

Finding your place on the science – advocacy continuum: an editorial essay

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Abstract The late founder of this journal, Stephen Schneider, argued that climate scientists must find the right balance between being honest about the limits of our knowledge and being effective in communicating the risks that climate change poses to society. The worlds of science and communications have changed dramatically in the years since Schneider first described this “double ethical bind”. Yet for most scientists, the core challenge of public communication remains. How do we choose between what we perceive as science – being honest – and what we perceive as advocacy – being effective? This essay suggests that scientists should view science and advocacy as opposite ends of a continuum with many possible positions. Drawing upon findings from psychology, communications, and science and technology studies, I describe how scientists can use research and critical self-analysis to be “scientific” about public engagement and to choose a suitable place for themselves on the science-advocacy continuum.

Twenty-five years ago, the late founder of this journal, Stephen Schneider, wrote an essay about the challenge of discussing the role of climate change in the “greenhouse summer” of 1988, then the warmest, driest summer in recorded U.S. history (Schneider 1988). As in many other publications and presentations, Schneider suggested scientists faced a “double ethical bind” whenever speaking with the media. He argued that each scientist must find a balance, between being “honest” about the limits of scientific knowledge, and being “effective”, or communicating in a broadly comprehensible manner in order to best educate the world about scientific findings (Schneider 1988).

Much has changed in the quarter century since that article. The core evidence that human activity is changing the climate has strengthened, based on the consensus presented in the five IPCC reports from 1991 through 2013. The then-record global annual mean temperature of 1988 has been surpassed in 19 times out of 24 chances. The media platforms through which climate change are discussed have arguably changed even more than the climate itself. Centralized information sources like the prestige press and the 6:30 evening news have given way to the dispersed and interactive worlds of the internet and social media. Scientists are now in direct, daily contact with policymakers and the public. Many also now receive specialized

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communications and media training through institutional initiatives, graduate courses and fellowships like the Aldo Leopold Leadership Program.

Despite all the advances of the past quarter century, the fundamental challenge laid out by Schneider remains. How does a scientist working on a highly politicized subject like climate change find the proper public balance between science – being “honest” – and advocacy – being “effective”? The answer may be for scientists to do what they do best: research. Drawing upon emerging findings from psychology, communications, and science and technology studies, this essay aims to show how climate scientists can use research and critical self-analysis to choose their place on the continuum between science and advocacy.

1 The science-advocacy continuum

Science is commonly seen as a system of knowledge generation distinct from issue advocacy. Scientists themselves are characterized as impartial “arbiters of truth” that avoid the persuasive forms of communication used by advocates of particular policies or political philosophies (Fischhoff 2007). A scientist is said to cross the line to advocacy when she or he makes a “should” statement. For example, a scientist might state that reducing greenhouse gas emissions will slow climate change, whereas an advocate might state that greenhouse gas emissions should be reduced. In this old-fashioned, binary view of science and advocacy, the former is an objective¹ judgement arising from an assessment of experimental results, and the latter is a normative or subjective judgement about actions that the scientist feels society should take.

In practice, there is no pure state of science, nor is there a pure state of advocacy. Communications scholars disagree on what specifically constitutes advocacy (Nelson and Vucetich 2009). The scientific method itself essentially recognizes that no one, including scientists, can be purely objective. We state methods and assumptions as means of correcting for the potential influence of subjectivity on the results and of providing others with the opportunity to repeat our experiments. The everyday business of doing science also requires daily advocacy for specific projects, for a field of research or for science as an enterprise via scholarly presentations, grant proposals and other activities.

Though these everyday practices are often treated as separate from “public” advocacy (Fischhoff 2007), they do involve a mix of objective and normative judgements which can, at least inadvertently, influence policy. A scientist who dutifully avoids any public engagement still engages in some non-zero level of public advocacy by arguing when their research is of sufficient importance to warrant expenditure of public funds. Policy preferences can become consciously or unconsciously embedded in the cultural norms of the field over time. Lackey (2007) points to ecologists’ frequent use of terms such as “degradation” which imply that a particular ecological state may be less desirable than others. Regardless of the level of public or expert agreement on the desirability of that state, the language does reflect normative judgements about preferred outcomes.

Scientists may be best served viewing science and advocacy as different ends of an approximate continuum (Fig. 1). On the science-dominant end, judgements are more objective in nature. As scientists proceed towards the advocacy side of the continuum, personal worldview tends to have a greater influence on those judgements. The scientific uncertainty embedded in those judgements tends to increase, as scientists must draw upon additional models or decision-making processes each of which contain some uncertainty. The

¹ “Objective”, rather than “positive” (i.e., positivism), is used to describe scientific judgements in order to avoid confusion with other colloquial definitions of positive.

professional risk of judgements also increases along the continuum due to the cultural norms of science and the public perception of science as objective. This linear model is simpler and more limited than the multi-dimensional typologies of authors like Pielke (2007), but explicitly recognizes the continuous, rather than categorical, nature of the public roles taken by scientists.

The continuum model is particularly applicable to climate change research. The scale and multi-factorial nature of the climate system creates irreducible uncertainty in climate prediction. Whenever data are incomplete or a problem cannot be addressed with perfect precision, subjective judgements must be made to assess the confidence in results and the range of uncertainty (Schneider 2000). On the science end of the continuum, assessing a key climate change finding like climate sensitivity to carbon dioxide involves decisions for which there is no perfect objective answer (e.g., how to integrate paleoclimate observations and climate model output). One of the reasons that prominent climate meta-analyses – including the original “hockey stick” publication, studies assessing the degree of scientific consensus, and the IPCC reports – draw disproportionate attention from motivated climate “contrarians” is that such analyses require by definition some subjective filtering and synthesizing process. Conversely, on the advocacy end of the continuum, even the most partisan voices at a protest for or against action to reduce greenhouse gas emissions based their decision to participate on some minimal amount of scientific information.

2 Navigating the science-advocacy continuum


Given the nature of climate research and the public attention devoted to climate change, it is important for climate scientists to recognize where they wish to be on the science-advocacy continuum. Failure to consider the possible influence of normative judgements on one’s thinking can lead to “covert” or “stealth” issue advocacy, in which scientists do not perceive the implied advocacy position in their research or public statements (Lackey 2007; Pielke 2007). This can undermine one’s objective of informing the public and policymakers about science and policy options. Table 1 provides an example of the various questions and normative judgements many climate scientists might face along one application of the continuum, progressing from focusing on the scientific evidence for human-caused climate change to public advocacy for a particular policy solution. This example is intended as one of many possible applications of the continuum model and not to advocate for a specific position or a specific answer to any of the questions.

Scientists restricting their research and public statements to Questions 1 through 4 are choosing the position, recommended by many scholars, in which science “speaks for itself” (Fischhoff 2007). At this end of the continuum, one’s worldview likely still influences the choice whether or not to do climate research or to focus on a specific problem. Addressing



Fig. 1 Illustration of the science-advocacy continuum

Table 1 Example of questions along the science-advocacy continuum model, applied to human-caused climate change and actions to address greenhouse gas emissions

	Motivating Question ^a	Extent of Normative Judgements
S C I E N C E  A D V O C A C Y	1. Is the climate changing?	Choice of research topic is subjective. In the North American political climate, the choice to focus on human-caused climate change could reflect or appear to reflect one's worldview
	2. How is human activity contributing to climate change?	
	3. How will the climate change in the future? (i.e., climate sensitivity, emissions scenarios)	Broadly policy-driven science; choice to do this research, and choice of impacts and scenarios may reflect worldview and experiences
	4. What are the impacts of projected climate change?	
	5. Are there undesirable or potentially dangerous impacts of climate change?	Scientist can play "honest broker" (Pielke 2007), however, list of impacts may reflect worldview of community or individual
	6. Broadly-speaking, what actions (mitigation, adaptation) would adequately reduce risk of projected climate impacts?	Research contains implicit and possibly explicit judgements about broad policy options (action vs. inaction)
	7. Broadly-speaking, should any action be taken to address climate change?	"Should" suggests advocacy side of the continuum; particular position, however, may be widely shared and relatively low risk
	8. Would specific actions or policies (e.g., stopping expansion of Alberta oil sands) adequately reduce risk of projected climate impacts?	Potential "honest broker" question before Q7 if actions informed by judgement of outside experts; may imply broad or specific advocacy, even without explicit policy recommendation
	9. Should the specific action be taken? (e.g., cap oil sands expansion, carbon pricing, reject pipeline proposals)	Requires additional normative judgement about the choice of action; judgement may be informed in part by research for Q8
	10. Should certain tactics be employed to bring about specific action? (e.g., participate in protest against fossil fuel development or pipeline)	Strong advocacy position requires normative judgements about political action, yet may be grounded in research about effective tactics

^a Questions generally represent movement along continuum; questions are not evenly distributed

Questions 5 and 6 about dangerous impacts of climate change and the effect of policy options invites additional normative judgements. A scientist focusing on these problems could strive to be the "honest broker" of Pielke (2007) who objectively provides the full suite of results and policy options to policymakers. Some scholars question whether the honest broker position is tenable given that the aforementioned process of filtering and synthesizing scientific findings involves normative judgements (Nelson and Vucetich 2009). Regardless, scientists may be motivated to accept this role because they are in many cases better trained to assess the physical or biological effect of policy options than people in other occupations (e.g., political staff). In addition, although there is no legal equivalent of the Hippocratic Oath for scientists, it can be argued that scientists, particularly publicly-funded scientists, share a responsibility to communicate their findings to the public and to offer their expertise to decision-makers (e.g., Meyer et al. 2010).

In the classic binary view of science and advocacy, a step to Questions 7 and 8 would likely be perceived as an overt move to advocacy. Although much of the scientific community and the public accept the position that some unspecified action to address climate change is necessary, a statement in favour of action is still a predominately normative position.

Advocates for and against action to address climate change may follow the same thought process through to Question 7. An analysis of specific policy actions (Question 8) may not require explicit advocacy, provided one follows the honest broker approach, but may still imply advocacy for the best option. Taking positions on these questions could be considered by some to be “justified” advocacy because scientists are seen as being trained, in general, to logically assess evidence (Nelson and Vucetich 2009); a position on Question 8 could draw upon analysis of findings from economics or other fields. It is also possible that scientists declining to answer Questions 7 and 8 in a public setting could be perceived as advocating the contrary position that action is not necessary.

A scientist’s answer to Questions 9 and 10 is a majority advocacy position motivated in large part by personal worldview and preferred theory of change. A position on specific policy actions (e.g., penning an op-ed supporting or opposing pipeline construction) or personal engagement in specific political actions (e.g., attending a protest for or against pipeline construction) may be informed by research, but is also emotionally driven and risks alienating those colleagues and audiences with opposing political views. Many forces work against assuming a position on this advocacy end of the continuum, including the cultural norms of science and the fear of public critics (Brysse et al. 2013). This professional risk exists both for those advocating for specific action to address climate change and those advocating against that action, whether the latter is rooted in skepticism of the scientific consensus (Questions 1–4) or an assessment of policy options (Questions 7–8). While explicitly advocating for a policy or political action after careful thought may run counter to the traditional notion that science should “speak for itself”, Pielke (2007) and others have argued that doing so is more honest and effective than “stealth” advocacy arising from a failure to consider the difference between normative and objective judgements.

3 Using research to choose your place on the continuum

There is no fundamentally correct position on the science-advocacy continuum, just as there is no ideal solution to Schneider’s ethical bind. Scientists are still generally advised to exercise “great care” (Lackey 2007) in choosing an appropriate and clearly defined public role, based on consideration of the scientific evidence, their preferred balance of normative and objective judgements, and the effect their position may have on the scientific community, the public and policymakers. The key advance since Schneider first described the ethical bind is that research from other fields can now serve as a guide for choosing a place on the continuum.

Psychological research suggests that long-term issues like climate change do not generate the emotion necessary to trigger people’s moral judgement (Markowitz and Shariff 2012). The information deficit model, the traditional non-persuasive mode of science communication, is generally ineffective outside the classroom at motivating decisions (Fischhoff 2007; Nisbet 2009; Moser and Dilling 2011). For example, if asked to speak in a public forum, many scientists instinctively start from a position on the science end of the continuum. They will describe the science in detail and not mention possible responses to climate change until the latter part of their presentation, if at all. However, evidence suggests speaking positively about impacts of climate change and actions to address climate change at the beginning may actually improve uptake of the science by better engaging the audience and hence motivating them to learn (Moser and Dilling 2011).

A key obstacle noted in much recent communication research is that the public and policymakers may hold different values from scientists and from each other. All information is interpreted in a biased manner based on one’s worldview or cultural values (Kahan 2010).

Individual beliefs and actions are shaped by peer groups, especially the highly respected members of those groups (Markowitz and Shariff 2012). Experiments show that when the intended audience does not identify with the speakers or their peer group, the outreach effort is ineffective or counterproductive.

As a consequence, polarization about climate change may increase, not decrease, with science literacy (Kahan et al. 2012). “Stealth” issue advocacy by some scientists can therefore limit the ability of other scientists to reach across political divides, and can risk the reputation of science. For example, climate change outreach embedded with liberal values like internationalism has contributed to the politicization of climate change (Nisbet 2009). While scientists have historically been highly trusted public figures, that trust is now declining among American conservatives (Gauchat 2012).

This brief introduction to the growing literature on science communication and cultural cognition shows that scientists now have the opportunity to use science to guide public engagement and to resolve their position on the continuum. If you combine this research with audience segmentation data like that of the Six Americas project (Leiserowitz et al. 2011), you can make informed decisions about whether and how to engage with the public or with policymakers in different settings. The ability to reach an audience, because of shared community or shared values, may be an ideal way to choose one’s place on the continuum on a given issue. For example, the research clearly suggests that a scientist from a politically liberal university town will not be effective talking about climate change to a doubtful or dismissive audience. Scientists hoping to engage with new audiences and avoid “preaching to the choir” are advised to find areas of shared values, partner with a representative of other groups, and avoid partisan and, depending on the audience, internationalist positions on the advocacy end of the continuum.

4 Being scientific about public engagement

Successful public engagement on issues like climate change, regardless of one’s position, requires the same detail and preparation as successful scientific research. In choosing a place on the science-advocacy continuum, scientists are advised to consider three key lessons that emerge from the growing research on science communication and the collected wisdom of experienced climate communicators (e.g., Schneider 2000; Oppenheimer 2011). Though relevant to all scientists, it is particularly important for young scientists starting their careers to think carefully about these lessons before engaging outside the scientific community.

1) *Choose a place that is right for you*

The only “wrong” position on the continuum is one assigned by others or chosen without careful reflection. Today, we can use research on audience segmentation and cultural cognition to understand the implications of different positions on the continuum, and then choose a position that may best suit our personality and worldview. For example, James Hansen’s protests against coal-burning power plants - strong advocacy positions with which other scientists disagree - may be more defensible than a scientist with no outreach experience stating that “the science” says we must act, because Hansen’s motivations have been clearly and loudly articulated elsewhere (Hansen 2009). However, you must also recognize that choosing such a strong advocacy position on one subject may lead to being labelled an advocate in general and/or to influencing public views of your colleagues studying that subject (point 2). One can try to protect against “labelling” by continuing to communicate clearly and making backup material available (Schneider 2000), as Hansen has done; today, a professional blog is a good, accessible means for documenting the

reasoning behind a policy position. Nevertheless, scientists in the public eye must be prepared to have their views distorted and to be subject to personal attacks (Oppenheimer 2011), and weight these risks while crafting any public statement. There is no better evidence of the inevitability of some distortion than the distortion of Schneider's description of the ethical bind that persists in the online climate discourse (Brysse et al. 2013).

2) *Consider whom you represent*

Wherever you choose to be on the science-advocacy continuum, good science leads to effective public engagement (Meyer et al. 2010). Research shows that the place you choose can affect not only your personal and professional life, but your institution, your research field, and "science" as an enterprise (Nisbet 2009; Gauchat 2012). The choice is more likely to be respected by the scientific community and the public if your research and authority on the subject are also respected. This is particularly true for young scientists on the advocacy end of the continuum: why should other scientists or the public value the policy judgement of a scientist with little experience? The corollary is that scientists, particularly prominent senior scientists, taking a strong advocacy role may be perceived to speak on behalf of the community at large. It is therefore critical for scientists with prominent public voices to read and reflect upon the research on climate change communication and upon their intended audience, especially before adopting a position on the advocacy end of the continuum, regardless of whether that position supports or opposes action to address climate change.

3) *Analyse your strengths and motivations*

Finding a comfortable and effective position on the science-advocacy continuum requires analyzing ourselves with the same rigour we would use to analyze our data. We are scientists, but we are also citizens, voters, taxpayers, parents, children and homeowners. Research on science communication suggests that we must consider our knowledge, our motivation, our cultural values and our ability to reach different audiences in order to be effective at public engagement. Questions to probe range from the state of your scientific knowledge of the issue, to whom you deem to represent, to your ability to be calm in the face of scrutiny (Table 2). This self-analysis is critical to making personal biases explicit and separate from scientific findings, to recognizing the limits of your communication abilities, and to protecting the hard-won public trust in science.

Table 2 Questions to review when choosing a position along the continuum, developed from Nelson and Vucetich (2009), Oppenheimer (2011) and other sources in this article

Key Questions for Self-analysis

How are my values influencing my choice of subject and my policy positions?

Is there confidence, among the scientific community, in the results or argument?

Am I speaking on behalf of myself, my research, my institution, my branch of science, and/or "science"?

How will my position influence the ability of myself and others in my field to conduct research and/or public engagement in the future?

Will this action effectively engage new or existing audiences?

Will this action alienate some or all of the intended or unintended audience?

Is this action the most effective use of my time, given the above?

Am I prepared to accept public scrutiny, justified or not?

Can I maintain civility in the face of public scrutiny?

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