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If scientists want to educate the public, they should start by listening

By Chris Mooney
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Whenever controversies arise that pit scientists against segments of the U.S. public -- the evolution debate, say, or the fight over vaccination -- a predictable dance seems to unfold. One the one hand, the nonscientists appear almost entirely impervious to scientific data that undermine their opinions and prone to arguing back with technical claims that are of dubious merit. In response, the scientists shake their heads and lament that if only the public weren't so ignorant, these kinds of misunderstandings wouldn't occur.

But what if the fault actually lies with both sides?

We've been aware for a long time that Americans don't know much about science. Surveys that measure the public's views on evolution, climate change, the big bang and even the idea that the Earth revolves around the sun yield a huge gap between what science tells us and what the public believes.

But that's not the whole story. The American Academy of Arts and Sciences convened a series of workshops on this topic over the past year and a half, and many of the scientists and other experts who participated concluded that, as much as the public misunderstands science, scientists misunderstand the public. In particular, they often fail to realize that a more scientifically informed public is not necessarily a public that will more frequently side with scientists.

Take climate change. The battle over global warming has raged for more than a decade, with experts still stunned by the willingness of their political opponents to distort scientific conclusions. They conclude, not illogically, that they're dealing with a problem of misinformation or downright ignorance -- one that can be fixed only by setting the record straight.

Yet a closer look complicates that picture. For one thing, it's political outlook -- not education -- that seems to motivate one's belief on this subject. According to polling performed by the Pew Research Center, Republicans who are college graduates are considerably less likely to accept the scientific consensus on climate change than those who have less education. These better-educated Republicans probably aren't ignorant; a more likely explanation is that they are politically driven consumers of climate science information. Among Democrats and independents, the relationship between education and beliefs about global warming is precisely the opposite -- more education leads to greater acceptance of the consensus climate science.

In other words, it appears that politics comes first on such a contested subject, and better information is no cure-all -- people are likely to simply strain it through an ideological sieve. In fact, more education probably makes a global warming skeptic more persuasive, and more adept at collecting information and generating arguments sympathetic to his or her point of view.

A similar story unfolds with public opposition to vaccination. Once again, on a technical level, skeptics get the science wrong. The body of epidemiological evidence overwhelmingly shows that vaccines don't cause autism. Furthermore, the principal agent accused of having this effect (a mercury-based preservative called thimerosal) has long since been removed from most childhood vaccines. Yet autism rates have not declined.

With public health at stake, it's no wonder medical experts get frustrated when they hear autism activists such as actress Jenny McCarthy attack vaccines. But once again, the skeptics aren't simply ignorant people. If anything, they seem to be more voracious consumers of the relevant medical information than the nation as a whole. According to a 2009 study in the New England Journal of Medicine, children who go unvaccinated by parental choice (rather than because of inadequate access to vaccines) tend to be white, from well-to-do families and with married, college-educated mothers. Parents in such families are more likely to go onto the Internet (what McCarthy calls the "university of Google") to research the health risks of inoculation than are other groups of parents.

Or consider the long-running controversy over plans to dispose of the nation's nuclear waste at Nevada's Yucca Mountain. Although many technical experts have long argued that the repository would be safe, this has hardly convinced frightened and angry Nevadans. In 1991, the American Nuclear Energy Council even launched an ad campaign to educate the public about the Yucca Mountain plan but it backfired. Nearly a third of viewers became more resistant to the repository, and among those who were already opposed, their resolve strengthened. (Just 15 percent had a more favorable opinion of the repository after seeing the ad, and half of viewers did not change their minds.)

These three controversies have a single moral, and it's that experts who want Americans to take science into account when they form opinions on contentious issues need to do far more than just "lay out the facts" or "set the record straight." What science says is important, but in controversial areas, it's only the beginning. It's critical that experts and policy makers better understand what motivates public concern in the first place; and in this, they mustn't be deceived by the fact that people often appear, on the surface, to be arguing about scientific facts. Frequently, their underlying rationale is very different.

Thus, for instance, resistance to climate science in the United States seems to be linked to a libertarian economic outlook: People who resist what experts tell them about global warming often appear, at heart, to be most worried about the consequences of increased government regulation of carbon emissions. Similarly, based upon my observation, vaccine skepticism seems closely connected to distrust of the pharmaceutical industry and of the federal government's medical research establishment. As for Yucca Mountain,

much of the outrage appears to originate in the perceived unfairness of having Nevada proposed as the sole dump site for the waste of an entire nation.

For this reason, initiatives that engage the public about science policy in a two-way conversation -- before controversies explode -- show great promise. In Canada, for instance, the national Nuclear Waste Management Organization spent three years listening to the public's views about how to handle nuclear waste disposal and promised that no dump or repository would be sprung on a community without its consent. Throughout the process, even critics of waste storage efforts remained engaged and supportive of attempts to come up with the best possible solution. In the United States, meanwhile, the federally funded National Nanotechnology Initiative has sponsored a great deal of social science research to explore possible public concerns that may arise as this new field of technology advances.

Experts aren't wrong in thinking that Americans don't know much about science, but given how little they themselves often know about the public, they should be careful not to throw stones. Rather than simply crusading against ignorance, the defenders of science should also work closely with social scientists and specialists in public opinion to determine how to defuse controversies by addressing their fundamental causes.

They might, in the process, find a few pleasant surprises. For one thing, the public doesn't seem to disdain scientists, as scientists often suppose. A 2009 study by the Pew Research Center for the People & the Press found that Americans tend to have positive views of the scientific community; it's scientists who are wary of the media and the public.