'substantial' enough reduction to justify killing badgers. The third judge supported the appeal on a technicality: that the Welsh Assembly Government had not specified in its case that culling would be restricted to one part of southwest Wales. As the British Broadcasting Corporation (BBC) correspondent noted (<http://www.bbc.co.uk/news/10612240>), if culling were expected to reduce TB in cattle by 9 per cent, why were farmers not interested in the other 91 per cent?

### (c) *Alcohol*

Alcohol is an addictive and harmful substance, and yet the regulations governing its use are relatively light. According to the Cabinet Office's 2004 analysis (<http://www.cabinetoffice.gov.uk/media/cabinetoffice/strategy/assets/caboffice%20alcoholhar.pdf>), 1.2 million violent incidents (half of the total) are linked to alcohol, and between 750 000 and 1.3 million children are affected by parental alcohol problems. Alcohol Concern estimates that there are 2.7 million people in the UK who are dependent on alcohol and that the number of deaths has doubled in 15 years.

The scientific and medical experts essentially agree on the best ways to manage the risks of excessive alcohol consumption. A meta-analysis of 1003 estimates from 112 studies of policy interventions concluded that: 'A large literature establishes that beverage alcohol prices and taxes are inversely related to drinking. Public policies that raise prices of alcohol are an effective means to reduce drinking' ([24], see also Le Grand [25]). Similarly, the World Health Organization [26] concluded that raising the price, restricting availability, controls on marketing, effective enforcement and restricting drinking in public are the most effective policies to curb alcohol consumption. The former Chief Medical Officer in his 2009 annual report ([http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/@ps/documents/digitalasset/dh\\_114012.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/documents/digitalasset/dh_114012.pdf)) called for a minimum price for alcohol. The drinks industries clearly accept the strength of evidence because they are strongly opposed to minimum pricing. If they thought it would have no effect on sales and consumption why would they object? But the politicians of all parties fell over themselves to reject this idea, saying it would 'punish the majority of responsible drinkers', that it is important 'to deal with people's attitudes' and so on. Why? Are they following Gabriel Betteridge's



advice in *The Moonstone* by Wilkie Collins [27]: ‘Cultivate a superiority to reason and see how you pare the claws of all the sensible people when they try to scratch you for your own good’?

One possibility is the ‘nanny state’ argument: it is not up to the state to determine what people do with their lives. This was carefully evaluated in a report that I chaired for the Nuffield Council on Bioethics [28]. The report identified the justifications for state intervention. These include preventing harm to others (John Stuart Mills’ famous harm principle) and protecting vulnerable sections of society, such as children. These are relatively uncontentious and existing restrictions on our freedoms (e.g. carrying guns, dealing in child pornography, the ban on smoking in public places) are for these purposes. On this count, there is a fair case for legislating to discourage excessive alcohol consumption: the harms caused to others, including children, are, according to the Cabinet Office figures above, considerable.

A second argument is one that considers the trade-off between public health and other benefits. Perhaps, for instance, it could be argued that the drinks industry (both manufacturing and retail) employs many people and contributes substantially to local economies, and that this benefit has to be weighed against the harms and risks caused by excessive consumption of alcohol.

The comparison with tobacco suggests another strand to the political decision. In 1950, when 75 per cent of adults in this country smoked, it would have been almost inconceivable to introduce a ban on smoking in enclosed public spaces, but by 2008, when the ban in England was introduced, only about 25 per cent of adults smoked, so for the majority of voters it was a boon and not an infringement. Alcohol is more like tobacco in the 1950s: about 90 per cent of us drink.

## 5. Conclusion: communicating risk and uncertainty

My three examples—pesticide drift and human health, badgers and bovine TB and alcohol-related harms—illustrate some of the difficulties in translating scientific estimates of risk into policy, especially where the evidence is subject to a range of interpretations as a result of uncertainty. Experts disagree about the risks connected with pesticide sprays, although they agree that there are uncertainties. While there is a near-consensus among the most informed experts that killing badgers is not an effective way of controlling TB in cattle, the government’s Chief Scientific Advisor took the opposite view. The fact that scientists disagree is not helpful to policy-makers, but challenge and disagreement is a central part of the process of scientific discovery. Robert May [12] puts it beautifully. ‘There is, at any one time, what might be thought of as a landscape of opinion. In the early stages of research, various ideas are proposed, producing lots of little clusters of opinion like hillocks on the landscape. ... In general ... the historical landscape of any major scientific question has its own evolution, from pimply plurality, to contending hillocks to a single narrowly spikey mountain in maturity’. One important role for scientists, in the interpretation of their risk assessments, is to help policy-makers understand how far scientific understanding has evolved in this landscape, and, if there are competing hillocks, to explain why in the clearest possible terms. In my third example, the evidence is as clear-cut as it could be: there is little doubt

that increasing prices would curb excessive drinking, but Ministers are reluctant to introduce this policy because other considerations appear to over-ride the interests of public health.

In closing, let me briefly return to the starting point: communication. Is there a good way of getting across to the public (I use the plural because different people understand or respond to different kinds of message) ideas of risk and uncertainty? If the risks are large and well characterized—the single spikey mountain of opinion—the message may be straightforward, for instance ‘smoking kills’, but often the risks may be estimated as small and with a degree of uncertainty—the contending hillocks or pimply plurality stage. I have no magic bullets, but I can give an example of success in communicating a rather complex risk message. It relates to the foot and mouth epidemic of 2001. At the time, for most people the most vivid and salient images were of the horrifying, inferno-like, funeral pyres of burning carcasses up and down the country. In this febrile context, the Food Standards Agency was asked by the government of the day to advise on the question of whether pollution from the pyres could pose a risk in the food chain. It was possible that dioxin-like chemicals, which might be carcinogens, could have gone from the funeral pyres into grass, and thence into cattle and their milk, and eventually into the human food chain.

When we looked at the scientific evidence, we concluded that, although the risk was likely to be very small, not least because retail milk is blended from a large number of farms, some of which would have been near pyres, others not, we did not have enough data to characterize the risk accurately. Milk samples had been taken for analysis, but the results would not be clear for some time, because of the lags in passage of any contaminants into the food chain. We decided that the best thing to do was to tell the public, via the media, what the situation was; namely, we did not think there was a risk, but we were in the process of finding out and we would let people know as soon as the results were in. We also proposed to offer advice to people who wanted to reduce any possible risk. We did not advise people to stop drinking milk or eating dairy products, but they could, if they wished, select low-fat options (dioxins are fat soluble) or, for the few drinking local, single-farm, milk, they could switch to blended normal retail milk.

The government was not at all happy with this proposition. It feared that the result would be panic and confusion among consumers. Therefore, I was advised that it would be better to keep quiet until the results of the milk tests were completed. I pointed out a serious downside to this approach: suppose the results of the milk analysis showed that there was indeed a risk, and that we had known about the possibility for some weeks but had decided to keep quiet. It takes little imagination to picture the media stories of a cover-up and conspiracy to protect the dairy industry, followed by a collapse in public confidence in the Food Standards Agency. So we went ahead, and in the event the communication strategy worked remarkably well. A rather complex message was accurately portrayed in the media, and there was no public panic. One newspaper editorial said, ‘In short, it [the Food Standards Agency] has treated British adults as adults. It has behaved with the utmost responsibility on its own account and remit ... Would that there were more public bodies like that’ [29]. When the results of the milk tests were completed a few weeks later, they showed that there had not been a risk from milk and other dairy products, but at least no one could say that they had been kept in the dark. If this example is anything to go

by, it would appear, perhaps not too surprisingly, that straightforward honesty about risk and uncertainty, coupled with clear advice for the public about their options, is the best policy.

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