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## Science in America: Selling the truth

31 October 2011 by [Peter Aldhous](#)

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*Opponents of science are experts at winning the battle for hearts and minds. It's time to learn their game and beat them at it*

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JOHN HOLDREN, science adviser to President Barack Obama, is a clever man. But when it comes to the science of communication, he can say some dumb things. In January, [Holdren](#) welcomed the prospect of climatologists being called to testify before Congress: "I think we'll probably move the opinions of some of the members of Congress who currently call themselves sceptics, because I think a lot of good scientists are going to come in and explain very clearly what we know and how we know it and what it means, and it's a very persuasive case."

Fat chance. In March, an impressive array of climate scientists did exactly what Holdren wanted, but their efforts seemed only to [inflame the scepticism of Republicans opposed to regulation of emissions](#).

For researchers who study how people form their opinions, and how we are influenced by the messages we receive, it was all too predictable. Holdren's prescription was a classic example of the "deficit model" of science communication, which assumes that mistrust of unwelcome scientific findings stems from a lack of knowledge. Ergo, if you provide more facts, scepticism should melt away. This approach appeals to people trained to treat evidence as the ultimate arbiter of truth. The problem is that in many cases, it just doesn't work.

Perversely, just giving people more information can sometimes polarise views and cause sceptics to harden their line. "We can preach the scientific facts as long as we want," says [Dietram Scheufele](#), a specialist in science communication at the University of Wisconsin-Madison. "This is replicating the same failed experiment over and over again."

### Soft science

The good news is that the latest research on communication and public opinion reveals strategies



Decline and fall (Image: [Alex Williamson](#))

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that anyone who wants political debate to be informed by accurate scientific information should be able to use to get their message across.

Indeed, given recent comments from some Republican presidential hopefuls, it may be high time US scientists put aside their own scepticism about the "soft" social sciences, and embrace what these studies have to say.

First, though, a bit of perspective. While some of the comments made recently by Rick Perry, Michele Bachmann and others may seem alarming, it's important to bear in mind the relatively narrow audience they were intended to reach.

This is presidential primary season, when candidates must appeal to the most ideologically committed voters to win their party's nomination. When Perry [invoked Galileo](#) in contending that "the science is not settled" on climate change, it was a message crafted to appeal to hard-core Republican voters and big-money donors within the oil and coal industries - not to the majority of Americans who accept that our planet is getting warmer and that human activities are largely to blame.

In fact, few objective measures support the idea that fundamentally anti-science ideology has taken hold in the US. Scientists are generally held in high public esteem, scientific knowledge shapes up fairly well compared to other nations, public interest is high and investment in research remains healthy. "You can't find a society that's more pro-science," argues [Dan Kahan of Yale University](#).

Even so, there are a few key areas of US public opinion where this picture begins to break down. People aren't empty vessels waiting to receive information. Instead, we all filter and interpret knowledge through our cultural perspectives, and these perspectives are often more powerful than the facts. That poses a problem for some areas of science, which have come to clash with the values of a sizeable proportion of the US population.

Evolution provides the clearest example. Religion is a bigger factor in the lives of Americans than it is for citizens of most other developed countries. Evangelical Christian churches that preach literal interpretations of Genesis are especially influential. No wonder the US comes near the bottom of the pile in international surveys measuring the percentage of people who accept evolution (see "Darwin's doubters").

Cultural filters also explain why some social conservatives - including Bachmann - are willing to believe anecdotal reports that the human papillomavirus (HPV) vaccine can cause mental retardation. Here, evidence that the vaccine is effective and poses little risk is being filtered through the fear that a product designed to protect against a sexually transmitted virus will encourage promiscuity among teenage girls.

Such biases are not the preserve of the right - many of those who falsely believe that childhood vaccines cause autism are [left-leaning supporters of "natural" medicine who distrust the pharmaceutical industry](#).

But on climate change, again, it is those on the right who are butting heads with scientists. Climate is especially interesting because polling indicates a relatively recent and strengthening ideological split on the issue (see "Divisive climate"). The most ardent sceptics are those who identify with the Tea Party movement, according to a [poll run earlier this year](#) for the [Yale Project on Climate Change Communication](#). For these voters, the cultural filter seems to be the idea that taking action to limit climate change means "big government" intervention in the US economy, anathema to staunch conservatives.

Hammering another nail into the coffin of the deficit model, Kahan's [latest survey of more than](#)

1500 US adults indicates that far from overcoming our cultural biases, education actually strengthens them. Among those with greater numeracy and scientific literacy, opinions on climate change polarised even more strongly.

Kahan's explanation is that we have a strong interest in mirroring the views of our own cultural group. The more educated we become, he argues, the better we get at making the necessary triangulation to adopt the "correct" opinions. On issues like climate change, for most people these cultural calculations trump any attempt to make an objective assessment of the evidence.

As well as explaining how intelligent and educated people come to misunderstand where the scientific consensus lies, Kahan's work suggests a way to drag debate back towards what the science actually says: change the messenger.

### Trusted voices

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Kahan scores people on two cultural scales: hierarchists versus egalitarians and individualists versus communitarians. Liberals tend to be egalitarian-communitarian, while conservatives are more often hierarchical-individualist.

In one experiment Kahan examined attitudes to the HPV vaccine. When presented with balanced arguments for and against giving the vaccine to schoolgirls, 70 per cent of egalitarian-communitarians, and 56 per cent of hierarchical-individualists, thought it was safe to do so.

Kahan then attributed the arguments to fictional experts described so as to make them appear either egalitarian-communication (liberal) or hierarchical-individualist (conservative).

The "natural" pairing, with an egalitarian-communitarian arguing in favour of the vaccine, and a hierarchical-individualist arguing against, drove the two camps a little further apart. But, crucially, swapping the messengers around had a dramatic effect: 58 per cent of egalitarian-communitarians and 61 per cent of hierarchical-individualists rated the vaccine as safe (*Law and Human Behavior*, vol 34, p 501).

These findings suggest that one way to change people's minds is to find someone they identify with to argue the case. Climate scientists have almost certainly been badly served by allowing former Democratic vice-president Al Gore to become the dominant voice on the issue. His advocacy will have convinced liberals, but is bound to have contributed to the rejection of mainstream climate science by many conservatives.

So who might do a better job of carrying the climate message to conservative ears? Perhaps the US military, which is worried about the security implications of climate change, or senior figures within the insurance industry, who are factoring the risk of more frequent severe weather events into their calculations.

Of course, scientists themselves could step up to the plate. But their powers of persuasion may be limited. While it wasn't always so, US scientists tend to lean heavily towards the Democrats' camp - which helps explain why the idea of climatologists forming part of a liberal conspiracy to whip up alarm and keep federal research dollars flowing has become part of the climate deniers' narrative.

The appeal of this story to those on the political right illustrates another key finding: how a message is framed in relation to the cultural biases of the intended recipients is crucial to its persuasiveness. The Seattle-based Discovery Institute, a conservative think-tank that seeks to undermine the teaching of evolution in US schools, has learned this lesson well. After failing to get biblical creationism taught in science classes, the institute came back with the "scientific" concept of intelligent design, and two carefully researched talking points: "evolution is just a

theory" and "teach the controversy".

Not only were these frames attractive to the religious right, they were also difficult for scientists to counter without seeming to endorse censorship. Especially clever was the use of the term "theory". To many people the word is roughly synonymous with "hunch", so the frame did its intended job of questioning Darwinism's credibility.

[Matthew Nisbet](#), a communication specialist at American University in Washington DC, has long argued that scientists need to do a better job of framing (*Science*, vol 316, p 56). Working with [Edward Maibach of George Mason University](#) in Fairfax, Virginia, Nisbet recently found that framing action on climate change in terms of public health benefits prompts a positive response from a broad range of Americans, including those who are ambivalent when it is framed as an environmental issue (*BMC Public Health*, vol 10, p 299).

Another promising frame is the idea that climate change presents an economic opportunity for the US through the creation of "green jobs", although in recent weeks this rallying cry has been muffled by the controversy surrounding the Californian solar power firm [Solyndra](#), which went bankrupt despite being loaned more than \$500 million by the Obama administration.

Still, Scheufele is convinced that the most effective frames for communicating about climate change will ultimately revolve around economic opportunities, as concerns about the economy are usually where political debates are won and lost.

For many scientists, talk of "framing" and "selling" ideas to the public sounds uncomfortably like misinformation through the dark art of spin. This misses the point, argue advocates of framing. It's possible to communicate accurately about science in the context of an engaging frame, they say.

New research demonstrates the value of another mode of communication that should come more naturally to scientists. [Jason Reifler of Georgia State University](#) in Atlanta and [Brendan Nyhan](#) of Dartmouth College in Hanover, New Hampshire, tested two different ways of presenting the same information about temperature records to people who identified themselves as "strong Republicans" sceptical about human-caused climate change. One was in the form of a line graph, the other plain text.

The text had little effect, but the graph made the strong Republicans more likely to acknowledge that global warming is both real and a consequence of human activities. "Given sufficiently unambiguous graphical information, people are much more likely to acknowledge the facts," Nyhan and Reifler concluded, in a paper presented in September at the [American Political Science Association's meeting in Seattle](#).

Taken together, studies of communication provide a recipe to allow science to better inform US political debate: find frames that work with broad sections of the population and stick closely to those narratives; seek allies from across the political spectrum who can reach out to diverse audiences; and remember that a graph can be worth a thousand words. While there's little evidence the US is in the thrall of a coherent anti-science movement, the penalty for failing to follow this recipe could be the election of a president who is blind to the true scientific consensus on some of the key issues of our time.

Experience elsewhere provides a cautionary tale, argues [Seth Kalichman](#) of the University of Connecticut in Storrs, who studies the movement that denies that HIV causes AIDS. [Thabo Mbeki's flirtation with this movement](#) and his refusal to endorse the use of antiretroviral drugs during his tenure as South Africa's president has been estimated to have caused more than 300,000 premature deaths (*Journal of AIDS*, vol 49, p 410).

"You could very easily end up with a US president who holds unscientific views, and that could be

as damaging as Mbeki was in South Africa," Kalichman warns.

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