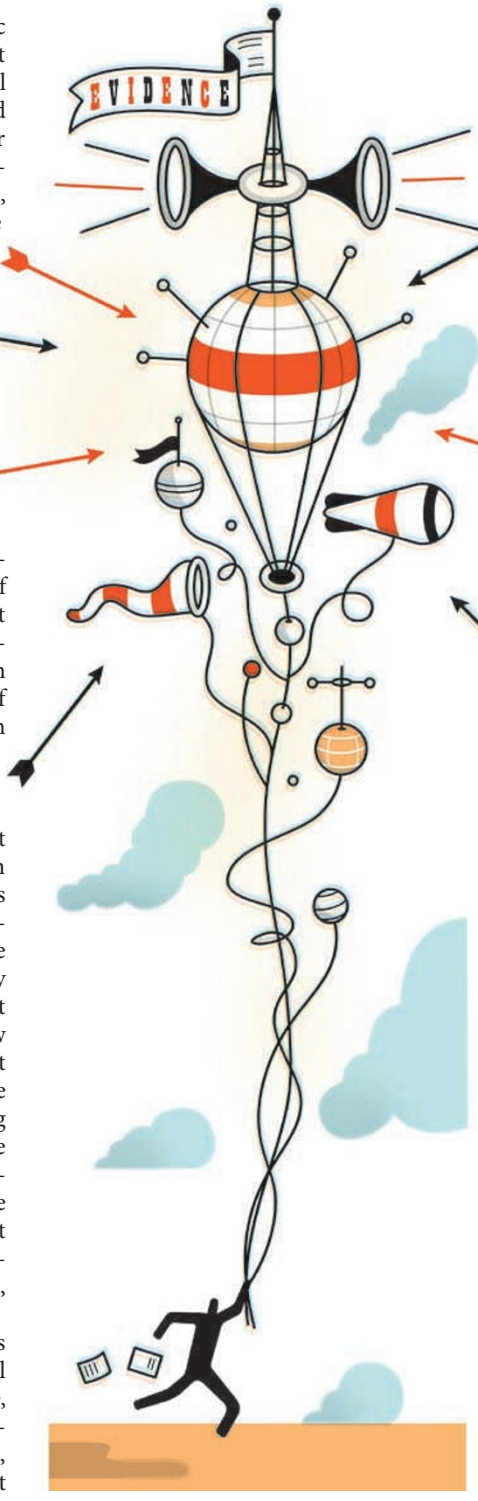
OPINION

Defeating the merchants of doubt

As climate scientists battle climate sceptics, they should note that we have been here before, say **Naomi Oreskes** and **Erik M. Conway**. History holds lessons for how researchers can get their message across.



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Ever since Charles Keeling began systematic measurements of carbon dioxide levels as part of the 1957–58 International Geophysical Year, scientists have been working to understand the effects of that atmospheric change on our climate. By the late 1970s, a consensus was forming about anthropogenic warming and, in 1992, the UN Framework Convention on Climate Change committed its signatories to preventing dangerous human interference in the climate system. Nearly two decades later, little progress has been made.

Meanwhile, opinion polls have repeatedly shown that large numbers of US citizens — and many in Canada, Australia and some parts of Europe — disbelieve the scientific conclusions. A December 2009 Angus Reid poll found that only 44% of Americans agreed that "global warming is a fact and is mostly caused by emissions from vehicles and industrial facilities"[1]. There has been essentially no change in public acceptance of the scientific conclusions since the 1980s[2], with the public continually muddling the facts — believing, for example, that the ozone hole is the main cause of climate change[3].

One reason that the public is confused is that people have been trying to confuse them, in large part by intentionally waging campaigns of doubt against climate science. Doubt-mongering is an old strategy. It works because if people think the science is contentious, they are unlikely to support public policies that rely on that science. As we recount in our new book, *Merchants of Doubt*[4], it is a strategy that has been pursued — often by the same people — to combat the ideas that cigarette smoking causes cancer, that acid rain or the ozone hole is caused by man-made pollution, that the pesticide DDT should have been banned, that the world is warming or, if warming, that we ought to be worried. Yet, despite this long history, scientists are still ill-equipped, and ill-prepared, to deal with doubt-mongering.

From the late 1980s, one of the major sources of sceptical and contrarian claims about global warming was the George C. Marshall Institute, a think tank in Washington DC. The institute was founded in 1984 by Frederick Seitz, a solid-state physicist and one-time president of the National Academy of Sciences, Robert Jastrow, an astrophysicist and head of the Goddard Institute for Space Studies, and William Nierenberg, a nuclear physicist and head of the Scripps Institution of Oceanography. All three were successful, prominent and brilliant. And all three spoke strongly against communism and in favour of free enterprise. In 1984, the men joined forces to defend then US president Ronald Reagan's Strategic Defense Initiative (popularly known as Star Wars). But just a few years later the supposedly implacable enemy disintegrated before Western eyes.

By this time the three physicists were all over 60 and might have retired, happy in the knowledge that they had helped to win the cold war. Instead, they turned their attention to environmentalists, who some at the time called "watermelons" — green on the outside, 'red' on the inside. Through the institute they began to challenge the scientific evidence of anthropogenic causes of the ozone hole and global warming. Tellingly, as the Marshall Institute was getting going in the early 1980s, Nierenberg chaired a peer-review panel assembled by the Reagan administration that played down the severity of acid rain. And Seitz was working for the tobacco industry. From 1979–85, Seitz directed a programme for the R. J. Reynolds Tobacco Company, funding biomedical research used to defend its products against claims that tobacco was responsible for cancer, heart disease and other illnesses.

The story of tobacco-industry obfuscation has been amply documented[5]. What is particularly important to understand is how the industry used the trappings of science to make its case. It created the Council for Tobacco Research (originally the Tobacco Industry Research Council, but it dropped 'industry' on advice from a public-relations firm), along with various newsletters, journals and institutes, to publish claims. And it recruited scientists to speak up for this work, because it was obvious that tobacco-industry executives would lack credibility — although often the scientists had little or no expertise in medicine, oncology or epidemiology.

This strategy of creating a 'scientific Potemkin village' was applied to global warming too. During the period that we scrutinize in our book, the Marshall Institute didn't create its own journal, but it did produce reports with the trappings of scientific argument — such as graphs, charts and references — that were not published in the independent peer-reviewed literature. At least one of these reports — read and taken seriously by the administration of former US president George H. W. Bush — misrepresented the science by presenting only part of the story[4]. NASA climate modeller James Hansen and his team had demonstrated in the peer-reviewed literature that historic temperature records could be best explained by a combination of solar irradiance, volcanic dust, and anthropogenic greenhouse gases[6]. The Marshall Institute report included only a single piece of Hansen's graph, using the fragment to make it seem as if there was a poor link between carbon dioxide and climate warming, and to argue — against Hansen's analysis — that the real culprit was the Sun.

Fighting back

How can researchers respond to organized, sophisticated and persistent attempts to undermine science? It is not easy. Many scientists have been intimidated into staying silent, fearful of personal attacks. Others have simply ignored fallacious reports and claims, hoping they would go away. Those who engage in discussion discover a frustrating situation. Whatever facts one supplies, the sceptics continue to challenge them or offer alternative explanations. One cannot call one's opponent a liar because it just seems desperate and *ad hominem*. Nor does it work to debate their points, because that feeds into the 'controversy' framework: the sceptics say there is a debate, you say there isn't — voilà, they have proved their point[7].

How any group or individual can best communicate with the public, the press and policy-makers under such circumstances is a complex question, about which there is a large body of literature in communications, sociology and anthropology. From our own perspective, we can make a few suggestions.

For too long, the scientific community has subscribed to the idea that the 'real work' of science takes place in the lab or in the field, and that taking the time to communicate broadly doesn't count. This assumption needs to be rethought, and the academic reward systems changed to encourage outreach. Contrarians do take the time and, given their tiny numbers, have had an enormous effect. In the nineteenth and early twentieth centuries it was much more common for scientists to write books aimed at the educated public; this tradition could be revived.

Scientists have much to learn about making their messages clearer. Honesty and objectivity are cardinal values in science, which leads scientists to be admirably frank about the ambiguities and uncertainties in their enterprise. But these values also frequently lead scientists to begin with caveats — outlining what they don't know before proceeding to what they do — a classic example of what journalists call 'burying the lead'.

A few weeks ago, 255 members of the US National Academy of Sciences wrote a letter in response to recent attacks on climate scientists[8]. The Academicians began by noting that "science never absolutely proves anything", and went on to explain that "when some conclusions have been thoroughly and deeply tested, questioned, and examined, they gain the status of 'well-established theories' and are often spoken of as 'facts'". Although this care and nuance is intellectually scrupulous and admirable, being so philosophical about the 'factual' nature of climate change doesn't serve public communication.

"Scientists should now label anthropogenic warming a fact."

We believe that the preponderance of evidence is such that scientists should now clearly label anthropogenic warming a fact. Why do they have so much trouble doing so? Perhaps in part because this judgement requires a broad overview that is difficult for today's specialized researchers to feel confident in. Again, they need to take the time to gain that view, if they are to respond effectively to doubt-mongers.

Scientists should also take some time to learn their history, so that they have compelling historical facts at their fingertips for rebuttals. For many years, contrarians insisted that concern over anthropogenic global warming was just the latest environmental fad, and the science was unsettled. This isn't true. In the words of the National Academy in 1979: "A plethora of studies from diverse sources indicates a consensus that climate changes will result from man's combustion of fossil fuels and changes in land use."[9] History also refutes the often-quoted canard that scientists previously had a consensus that the world was cooling. Those who make this claim usually point to a one-page piece published in the American magazine *Newsweek*[10] in 1975, that spelled out scientific concerns over a mid-century Northern-Hemisphere cooling trend. However, not only was there no consensus at that time that the world was cooling, but the bulk of the published peer-reviewed literature argued for anthropogenic warming[11].

Journalists also need to become much more sophisticated in their assessment of expertise. As well as being a trained physicist, Seitz was president of Rockefeller University in New York — one of America's leading biomedical institutes. Such bona fides, perhaps granted because of a scientist's political connections or managerial flair rather than research experience, can easily mislead. Reporters need to dig deeper.

We are not saying that clear communication will inexorably lead to an informed public, which will in turn suddenly precipitate informed policies. It's more complicated than that. Yet improving communication is a step that can make a difference. In addition, if the public is to learn that science is 'messy' and full of uncertainty — which can help to improve public trust in the system — they should also learn that sensible decision-making involves acting on the best information available. Peer-reviewed literature and the agreed opinions of expert bodies can and should be granted reasonable trust.

Of the many cases of doubt-mongering that we have studied, most ended for the better. At a certain point, the companies manufacturing chlorofluorocarbons (CFCs), admitted their link to ozone depletion and did the right thing by committing to phasing them out. The public is now firmly convinced of the link between cigarettes and cancer. Inductive reasoning implies that the same should happen with climate change: the consensus scientific view will eventually win public opinion. But in the meantime irreversible damage is being done — to the planet, and to the credibility of science. ■

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