Focus Article

Communication strategies for earning trust in climate change debates

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Climate scientists need the trust of lay audiences if they are to share their knowledge. But significant audience segments—those doubtful or dismissive of climate change—distrust climate scientists. In response, climate scientists can undertake one of two general communication strategies for enhancing trust, each appealing to one of two broad types of cognitive processing mechanisms. In the first, the communicator displays traits like humor, attractiveness, vigorous delivery, and likeability that audiences use as heuristics in determining whom to trust. But this strategy is unlikely to be successful with the very audiences who are its main targets, since those audiences will be primed to employ a more analytic and critical approach to assessing trustworthiness. In the second communicative strategy, the communicator earns trust by undertaking burdens and commitments and making herself vulnerable in ways her audience can enforce. This vulnerability signals her trustworthiness, since the audience can reason that she would not undertake such risks unless she was confident in what she was saying. Climate scientists have a variety of ways of making themselves vulnerable, including committing themselves to engaging with doubtful and dismissive audiences, undertaking burdens of proof to argue with them, empowering audiences to assess the science themselves, admitting error, and focusing on small issues. Overall, when adopting the second strategy, climate scientists must extend trust in order to earn trust, committing themselves to an on-going relationship within which their true trustworthiness will become apparent.

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INTRODUCTION

With the debates over climate policy well into their third decade, many in the climate science community are looking to improved communication for ways forward.[1,2] The communication challenges are immense: complex and extensive scientific knowledge needs to be offered in comprehensible and usable ways to culturally and ideologically diverse global audiences in an atmosphere already saturated with controversy and conflicts of interest. In this review, we take up only one aspect of the general communication challenge, focusing on approaches to creating *trust* between climate scientists and their public audiences. A relationship of trust is the necessary grounds on which the communication of expert knowledge, including climate science, can move forward. We therefore review two approaches to earning trust that have been developed within the communication discipline. While representing diverse traditions of scholarship, both approaches can provide useful orientations for climate scientists addressing public audiences. The first approach, drawn from social scientific subfields, stresses the impact of a scientist's personal characteristics in promoting her audience's trust. While important when addressing audiences who are favorable or unengaged, we suggest

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that accentuating factors such as likeability and humor is unlikely to be persuasive to the very audiences who are most distrustful of climate science. The second approach, drawn from the humanistic subfield of rhetorical studies, focuses on earning trust from such doubtful and dismissive audiences through a general strategy of accepting vulnerability. We close by sketching some specific communication strategies suggested by this second approach that climate scientists can fruitfully pursue.

THE NEED FOR TRUST BETWEEN CLIMATE SCIENTISTS AND LAY AUDIENCES

Trust is an expansive phenomenon and conceptualizing it has proved challenging for both philosophers[3,4] and social scientists.[5] In ordinary parlance, trust is 'confidence in or reliance on some quality or attribute of a person or thing.'[6] Broadly speaking, one person trusts another when he relies on her to do something *for him*, perhaps because she cares about him, is committed to behaving correctly towards him, is concerned to maintain a good relationship with him, or even just wants to live up to his trust in her.[7] A person who trusts another is thus vulnerable twice over. If the trusted person lets him down, he will feel disappointed because things did not turn out as he expected; he will also feel personally betrayed.[8]

Despite the double riskiness of trust, it plays vital roles in social life both as the glue holding relationships together and as the grease allowing transactions to move forward. In particular, trust enables us to benefit from others' expertise. When someone without expertise in a given domain—a layperson—accepts what an expert tells him, he necessarily does so on trust. At a minimum, it would be laborious for him to try to verify what the expert said, say by reanalyzing the data on which she based her knowledge.[9] Such reanalysis, moreover, would generally be impossible for him to carry out. Current theories suggest that experts do not just know quantitatively more than laypersons; instead, they see the world in a qualitatively different manner, identifying significant patterns in phenomena that are invisible to the layperson's eyes.[10] The only way to gain the tacit knowledge characteristic of expert performance is through the well-known 'ten thousand hours' of practice[10] carried out within the expert community.[11] In short, the lay person cannot check the soundness of what an expert tells him, unless he becomes an expert himself. Otherwise, not competent to assess the grounding of the expert *message*, the lay person faced with the task of figuring out whether to place his trust the expert *messenger*. As Collins and Evans have put it, laypersons must proceed by 'making *social* judgments about *who* ought to be agreed with, not *scientific* judgments about *what* ought to be believed.'[11]

Is there a lack of trust between climate scientists and their lay audiences?—a 'crisis of trust,' as the House of Lord's *Science and Society* report famously declared?[12] Or does public support for science and public confidence in science leaders remain strong, as US science indicators suggest?[13] For climate science, a more nuanced view of the current state of trust can obtained from on-going surveys carried out by the Yale/George Mason University project on Climate Change Communication. While a recent survey[14] found that overall close to three quarters of Americans trust climate scientists as a source of information about global warming, that attitude is not evenly distributed. Among those *doubtful* of the existence of anthropogenic climate change, 36% actively distrust climate science, as do fully 70% of the *dismissive* audience. Together, the these two groups have comprised 20-25% of the American public over the past 5 years.[15] Public trust, furthermore, is not stable. In line with findings of a 'growing political polarization of science' generally,[16] the Yale/GMU surveys have documented a decline in trust every year, from 83% in 2009[17] to 73% in 2012.[14] Surveys and focus groups in the United Kingdom have found a similar distribution of and decline in trust.[18]

The public's trust in climate scientists is thus substantial, but it may also be 'fragile'[19] and unequally distributed. Public trust, in short, should not be taken as a given by climate scientists. Nor is it enough for climate scientists simply to be trustworthy, if their trustworthiness is not manifest to diverse audiences. Instead, trust is a valuable resource that needs to be actively maintained.[20] As the Yale/GMU group concluded in their review of public opinion following Climategate, 'finding ways to rebuild . . . trust should become an important priority for the scientific community, lest it risk a growing marginalization of science-based information in the policy-making process.'[21] In the following section, we therefore turn first to a set of communication strategies for gaining trust, those drawn from social scientific approaches to communication.

FACTORS INDUCING TRUST AND THEIR LIMITATIONS

The literature examining trust within the social sciences is vast. Here we will focus our discussion on the importance, psychological determinants, and effects

of trust as documented in the empirically oriented communication subfields of persuasion, science communication and risk communication. This will permit us to distil recommendations relevant within a climate change context. Even within these subfields, trust itself is an elusive construct, defined differently across studies and sometimes being referenced by the related terms of 'ethos' or 'credibility.' This lack of uniformity has been a source of criticism.[22] Nevertheless, we rely here on the more general sense of trust as expressed in everyday speech, especially when synthesizing related strands of research across diverse literatures for the purpose of generating practical advice. Noting that this common parlance definition of trust will subsume factors that some studies contrast, we define communicative trust in this paper as a willingness to consider a message favorably based on characteristics related to the message *source*, in contrast to characteristics of the message *content*.

Trust is receiving growing attention within science communication as one of the central issues promoting public understanding and acceptance of science. Priest and colleagues used survey data to show that differences in trust in institutional actors mattered more for the acceptance of a range of technologies than individual knowledge or education levels.[23,24] This importance of trust for science acceptance has been echoed in topics as diverse as vaccines,[25] the food industry[26] and stem cells.[27] Studies examining environmental and climate change issues also recognize the relevance of trust, with recent articles finding that the link between knowledge and concern about climate is dependent upon trust in scientists[28] and that trust mediates the relationship between the perceived motives of scientists and acceptance of climate change messages.[29] All this supports Brian Wynne's claim that the recent calls to restore the public's trust in science represent the latest paradigm within science communication.[30]

How can trust be secured? Some of the earliest work conceptualizing trust in the communication discipline was conducted by Hovland and colleagues who looked at how factors associated with the source providing information, rather than the content of the information itself, would influence acceptance of a persuasive message.[31] Research into such 'source factors' has expanded from these early studies, resulting in a long list of factors that influence trust in the speaker. These include expertise, experience, occupation, education, clear delivery, dynamic delivery, citation of evidence, humor, similarity to the audience, likeability, and physical attractiveness.[32,33] Empirical research suggests that as a source factor becomes more favorable, such as a communicator having a more prestigious occupation, speaking more clearly, or being better looking, the audience's acceptance of the information increases as well. Risk communication literature supplements these factors, noting that the determinants of trust go beyond perceptions of knowledge and expertise, depending also on perceptions of openness, honesty, concern, and care.[34]

The obvious conclusion is that in order to increase the acceptance of their messages, climate scientists should work to shift as many of these factors as possible in their favor. It has been suggested, for example, that choosing a spokesperson for science from within a community will result in greater science acceptance by that community.[2,35,36] Communication materials directed at scientists make recommendations about dress, vocal delivery, humor, and 'personality.'[37,38] This is important advice that can improve scientists' communication with lay audiences. Unfortunately, research has also revealed that these source factors are inconsistent predictors of influence.[33]

This inconsistency can partially be explained by a dual-processing model of cognition from the persuasion literature, introduced as the Elaboration Likelihood Model,[39] later refined into the Heuristic Systematic Model,[40] and now underlying many models within the psychological sciences.[41] These models recognize that humans have two broad capacities for processing information. One—sometimes called 'heuristic' or 'peripheral' processing, or most simply 'Type 1'—is rapid, low effort, based on rules of thumb and associations, and generally unconscious. The other—'systematic,' 'central,' or 'Type 2'—is slow, high effort, analytic, and at least partially under conscious control. The former allows us to respond quickly and easily to the flux of circumstances: to run away from the tiger, without pausing to think. The later allows us to reason our way through complex problems: to make prudent decisions about retirement investments.

Persuasion research suggests that source factors appear to have the most influence on judgments when the audience is employing Type 1 processing, but have less direct impact when audiences use Type 2 instead.[32] In a pair of classic studies, attitudes towards a topic of high relevance to the audience were found to be primarily affected by the quality and quantity of the arguments presented. By contrast, when the proposal was of low importance, audiences were influenced primarily by the communicator's apparent expertise[42] or likeability.[43] Such reliance on source factors is not lazy or irrational; instead, it is a prudent strategy for actively managing the flood of

information characteristic of contemporary life.[24,44] As one persuasion theorist has commented:

> For issues of little personal relevance, receivers may be content to let their opinions be shaped by the communicator's apparent credibility; for such an issue, it is not worth the effort to follow the details of the arguments. But for highly relevant topics, receivers will be more likely to attend closely to the details of the message, to scrutinize the communicator's arguments and evidence, and to invest the effort involved in thinking closely about the contents of the message—and the comparatively greater importance of the message contents means that the communicator's credibility will play a small role than it otherwise might have.[32]

What does this mean for the communication of climate science? The public controversy surrounding climate science and policy creates conditions under which key audiences are likely to employ the more effortful, Type 2 critical thinking. Audiences tend to adopt a Type 2 approach when the topic has significant personal consequences, when it relates to their personal values and when they expect to interact with others about it.[45] Prior knowledge about the topic and the presence of multiple, competing messages on the topic have also been identified as increasing the likelihood of elaborated processing.[32] Several of these factors are likely to be triggered for doubtful and dismissive audiences, who rate their involvement in politics high[14] and believe policies to address climate change will be very costly.[15] But if key audiences will process their messages with Type 2 cognitive approaches, then enhancing the likeability, humor, delivery, and attractiveness of climate scientists will not help them communicate more effectively. Where trust is most needed, it is least likely to be gained by relying on the source factors identified in empirical scholarship on persuasion.

As noted earlier, trust is a risky undertaking. It is natural for lay audiences to exercise a degree of reasonable skepticism or 'epistemic vigilance'[46] when considering whether to trust any of the purported experts pressing their views upon them. Source factors such as humor, similarity to audience, and verbal delivery can enhance trust among the disengaged or already somewhat trustful audiences who process climate messages with Type 1 cognitive mechanisms. Among audiences already doubtful and dismissive of climate science, who are primed to use Type 2 thinking processes in considering messages, communication which aims to promote trust by enhancing source factors is unlikely to be effective.

CREATING THE GROUNDS FOR REASONABLE TRUST

Experts such as climate scientists thus need communication methods for demonstrating their true trustworthiness to doubtful and dismissive audiences. To identify such methods, we look here for insights from another communication subfield: rhetoric. Contemporary rhetorical studies adopts humanistic methods to examine how communication can take place even in the midst of controversies. Rhetorical studies also has a traditional focus on messages that provide reasons addressed to audience's Type 2, critical thinking mental processes. This section presents an account of how speakers earn trust which has been developed within rhetorical studies and which draws in addition on related scholarship from philosophy, information economics and argumentation theory on the reasons that interactions can proceed even in the face of substantial distrust.

Consider first the 'market for lemons,'[47,48] based the work that won George Akerlof a Nobel prize and which has since become a commonplace example of how transactions can go forward even when there are grounds for distrust. The used car dealer is an expert of a sort; she is in a uniquely good position to know whether a car she is selling was owned by an old lady who only drove it on Sundays, or is instead a poorly maintained clunker. Since the dealer stands to profit from misrepresenting the car's condition, the buyer has little reason to trust her statements. How then can the transaction go forward? One way is for the dealer to voluntarily offer a guarantee, committing herself to repairing the car if it goes bad and providing a replacement in the interim. This guarantee offers the buyer two rationales. First, he can conclude that it doesn't really matter whether the car is a lemon, since he will have transportation in any case. But second, he can also reason that the used car dealer would not recklessly incur the costs of replacing and repairing a lemon; she would not offer such a costly guarantee unless she was confident that the car was a good one. The dealer's willingness to offer of a guarantee thus signals[48,49] her trustworthiness. It gives the buyer a reason to trust her, believe what she says about the car, and go forward with the deal.

Gambetta and Hamill[49,50] have found similar reasoning in their ethnographic study of trust among taxi drivers in violence-prone neighborhoods of New York and Belfast. Here, the passenger is the expert: she knows better than the driver whether she is planning to rob or hurt him. In response, drivers screen passengers for signs of trustworthiness that would be costly to fake: age, for example, or gender, or conspicuous wealth. In contrast, signs that are cheap

to fake are discounted, or even taken as warnings; thus drivers consider a passenger's extra efforts to 'persuade them how nice he is' (p. 211) to be a reason for distrust. How then can a passenger who isn't an elderly woman in a mink coat ever get a cab? Gambetta and Hamill's work shows that passengers can enhance their apparent trustworthiness by increasing the costs, risks and burdens they undertake in asking for a ride. For example, a passenger can reveal her identity by telephoning for the cab and giving a phone number and address. A passenger can give up on her privacy and actively invite probing from the driver that would reveal her potentially dangerous background. Or a passenger can go out of her way to be picked up at a safe location, such as in front of police station. These actions by the passenger permit the driver to reason that the passenger would not so increase her risk of being caught, unless she was confident that she intended him no harm. The passenger's increased vulnerability gives the driver a reason to trust her good will, and give her a ride.

In one leading view, the same rationale for trust is in fact created whenever we say anything. Communication, like used car sales and taxi rides, involves asymmetrical information; the speaker, more than the audience, knows whether she is telling the truth. How then can a member of an audience ever trust a speaker's mere words? According to the assurance theory of the basic speech act of saying something, in offering information to another, the speaker commits herself to the truth of what she says.[51–53] If the information later turns out to be wrong, the audience can rightfully hold her responsible and blame her for her error. The speaker's openly undertaken vulnerability gives the audience a reason to believe her. He can conclude that she would not risk the resentment she would now incur by misleading him, and judge that she is trustworthy in providing him information.

These cases point to a general communication strategy for building trust, even when the audience is distrustful and is employing Type 2 cognitive processing. In each case, the person with the unique knowledge does something to put herself at risk. By voluntarily undertaking such vulnerability, the speaker enters into an on-going relationship with the audience, a relationship in which she risks being penalized by him if things go wrong. Her undertaking thus creates a situation where the audience can reason: 'she would not risk this unless she was confident about what she is telling me.'[54] The speaker's undertaking of vulnerability has thus given the audience a good reason to trust her—a reason that can withstand critical scrutiny by Type 2 critical thinking.

GOOD REASONS FOR TRUSTING CLIMATE SCIENTISTS

It may be uncomfortable to admit, but from the point of view of vigilant laypersons, climate scientists may resemble used car salesmen. They purvey a product whose quality can't be easily verified by the layperson, who is not in a position to assess whether the scientist is speaking within her particular expertise and presenting a full and fair overview of current knowledge.[55] Although distrust of experts can be driven by nonrational factors,[56] some degree of epistemic vigilance is indeed reasonable. When communicating with reasonably distrustful audiences, climate scientists may therefore want to consider the following four rhetorical principles, suggested by the account of earning trust sketched above.

Make yourself vulnerable. Central to legitimate distrust is the audience's calculation that the expert appears to have something to gain by being untrustworthy. Central to overcoming distrust is thus creating circumstances in which the expert manifestly has something to *lose*. This may be achieved by making a commitment as small as just to keep a conversation going between scientists and those who doubt them. The climate scientist making such a commitment risks aggravation and waste of time should the conversation remain unproductive. She furthermore faces a real risk of becoming the object of the kind of personal attacks familiar in the climate debates generally. Her willingness to undertake such risks—her willingness to promise to keep on showing up and listening (in person or virtually) despite the venom—signals her sincere desire for an on-going relationship with the lay audience, and creates the conditions in which a degree of trust may be extended.[57]

In appropriate circumstances, a climate scientist may want to consider undertaking an additional commitment, not only to show up and listen but also to support what she is saying with good arguments. Taking on such a burden of proof can address an audience's legitimate concerns that their own time is being wasted or that they are being treated unfairly.[58] There is no doubt that any climate scientist will have many good reasons backing up her claims about the climate system. For the scientist, the vulnerability or 'burden' of the burden of proof comes in having to present these reasons to lay audiences. Having committed herself to provide good arguments, the climate scientist will have restricted her right to dismiss lay doubts or objections as unfounded, long-since answered, unqualified or ridiculous. Further, she will be limited in her ability to assert things on her own authority, since the trustworthiness of that authority is precisely what is in question.

It should be understood that the risks the climate scientist undertakes are real (although perhaps sometimes overestimated[59]). If she does not face the possibility of significant tedium, labor, embarrassment, or even personal attacks, she will not address her audience's legitimate distrust. In this sense, to gain trust it may be useful first to give trust[60]—engaging with a distrustful audience, inviting them to treat one with respect.

Empower your audience. The account given above suggests that a layperson will find an expert trustworthy when he is confident not only that she is vulnerable, but that she is vulnerable in a way that he himself can reliably enforce. This presents a particular challenge to climate scientists. While a buyer can tell when a used car breaks and can be confident that he can hold the dealer to her guarantee, there are few if any human-scale metrics a layperson can use to detect when climate science 'breaks,' nor does the layperson have much direct leverage over the climate scientist. To earn trust, the climate scientist should aim to empower her lay audience to the extent possible, adopting an attitude of openness and putting them in a position to assess her statements and hold her responsible for them.[57,61] Institutional mechanisms to create a 'common climate language' which audiences can understand,[62] to secure transparency of data for audiences to analyze,[1,19,63] to ensure accountability for scientific misconduct,[27] and to promote public participation in the research, assessment, and policy processes[64–66] can help the individual climate scientist achieve this goal.

Take responsibility for being wrong. While it is reasonable to distrust an expert who is always wrong, it is equally reasonable to distrust one who is never wrong. Given the prevalence of human error, the layperson can reasonably suspect that the never-wrong expert is abusing her knowledge and position to cover up her mistakes. Along these lines, it should be remembered that information providers such as the *New York Times* are more trustworthy because of, not in spite of, the fact that they admit errors and issue corrections. Experts likewise are more credible when they present themselves as less certain[67] and when they acknowledge the existence of misconduct.[27] The climate scientist who shares with her lay audience her mistakes, her changes of mind and her uncertainties will sharpen her audience's reasons for trust.

Start small. In addition to increasing her own risks, the climate scientist can work to reduce the risks on her lay audience, inviting them to take just small steps towards trust. Issues of policy can be separated from issues of science, for example; detection of climate change can be separated from its attribution; and the attribution question itself can be broken down into different possible forcings. The less consequential the issue, the easier it will be to earn trust (Box 1).

An example of how these four communication principles work in practice will serve to conclude this section. In the United States, television weather reporters are the second most trusted source for information about global warming.[68] It is likely that weathercasters are trusted in part because they are selected for likeability, humor, good looks and other factors that appeal to viewers' Type 1, quick-and-dirty thinking processes. It is worth noting, however, that viewers also have good reasons for trust that stand up to Type 2 critical scrutiny. Local televisions stations have a strong interest in retaining viewers and are thus very vulnerable to being turned off. Viewers are well able to judge when predictions turn out to be mistaken; they also have the power to flip the channel in response. Weathercasters are blessed with frequent opportunities to demonstrate how they take the consequences of being wrong. And they are asking for only a mite of trust, in statements about the next few days' weather. It is therefore reasonable for viewers to trust weathercasters to work as hard as they can to bring them accurate forecasts.

BOX 1

EARNING TRUST ONLINE

The blogosphere conveniently allows climate scientists to engage diverse audiences without leaving their offices. Judith Curry's blog *Climate Etc.*[69] has put the rhetorical principles identified here into practice over the past 3 years. Curry has invested her time to work up three to five posts per week, which has also required breaking down the larger issues into smaller daily chunks. She reads (or at least scans) from 150 to 1000 comments on each post, and not infrequently writes about what she has learned from them. She has welcomed to the blog participants representing the full range of knowledge and views on climate change and climate policy—with the more doubtful and dismissive perhaps being the loudest voices. As is typical in an online forum, ad hominem attacks are frequent in the comment threads. Some of them are leveled against Curry herself, especially for dignifying possibly marginal points of view by choosing to write about them. But the blog's regular participants ('denizens') often come to her defense. Curry's undertaking of the burdens and vulnerabilities of blogging has apparently

laid the groundwork for mutual trust, creating one of the few places online where people find it worthwhile to debate each other on climate issues, and worthwhile also to listen in to those debates.

CONCLUSION

In this review, we have focused on communication theories that can orient climate scientists to gaining and maintaining the trust of lay audiences. Social scientific approaches to communication recommend that scientists enhance their likeability, invigorate their delivery and use humor in order to sustain the trust of the favorable or disengaged audiences who are likely to process messages using Type 1 cognitive mechanisms. Complementing this advice, the humanistic approach to communication taken in rhetorical studies provides recommendations for addressing doubtful and dismissive audiences likely to process messages using Type 2 cognitive mechanisms. Audiences exercising epistemic vigilance recognize that they are undertaking a risk when they accept a scientist's word; climate scientists can provide such audiences good reasons for trust by conspicuously enhancing the risks that they themselves undertake in response.

Gaining and maintaining trust is only the first step in what must be an on-going effort to communicate climate science. But it is a necessary step. As a recent editorial in *Nature* concluded, 'scientists will be only as persuasive as they are trusted—which means that preserving and cultivating the public's trust must be the scientific community's top priority.'[70] The overall message of this review is that climate scientists bear substantial responsibility for securing the trust of their lay audiences. Trust and mistrust are not static, background properties of social interactions. Instead, appropriate communication can create opportunities to get on an 'escalator of increasing trust' in which a judgment to extend trust in small ways leads to further interactions that confirm trustworthiness.[71] Inappropriate communication, by contrast, can create a downward spiral, where distrust leads to limiting interactions and reinforces suspicions. To climb on the upward escalator, a climate scientist might attempt to present herself strategically in ways that her audience finds trustworthy—that is, she might try to play a role. But climate scientists are unlikely to be capable of pulling off strategic manipulation of audiences, especially with doubtful and dismissive audiences who exercise a degree of epistemic scrutiny. As Brian Wynne has commented:

> it is simply not possible to expect the other in a relationship to trust oneself, if one's assumed objective is to manage and control the other's response. The only thing which one can expect to control, and to take responsibility for, is *one's own trustworthiness*—but this cannot encompass the reaction of the other in the relationship.[30]

The theories reviewed in this essay point to strategies for climate scientists to earn trust by making apparent what is in fact the case: that they are willing to sacrifice in order to engage even doubtful and dismissive audiences, that they invite critical scrutiny, and that they are committed to full transparency in regards to data, analysis, limitations, and errors. By undertaking such vulnerabilities, climate scientists put their lay audiences in a position to assess for themselves the true trustworthiness of climate scientists.

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