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Roundtable Discussion: Science, Environment, and the Law

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Science, environment, and the law is our topic. The problem of interest to me has to do with risk regulation and, more particularly, with the fact that technical and scientific views of risk differ dramatically from lay or public views. How is this conflict to be managed and resolved? I have to go through my account very quickly, given the time constraint, so let me mention that it is based on an article that sets out my arguments at length.[1]

It is a well-documented fact that scientists and technical experts, on the one hand, and lay people, on the other hand, tend to have very different views about what risk means.[2] The question, of course, is how this difference should play out in the legal system. I do not know the answer to that question, but I do know that the question itself is central to the risk issue, and that is what I am trying to get across to you today.

Resolution of the conflict between lay and scientific views lies at the heart of issues having to do with accountability, regulatory objectives, and institutional design. Yet, notwithstanding the fact that resolution of this conflict should logically precede all other technical environmental issues, this matter is being largely ignored in the ongoing debate about risk.

Both of the contending sides—the technical experts on the one hand and the lay people on the other—are no doubt interested, as they should be, in minimizing the sum of the costs of risk and risk avoidance. But they go at things differently in that they have competing conceptions of risk itself.

Scientists tend to be what I call "body counters." They reduce risk to one dimension, to a single variable, expressed in terms of expected mortality and morbidity. "Expected" refers to the probabilistic nature of risk. The body counters consider risk to be a function of the loss, or the cost of sickness and death should a risk actually materialize, multiplied by the probability that the loss will occur. Thus, an

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1. Clayton P. Gillette & James E. Krier, *Risk, Courts, and Agencies*, 138 U. PA. L. REV. 1027 (1990).

2. *See, e.g.*, Stanley Rothman, *Panel I: Liberty, Property, and Environmental Ethics*, 21 ECOLOGY L.Q. 390 (1994).

accident that threatens the loss of ten lives per year, but that is likely to occur at only a ten percent probability, carries with it a risk, an expected mortality, of one life annually. This is what the technical expert views as the measure of risk cost. To generalize, one could say that for technical experts, "a death is a death is a death." A one-in-one chance of one death is the same as a one-in-one-thousandth chance of a thousand deaths, the expected loss in each case being one life.

In contrast to the one-dimensional nature of the technical expert's approach, lay people tend to take an "*n*-dimensional" view of the matter. This, at least, is what one gathers from a considerable number of experimental studies by cognitive psychologists.[3] Scientifically informed regulators, which is to say the people who are charged with the job of risk regulation, are very troubled by the lay view. Regulators want to compare and rank risks, and doing this requires the use of simple and manageable numbers, such as expected mortality or morbidity. It would be very hard to keep a scorecard in the terms of the lay view, because that view encompasses such a rich and nuanced set of dimensions.

What do lay people look at in addition to the expected mortality and morbidity considered by technical experts? On this question there is a large literature, much of it cited in the article I mentioned above,[4] and I can at best give only a very brief summary here. First, it matters to lay people whether a risk arises from voluntary or involuntary exposure. It also matters whether the risk is the product of a delayed effect (the so-called latency characteristic). It matters whether there is a lot of scientific uncertainty about the hazard in question. It matters whether the hazard is common or "dreaded," the latter term here referring to activities, technologies, and threats that seem not to be well understood (invisible radiation, for example, as compared to harm from an auto accident). It matters whether the threatened consequences would be irreversible, and whether they would be catastrophic in the very worst (but highly unlikely) case. Finally, it matters whether the risk threatens future as opposed to present generations, and whether the risk is concentrated or diffused in time and space. For example, would materialization of the risk suddenly wipe out a community of 10,000 people, or would it rather be spread across the globe, taking a few lives here and now, a few there and then?

These are the kinds of things that lay people think about and that technical experts tend to ignore. As a consequence, the general public

3. *See, e.g.*, Gillette & Krier, *supra* note 1, at 1073-75.
4. *Id.*

might regard as risky some activity that seems relatively benign to a professional risk assessor because it has a low expected mortality.

Notice that it is not public ignorance about relevant statistics that produces this difference in attitude. There are any number of studies, again by cognitive psychologists, and again cited in the article referred to above,[5] that show the following: If you ask lay people to rank risks *in terms of expected mortality*, their rankings more or less match the rankings of the experts. But if you then ask the same two groups to rank *in terms of "risk,"* the lay people will label certain activities "risky," although the experts may regard the activities as relatively safe because of low expected mortality. The experts start and stop with that one variable; lay people, in contrast, work up from expected mortality by adding in concerns based on the other factors discussed above. For this reason, lay people might fear nuclear power, whereas scientists insist that it is relatively safe compared to alternative energy sources that have higher expected mortalities.

What are the implications of the schism I have discussed? Of the many possibilities, I will mention only two. First, technical experts tend to be more tolerant of modern technological risk than the general public, for the simple reason that the experts stop at mortality whereas the public works up from it. If two activities pose equal expected body counts, but one brings with it dread or catastrophic potential or whatever, then the lay public will regard that one as more risky than the other, whereas the experts will tend to regard them as posing equal hazards.

The second point I would like to make is one made by Peter Huber in his essay on risk regulation.[6] If you look at Peter's work, you will see him lamenting the fact that the courts share the lay point of view on risk, whereas agency experts embrace the technical view. It follows that if the technical view is "correct," we should lean toward agency regulation, whereas if the lay view is best, we should lean toward judicial regulation, or at least active judicial oversight of agency activity, instead of deference, which Huber supports.

So how should we decide? Well, on the one hand, we could ask what democratic government is about and conclude that it is obviously the public's view that should matter, so long as it has reasonable intellectual support and tolerable rationality, which it clearly does, as discussed at length in the essay I co-authored with Clay Gillette.[7] On the other hand, there is also plenty of intellectual support for the expert view, which has its own rationality (body counts count!). Moreover,

5. *Id.* at 1074.

6. Peter Huber, *Safety and the Second Best: The Hazards of Risk Management in the Courts*, 85 COLUM. L. REV. 277 (1985).

7. Gillette & Krier, *supra* note 1, at 1076-80.

there are crazy lay people out there, crazy scientists, too, I suppose, and we cannot get too carried away and say: "Whatever people fear, we must act accordingly." But how can we tell sensible fears from unsensible fears? Is it sensible to fear electromagnetic radiation? What about nuclear power? How do we decide?

If we routinely leave the matter to the public, it might work out crazily. If we leave it to a pluralistic process of debate, it is likely to work out in favor of the expert view, because the expert view is better organized and more congenial to the people running regulatory agencies. If we leave it to the technical experts, we give to them the right to decide an ethical and political issue that transcends their technical expertise. And if we decide to continue to muddle through, which seems to be our current great approach to dealing with uncertainty, we confront the possibility of very high error costs should the worst case transpire after all. If nuclear power is as threatening as some think, and if the worst comes to be, then we might never have a chance to correct errors in judgment.

Unfortunately, we cannot just decide to make the most conservative decision and take the path of precaution. Consider, for example, that fifteen years ago Jon Elster analyzed the problem of nuclear power versus fossil-fuels power and concluded that the safest course was to abandon nuclear power because its worst-worst case, in the event of a mistake, is more terrible than the worst-worst case (global warming) with fossil fuels.[8] Yet if you look today at the work of people like Peter Huber, to which I referred earlier,[9] you will find the reasoned judgment that it would be more risky *not* to have nuclear power.[10]

So, again, how should we decide? I do not know the answer to that question, but I think it is the question that has to be debated. We have a problem of competing rationalities, and it cannot be decided by scientific expertise because the scientific expertise of technical risk assessors is not about the ethical and political questions of what risk should mean.

8. Jon Elster, *Risk, Uncertainty and Nuclear Power*, 18 SOC. SCI. INFO. 371, 387 (1979).

9. *See* Huber, *supra* note 6 at 294-99 (arguing that new risks are generally less serious than the old risks that they displace).

10. *See generally* James E. Krier, *Risk and Design*, 19 J. LEGAL STUD. 781, 785-90 (1990); James E. Krier, *The End of the World News*, 27 LOY. L.A. L. REV. (forthcoming 1994).