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Risk, Freedom and Responsibility[1]

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Abstract

The populations of affluent nations have never been wealthier, healthier or longer-lived but, at the same time, we are becoming more anxious about risk and mistrustful of government, industry and science. And yet, paradoxically, there appears to be increasing acquiescence in the control of our lives by professional risk experts. Why?

We are all ambivalent risk managers. Managing risk involves balancing potential rewards against potential losses. No one wants an accident but everyone wants to be free to take risks - without them life would be unutterably boring. Safety interventions that do not acknowledge the perceived rewards of risk are likely to be met with behaviour that seeks to frustrate them. We also resent and resist risks imposed upon us by others and, generally, support regulation to contain them.

Most intractable are "virtual" risks - uncertainties to which we cannot attach probabilities. Virtual risks are cultural constructs. The scale of such risks has grown with physical mobility and the power of science and technology. The response to such risks is variable. ***Individualists*** *focus on the benefits associated with these risks and trust in the invisible had of market forces to contain them,* ***egalitarians*** *urge retreat to small-scale sustainability, and* ***hierarchists*** *trust in more effective management. But the most common response is resigned* ***fatalism****.*

Homo Sapiens, like all other animals, is an instinctive risk manager. We have evolved in an uncertain world, and our success relative to the rest of the animal kingdom suggests that most of our species have been fairly good at it. By many widely accepted measures of success we are still improving. Aaron Wildavsky[2] observes

> "Overwhelming evidence shows that the economic growth and technological advance arising from market competition have in the past two centuries been accompanied by dramatic improvements in health - large increases in longevity and decreases in sickness."

And yet we appear to be losing our nerve. Ulrich Beck's influential *Risk Society*[3] identifies scientific and technological advance as the *source* of risks "that endanger *all* forms of life on this planet"(p22). In *Culture of Fear* Frank Furedi[4] catalogues the "explosion of risks" with which society is increasingly preoccupied, and documents the way in which we are, apparently willingly, handing over responsibility for the management of the risks we face to regulators and institutional risk managers. *Why are*

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[1] In addition to sources cited in the footnotes, this paper draws upon four earlier papers by the author: Can technology save us? *World Transport Policy and Practice*, June 1996; Cars, Cholera and Cows: virtual risk and the management of uncertainty, *Science Progress,* 80 (2) 1997; A Richter scale for risk? *Interdisciplinary Science Reviews*, 1998, vol. 23, no.2.; and Virtual risk and the management of uncertainty, *Science, Policy and Risk*, The Royal Society, London 1997.

[2] Aaron Wildavsky (1998) *Searching for Safety*, Oxford: Transition.

[3] Ulrich Beck (1992) *Risk Society: towards a new modernity*. London: Sage.

[4] Frank Furedi (1997) *Culture of fear; risk-taking and the morality of low expectation*. London: Cassell.

we becoming more fearful? Why are we acquiescing, with some notable exceptions, in the increasing control of our lives by professional risk experts?

To attempt answers to these questions we must first be clear about the nature of risk management. *Everyone* is a true risk-management 'expert' in the original sense of the word; we have all been trained by practice and experience in the management of risk. The development of our expertise in coping with risk begins in infancy. The trial and error processes by which we first learn to crawl, and then walk and talk, involve decision-making in the face of uncertainty. In our development to maturity we progressively refine our risk-taking skills; we learn how to handle sharp things and hot things, how to ride a bicycle and cross the street, how to communicate our needs and wants, how to read the moods of others, how to stay out of trouble. How to stay out of trouble? This is one skill we never master completely. It appears to be a skill that we do not want to master *completely*.

The behaviour of young children, driven by curiosity and a need for excitement, yet curbed by their sense of danger, suggests that these junior risk experts are performing a balancing act. In some cases it is a physical balancing act; learning to walk or ride a bicycle cannot be done without accident. In mastering such skills they are not seeking a zero risk life; they are balancing the expected rewards of their actions against the perceived costs of failure. The apprehension, determination and intense concentration that can be observed in the face of a toddler learning to toddle, the wails of frustration or pain if it goes wrong, and the beaming delight when it succeeds, are all evidence that one is in the presence of a serious risk management exercise. But most decisions about risks involving infants and young children are taken by adults. Between infancy and adulthood there is a progressive handing over of responsibility until, by the age of 18 or 21 in most western countries people reach the age of "responsibility".

Adults are considered *responsible* for their actions, but they are not always considered trustworthy or sufficiently well informed. A third level of responsibility for the management of risk consists of various *authorities* whose role with respect to adults is similar to that of adults with respect to children. The authorities are expected to be possessed of superior wisdom about the nature of risks and how to manage them. Some of these authorities merely offer us advice, but others, increasing in number, seek to compel us to behave safely. Their record of success is meagre and their legitimacy is frequently challenged.

So what is risk management?

Risk management is a balancing act. It involves balancing risks and rewards. Figure 1, the risk thermostat, is a simplified model of this process. The model postulates that

- everyone has a propensity to take risks - the setting of the thermostat

- this propensity varies from one individual to another - some like it hot, others cool, but no one wants absolute zero.
- the propensity is influenced by the potential rewards of risk taking
- perception's of risk are influenced by experience of accident losses - one's own and others'
- risk taking decisions represent a balancing act in which perceptions of risk are weighed against propensity to take risk
- accident losses are, *by definition*, a consequence of taking risks; taking a risk is doing something that carries with it a probability of an adverse outcome
- the more risks an individual takes, the greater, on average, will be the losses he or she incurs; but also the greater will be the rewards.

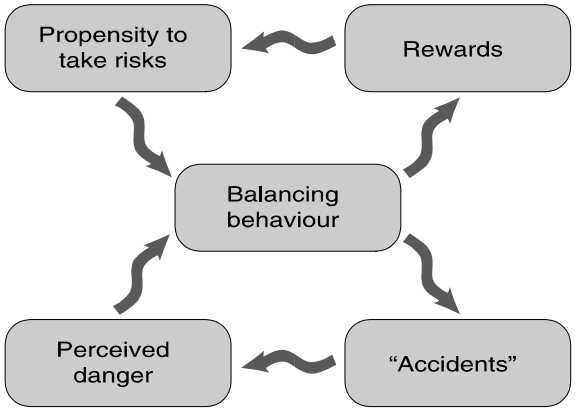

Figure 1 The Risk thermostat

What risks are being managed?

There has been a long-running and sometimes acrimonious debate between "hard" scientists - who treat risk as capable of objective measurement - and social scientists - who argue that risk is culturally constructed[5]. Much of this dispute can be made to evaporate if one is clear about the nature of the risks under discussion. It is helpful to distinguish three categories of risk:

- *directly perceptible risks*: e.g. climbing a tree, riding a bicycle, driving a car,
- *risks perceptible with the help of science*: e.g. cholera and other infectious diseases,
- *virtual risks* - scientists do not know or cannot agree: e.g. BSE/CJD, suspected carcinogens, global warming.

In Figure 2 these categories are represented by three overlapping circles to indicate that the boundaries between them are indistinct, and also to indicate the potential complementarity of approaches to risk management that have previously been seen as adversaries.

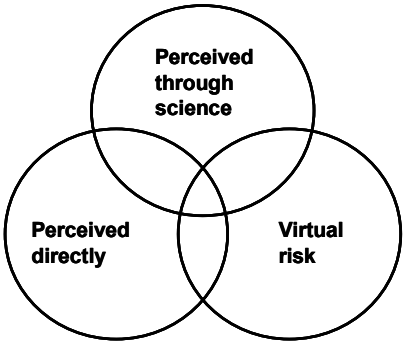

Figure 2. Three types of risk.

[5] One of the best examples of this debate can be found in a collection of essays published The Royal Society in 1992: *Risk: analysis, perception and management*. London: Royal Society.

Directly perceptible risks - who is responsible?

The management of *directly perceptible risks* - by toxicologists, doctors, the police, safety officials and numerous other "authorities" - is made difficult and frustrating by individuals insisting on being their own risk managers, and overriding the judgements of risk experts and the interventions of safety regulators - a phenomenon routinely attested to by millions of smokers, sunbathers, consumers of cream buns, and speeding motorists. Why do so many people insist on taking more risks than safety authorities think they should? It is unlikely that they are unaware of the dangers - there can be few smokers who have not received the health warning. It is more likely that the safety authorities are less appreciative of the *rewards* of risk taking.

Directly perceptible risks are "managed" instinctively; our ability to cope with them has been built into us by evolution - contemplation of animal behaviour suggests that it has evolved in non-human species as well[6]. Our method of coping is intuitive; everyone ducks if they see something about to hit them, and we do not undertake a formal probabilistic risk assessment before we cross the street. There is now abundant evidence, particularly with respect to directly perceived risks on the road, that *risk compensation*, sometimes referred to as offsetting behaviour, accompanies the introduction of safety measures. Statistics for death by accident and violence, perhaps the best available aggregate indicator of the way in which societies cope with directly perceived risk, display a stubborn resistance, over many decades, to the efforts of safety regulators to reduce them[7].

With directly perceptible risks we encounter an intriguing ambivalence. In Britain both opinion poll evidence and a high level of compliance with the seat belt law suggest that this measure, which is designed to protect people from themselves, enjoys a high measure of popular support. And yet there is compelling evidence that motorists have responded to such measures by driving in a manner that restores their original level of risk.[8] It appears that a great many people support laws that compel them to be safer than they choose to be.

Furedi (p 136) identifies loss of trust - in institutions *and in ourselves* - as an important characteristic of the *culture of fear*. The increasing number of laws and regulations that are designed to protect us from ourselves - and our acceptance of them - are consistent with this view; but at a deeper level we appear to be manifesting, through our behaviour, a determination to retain responsibility for managing directly perceptible risks. We insist on being our own judges of what is safe or dangerous.

Attempts by "authorities" to over-ride these judgements and criminalize *self-risk* are, at best, likely to be ineffectual, and at worst likely to produce perverse side-effects: prohibition spawned organised crime in America, seat-belt legislation has made the roads more dangerous for cyclists and pedestrians[9].

Risk perceived through science

Here we are more clearly in the realm of *institutional risk management* - the domain of regulators and their scientific advisers. The risk and safety literature does not

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[6] Heinz Wolff, rebuking me for my anthropocentric approach to risk, maintained that even the amoeba takes risks.

[7] See Adams, J. *Risk*, UCL Press, 1995, for a discussion of this phenomenon. It constitutes an important exception to Wildavsky's observation, quoted above, that the world is becoming safer.

[8] Nowhere in the world is there evidence that seat belt laws have saved lives - see Adams, *Risk*, chapter 7.

[9] Ibid.

cover all three categories of risk equally. It is overwhelmingly dominated by the second category - *risks perceived through science* - Figure 3.

Central to this literature is the *rational actor paradigm*[10]; the advice of the risk experts about how to manage risks is based upon their judgement about how a *rational optimiser* would, *and should,* act if in possession of all relevant scientific information. In this literature economists and scientists strive together to serve the interests of someone we might call *homo economicus-scientificus* - the offspring of the ideal economist and the ideal scientist.

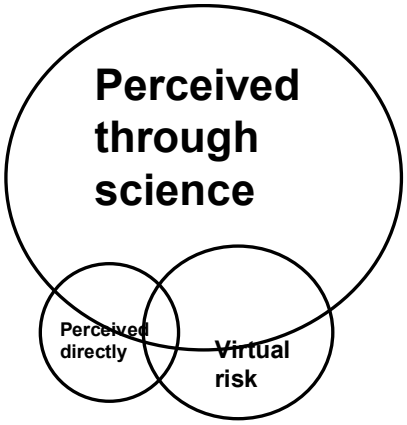

Figure 3. The rational actor paradigm dominates the risk and safety literature

Infectious diseases such as cholera are not directly perceptible. One requires a microscope to see them, and a scientific training to understand what one is looking at. Science has an impressive record in making invisible, or poorly understood, dangers perceptible, and in providing guidance about how to avoid them. Large decreases in premature mortality over the past 150 years, such as those shown for Britain in Figure 4, have been experienced throughout the developed world. Such trends suggest that ignorance is an important cause of death, and that science, in reducing ignorance has saved many lives. When the connection between the balancing-behaviour box and the accident box in Figure 1 is not perceptible, there is no way that it can influence behaviour.

[10] See Renn, O., C. Jaeger, E. Rosa, and T. Webler. 1998. 'The Rational Action Paradigm in Risk Theories: Analysis and Critique,' in Risk in the Modern Age: Science, Trust, and Society, Maurie J. Cohen, ed., London: Macmillan in Press.

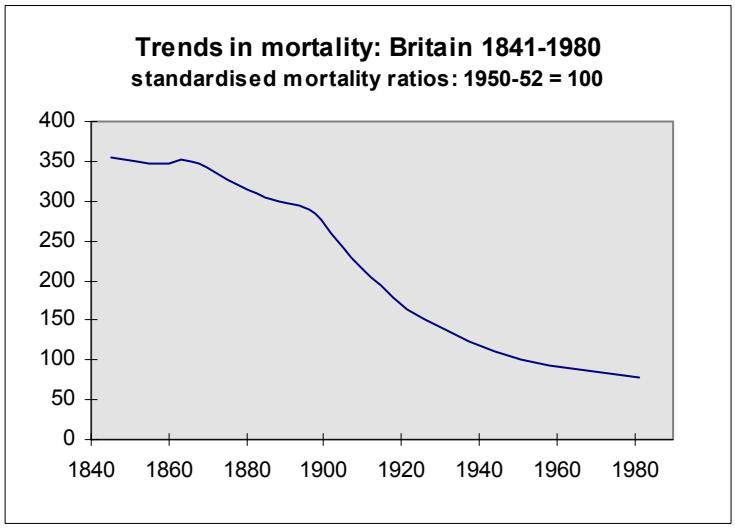

Figure 4. Source: *Living with Risk*, British Medical Association, 1987

The scientific approach - a limitation. The scientific approach to risk management encounters an intractable problem. Adherents to this approach are committed to the idea that safety and danger are capable of objective measurement. The most popular metric of risk-management success is accident statistics - but *accident statistics do not measure danger***.** If a road has many accidents it might fairly be called dangerous; but using past accident rates to estimate future risks can be positively misleading. There are many dangerous roads that have good accident records *because* they are seen to be dangerous - children are forbidden to cross them, old people are afraid to cross them, and fit adults cross them quickly and carefully. The good accident record is purchased at the cost of community severance - with the result that people on one side of a busy road tend no longer to know their neighbours on the other. But the good accident record gets used as a basis for risk management. Officially - "objectively" - roads with good accident records are deemed safe, and in need of no measures to calm the traffic.

Figure 1 can be used to illustrate the problem. Information about accidents informs perception of danger, perception influences behaviour, and behaviour influences the number of accidents; the act of measurement alters that which is being measured - a phenomenon not unknown to scientists familiar with the work of Heisenberg.

Institutional risk management - who is in charge?

Every *individual* performs the mental balancing act described in Figure 1 in his or her own head. *Institutions* - government departments or large commercial enterprises - usually assign the job of risk management to particular people or departments. The risk-decision process which in individuals is usually conducted informally and intuitively, in institutions becomes explicit and formal. Figure 5 describes a set of procedures used by a large pharmaceutical company to manage risk . The risk literature is replete with similar algorithms[11]. When compared with Figure 1 above they can all be shown to be more elaborate versions of *the bottom loop* of the risk thermostat model.

[11] *A Guide to Risk Assessment and Risk Management for Environmental Protection* published by the Department of the Environment (HMSO 1995) and *Risk Management in the NHS*, Department of Health, July 1996 contain similar diagrams.

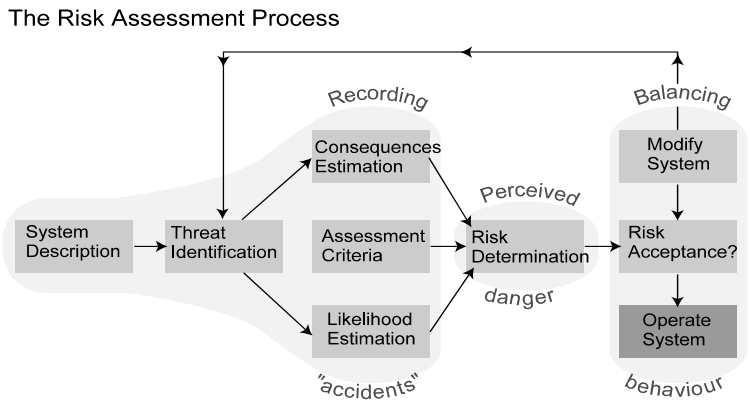

Figure 5 "A bottom loop model": the shading with labels indicates the correspondence with the bottom loop of the risk thermostat model in Figure 1

What is termed "risk management" in institutional settings, with a few exceptions such as venture capital enterprises[12], turns out on inspection to be exclusively concerned with *risk reduction*. Institutional risk management models characteristically have no top loop; the "rewards" loop is the responsibility of some other department - often marketing. This view was reinforced during a seminar I presented to the risk managers of a large private-sector concern, when one of the participants said, rather morosely, "Yeah, around here we're known as the sales prevention department." As the following pronouncements from Shell Oil indicate, the objective of most institutional risk managers is the elimination of *all* accidents.

> "The safety challenge we all face can be very easily defined - to eliminate all accidents which cause death, injury, damage to the environment or property. Of course this is easy to state, but very difficult to achieve. Nevertheless, that does not mean that it should not be our aim, or that it is an impossible target to aim for" (Richard Charlton (1991), director of exploration and production, Shell Oil).
>
> "The aim of avoiding all accidents is far from being a public relations puff. It is the only responsible policy. Turning 'gambling man' into 'zero-risk man' (that is one who manages and controls risks) is just one of the challenges that has to be overcome along the way" (Koos Visser (1991), Head of Health, Safety and Environment, Shell Oil).[13]

The single-minded pursuit of risk reduction by institutional managers usually leaves the pursuers disappointed and frustrated . Safety interventions that do not lower the settings of the risk thermostats of the individuals at whom the interventions are aimed, are routinely offset by behavioural responses that reassert the levels of risk that people were

[12] The world of finance provides important exceptions. Current problems in the world's financial markets have largely been caused by the dominance of the top loop in the incentive structures of the big players in the game. In a good year the Christmas bonus of a "rocket scientist" who speculates with other people's money is large enough to retire on comfortably for life. If he gets it wrong, the worst that is likely to happen is that he will lose his job. It is an incentive structure designed to promote irresponsible speculation.

[13] *Shell World: the international business magazine of Royal Dutch Shell,*February 1991.

originally content with. This problem is compounded by the division of labour usually found in institutional risk management; different people or departments are commonly placed in charge of the top and bottom loops - with no one obviously responsible for the overall balancing act. What then happens when the problem is further compounded by a lack of reliable knowledge or agreement about the rewards and accident costs to be balanced?

Virtual Risk - beyond reliable knowledge

This is the realm of *culturally constructed risk.* Virtual reality is a product *of* the imagination which works *upon* the imagination. It is capable of simulating something real - as in the case of a flight simulator used to train pilots - or something entirely imaginary - as in the case of the Space Invaders of computer games. Virtual risks may, or may not, be real - but they have real consequences.

When scientists do not know or cannot agree about the "reality" of risks people are liberated to argue from belief and conviction. Figure 6, a typology of "myths of nature", describes various preconceptions about nature that inform risk-taking decisions in such circumstances. The essence of each of the four myths is illustrated by the behaviour of a ball in a landscape; each myth is associated with a distinctive risk-management style.

- Nature benign: nature, according to this myth, is predictable, bountiful, robust, stable, and forgiving of any insults humankind might inflict upon it; however violently it might be shaken the ball comes safely to rest in the bottom of the basin. Nature is the benign context of human activity, not something that needs to be managed. The management style associated with this myth is therefore relaxed, exploitative, laissez-faire.
- Nature ephemeral: here nature is fragile, precarious and unforgiving. It is in danger of being provoked by human greed or carelessness into catastrophic collapse. The objective of management is the protection of nature from Man. People, the myth insists, must tread lightly on the earth. The guiding management rule is the precautionary principle.
- Nature perverse/tolerant: this is a combination of the first two myths. Within limits nature can be relied upon to behave predictably. It is forgiving of modest shocks to the system, but care must be taken not to knock the ball over the rim. Regulation is required to prevent major excesses, while leaving the system to look after itself in minor matters. This is the ecologist's equivalent of a mixed economy model. The manager's style is interventionist.
- Nature capricious: nature is unpredictable. The appropriate management strategy is again laissez-faire, in the sense that there is no point to management. Where adherents to the myth of nature benign trust nature to be kind and generous the believer in nature capricious is agnostic; the future may turn out well or badly, but in any event, it is beyond his control. The non-manager's motto is *que sera sera.*

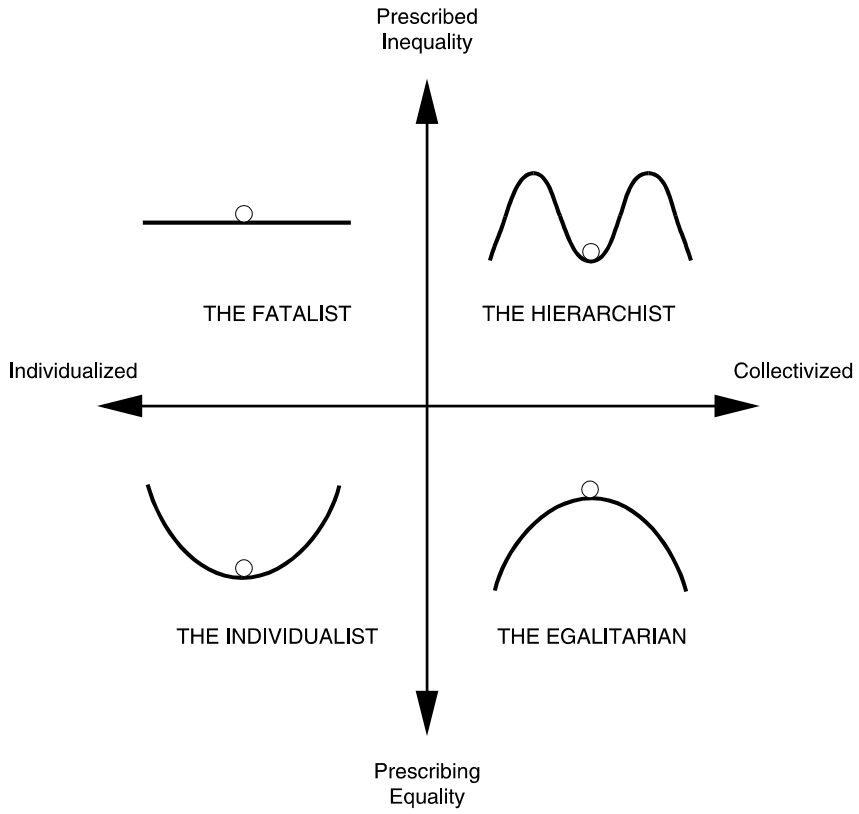

Figure 6 Four rationalities: a typology of bias[14]

Plural Rationalities

These distinctive management styles have been associated, by anthropologists and political scientists - most prominently Aaron Wildavsky, Mary Douglas and Michael Thompson[15] - with distinctive "rationalities".

- Individualists are enterprising "self-made" people, relatively free from control by others, and who strive to exert control over their environment and the people in it. Their success is often measured by their wealth and the number of followers they can command. The self-made Victorian mill owner or present-day venture capitalist would make good representatives of this category. They oppose regulation and favour free markets. Nature, according to this perspective, is to be *commanded* for human benefit.
- Egalitarians have strong group loyalties but little respect for externally imposed rules, other than those imposed by nature. Group decisions are arrived at democratically and leaders rule by force of personality and persuasion. Members of religious sects, communards, and environmental pressure groups all belong to this category. Nature is to be *obeyed*.
- Hierarchists inhabit a world with strong group boundaries and binding prescriptions. Social relationships in this world are hierarchical with everyone knowing his or her place. Members of caste-bound Hindu society, soldiers of all ranks and civil servants are exemplars of this category. Nature is to be *managed*.
- Fatalists have minimal control over their own lives. They belong to no groups responsible for the decisions that rule their lives. They are non-unionised employees,

[14] It is called a typology of *bias* to emphasize that real people have all these characteristics contending within them. Their relative salience can change with context and circumstances.

[15] Thompson, M, Ellis, R & Wildavsky, A (1990) *Cultural Theory*, Boulder Colorado, Westview.

outcasts, refugees, untouchables. They are resigned to their fate and see no point in attempting to change it. The best you can do is *duck if you see something about to hit you*.

Coping with risk and uncertainty

Wherever the evidence in a dispute is inconclusive the scientific vacuum is filled by the assertion of contradictory certitudes. There are numerous risk debates, such as that about BSE/CJD, in which for the foreseeable future scientific certainty is likely to be a rare commodity; issues of health, safety and the environment - matters of life and death - will continue to be decided on the basis of scientific knowledge that is not conclusive.

The BSE/CJD controversy still appears far from scientific resolution. The very existence of prions is disputed by some reputable scientists[16]. Others question whether the "new strain" of CJD is a mutant version of CJD, or a human strain of BSE. There is another reputable school of thought that argues that BSE and CJD are caused by a bacterium called *Acinetobacter*.[17]

Even scientists, perhaps especially scientists, must live with uncertainty. Professor Emeritus John Pirt, specialist in autoimmune diseases at King's College London assured readers of *The Times* in a recent letter (28 August 1998) that "we can continue to relish and enjoy our cuts of lamb and beef without fear." But Stanley Prusiner, by common consent the most eminent scientist involved in the BSE controversy - by virtue of his Nobel Prize for his work on prions - was asked, when giving evidence to the UK Government's BSE Inquiry, whether he had changed his diet since learning of BSE. He replied

> "I have worked in this field for 25 years. … Did I go out and eat lamb chops, did I go out and eat lamb brain, sheep brain? The answer was 'no', but it was not based on scientific criteria it was based on just emotion. … I cannot give you a scientific basis for choosing or not choosing beef, because we do not know the answers. … the science is very complicated; and very few people understand the science at a deep level.[18]

Figure 7 shows the risk management model fitted with cultural filters. The mythological figures of Cultural Theory are caricatures, but they have numerous real life approximations in debates about risk. Long-running controversies about large scale risks are long running because they are scientifically unresolved, and unresolvable within the time scale imposed by necessary decisions. This information void is filled by people rushing in from the four corners of Cultural Theory's typology asserting their contradictory certitudes. The clamorous debate is characterised not by irrationality, but by plural rationalities.

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[16] "Nobody has proven that these prions really exist." Special News Report, *Science*, 12.7.96.
"The prion hypothesis is the 'cold fusion' of infectious disease - it's a very radical idea, and just like cold fusion it has some very appealing aspects. But because it's so radical it deserves a very high level of scepticism and scrutiny before it's adopted." Robert Rohwer, quoted in *Science*. 12.7.96

[17] S.J. Pirt, letter to the *Times*, 28 August 1998; also evidence given to the UK Government's BSE Inquiry by Ebringer and Pirt, 26 March 1998, available on the Internet at www.bse.org.uk.

[18] www.bse.org.uk 6 June 1998, pp 64-66 of evidence by S Prusiner to UK Government BSE Inquiry.

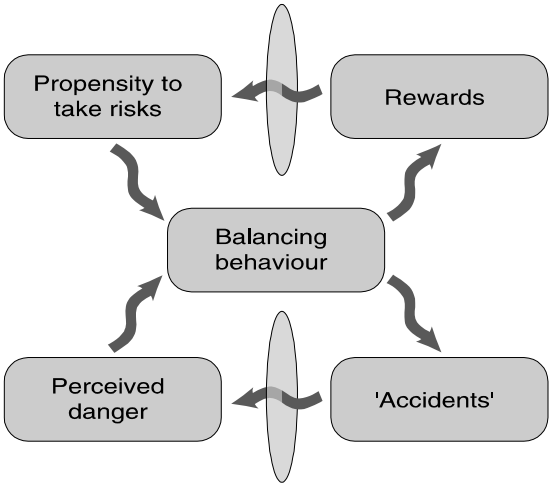

Figure 7 The risk thermostat fitted with cultural filters

The contending rationalities not only perceive risk and reward differently, they also differ according to how the balancing act ought to be performed. Hierarchists are committed to the idea that the management of risk is the responsibility of "authority" - appropriately assisted by expert advisers. They cloak their deliberations in secrecy because the ignorant lay public cannot be relied upon to interpret the evidence correctly or use it responsibly. The individualist scorns authority as "the Nanny State" and argues that responsibility for decisions about whether to wear seat belts or eat beef should be left to individuals. Egalitarians focus on the importance of *trust;* risk management is a consensual activity, consensus building requires openness and transparency in considering the evidence.

These different rationalities and their different balancing acts are active in the antibiotics debate discussed by Anthony Daniels [19]. The Government (hierarchy) recently issued guidelines to encourage doctors to curb their prescribing of antibiotics in order to reduce the rate at which resistance to antibiotics is developing. These guidelines have met with approval from some and resistance from others: approval from the public health lobby (egalitarians) who conclude that they will, on balance, benefit society; and resistance from (individualist) doctors and patients who place their individual prescribing freedom, or individual welfare above that of the collectivity. Daniels observes

> "From the doctor's point of view … there is less litigation over 99 unnecessary prescriptions for antibiotics than over one case of meningitis for which they were not prescribed[20]. … There is a serious conflict here. Is the doctor the agent of the individual … or of society. … The tension between the public and private function of the doctor is now permanent; how to balance them will always be a matter of judgement."

How should this judgement be exercised in the face of uncertainty. Ignorance and uncertainty are a challenge to the very idea of authority and expertise. The response of hierarchists is to conceal their doubts and present a confident public face. Confession of ignorance or uncertainty does not come easily to authority. In the face of uncertainty

[19] Anthony Daniels (6 September 1998) When doctor knows better than nanny, *Sunday Telegraph.*

[20] Given the rarity of meningitis and the huge number of prescriptions for antibiotics I suspect 99999 cases to one would be a more accurate description of the dilemma.

about an issue such as BSE they seek to reassure[21]. Individualists are assiduous collectors of information - even paying for it - but are also much more comfortable with uncertainty. Their optimism makes them gamblers - they expect to win more than they lose. Markets in their view are institutions with a record of coping with uncertainty successfully. If the experts cannot agree about BSE, there is no basis upon which central authority can act; the risk should be spread by letting individual shoppers decide for themselves. The egalitarian instinct in the face of uncertainty is to assume that authority is covering up something dreadful, and that untrammelled markets will create something dreadful. They favour democratising the balancing act by opening up the expert committees to lay participation and holding public inquiries to get at the truth - which, when known, will justify the draconian intervention in the markets that they favour. The fatalist just carries on drinking beer, reading the Sun and buying lottery tickets. Figure 8 presents a representative selection of comments about BSE categorised by the cultural theory typology of bias. The falling out between political and scientific authority manifest in the upper right hand corner is characteristic of the disarray into which hierarchy falls when its mask of authoritative knowledge is torn off.

Should we follow a risk-averse environmental policy?

Who are "we"? "Risk-averse" and "risk-seeking" are usually labels that people apply to others whose risk thermostats are fitted with different cultural filters. Those who argue for a more risk-averse policy are, in effect, saying that there is a discrepancy between the dangers that they perceive and the risks that they are prepared to take. The activities of environmental groups (egalitarians) lobbying for the precautionary principle can be seen as a collective behavioural response to this discrepancy. The environmentalist case rests on the conviction that growth processes - economic and demographic - are pressing against global limits. Perhaps the best exemplars of this conviction are Meadows et al who argue in *Beyond the Limits*[22] that

> "The human world is beyond its limits. The future, to be viable at all, must be one of drawing back, easing down, healing. ... The more we compiled the numbers, the more they gave us that message, loud and clear."

In the BSE debate the complementary message that is received and re-transmitted loud and clear by egalitarians is that BSE is a punishment for *unnatural* methods of agriculture. Modern intensive, high-energy production methods, veal crates, battery chickens, genetic manipulation, food preservation methods, pesticides and feeding meat to herbivores are all, according to this perspective, aspects of the same hubristic syndrome.
The remedy? Nature is to be obeyed; we must (re)turn to more humane and extensive, organic, *natural* methods of production. To do otherwise would be irresponsible.

This message is countered by an individualist back-lash that views the environmental lobby itself as an environmental threat. Julian Simon, for example, insists that there is a positive correlation between indices of material wealth and an *improving* environment. With Herman Kahn he has argued

[21] The propensity of authority to cope with ignorance by denying its existence is described by Jerome Ravetz in The Sin of Science: Ignorance of Ignorance, *Knowledge*, vol.15 no.2, pp 157-165.

[22] Meadows, DH, Meadows, DL & Randers, J (1992) *Beyond the Limits: global collapse or a sustainable future*. London, Earthscan.

> "We are confident that the nature of the physical world permits continued improvement in humankind's economic lot ... indefinitely. ... there are always newly arising local problems, shortages, and pollutions ... But the nature of the world's physical conditions and the resilience in a well-functioning economic and social system enable us to overcome such problems, and the solutions usually leave us better off than if the problem had never arisen; that is the great lesson to be learned from human history."[23]

This "rationality", when confronted with the evidence of BSE/CJD sees no evidence of serious harm. It points to the enormous benefits of intensive agricultural production: the freedom from toil and drudgery provided by modern machinery, improved nutrition and material standards of living enjoyed by both farmers and consumers, the vast range of choice now available to food shoppers. Their version of the precautionary principle sees all these benefits being placed in jeopardy by an over-reaction to tenuous scientific evidence about the cause of a very rare illness.

[23] Julian Simon and Herman Kahn, *The Resourceful Earth*, quoted in Meadows et al *Beyond the Limits*.

Figure 8. BSE/CJD: a typology of bias

Fatalist	**Hierarchist**
• "They should shoot the scientists, not cull the calves. Nobody seems to know what is going on." Dairy Farmer quoted in *The Times* (2.8.96)  • "**Charles won't pay for Diana's briefs**" Main headline in *The Sun* on 21.3.96, the day every other paper led with the BSE story.	• "We require public policy to be in the hands of elected politicians. Passing responsibility to scientists can only undermine confidence in politics and science." John Durant, *The Times Higher* 5.4.1996 • "As much as possible, scientific advice to consumers should be delivered by scientists, not politicians." *The Economist*, 21 March 1996 • "I believe that British beef is safe. I think it is good for you." (Agriculture Minister Douglas Hogg 6.12.95) "I believe that lamb throughout Europe is wholly safe." (Douglas Hogg, 23.7.96) • "I felt the need to reassure parents." Derbyshire Education chief quoted in *The Sun*, 21,3.96 • "I have not got a scientific opinion worth listening to. My job is simply to make certain that the evidence is drawn to the attention of the public and the Government does what we are told is necessary." Health Secretary Stephen Dorrel, *Daily Telegraph,* 22.3.96 • "We felt it was a no-goer. MAFF already thought our proposals were pretty radical." Richard Southwood explaining why he had not recommended a ban on cattle offal in human food in 1988, quoted by B Wynne, *Times Higher* 12.4.96
Individualist	**Egalitarian**
• "The precautionary principle is favoured by environmental extremists and health fanatics. They feed off the lack of scientific evidence and use it to promote fear of the unknown." T. Corcoran, *The Toronto Globe and Mail* • "I want to know, from those more knowledgeable than I, where a steak stands alongside an oyster, a North Sea mackerel, a boiled egg and running for the bus. Is it a chance in a million of catching CJD or a chance in ten million? I am grown up. I can take it on the chin." Simon Jenkins, *The Times,* quoted by J. Durant in *Times Higher*, 5.4.96 • " 'Possible' should not be changed to 'probable' as has happened in the past." S.H.U. Bowies, FRS, *The Times* 12.8.96 • "It is clear to all of us who believe in the invisible hand of the market place that interference by the calamity-promoting pushers of the precautionary principle is not only hurtful but unnecessary. Cost-conscious non-governmental institutions are to be trusted with the protection of the public interest." P. Sandor, *Toronto Globe and Mail* 27.3.1996 • "I shall continue to eat beef. Yum, *yum*." Boris Johnson, *Weekly Telegraph*, no 245.	• Feeding dead sheep to cattle, or dead cattle to sheep, is "unnatural" and "perverted". "The present methods of the agricultural industry are fundamentally unsustainable." "Risk is not actually about probabilities at all. It's all about the trustworthiness of the institutions which are telling us what the risk is." (Michael Jacobs, The Guardian, 24.7.96) • "The Government … choose to take advice from a small group of hand-picked experts, particularly from those who think there is no problem." Lucy Hodges, *Times Higher* (5.4.96) • "It is the full story of the beginnings of an apocalyptic phenomenon: a deadly disease that has already devastated the national cattle herd … could in time prove to be the most insidious and lethal contagion since the Black Death." "The British Government has at all stages concealed facts and corrupted evidence on mad cow disease." "Great epidemics are warning signs, symptoms of disease in society itself." G. Cannon in the foreword to *Mad Cow Disease* by Richard Lacey • "My view is that if, and I stress if, it turns out that BSE can be transmitted to man and cause a CJD-like illness, then it would be far better to have been wise and taken precautions than to have not." Richard Lacey ibid.

Source: J. Adams, Cars, Cholera and Cows: virtual risk and the management of uncertainty, *Science Progress,* 80 (2) 1997

One side says that if you cannot prove it is safe you must treat it as dangerous. The other side says that such an approach would quickly bankrupt any imaginative government, and argues that if you cannot prove it is dangerous you should treat it as safe. Governments, the hierarchists, are caught in the middle. Committed to the idea that problems such as BSE ought to be manageable, and embarrassed by their manifest failure to do so convincingly, they seek to reassure the public that eating British beef is *probably* safe, and commission more research that they hope will confirm it.

And so the arguments continue. The precautionary principle can be shaped to support almost any cause. Environmentalists use it to argue for minimal interference with nature. Edward Teller makes use of it to argue for the development of more powerful H-bombs and delivery systems to enable the world to fend off asteroids - even if the odds of them being needed are only one in a million.[24] All such arguments are about *virtual risks* - about the future, which does not exist except in people's imaginations. What you believe, and who you believe, about virtual risks will be powerfully influenced by who you trust.

Whom do you trust?

There are two distinct perspectives on risk and responsibility, both of which are frequently labelled right wing. The principal concern of writers such as Wildavsky and Furedi is the decline of *individualism* - the loss of confidence in *self*, and in the institutions of the market which foster freedom and prosperity. Bork laments the decline of *hierarchy*. In *Slouching Towards Gomorrah* he identifies the cause of America's decline as both *radical individualism* **and** *radical egalitarianism*[25]. His eloquent anger focuses on all those who undermine respect for traditional authority - from pornographers to members of the Supreme Court. His solution is classic hierarchy - "aggressive conservatism [especially religious conservatism], or traditionalism" (p333). But both perspectives are agreed that there are

- growing fears about health and the environment,
- a growing sense of alienation and powerlessness,
- a loss of a sense of community, and
- a continuing loss of trust in established authorities and institutions

In terms of the typology of Figures 6 & 8 they are describing a migration away from hierarchy and individualism towards egalitariansim and fatalism. Figure 9 from a survey by Marris et al[26] reveals a remarkable lack of trust in established institutions - trade unions score only 27%, religious organisations 22% and government a miserable 6%. Companies at 9% do little better. Environmental organisations, the mouthpieces of the egalitarian tendency, score an impressive 76%, while family and friends - i.e. those likely to have the least expert knowledge about environmental risks - score the highest.

[24] Interview on Big Science, BBC2 22.8.95.

[25] Robert Bork (1996) *Slouching Towards Gommorah: Modern Liberalism and American Decline*. Regan Books: New York

[26] ClaireMarris, Ian Langford & Tim O'Riordan (1996) *Integrating sociological and psychological approaches to public perceptions of environmental risks: detailed results from a questionnaire survey*. CSERGE Working Paper GEC 96-07, University of East Anglia.

Scientists scored 49%, but a MORI[27] poll found that approval ratings for scientists were strongly influenced by information about the scientist's employers: top, at 78%, came scientists who worked for environmental NGOs, bottom came government scientists with 32%.[28] The media, directly or indirectly the source of most peoples' knowledge about environmental risks, score only 15%. Not only do the media inspire little trust, their coverage of environmental issues is widely ignored. At the time of the Brent Spar controversy, an issue which received enormous media coverage, only 59% of those
questioned about Brent Spar were aware of the incident;[29] 41% is probably a conservative estimate of the proportion of fatalists in the UK. Only the doctor, amongst traditional institutions, retained a respectable level of trust.

Although I know of no equivalent poll conducted in the early 1970s before the

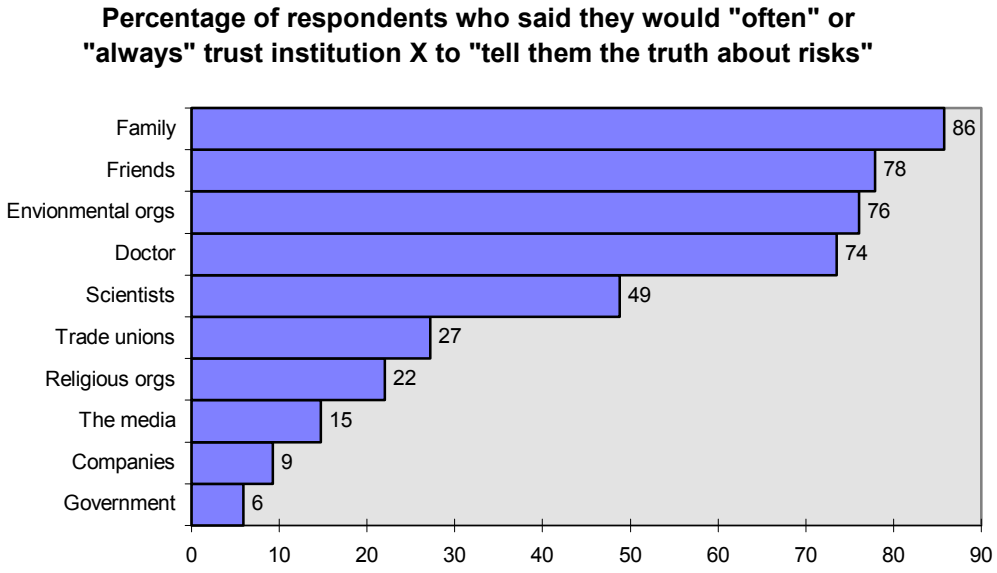

Figure 9 represents the combined and weighted results from four samples: Chamber of Commerce, Scouts, Greenhouse (a green environmental organisation), and a general sample.

energy crisis, I would venture from personal experience[30] that, in terms of trust commanded, the respective positions of environmental organisations and government/companies have been reversed over the last 30 years. As an explanation, Furedi points to "individuation", a bundle of processes - including loss of job security, the erosion of traditional forms of worker solidarity, the decline of community, the breakdown of family life, the loss of traditional religious faith, and diminished respect for

[27] Cited by T. O'Riordan, C. Marris and I Langford (1997) in Images of science underlying public perceptions of risk, *Science Policy and Risk*, Royal Society, Royal Society: London.

[28] The widespread suspicion of conspiracy between government and industry, and the mistrust of science sponsored by either, was highlighted by Colin Blakemore, president of the British Association for the Advancement of Science in his call for Britain's Minister of Science to be detached from the Department of Trade and Industry and given an independent position in the cabinet. (*The Times*, 3 Sept 1998).

[29] Shell spokesman, 5.2.96.

[30] The author was a member of the original board of directors of Friends of the Earth. It was, in the early days, a fringe organization commanding little attention or respect from the mainstream media.

established authority - which combine to fragment society and leave the individual feeling isolated and powerless. Fatalism and egalitarianism are alternative, plausible responses to individuation; they are accompanied by very different ideas about responsibility for managing risk.

The risk of freedom

In identifying *radical* individualism and *radical* egalitarianism as the forces principally responsible for American decline Bork is making the point that it is possible to have too much of a good thing. One freedom that most people cherish highly is the freedom to move where they want, when they want. Might it be possible to have too much of this freedom? Might it be one of the sources of individuation and the breakdown of consensus about the nature of responsibility?

The scientific and technological advances that trouble Ulrich Beck have fostered a great increase in physical mobility. In Britain in 1950 the average person travelled about 5 miles a day. Now it is 25 miles a day - 45 miles a day in the United States. The forecast for Britain in the year 2025 is 60 miles a day - and doubtless the United States will still be ahead of us.

As populations become highly mobile a variety of forces operate to undermine community and consensual politics. In an influential essay written over 30 years - *Order in diversity: community without propinquity* - ago Melvin Webber[31] enthused about the prospect of Californian freeways liberating people from their old-fashioned geographical communities to live in aspatial communities of interest. It is now happening - but the *diversity* is more apparent than the *order.*

The physical mobility about which Webber enthused is now being overtaken by electronic mobility as a "liberating" force. On the Internet one can now live in a *virtual* community of interest[32]. Residents of these virtual communities encounter innumerable virtual risks. Torrents of unverifiable information about a vast range of threats to health and the environment are published on the Internet - often anonymously or pseudonymously, and free of any quality controls such as peer review. In such conditions disinformation and rumour easily become "fact". As we are confronted with impossible-to-cope-with quantities of information we resort to ever cruder cultural filters in our attempts to make sense of it all. These filters structure both the search for information as well as its interpretation. They inevitably also structure our sense of what is risky and what constitutes *responsible* behaviour.

Democracy is government by the people. Its purest form (ignoring the plight of women and slaves) is widely held to be Athenian democracy - everyone in the forum had an equal say. Beyond a certain scale this becomes impractical, and the preferred model becomes *representative* democracy. But as the scale of the issues requiring collective management increases still further, representative democracy also breaks down. Either the number of representatives becomes unmanageable and the limits of the Athenian model are reached again - i.e. the forum for debate becomes overcrowded - or the number of voters per representative reaches a level that renders the individual voter insignificant[33].

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[31] Webber, M. (1963) Order in diversity: community without propinquity, *Cities in Space: the future of urban land* (L. Wingo, ed.) Johns Hopkins Press.

[32] Howard Rheingold (1994) *The virtual community*, Secker & Warburg, London.

[33] A friend who will be standing for election as a Member of the European Parliament in the next election tells me that his constituency numbers over 4 million.

As a society becomes more mobile, those who get left behind have diminishing control over their lives, and diminished faith in either markets or the institutions of government to safeguard their interests. The more mobile a society becomes, the stronger becomes the motivation of those who are lagging behind to catch up. A recent survey of young adults in England contained the following question: "imagine you are only able to have one of the following two rights - the right to vote in an election, or the right to obtain a driving licence - which would you choose?" 72% chose a driving licence[34].

In the whole of the literature of science fiction devoted to fantasising about futures in which distance has been defeated by science and technology, there are to be found no plausible examples of democratic government[35]. From *Brave New World* and *1984* to *Star Wars* and *Blade Runner*, the form of politics found in science fiction is tyrannical hierarchy. Democracies, to function effectively, require common values, and a measure of agreement about societal goals forged out of common experience. If distance is vanquished the requisite minimum level of consensus and trust will be unattainable; the world will be filled with billions of strangers sharing the same physical space, but living in very different virtual communities of interest - with very different understandings of the words *risk* and *responsibility.* The *freedom* they enjoy is likely to be a meagre and unsatisfying thing. For many the most rational response to the risks encountered in such a world will be a fatalistic shrug, and a retreat into the mindless hedonism deplored by Bork.

[34] J. Solomon (1998) *To Drive or Vote?: young adults' culture and priorities*. Chartered Inst. of Transport, London.

[35] Three years ago I was invited to address the annual conference of science fiction writers in Britain on the subject of transport planning. I made this assertion hoping to be refuted. I was not.