Risk Perception by the Public and by Experts: A Dilemma in Risk Management[1]

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Abstract

Experts and the public frequently disagree when it comes to risk assessment, indicating a lack of trust among the general public. The reasons for such disagreement are discussed, and it is pointed out that disagreement among experts and lack of full understanding of real risks contributes to skepticism among the public. The notion that people are in general reacting in a highly emotional and non-rational, phobic, manner is rejected. The conditions for risk assessment, and common-sense cognitive dynamics, are better explanations of risk perception. If trust is to be established in a country or community where it is quite low some kind of politically regulated public influence on decision making and risk monitoring is probably needed, e.g. by means of a publicly elected and responsible ombudsman.

Keywords: *risk, risk assessment, cognitive dynamics, ombudsman*

Introduction

People's reactions to risks have become an issue of central importance in policy making. The most well-known case is, of course, that of nuclear power, but many others could be mentioned as well: toxic waste, genetic engineering, food additives, etc. In most, or all, of these cases experts judge risks to be minor or even non-existent while the public is quite concerned about the risks and perceive them to be high.

The gap between experts' risk assessment and that of the public has given rise to some very difficult policy problems. One such problem is that of siting a high level nuclear waste repository (Flynn, Chalmers, Easterling, Kasperson, Kinreuther, Mertz, Mushkatel, Pijawka, Slovic and Dotto 1995). No country has yet been able to find a voluntary local community willing to host such a facility, in spite of assurances about its safety. Previous statements that the Swedish public was willing to do so (Flynn et al. 1995) were based on results from one, leading, poll question. Extensive experience in Sweden shows that it has problems similar to those in other countries (Sjöberg, Viklund and Truedsson 1998). Trust — or rather mistrust — is very salient in nuclear politics in the FSU (Drottz-Sjöberg et al. 1993; Drottz-Sjöberg, Rumyantseva, Martyushov, Arkjangelskaya, Nyagu and Ageeva 1994), to take another example.

Of course, the evaluation of most risks is uncertain for many reasons: lack of experimental data and incomplete theoretical understanding of the mechanisms behind a risk being perhaps one of the most important ones (Otway and von Winterfeldt 1992). The scientific majority sometimes finds itself pitted against a public opinion which simply does not accept its conclusions. Social turbulence follows and politicians are forced to allocate resources in ways which may bear little or no relationship to the real needs for risk reduction in a society (Ramsberg and Sjöberg 1997).

The first reaction that comes to mind upon reflection on this situation is that people are just misinformed and ignorant (Cohen 1998), and victims of various commercial and social/political vested interests that exploit their fear and ignorance. Is it not true that experts know much more about these risks than the public does? However, to try to explain the difference between experts and the public with reference to knowledge and lack of knowledge is somewhat futile, for several reasons:

1. People are not *that* misinformed about all risks. Data on judged mortality rates that I collected in Sweden show that the average public ratings have the same rank order and level as the true values, with one exception (heart attack) where the public grossly underestimated the risk (although they still placed it in the correct rank). Admittedly, there is tremendous variability of ratings behind such data, but, once again, the "average man" was just about right in his or her risk perception.

A second example: In a study of the perceived AIDS risk carried out in Sweden (Sjöberg 1991a) I found that people were extremely well informed. In fact, people were so well informed about these basic AIDS facts that it was almost impossible to construct a varying knowledge score.

2. In several studies we have found that there is, indeed, a correlation between perceived risk and knowledge about the issues involved in that particular risk. Those who know more judge the risk to be smaller (Johnson 1993). However, the correlation is typically quite modest in size, perhaps about 0.2. This means that very little of the variance in risk perception can be explained by variation in knowledge. If knowledge is measured by self ratings, i.e., people are asked to rate how much they know about a topic, the small correlation vanishes altogether. This finding does not deny that the variability between experts and the public reveals a clear correlation between knowledge and perceived risk, of course.

3. The difference in perceived risk between experts and the public does not necessarily demonstrate a causal influence on risk perception by a high level of knowledge. As an alternative, consider the possibility that experts *first* acquired their risk perception, *then* decided, perhaps partly on that basis, to devote themselves to the acquisition of expertise in a given area such as nuclear power or genetic engineering. We (Drottz-Sjöberg and Sjöberg 1991) studied high school students and found very strong covariation between line of study (science, technology, social science or humanities) and perceived risk. Those who participated in programs that led to university level studies of sciences and technology — and some of them were future experts in these fields — were much less concerned about risks of nuclear technology than others, although they had not yet, at this point in their lives, acquired expert knowledge. These differences were even larger than gender differences, which are always observed with regard to radiation risks, and which we found in our study as well.

It is indeed unlikely that an adolescent would devote his or her career to a field of technology believed to be creating a hazard to society — interest is a very important driving force behind career choice (Sjöberg 1997) and positive interest is hard to combine with a high level of perceived risk.

Experts and the Public

Risk perception is rarely equal for experts and the public, even if they may be, at times, in rough agreement. In a frequently cited study, the US EPA compared experts' rankings of important environmental risks with public risk perception (US Environmental Protection Agency 1987). They found little agreement between the two sets of rankings. A follow-up three years later gave virtually the same results (Roberts 1990). A set of French data give a very different picture, however. In a study in Bordeaux, experts on hygiene and safety rated risks and desired risk reductions (Barny, Brenot, Dos Santos and Pages 1990). They found extremely close rank order agreement with mean ratings of the same risks made by the public, although the level differed: experts gave lower risk ratings. This discrepancy raises the question which is right: the French or the US data? Perhaps the French experts were less qualified experts than the corresponding EPA experts. It seems unlikely that anyone can really be an expert on all the diverse risks studied in the French investigation. On the other hand, there are other studies showing convergence of expert and public opinion as well (e.g., Wyler, Masuda and Holmes 1968). Wyler et al. (1968) found that patients and doctors gave similar risk ratings of various illnesses. A study of experts on food risks in Sweden gave differences between their risk perception with regard to some hazards, but not all (Sjöberg, Oskarsson, Bruce and Darnerud 1997).

Another study carried out in Sweden (Sjöberg and Drottz-Sjöberg 1994) compared the risk perception of experts and the public with regard to nuclear power and nuclear waste. It provides a drastic illustration of the differences between experts and the public.

The experts were employed by the nuclear industry, regulatory authorities or universities and had college or graduate school education (with a few exceptions) (n=137). The data on the public were obtained from a random sample of the Swedish population, ages 18–65, response rate 62 per cent (n=1099). In both samples, respondents were asked to judge the risk to people in general from domestic nuclear power. The response distributions are shown in Figure 1.

The figure shows drastic differences in risk perception. Very few experts judged the risk to be larger than "very small", while 65 percent of the public did so. A more specific question about nuclear waste was also asked. The subjects were asked if they regarded the problems regarding the final storage of nuclear waste as currently solved in a satisfactory manner. The response distributions are given in Figure 2.

There were very drastic differences between the public and the experts, as can be seen in Figure 2. Very few people from the public regarded the problems as solved, while an overwhelming majority of the experts did so. The extent of public distrust can be studied in Table 1, which is based on data from the same study.

The table shows that mistrust is very widely spread, in particular for politicians but also for experts and industry. Furthermore, trust is consistently, and moderately strongly, correlated with perceived risk. The table also shows that nuclear experts have a high level of trust, but that they also do not trust politicians, nor do they trust the experts who have denounced nuclear power.

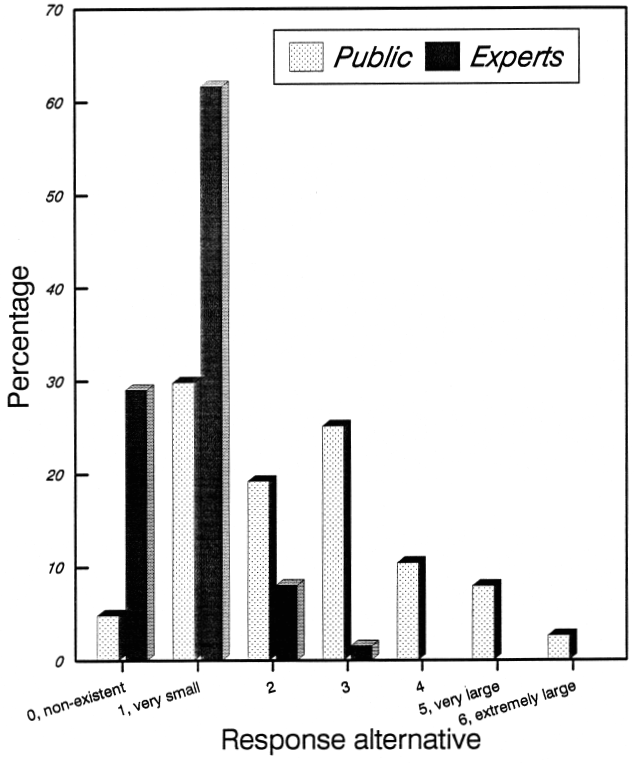

Figure 1. Judgments of the perceived risk of domestic nuclear power to people in general. Data from experts and from the public.

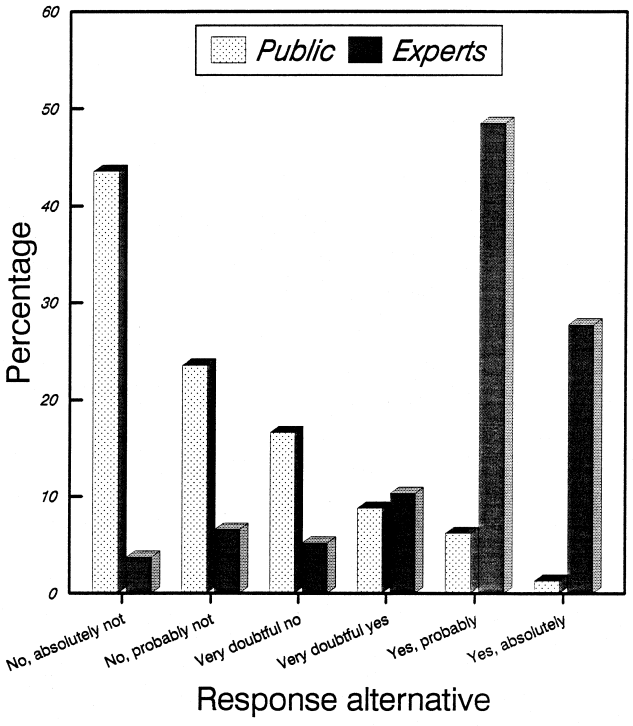

Figure 2. Responses to a question whether the current solution of the problem of how to store nuclear waste is satisfactory. Data from experts and from the public.

Table 1. Percentage of respondents who stated that they had no trust, very little trust or rather little trust in various groups and agencies, with regard to management or risk assessment. The table also gives correlations between trust and an index of perceived nuclear waste risk, N=600.

	Management of nuclear waste risks			Published assessment of nuclear waste risks		
	Percentage of public lacking trust	**Percentage of experts lacking trust**	**Correlation trust-perceived nuclear waste risk**	**Percentage of public lacking trust**	**Percentage among experts lacking trust**	**Correlation trust-perceived nuclear waste risk**
Group or agency						
Experts at government agencies	59	15	-0.28**	63	13	-0.34**
Experts at universities	35	20	-0.21**	37	19	-0.25**
Experts employed by the nuclear industry	37	8	-0.27**	48	19	-0.31**
Experts who have denounced nuclear power	45	78	0.21**	47	87	0.21**
Responsible politicians	93	82	-0.17**	91	84	-0.20**
Pertinent authorities	41	5	-0.28**	45	5	-0.34**
The nuclear industry	57	16	-0.27**	60	21	-0.34**
Personnel working with these tasks	42	11	-0.21**	-	-	-

**p < .01

Types of Expert Roles

In some cases, the public takes risks that experts discourage, such as risks of smoking, drinking, AIDS or high radon levels in homes. Some people do listen to warnings about such risks, of course, and some of them act accordingly, but most ignore them. They may be persuaded that there is a risk *for others*, but not for them. They tend to deny personal risks (Weinstein 1984). A good example is alcohol. Alcohol is a risk that people perceive that they can control. They see it as a big risk to others, small to themselves.

I propose a typology of expert roles: Protectors and Promoters. A Protector considers his or her role to be that of warning people about a risk that they do not know about or neglect to protect themselves from with sufficient vigor. Protectors wonder why people are so *un*interested in their own safety and regrets that so little money is spent on saving lives. Protectors are found among experts on the following: many medical problems, fires, tornadoes, earthquakes, radon, ultra-violet radiation, and some economic problems.

Promoters, on the other hand, regret that people are too much concerned about risks and ask how they can be convinced that those risks are not so large and that they certainly are worth taking. Promoters are found in the fields of the following: nuclear power, pesticides, genetic engineering, and crime policy (at least in Sweden). An example of a Promoter is provided from a lecture delivered by Norman Rasmussen (1991). A few citations:

> *No matter whether you say something might happen the next century, next year, or next week, the response from the public will be 'That's just too often for me'. By the time you are down to 10^{-4}, you are in a region that is not understood. When you start comparing it with (common) ways people could lose their lives, they think you are trivializing it.*
>
> *(We have) strong dislikes and paralyzing fears about any activity that entails risk. Projects are so costly and our systems for dealing with people so involved that in the end we reach agreements that are against logic. We spend and squander our resources to defend ourselves against phantom risks.*

Experts on natural hazards tend to look differently at public risk perception. Bolt (1991), in a Protective mood, writes about the earthquake risk:

> *In terms of national welfare, it might be expected that the risk involved in earthquakes would give special force to the claims for funds and resources for earth scientists, engineers, planners and others involved in enhancing seismic safety. Seismological history tells otherwise. Risk reduction is characterized by bursts of activity and political support after damaging earthquakes, and decay curves that have a half-life of a year or so before public effort recedes.*

The viewpoint of a Protector is also clear in this citation:

> *The review of Lawless of 45 major public alarms over technology found that in over 25 percent of the 45 study cases, the threat was not as great as that originally described by opponents of the technology, but in over half of the cases, the threat was probably greater than that admitted by the proponents. Still the problem was allowed to grow. Early warning signs were available but mostly ignored in 40 percent of the cases* . . . (Lawless 1974, cited in Kates 1978, 87).

The conflict between Protectors and Promoters is often a theme in fiction or movies. Take the movie Jaws as an example. Here the Protector is a police officer who is concerned about the safety of the population in a beach resort town. Finding traces of a Big White on the shore he blows the whistle. The mayor of the town, however, is a Promoter of the tourist trade. To him the alarm is very misplaced because it threatens that trade. Hence he does not believe in the warnings, ridicules or even fires the police officer, etc, etc. Many other examples could be given. The story is nearly always the same. The whistle blower, or Protector, is ignored or harassed by Promoters who have large vested interests in some kind of business. A final disaster is then avoided or mitigated by the heroic deeds of the Protector who is finally recognized by everyone as having been right all the time.

At times, the distinction between Protectors and Promoters is rather subtle and it is not immediately clear whether the expert is a Promoter (and of what) or a Protector (and from what). Take Swedish AIDS policy as an example (cf. (Sjöberg 1991a)). It might be expected that AIDS is a simple case: it is something you would want to protect people from. However, other considerations enter the picture. It is true that it is desirable to protect people from AIDS, but politicians and administrators are also concerned with at least two other risks: the risk of prejudice and aggression against stigmatized groups such as those infected by the virus or homosexuals, and the risk that people somehow lose their interest in positive intimacy. The result is that the message becomes quite blurred: while AIDS is surely very dangerous and something one should try to protect oneself from, sex is still very positive and should be enjoyed much as before. The end result is that the experts here seem to have partly adopted a role of Promoters (of positive intimacy), and that their protective concerns are salient not only when it comes

to AIDS but also with reference to social stigma of certain groups of people. It seems quite debatable whether such a stance is likely to lead to the adoption of an effective strategy of communication.

The conflict between Protectors and Promoters seems to mirror the basic structure of expert disagreement about risks. There are always at least some uncertainties in an empirical risk estimate and these can be used for developing an argument in favor of an increased or decreased risk estimate.

The stage is set, then, for ongoing disagreement and fierce debates, which seem unavoidable (Sjöberg 1980). Yet, this point is sometimes vehemently denied. Is the notion of expert disagreement merely an illusion of uninformed outsiders who do not realize that experts in fact agree on all important matters?

Explaining the Difference Between Experts and the Public

What is the reason for the difference between experts and the public when it comes to level of perceived risk? One possible set of factors is background data: gender, education and perhaps age. Several additional possibilities can be mentioned:

- Realism. The public may in fact be misinformed and the experts may be making realistic risk assessments. But realism cannot be the whole story, since experts vary. They cannot all be right. In addition, risk assessment is not only a question of factual judgment; values enter necessarily.
- Different risk definitions. Experts pay more attention to probability, the public to consequences (Sjöberg 1999b).
- Self-selection. The differences may exist *before* scientists receive their professional training at college and graduate school, see Drottz-Sjöberg and Sjöberg (Drottz-Sjöberg and Sjöberg 1991).
- Socialization of values and risk perception in professional training and work. Conformity pressures and vested economic and career interests may play a role.
- Perceived control and familiarity. Experts directly involved in an area probably perceive that they have control over its risks, and long experience may have habituated them to these risks (familiarity).
- Professional role. Some experts have the role of protecting the public (e.g. physicians or fire fighters) while others are concerned also with the promotion of a certain technology.
- General political ideology. This is a powerful factor in risk perception in general. But the tremendous differences between experts and the public speak against a purely ideological explanation. It is unlikely that experts are so strongly atypical in their political attitudes, although this dimension may explain some of the differences among different groups.
- Media contents, in turn to be explained by their commercially and ideologically driven strategies.
- A primary question was if the low risk judgments by experts are a reflection of a *general* tendency to dismiss risks? Experts in one specific area need not judge risks in *other* areas as small.
- Trust. Experts probably trust industry, agencies and other experts more than the public does. Since trust is implicated as a determinant of perceived risk in the general public, it could also explain part of the variation between experts and the public.
- Risk perception factors. It is possible that experts perceive risks differently in a qualitative sense, not only with regard to level. This notion is discussed in detail elsewhere (Sjöberg 1999a).

Why Mistrust Experts?

Whatever the reason, experts and the public disagree. In a situation such as this, it is likely that communication tends to break down (National Research Council 1989; Sjöberg 1980; Sjöberg 1991b; Stern and Fineberg 1996). Experts see the public as misinformed, badly educated and highly emotional (Cohen 1998; Fritzsche 1995) while the public suspects that experts know less than they claim and that they are corrupt due to their being hired by the industry or government. People trust independent experts much more than experts hired by the industry and at least in Western Europe such independence is perceived when it comes to experts who are associated with universities, or who have publicly warned about risks (whistle blowers). In a study of the nuclear waste risk we found that there was more confidence in dissident experts than in experts associated with state authorities or the nuclear industry (see Table 1).

But why are experts not trusted? There are many reasons. First, experts often disagree. Otway and von Winterfeldt (1992) cited a study of expert assessment of failure probability in a nuclear power plant. Different teams of experts were formed. The error probability estimates converged when the teams were informed about each others' estimates and analyses, but the initial estimates varied by a factor of 1–50. Uncertainty ranges varied even more.

Second, today there is much more knowledge about risks, even small risks, than previously. This situation has its problems. One problem has to do with the fact that knowledge about the risks is incomplete. In many practical situations risks are hard to measure and estimate. Perhaps there is knowledge that risks are "small" but they cannot be specified more exactly. We do not know *how* small they are. Knowledge thus has the character that a risk is known to exist but its size cannot be specified. Because of this, there is

room for different opinions as to the size of the risk and much uncertainty. The public demands certainty from its scientists (often an unrealistic demand) and uncertainty is often confused with incompetence, hence a basis for mistrust.

Third, many risk assessments are based on animal experiments. Animals are exposed to large doses of a chemical, and the observed cancer risk is extrapolated downwards to the risk levels that exist for humans. This practice has been criticized on two grounds. First, it is uncertain to which extent one can generalize between species. Second, a linear extrapolation can overestimate the risk at small dose levels (Abelson 1990). Slovic and coworkers have provided interesting information about the varying viewpoints with regard to inference from animal studies, in investigations of the public and toxicologists (Gray and Graham 1993; Kraus, Malmfors and Slovic 1992; Kraus, Malmfors and Slovic 1993; Slovic and others 1995).

Fourth, there has been a trend of increasing mistrust during the last few decades (Putnam 1990). The reasons for this trend are not well understood and several theories have been proposed. Suffice it here to mention it as a phenomenon which may contribute to a widening of the gap between experts and the public.

Common-Sense Knowledge and Causal Inference

Several explanations of the public's lack of trust are thus possible. In addition to the ones mentioned, others have been suggested, such as a neurotic fear, "radiophobia". Drottz-Sjöberg and Persson (1993) discussed thoroughly the concept of radiophobia and they argued that it is misplaced. People perceive radiation risks which experts deny, yes, but this is a phenomenon which is not necessarily tied to phobic fear. Why, then, do people have these risk perceptions, following a nuclear accident? Is perceived personal risk in some way related to the experiences that people have?

To answer this question we must first consider the fact that most people are quite concerned about radiation even before there is an accident. Radiation is associated with cancer, it cannot be sensed and avoided and it is even associated with the horrible images of nuclear war.[2] Accidents involving sizable radioactive fall-out therefore easily trigger fear. To alleviate such fear, people need to be informed about the levels of radiation that have actually been produced by the accident, and, if these levels are not high enough to be dangerous, they need to be informed about this fact. This would be a normal process of information, and it would tend to work if people trusted the government and its experts.

However, it is obvious that experts enjoy far from 100 percent trust from the public. The public has other notions and other beliefs. These beliefs are not completely irrational, on the contrary I shall argue that they are formed on a basis of experience which everybody uses. They can sometimes lead astray — and sometimes they serve us quite well.

I will briefly discuss the character of everyday knowledge and compare it to complete irrationality on the one hand, science on the other. The purpose of the discussion is to suggest an explanation for why people are convinced of a causal attribution of their state of health which is unacceptable to experts.

People "know" about their environment and its risks in several ways. They may just feel that something is risky, have an intuition about it, without being able to explain why they feel that way, or they may base their perceptions and thoughts on something they have experienced. It is the latter alternative I will discuss here.

Every adult person knows some things such as the following:

- we live on a large globe, a planet, which rotates around the sun
- water freezes to ice when the temperature is low enough
- all men are mortal
- a week has seven days
- most men strive for pleasure and try to avoid pain

These are quite different examples. The first two refer to the physical world, the third is a biological fact, the fourth a social convention and the fifth a psychological principle. Science does not deny these statements, of course, and it has even historically contributed at least one of them, the first. For how could you know that Earth is a globe, it certainly cannot be seen (unless you are an astronaut) as such. The answer, of course, is that you trust scientists when they make the assertion.

For the other cases you need not trust science to believe in them. These are things that you can find out for yourself, by talking to other people and by observing nature. Yet, no one denies that knowledge acquired this way is trustworthy, necessary and used by everybody.

Hence, there is perfectly good knowledge which is not scientific and which guides us in our everyday lives. Let us look a little further at a strategic aspect of such knowledge, i.e. causal attribution.

Science is superior to everyday life knowledge in two basic respects: it builds upon systematic empirical evidence and it organizes such evidence in cumulative theoretical structures, which are subjected to continuous testing. But there are no clear boundaries between science and everyday life knowledge, and the latter is clearly superior to other forms of beliefs, such as paranoiac delusions, phobias and magic, see Table 2.

Phobia is a reaction almost totally devoid of any rational basis and it is recognized as such by the phobic him or her-

Table 2. Various knowledge modes characterized by degree of theoretical elaboration and empirical basis.

		Theoretical elaboration		
Empirical basis		**Low**	**Medium**	**High**
	Low, or none	Phobia	Mild delusions	Paranoic delusions, religion etc
	Medium	Magic	Everyday knowledge	Science, theoretically dominated
	High	Science, empirically dominated	Science, building theory on data	Science, theoretical and empirical

self. Paranoiac delusions have a similar rigidity but they are believed by the paranoiac and they lend themselves to endless cognitive elaborations. Everyday knowledge can lead astray but it is connected with reality in a manner not common to phobic or paranoiac notions. Therefore, one should not quickly dismiss public notions phobic reactions. They may be incorrect because they are based on the insufficient evidence that we always have to base our common sense beliefs on, as soon as we are not dealing with phenomena in a scientific manner.

Michotte (1954) performed classical studies of perceived causality. A very close temporal contiguity in the order first A then B of two events compels us to perceive that B was caused by A. Our perceptual apparatus is tuned to the discovery of causes and it organizes our world view according to cause-effect relationships. We do not easily "see" randomness, or its consequences. If purely random events are presented we see systematic patterns. In addition, when asked to produce or simulate random patterns of symbols people usually fail and produce systematic deviations from randomness, e.g., they produce too few long runs of one symbol. This could be explained by the famous gambler's fallacy effect: people believe that the likelihood of change increases the longer they have been exposed to a series of repetitions of one event (Bar-Hillel and Wagenaar 1991).

Later work has been more concerned with inferred causality rather than directly perceived causality. Kahneman and Tversky (1974) have demonstrated that perception is affected by similarity and salience. If A and B are similar in some important manner and A preceded B, A may be regarded as the cause of B. If A is made salient by much media attention it is more likely to be regarded as the cause of events that followed it — especially if A is a very potent event, such as major technological disaster (Tversky and Kahneman 1973). Finally, people have a bias to perceive only *one* cause of an event, thereby greatly simplifying things, sometimes to the level of nonsense.

How common are certain illnesses or other problems? How can you judge if you do not have access to reliable statistics? One plausible strategy for making such judgments is to base it on cases you know about personally, have heard about or read about. However, even if an illness is quite rare, the chance is good that you may have heard about a few cases. If it is a serious disease with a possible connection to environmental pollution of some kind, it may be quite salient in the media. Hence, rare occurrences form the basis of a concept of general frequency and the fact that they are quite rare is almost impossible to infer from casual exposure to single cases among one's acquaintances or in the media. Co-occurrences with environmental pollutants tend to be taken as a basis for causal attribution; people give most attention to positive co-occurrences and tend to forget about the three other possible cells of a four-field table (Smedslund 1963).

Hence, people do acquire knowledge in everyday life which is often quite correct, although not at all scientific. But this strategy may at times be very misleading, and it is hard for people to know when they should *not* "trust what they can see with their own eyes".

In my view, all this constitutes a plausible explanation why some people, especially in the FSU, are so convinced that the Chernobyl accident has caused illness, *regardless of whether the claims are true or not.* For even if some of the claims are true, they could still hardly be substantiated by informal, spotwise impressions.

Data collected in 1992 in Novozybkov (Drottz-Sjöberg et al. 1993) illustrate the point. The subjects, 185 persons living in the area, rated each of 33 dangers on a 7-point scale, and they also rated change in those dangers since Chernobyl. Price increases topped the list, but it was otherwise dominated by nuclear and radiation dangers. Such common risks as smoking, traffic and alcohol came last.

The combination of mistrust, with its historical basis, and reliance on everyday knowledge has set the stage for the very difficult problems faced in the FSU.

A Suggested Solution

Let me finish by making a concrete suggestion as to how credibility could be achieved in a community with a low level of trust in experts, authorities and media. The suggestion is based on the following premises (Shalpentok 1985):

1. People deeply distrust the government, industry and experts employed by the government and industry.
2. University or Academy researchers are not trusted much more, because there is a lack of a tradition of politically independent institutions of higher learning.
3. External experts may have a higher level of trust but when and if they join the local government in their evaluation of risks they will lose much of their credibility.
4. There is only low trust in domestic media.

These assumptions are supported by data collected in 1992 in the study cites above (Drottz-Sjöberg et al. 1993). All information sources were found to be trusted rather little, but especially national and local political bodies were mistrusted. Most trust was exhibited in foreign sources, especially foreign experts. It is not known if these results generalize to the Russian population as a whole, but I will assume that they do. It is also likely that most of these conditions will arise in the heated debate atmosphere in a local nuclear repository siting issue. Deep seated central values become involved, with the result of previously unheard of aggressions between people (Drottz-Sjöberg 1996), as was the case in the small Swedish community of Storuman, where a local referendum was held in 1995 about a repository siting.

Approaches to dealing with the most entrenched social and political risk conflicts have so far failed. People are not persuaded by risk comparisons (Sowby 1965), nor are they very responsive to the PR industry (Stauber and Rampton 1995) or risk communication (Renn 1992). The present emphasis is on participatory processes (North 1998), but it has yet to prove its value.

In this very difficult situation I suggest that it may be useful to consider the traditional office of ombudsman. An ombudsman is a representative of the people and should act in the interest of the people, and in no other capacity. An office of nuclear ombudsman could be made responsible for nuclear safety and authorized to inspect power plants and other facilities, to order improved safety programs and, in extreme cases of acute necessity, to order the shutdown, permanent or temporary, of nuclear power plants and other facilities. The person in charge of this office, the ombudsman, should not be appointed by the government because of the credibility problem. He or she should be elected directly by the people and be responsible only to them, not to the government or to industry.

The ombudsman concept is well known in Sweden and has served a useful role.[3] It is a relatively simple way of empowering people. The usual democratic institutions have the drawback of being responsible for many issues — the ombudsman would only be responsible for the safety of nuclear facilities. More common ideas of participatory democracy and "stakeholders" are problematic because the interest groups formed tend to have a very limited and often unclear responsibility and no or little formal power. They also attract a very special group of people (Milbrath 1981) willing to devote a lot of their time to, most often, unpaid work. Many of those who remain passive and do not join the interest groups will still have strong opinions about the issues. For example, in the two Swedish local repository referenda voter turnout was very high (76 and 87 percent).

Maybe the ombudsman idea will remain a thought experiment since its realization would require a willingness to try a real shift of power in important risk questions. However, one could hope that such a shift of power would involve responsible decisions by the citizens. After all, that is the whole basis of democracy, and democracy is the least bad system of government, to use a cliche that happens to be true.

Endnotes

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2. Yet, ionizing radiation is seen in a positive light when used in medical applications (Sjöberg 1996).
3. The ombudsman suggested here would be elected directly by the people of the local community; current ombudsmen in Sweden (there are several) have been appointed by the Government and tend to be relatively tame.

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