Science Sessions Podcast: Baruch Fischhoff

PNAS: Welcome to Science Sessions. I'm Brian Doctrow.

For people to appreciate the value of science, scientific information must be effectively communicated to the general public. This is not a trivial task, as scientists may not necessarily be good communicators, while communicators may not necessarily be good at interpreting scientific data. Poor science communication can lead to public mistrust of science, a misinformed public, and policy decisions that are not based on evidence. The "science of science communication"—using scientific methods to figure out how to communicate scientific results most effectively—has in recent years emerged as a distinct area of research. As part of this effort, the National Academy of Sciences hosted a series of colloquia since 2012, with the aim of fostering collaboration across disciplines and between researchers and practitioners of science communication. Baruch Fischhoff, a decision scientist at Carnegie Mellon University, co-chaired the colloquia. I recently spoke with Fischhoff about what makes an effective science communication program, the obstacles to effective science communication, and some of the consequences of ineffective science communication.

PNAS: Dr. Fischhoff, what are some of the major obstacles to effective science communication?

Fischhoff: The biggest obstacle to any communication is not understanding the audience. Scientists are pretty good at explaining their work to people that they know; they're pretty good at explaining in the classroom. And those are different from communicating to general audiences. In the classroom, first of all, you give an exam, and you get feedback on how well you're doing. Whereas if you're communicating to a general audience, you don't have that kind of feedback that enables you to refine your message. Second, in the classroom, where we do most of our communicating, we have a captive audience. We dictate what's important, whereas for the general public, typically—unless they're really fascinated by our research—what we have to say is only a small part of any problem that they're solving in their lives.

PNAS: For the most recent Science of Science Communication colloquium, you wrote a perspective offering a practical framework for designing and evaluating scientific communication programs. What are the essential features of such a program?

Fischhoff: You need people who really understand the science, whether it's biology, physiology, physics. You need what we would call decision scientists, people who have the expertise in figuring out what are the things that really mattered to your audience. You need behavioral and social scientists who'll listen to the audience and try to find out from them what's important and how well it's going down. And then you need communication professionals. So, you get the right people together in mutually respectful and supportive roles.

PNAS: You mentioned the role of decision scientists, behavioral scientists, and social scientists. What makes them essential to the process?

Fischhoff: So, I would say the distinction between the scientists and social scientists has been one of our longstanding problems. I've been going to climate meetings since the late Carter administration. And I think we collectively misplayed a very strong hand, and I think it's in part because natural scientists made this distinction between themselves and social scientists, as a kind of inferior pursuit with the feeling that, well, they could just handle it all. And we got 30 years into it before you began to have much of any consistent research on what the public thought about climate change.

PNAS: Like climate change, vaccination is an issue where scientists have struggled to communicate effectively with a general audience. How could communication about this topic be improved?

Fischhoff: We had a project for CDC in the mid-2000s, trying to find out why there was pushback. One of the things that we found was, the vaccine professionals were not addressing concerns that were legitimate among members of the public and which the skeptics raised. The skeptics said, “well, how good is the surveillance after vaccines are out on the market?” It turns out it's not perfect. It's passive surveillance at that point. A physician needed to go out of his or her way in order to make a report. The interface was kind of clumsy. So, it wasn't perfect. And yet that just wasn't addressed. Something that was maybe a little trickier is that if you go to the skeptics' websites, they have powerful stories about problems that have been attributed to the vaccines. And you don't have the powerful stories on the other side. So, as a public health agency, maybe you're constrained about using anecdotal evidence, but I think with a little creativity, you could do something that was legal and ethical.

PNAS: What are some issues that you plan to investigate in the near future?

Fischhoff: Some people in critical care medicine at the University of Pittsburgh Medical Center were actually interested in physicians' decision making—how they make transfer decisions from outlying hospitals to the major medical center. We have autonomous vehicles in Pittsburgh that raise some interesting issues about people's perceptions of risks and benefit. There's an emerging area we're just starting to talk about, on how do you deal with the black box predictions that are coming out of artificial intelligence and machine learning? Should you make decisions based on something that you don't really understand and, in fact, the analysts don't really understand?

PNAS: You’ve talked quite a bit about instances where science communication has been ineffective. Do you have any favorite examples of good science communication?

Fischhoff: At the Dartmouth Medical School, they have an institute dedicated to a shared relationship between you, my doctor, and me, the patient, where you want to make certain I understand what I’m up against. They’ve developed a “drug fact box” that parallels the nutrition fact box, that gives people the kind of quantitative information about the risks and benefits of treatment, that you would need to make an informed

decision. They've had to swim upstream against people who have claimed that ordinary people are so innumerate, so scientifically illiterate that they can't understand the information. They found that if you do your job right, most people can find the information that they need.

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