

Integrating Values Into Science: The View of an Unreconstructed Philosophical Realist

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It is hard to argue with Carolyn Raffensperger's main point — that even science benefits from a broader participatory base. Since I don't like doing hard things (unless I have to), I won't argue with it. But this wouldn't be much of a commentary if I left it at that, so rather than coming at her piece head on (too hard), I'll come at it obliquely, calling into question her too ready acceptance of the NRC Report, *Understanding Risk*. I think her argument could be made stronger by taking a harder look at one of its underlying concepts.

The picture that underlies the NRC report is essentially the same as advanced in the 1970s by Robert Lowrance in his book, *Of Acceptable Risk*, running in a straight line through the NRC's later influential Redbook of 1983 through to *Understanding Risk*. In this view, determining safety is neatly divisible into two parts: the "value-free" risk characterization part¹ that involves "science," whether informed by non-scientists or not; and a value-laden part, which Lowrance calls "judging safety" (i.e., what risks are acceptable?) and later was known as risk management. This second compartment is explicitly acknowledged to involve values and political considerations. It is, therefore, the province of managers and politicians, using input from the scientists (or scientists and the public, in Raffensperger's model). The only defect with this picture is that it is all wrong. As defects go, I guess this could be characterized as "serious."

There is nothing value-free about any of the steps in risk characterization. Let's take one example: characterizing conditions of exposure. This is the journalistic "What? Where? When? How?" question. We know that what is measured (and by whom), where it is measured, when it is measured, and how it is measured — sometimes even determined — are influenced by science and extra-scientific questions. Take the question of criteria air pollutant monitoring, for example. Where is the monitoring equipment for SO₂? Usually on top of secure buildings, such as fire and police stations. Who determines what to measure and how to do it? Often those with a direct stake in the outcome of the measurement and a hand in developing the instrument itself. Why are some things measured and others not? The answer to that question is often a mixture of the technological, political, and ideological. It is not hard to go through all the other steps in a like manner (Why is there no national tumor registry in the

US, but for a small fee I can find out how many people commute everyday between Barnstable and Worcester counties in Massachusetts?). Before the "data" ever gets to the "risk manager" it has already been squeezed through a values sieve that lets some things through and not others.

How does this fit in with Raffensperger's argument? Consider Quantitative Risk Assessment (QRA). The principal reason most "environmentalists" (i.e., non-insiders) don't like QRA has nothing to do with its concept, but its use. Even the precautionary principle must use some ranking or qualitative assessment if it is to decide whether there is a possibility of "substantial" harm. What gets environmentalists riled up about QRA has little to do with its use as an assessment device, but its use as a decision justification device. The agency/industry/policy maker has shot the arrow, and the risk assessor obligingly paints the target around it, preferably with sophisticated paint using an abundance of integral signs and capital sigmas to make it look infallible. Part of the problem is that many assumptions and approximations are needed to make QRA work at all, and all of these assumptions and approximations are done "unblinded," i.e., with full knowledge by the assessor of their effect on the outcome, with consequent opportunity for conscious or unconscious bias. The other part of the problem is that the raw material going into the QRA is the product of the very same risk characterization steps discussed above.

The Raffensperger solution still works: Broaden the participatory base, consider other outcomes, force the collection of other data, weight the factors in other ways. But it seems to me this modification of Raffensperger's argument better allows it to be situated in current practice, while simultaneously subverting one of the principal foundations of that practice (the false dichotomy between the value-free and value laden components).

One concluding point. It would be easy to construe my remarks as weighing in on the side of the social constructionist view of all science. It is undeniably true that science is a social enterprise, but, as a scientist, I remain an unreconstructed philosophical realist. I believe there is a real world out there that exists independently of me, that I can know the world, and that Science is an important way to allow me to know it. Public participation is not a substitute for that scientific way of knowing, it is part of it.

Endnote

1. Which can be summarized as follows: Characterize the conditions of exposure to an agent, identify the hazards, determine a quantitative dose-response relationship between the exposure and hazard, and then estimate the risk by applying the relationship to each hazard and condition of exposure.

References

- Lowrance, W. 1976. *Of Acceptable Risk: Science and the Determination of Safety*. Los Altos, CA: William Kaufmann.
- National Research Council. 1983. *Risk Assessment in the Federal Government: Managing the Process*. Washington DC: National Academy Press.