

OPINION | LEE MCINTYRE

# What's so special about science?

By Lee McIntyre Updated May 6, 2019, 5:01 a.m.



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Earlier this year, the governor of the state of Washington declared [a state of emergency](#), due to an outbreak of measles in Clark County, where anti-vaxx ideology has led to nearly a quarter of children showing up to school without their MMR shots. In November, 600 true believers showed up at the Flat Earth International Conference in Denver.

Science denial seems to be getting worse. In some ways this isn't surprising. Fifty years of science denial over issues like the link between cigarette smoking and cancer, and the reality of climate change, have arguably made a large contribution to the creation of our current "post-truth" era. Does this mean that we should turn to scientists to learn how to fight back? Not necessarily.

By this I mean no disrespect. In graduate school, scientists are trained to become expert researchers, but almost none are schooled in effective public communication. Neither are scientists customarily asked to reflect on the logical or methodological roots of their disciplines. As a consequence, some come quite close to buying into a fairly unsophisticated view called "[naive realism](#)," which holds that science simply discovers the truth. When called on to defend their results, some therefore seem tempted to present their findings as fact and seem shocked when an audience of doubters doesn't believe them. But you don't convince someone who doesn't believe in evidence by presenting them with more evidence. You do so by helping them to improve their reasoning.

Many will (justifiably) find fault with the irrationality of science's critics. But at least part of the responsibility here lies with the scientists, who occasionally speak about what they are doing in a way that can be misinterpreted by science deniers. Loose talk about how the evidence for anthropogenic climate change has now reached [a gold standard of "certainty,"](#) or that evolution has been "proven," just feeds into some of the most prevalent myths about science. Science deniers use these to shore up their conclusion that, until the day comes when scientists can prove their results with absolute certainty, any hypothesis is just as credible as any other.

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So why don't they say so, and embrace the virtues of uncertainty and doubt in their defense of science? Because they are afraid they'd be crushed if they did.

Science is fallible. As opposed to deductive logic — where certainty can be reached — anytime one is dealing with an empirical subject, there is the possibility that one's theory may be proved wrong by some future data. Yet instead of a weakness, this is perhaps science's greatest strength. In science, we are required to balance openness to new hypotheses with a reflex to doubt any idea until it has been thoroughly tested. This is what allows us to learn from experience; science never shuts the books. But it is also why, no matter how good the evidence, we will *never* be able to show that vaccines are 100 percent safe. Or that gravity exists. Or that electrons are real.

Yet this does not mean that it is rational to disbelieve a well-corroborated scientific theory.

When confronted by anti-vaxxers, why do scientists sometimes become exasperated and pretend that their results have been proved? Or that vaccinations carry no risks? Perhaps a better strategy would be to anticipate the cherry-pickers and conspiracy theorists, and then explain that — technically speaking — they are right that absolute certainty is unobtainable, but then go on to

explain that this does not mean that any given belief is as likely as any other. That a scientific belief can be warranted by the evidence even though it has not been proved.

What makes science special is not its method or its logic, but the attitude of those who practice it. What is distinctive about scientists is that they are constantly comparing their theories against the evidence and, when it doesn't measure up, they are committed to changing their minds. It is not that scientists are not skeptical, it's just that — through a shared system of values that put a premium on evidence — they have developed a system of tests and procedures to help them deal with doubt and uncertainty in a rational manner.

Compare this to the strategy embraced by pseudoscientists who, despite protestations of skepticism, are often quite gullible and embrace conspiracy theories for which there is no good evidence. Or to science deniers who profess to care about evidence but then cherry-pick only that which suits their ideology. Talk to your favorite vaccine denier and they will probably make a claim that there is a governmental cover-up about the dangers of thimerosal. Or that a single study (though long ago debunked and proved to be fraudulent) shows that vaccines cause autism. It's not that science deniers have never been exposed to good evidence, it's that they have no good attitudinal context for knowing how to reason on its basis.

Thus rather than walking away, or belittling their critics as merely ignorant, perhaps scientists should welcome such occasions as an opportunity to demonstrate what's really special about science, which is not just its findings but its approach. Remember that science denial is not just resistance to the results of science, but to the process by which scientists come to formulate well-warranted beliefs in the first place. There is a growing body of evidence that shows that what actually convinces people is not data, but trust. In these days when even facts and truth seem to have become politicized, it can be easy to think that the experts are lying, causing some to double down on their ignorance. But if more scientists engaged in patient conversation with their critics, taking all of their questions and explaining not just what scientists have found but *how* they have found it, what benefits might result?

In the short run this may not seem promising. But just showing up counts for something. With the anti-vaxx crisis in Washington state, the governor has encouraged public health officials to hold workshops with skeptical parents. Some have reported that it was the first time their doubts were taken seriously, and a few minds were changed.

Scientific understanding is a marvel of human progress. If we can increase the number of people who respect science not just for its results, but for the special attitude that allows it to produce understanding in the face of uncertainty, we can defend science by truly understanding it after all.

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