Aiming for Social or Political Robustness? Media Strategies among Climate Scientists

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Abstract

This study examines climate scientists' views on media science communication and their strategies for dealing with journalists and climate deniers. Drawing on scholarly calls for openness and public engagement, particularly the concept of "socially robust knowledge," this paper discusses how climate scientists weigh concerns of control, openness and transparency when considering how to best communicate with the public through the mass media. I argue that "socially robust knowledge" neglects the challenges of "medialization" of climate science, and propose that the climate scientists' strategy can better be described as attempts to achieve "politically robust" communication.

Keywords: climate science; science communication; mass media; scientists' understanding of publics; socially robust knowledge

"Climategate": A Crisis of Trust?

The so-called Climategate affair can be seen as a symptom of a crisis of trust in climate science. In November 2009, documents, e-mails and data from a backup server at the Climatic Research Unit (CRU) at the University of East Anglia were unlawfully made public by either a hacker or an insider. Climate denialists, or "skeptics", dubbed the affair "Climategate," to indicate a large-scale scandal, and attempted to use the climate scientists' private e-mails to debunk the theory of anthropogenic climate change. Such "attacks" on climate science are not

new. Nevertheless, the e-mails provided climate deniers "with a golden opportunity to voice their views and challenge climate science" (Nerlich, 2010, pp. 420-421), giving them material they could spin as a "smoking gun that revealed a global conspiracy by scientists to dupe the world about man-made climate change" (Pearce, 2010, p. 4), and the assault on climate science was helped along by the news media, who adopted the framing created by the deniers (see Pearce, 2010; Ryghaug & Skjølsvold, 2010).

The CRU climate scientists and the University of East Anglia were cleared of all charges by review committees (House of Commons Science and Technology Committee, 2010; Russell, Boulton, Clarke, Eyton, & Norton, 2010). Nevertheless, it is feared that Climategate, together with other similar exposés (e.g. "Glaciergate"), has contributed to a drop in public belief in the reality of anthropogenic global warming. Thus, "Climategate" can be said to represent a continuation of a long-standing, heated media situation with respect to climate science. This paper is an attempt to study the strategies used by climate scientists to deal with the news media and similar public communication spaces. How does a charged context of reception influence scientists' dealings with the news media?

Openness versus Control: Two Divergent Approaches to Addressing the Trust Deficit

To alleviate the damage of Climategate and to avoid similar backlash-type events in the future, review committees and independent scholars alike have all called for more openness. It has been argued that more openness would increase the public's understanding of the processes and practices of science and scientists (Hulme & Ravetz, 2009), as well as improve their reputation (Russell et al., 2010). Sheila Jasanoff suggests that:

> *It will not be enough for climate scientists to be still more scrupulous and transparent toward their peers. Adding more new forms of expertise may increase the credibility of*

> *the field, but it will not fully address the third component of accountability, which involves relations between science and its publics.* (2010, p. 696)

As early as in 1998, Sheila Jasanoff and Brian Wynne argued that if one wanted to avoid such a backlash, one should instead aim for "inclusion rather than exclusion, (...) participation rather than mystification and (...) transparency rather than black boxing" (1998, p. 77).

This call for openness has been heeded. Arguably, there has been a turn toward public engagement in European science policy, concerned with dialogue and deliberation, in which generally, but not always, activities also referred to as science communication or public understanding of science are included, proposed as solutions to declining public confidence in science (e.g., Stilgoe, Irwin, & Jones, 2006). An example of one of the suggested approaches to public deliberation, is the concept "socially robust knowledge", developed by Michael Gibbons and collaborators (1994). They argue that more science communication, more openness and transparency, and the inclusion of the public in deliberations about scientific results and directions, will result in scientific results which are more easily accepted and trusted, i.e., "socially robust." Gibbons et al. use the metaphor of Athen's *agora* to describe space where science and the public meet; the social sphere in which dialogue and participation can bring about agreement about science's goals and methods. Does climate science follow an opening-up strategy to deal with climate skepticism and declining trust in climate science?

There is little research dealing directly with climate scientists' views of mass media communication. However, there are studies of scientists in other fields which may throw light over this. Since the relationship between climate science and the mass media has been characterized by "medialization" (Schäfer, 2009, p. 477; Weingart, 2005) – increased coverage, increased pluralization and increased degree of reported controversy (Antilla, 2005;

Boykoff & Boykoff, 2004; Ryghaug, 2006), we can fruitfully draw on studies concerned with other scientific fields where medicalization is strong, such as biomedical sciences, nanotechnology or aquaculture. What can we learn from research on science's views of science communication and public engagement in these fields?

This research has shown that scientists are often quite open to stakeholder engagement, conceiving such activities as important and have the potential to improve science (Burchell, Franklin, & Holden, 2009; Young & Matthews, 2007). In one sense, then, this research has revealed that the so-called deficit model – a conception of the public as undifferentiated and generally in need of more knowledge and education – is increasingly replaced, by an image of intelligent, supportive and scientifically capable publics (Burchell et al., 2009; Davies, 2008; Young & Matthews, 2007). However, Young and Matthews (2007) showed that even if scientists are quite open to stakeholder engagement, they can still be skeptical of increased openness in communication through the media. Other studies have found that scientists fear that the public cannot understand and cope with uncertainty (Boer, McCarthy, Brennan, Kelly, & Ritson, 2005; Frewer et al., 2001; Stilgoe, 2007) and that they are vulnerable to malignant actors such as anti-science groups and mass media who are held to misunderstand and sometimes willfully misrepresent available science (Boer et al., 2005; Burchell et al., 2009; Petersen, Anderson, Allan, & Wilkinson, 2009; Young & Matthews, 2007). This shows that it is better to see "new" (public engagement) and "old" ("deficit model") understandings as juxtaposed, perhaps complementing each other, than to see one as replacing the other (see also Irwin, 2006). Which of these conceptions of their publics do climate scientists adhere to?

Some studies of scientists' dealings with the public, and especially with the mass media, appear to indicate that issues of control is still central to many scientists strategies for dealing with mass media and other actors perceived as malignant (Young & Matthews, 2007). Why is that?

Most increased openness strategies, including "social robustness," is based on an idea that a loss or lack of trust is caused by public alienation from science. However, climate skeptics are not necessarily alienated individuals. Several studies show that they often have vested interests, either in "carbon capitalism" (Jacques, Dunlap, & Freeman, 2008; Oreskes & Conway, 2010; Urry, 2011, p. 92) or in traditional power relations between science and society, wishing to "stem the tide" of changes in the science—policy relationship (Lahsen, 2008). Neither is the climate science—public "agora" an uncharged context. Antagonistic audiences will often "read" utterances in radically different ways from the intended meaning, and mobilize because of what it has heard, thereby creating difficulties for maintaining authority and being persuasive (Hajer, 2009, p. 9). A problem with openness strategies' conception of public deliberation, is that they conceive of the public space as one in which the participants have some shared goals and norms, e.g. rational deliberation and a wish to come to an agreement. Gibbons et al.'s concept of the "agora", for instance, does not allow for some groups in the agora to be interested in exactly the opposite, namely, hampering agreement, which is often the case.

Clearly, this might make openness a less likely strategy, not least in light of studies like Holliman's (2011). Holliman found politicized scientific fields, whose scientific findings were continually challenged, were considerably more resistant to ideas of openness and transparency. Holliman argued that in such contexts, scientists will be less willing to share raw data and information for fear of how it may be used. Such a fear among scientists of misuse and misinterpretation of their results has also been found in other studies (e.g., Davies, 2008; Young & Matthews, 2007). Furthermore, studies of scientists' discursive strategies in controversies (e.g., Gilbert & Mulkay, 1984) indicate that often scientists close up more, not less, in situations of controversy, using "boundary work" (Gieryn, 1995) demarcation

strategies to deal with controversy and critics (Burchell, 2007a, 2007b; Michael & Birke, 1994a, 1994b).

As we have seen, many scholars argue that climate scientists should choose an openness strategy, managing the potential trust deficit by opting for social robustness. On the other hand, much previous research suggests that climate scientists will instead choose a strategy of closing up to retain control of the interpretation of their results, which is can be at least partly explained by scientists' adherence to variants of the deficit model of public understanding of science.

Previous research has in common that what is shows is how *conceptions of the public* influence scientists communication and engagement practices. Michael and Brown (2000) argued that such conceptions are part of scientists "lay political science", and Maranta et al. (2003) called them "imagined publics". In this paper, I explore how the scientists construct their audiences – their imagined publics – and how they perceive the challenges of reaching those publics. How do scientists weigh concerns of control and openness when they consider how to best communicate with the public through the mass media? Do they aim for social robustness, or do we need another way of characterizing the scientists' communication strategies?

Data and Methods

My case is Norwegian climate scientists' views on the challenges of climate science communication. Therefore, one may ask if there are special features inherent to the Norwegian situation. First, Norwegian policy and the Norwegian political debate exhibit a considerable amount of acceptance with regard to climate sciences conclusions (e.g., Ryghaug & Sørensen, 2008). Second, we know that the Norwegian general public shows a general acceptance of anthropogenic global warming as a fact, but with an "undercurrent of doubt"

and some hesitancy with respect to the seriousness of the issue (Norgaard, 2006, p. 372; Ryghaug, Sørensen, & Næss, 2010). The media context is fairly similar to that of other countries, with the public debate on climate science marked by the presence of climate skeptics (Ryghaug, 2006).

The prevailing definition of climate science in Norway involves: a) studies of natural processes relevant for achieving an understanding of the climate system, b) studies of the potential effects of climate change, c) studies of ways to mitigate greenhouse gas emissions, and d) studies outlining potential adaptation measures (the Research Council of Norway, 2006). The scientists who are most "under attack" from skeptics are natural scientists who are studying or modeling the climate system or climate system-relevant processes. Scientists of this kind are also the scientists who engage most in climate science communication in Norway. For both these reasons scientists of this kind were considered to have most views on the challenges of climate science communication, and the interviewees selected as the basis for this paper are climate scientists of this type.

Table 1 gives an overview of the scientists interviewed. Sixteen scientists and research managers from six different institutions have been interviewed. All of the important climate institutions were covered. Most of the interviewees have considerable experience with climate research. Since we were most interested in the views of scientists who had some experience with media contact, there is a bias in the sample towards established scientists. All of the interviewees were men, with the exception of one. Their professional background covers biology, climate modeling, physics, meteorology, climatology, geophysics, paleoclimatology, atmospheric physics, atmospheric chemistry and oceanography. For reasons of anonymity, this information is not used in the analysis, but no important insights are lost because of this.

The interview guide contained questions about research methods, science communication efforts and media contact. The interviews lasted between 50-90 minutes, were conducted face to face, recorded and transcribed verbatim. The interviews were conducted in two turns, a first round in 2005 and a second in 2009. The 2005 interviews were conducted by Marianne Ryghaug, the interviews from 2009 by Sunniva Tøsse (author). The 2009 interviews extended the number of interviewees in the sample, and provided supplementary information from two of the most prominent climate scientists in Norway. There were no important differences between the data obtained in 2005 and 2009 with respect to the main research questions, so there was no need to differentiate between the two samples in the analysis.

All of the interviewees had some experience with media contact. Their degree of media experience was assessed by counting the number of new media hits they each had through the Norwegian news media database, *Retriever ATEKST*. A query was carried out for each of the interviewees' full name using climate or weather as the search criteria. The search was done with respect to newspapers with national coverage over the time span from January 1, 2001 to October 1, 2011. The query results comprise all texts printed in the period involving the climate researcher's name, including journalists' articles and interviews as well as letters to the editor and feature articles. "Extensive" media experience is defined as more than 50 hits, "some" media experience as 11-50 hits and "little" media experience as less than or equal to 10 hits.

Table 1 shows that a little more than one-third of the interviewees have "extensive" media experience. Not unexpectedly, these respondents talked more about challenges with news media communication than then respondents with less experience. Consequently, the six individuals with the most experience are quoted more frequently in the analysis than the others. Even so, there were few disagreements among the interviewees. The main difference

between those with a lot of experience and the rest was that the first group had more to say about the issues raised in the interviews.

The analysis was inspired by a grounded theory approach (Charmaz, 2006; Corbin & Strauss, 2008): A qualitative content analysis yielded insight into the elements of climate scientists' mass media strategy. The theoretical overarching concepts of "control," "closing up" and "openness" were then applied, thus attempting to find an overarching concept to characterize their media strategy. This kind of theoretically informed but grounded approach to qualitative content analysis has been called "abduction" (Dey, 2004).

Communicating Climate Science through the News Media: Aims and Reasons

Table 1 reveals a considerable variation in news media engagement among the interviewed scientists, but none of them had zero hits. While some of the interviewees expressed uneasiness with respect to being in the media, there was a general agreement that the news media was a crucial channel for increasing public knowledge about and interest in climate science and climate change. "It is in the mass media that it happens. One newspaper or TV newsflash is worth a 100,000 brochures" (Research Scientist Aass).

Most of the interviewees' research institutions employed a media consultant – often a person with a journalistic background. However, though most of the interviewed scientists mentioned these consultants and described them as important, we shall here focus on the strategies involving direct contact between scientists and news media, like commenting and answering questions, giving interviews, taking part in radio and TV debates and writing feature articles.

The scientists appeared to have an idea of a collective news media strategy, which involved some division of labor concerning who had greater responsibility for contact with the media. There were two main arguments for this division of labor: one formal, and one "personal." First, the two most central climate research institutions were considered more responsible for

climate science dissemination than others. One of these had such dissemination as part of the organization's formal mandate, which its research director described as a "double mandate".

> *One part is to do research and obtain knowledge which is useful for the government administration and society, and the other part is that we shall engage in communication and dissemination about climate and climate change and climate science.*

The researchers at these two climate research institutions emphasized how it was part of their policy to urge their scientists to engage in science communication activities, particularly media contact.

Further, it was common to hold that not all scientists could handle media interaction scientists who were able to popularize climate science and could handle the personal stress of being in the media were sought after. Interaction with the mass media was not something scientists should be forced to do. It appeared that scientists believed that it should be left to those who were more suited to the task.

Apart from this element of a collective media strategy, there was also a general feeling that scientists had a moral responsibility to communicate their research results to some degree

> *It is my opinion that all research institutions ought to have a responsibility to engage in knowledge dissemination. (Research Director Dolmen)*

Scientist Nannestad expressed this as a wish to give the taxpayers their money's worth, giving something back to society:

> *I believe most of us have some degree of professional pride and feel a sort of citizen responsibility. The taxpayers pay my salary, so I feel a duty to inform society. (...) A great deal of our work is [of course] publication of results in international journals.*

That is the backbone of research, publication. But I also think that it is important to disseminate the results, that that is an important part of the job. (Scientist Nannestad)

Further, the importance of the issue of climate change itself provided an added responsibility to inform the public for some interviewees such as Professor and Research Manager Pettersen: "Personally, I feel that at present it is incredibly important. (…) If there was one point in time where I, in retrospect, could not defend doing nothing un-technical it would be now". Several interviewees expressed that they believed that it was "necessary to increase the level of knowledge in the general public" (Professor Christensen). "Clearly, the current situation implies that the general public does not take this as seriously as they should," stated Research Director Dolmen. It appeared that knowledge was believed to increase an awareness of and general belief in the seriousness and urgency of the climate problem, thus possibly helping to spur political action and lead to changes in individuals' behavior.

The general public dominated in the interviewed scientists' discourse about their communication efforts, as the scientists apparently considered the general public to be their primary target audience. Policymakers and politicians were less often explicitly mentioned when scientists spoke of their news media communication efforts. Instead, the groups were implied through references to, e.g. "policy," "political action" and "being on the political agenda." The lack of explicit considerations for politicians and policymakers could arise from scientists' beliefs that this group would be less confusable and gullible than the public, or from a belief that they would also get through to politicians and policymakers by attempting to reach the general public in the best possible way.

Communicating Climate Science through the Media: The Challenges

The scientists interviewed were clearly motivated to communicate climate science knowledge, not least because they felt morally obliged to do so. However, and not surprisingly, they

found climate science communication through the news media to be a challenge. This view appeared to arise from their experiences with – and ideas about – their various "imagined publics" (Maranta et al., 2003), that is, the groups they had to deal with and think about when carrying out climate science communication.

To begin with, we should note that the scientists referred to several publics/audiences when they talked about the challenges of climate science communication through the news media. In addition to the general public, considerations of journalists, environmentalists and "climate skeptics," guided the climate scientists' media strategies. These various groups were considered to pose different challenges for climate science communication.

With respect to journalists, the scientists interviewed complained about the unreflexive application of media norms, as well as journalists' lack of knowledge about science in general and climate science in particular. Professor Christensen exclaimed: "The general level of knowledge is low, and TV hosts have zero comprehension!" Journalists' misunderstanding of science was seen as primarily arising from their lack of knowledge. The scientists provided examples of problematic misconceptions about science and scientists among journalists, and of the harms they considered to arise from this. One example given example of journalists' lack of knowledge was how they often claimed that a particular weather incident was caused by climate change, even though that can never be said with scientific certainty. It was feared that such coverage could give the impression that climate science frequently claimed more than it could prove, leaving it open to attacks by skeptics, in addition to leading the public to believe that climate scientists readily exaggerated their findings. For instance, Research Scientist Nannestad feared that the way climate change had been "played up in the media lately" had led people to disbelieve climate scientists.

Research Manager Carstensen also complained that journalists often wrongly believed that one new research result would change the whole of science:

> *I should have liked for the media to follow the Research Council over a longer period of time so that they would have a network of experts among their contacts and acquire more comprehensive knowledge, because research is based on knowing the totality of the picture. One result does not necessarily change everything completely. But the media often does that [make it sound like that is the case], and thus the media depict scientists as much more fickle than they really are.*

Another complaint was how "it is easy for 'uncertainty' to be read as 'controversy'" *(Professor Fredriksen)*, that is, how journalists often conflated the two terms, thus indicating that knowledge was lacking and the science unsettled. Lastly, journalists were seen as unreflexive and uneducated because of their tendency to give scientists and "skeptics" equal coverage, without questioning the so-called climate skeptics' professional background and scientific merits. According to Research Manager Carstensen, "Many of those [climate skeptics] are not [climate] professionals. They may be scientists in other fields. The media is sometimes a little too uncritical with respect to who the scientists are and what merits they have." This emphasis on always hearing "both sides", and giving them equal weight, was widely unpopular. Research Director Dolmen expressed the sentiment vehemently:

> *Journalists have it almost as a reflex that they should present for and against and that they should polarize, and that that is what's interesting. Now you must not misunderstand me as meaning that those who are skeptical should not be heard, they should, but on the other hand the consensus on this [man-made global warming] is so overwhelming that one should not give the impression that this is a research community divided in the middle, and they are very polarized; and that is simply not the case.*

The interviewed scientists feared that attempts to create "balance" by giving "mavericks" the same amount of coverage as established climate scientists would confuse the public by presenting a biased picture as to the degree of scientific consensus. Did this mean that they saw the general public through the lens of the deficit model?

In general, yes. Although the general public was also considered to be interested in weather, climate and climate research, like Research Manager/Professor Carstensen observed: "The general public is very interested. Everybody forms their own ideas and makes their own observations," absence of behavioral changes among the general public was generally read as a sign that man-made global warming is not understood and taken seriously, as expressed by Research Manager Brekke: "If you consider what we work with at these climate research institutions, and when you look at the increase in CO_2 that Norway is responsible for, we have to say that the knowledge is ignored here in Norway. (...) I believe that the general public in many ways doesn't grasp how serious this really is." Although, scientist Nannestad initially offered a different explanation for the lack of behavioral change in the public, seeing it more as an action deficit than a knowledge deficit: "People know about it, but don't want to do anything about it. If people had taken it in, and believed in the reality of climate change, they would probably change their behavior," Nannestad, too, end up emphasizing how people would probably change their behavior if only the really understood the issue and took it seriously.

The general public was thus seen as lacking in knowledge, especially in-depth natural science knowledge, and lacking a grasp of "how serious this really is" (Research Manager Brekke). They were also seen as gullible to the "creation of doubt" strategies of climate deniers:

> *Average Joe reading the paper might get the impression that there are two views here: The one view is that one has climate change, the other is that one is not having climate*

> *change. Or, that one [either] has man-made climate change, or that it's natural. And if you look to the research community, the view is quite different. In the research community, I would say that there is something like 99.9% agreement that what we see today is climate change that is in part induced by human emissions.* (Professor Fredriksen)

The interviewees argued that increasing the knowledge level of the public would make them less gullible and vulnerable to seduction efforts by the climate skeptics. Several said that they tried to communicate to "straighten the record" (scientist Nannestad), or "get some realism into it [the debate]" (Research Manager Brekke). In accordance with the deficit model, they seemed to have a public education goal for their communication efforts.

It was seen as a challenge for science communication that the public appeared to want juicy and catchy information. Research Director Dolmen articulated the challenge thus:

> *I have faith in dissemination and knowledge, but then there is the question of the form of the dissemination. That can always be debated. Should you frighten the wits out of people or should you do matter-of-fact enlightenment that isn't very exciting, but has much seriousness to it, or what should you do?*

An accurate presentation of scientific facts was seen as potentially too boring, but on the other hand could make dissemination efforts look more serious.

Clearly, varieties of the deficit model were quite pervasive among the scientists interviewed, even if more positive observations about a great interest in weather and climate issues were articulated in the construction of the imagined general public. This construction did not seem to invite social robustness strategies, but not closing up strategies either. The main idea seemed to be to increase openness by increasing media visibility and public communication,

but with the fairly traditional goal of educating the public. Yet, when climate skeptics were considered, the situation changed.

This change was due to a feeling among the interviewed climate scientists that climate skeptics increased the difficulty of getting the climate science message across to the general public. In part, the difficulty was seen to be that the skeptics might confuse the public, but more importantly that the skeptics made the scientists' job of deciding what to say to the press, and how to say it, even more difficult and painstaking. The interviewees defined climate skeptics as rather hostile individuals or groups who willfully overlooked facts, misinterpreted climate science results, presented contrarian views in the media, and accused climate scientists of exaggeration and scaremongering and of feathering their own nests. The skeptics were seen as dangerous seducers capable of confusing the general public about the science of climate change. The interviewees believed that since the general public did not know all the relevant facts, they would have a hard time deciding whose knowledge claims to take seriously. The worry was that the public would take climate skeptics' claims about uncertainty and falsehoods at face value, and conclude that the science of anthropogenic climate change was not yet settled, or worse, that climate science was a fraud.

Perhaps more surprisingly, environmentalists were construed by the scientists interviewed as yet another challenge. Climate skeptics were seen as readily accusing climate scientists of exaggeration and scaremongering actually committed by environmental activists. Such activists were seen to point much too frequently to the most extreme scenarios, overstating the scientific certainty and exaggerating the severity of potential impacts. This worried Professor Fredriksen: "[Environmental organizations] often have more extreme statements than what you find in the research communities or in scientific results. (...) That can have an undermining effect. It easily leads to newspaper and media publicity that may go too far in the wrong direction." The scientists feared that such media coverage might have an undermining

effect because it could give climate research a bad name, giving the impression that climate scientists were involved in scaremongering and underselling the scientific uncertainty.

Further, Research Manager/Professor Carstensen also feared that confusion about whether climate messages came from climate scientists or from environmental activists was exacerbated by the mass media:

> *The media does not distinguish well between researchers and research on the one hand, and research translated and spread by the environmental movement. And they say you can get exaggerations, and you can get articles in the press saying "research report says this and that," and then it's really a report made by an NGO, based on their more or less selective evaluation of research. But it's not a research-based product.*

The interviewed climate scientists felt that their most important task – educating a potentially interested general public – was being made difficult by the three other publics described above: journalists, climate skeptics and environmentalists. And what impact did the challenges have on issues of openness and control/closing up in the climate scientists' communication strategies?

Communicating Climate Science: Strategic Considerations

As we have seen, the interviewed climate scientists pointed out four sources of problems of climate science communication through the mass media: journalists' misinterpretations and misrepresentation of climate science due to lack of knowledge and norms of "balanced" coverage, the general public's lack of knowledge, environmentalists' exaggerations of the climate science results, and climate skeptics' assaults on climate science. How did the scientists address these problems?

With respect to journalists, the main strategy was concerned with control, which was pursued in two main ways. First, many interviewees hoped that if journalists knew more about climate science, this might reduce misunderstandings and help improve climate science reporting. One research institution had created a kind of "exchange program" to educate journalists: a few climate scientists spent some weeks at the office of the local newspaper, and some journalists spent some weeks at the institute. Education efforts of such kinds would, it was hoped, lead to better science coverage, since journalists would then understand more of science, and get it "right" more often. This could be seen as attempts to "control" journalists' climate science representation.

Second, since the interviewees felt that the media gave climate skeptics too much exposure , but that their own ability to control the media –"change the way the media works" in Carstensen's words – was limited, they chose instead, as an effort to gain some control over the public's reading of the media coverage on climate science, to try and educate the public to be able to distinguish between experts and non-experts:

> *We try all the time to inform based on the facts and we try to comment on what we see as provably wrong. (…) We criticize harshly those who misinterpret observations or who do not relate to the observations that exist. (…) I think that it is important to raise doubt about those who misinterpret the observations or don't relate to the observations. (Professor/Research Manager Pettersen)*

Of course, to educate the public to recognize certified expertise is also a way of educating about climate science. With respect to communicating with the general public, such efforts are not obviously about control. Rather, since the climate scientists could not rely on scientific authority, they had to perform some type of public proof, thus pursuing social robustness.

However, the arguments also had to be interesting. The scientists needed to combine proof and drama, which Professor Fredriksen articulated in the following way: "The fact that the mean temperature will increase by two degrees is not interesting to the general public, only to a weather scientist. It is the extremes that are the most catchy, so to speak." At the same time, there was a danger of "going too far." Research Manager Nordheim described the challenge of being both scientific and interesting in the following way:

> *I notice that I become apprehensive about maximizing the problem and afraid of not being taken seriously by going too far. (…) If we natural scientists formulate our message much stronger, we get arrested by those who sit and look for slips, right? And then that is used as an example of the way we maximize the crisis and you should not listen to what we say and everything. (…) We truly cannot tabloidize this because it becomes too easy to attack.*

This quote emphasizes that there are risks involved in overstepping the line and overstating scientific findings. This exemplifies challenges of doing science communication in situation of heated political controversy. Such risks made the climate scientists engage in boundary work with respect to environmentalists:

> *"It is clear that environmental organizations play an important role in keeping this issue [global warming] on the agenda. I think they could be even better at giving a realistic picture of what it is about. A little too easily, it becomes – not doomsday prophesies, perhaps – but a little too much crisis maximization.* (Research Director Dolmen)

Professor Fredriksen argued similarly that:

> *Researchers, and climate researchers especially, are often accused of scaremongering. And that applies to the environmental organizations as well. At least, some of them are*

much better than us at fear mongering and scare scenarios. So I will say we ought to stick to a neutral line, indicating the most probable development, and then say something about the uncertainties. (...) We have learned that all climate research can easily be labeled as "bad science." I think it is very unfortunate that people misinterpret results [in these ways].

Of course, such statements are in accordance with the ethos of science. However, instead of fearing correction by their peers, the interviewed climate scientists' concerned was what climate skeptics would make out of statements that went beyond accepted scientific results. Climate skeptics were seen as readily accusing climate scientists of exaggeration and of underplaying uncertainty. This seemed to make the striking of a proper balance between popularizing and staying sufficiently scientific particularly acute.

Clearly, it was the general public that was the main audience of the climate scientists. By reaching out to them, the interviewed scientists mean to fulfill moral obligations with respect to dissemination, but also to influence policy and induce behavioral changes. Yet, this communication could not be carried out unless three other publics were considered: First, the journalists who populated the main channel of dissemination of knowledge – the news media; second, environmentalists who might be confused with climate scientists, and third, climate skeptics who were seen as eager to distort the dissemination of climate science.

Hence, while a kind of social robustness strategy – based on public proofs – could be used with respect to the general public, the public proofs could not be performed without considering the other three publics and how they might intervene in the process. As we have seen, this was considered to call for caution. The interviewed scientists' response was to formulate their statements about climate science in ways that made it difficult for climate skeptics to criticize or counter them on seemingly scientific grounds. They tried to achieve

this by avoiding what could be considered weak spots – errors, exaggerations or omissions – whereby the validity of climate science could be challenged. In addition, they engaged in boundary work with regard to both environmentalists and climate skeptics to make their own expertise trustworthy as science, in contrast to the two other parties, characterized as unscientific.

The interviewed climate scientists emphasized the need to avoid factual errors and exaggerations to the degree that their main communication strategy could be described as a "guarded approach." The ideal was to always be a "credible supplier of facts that no one manages to criticize" (Research Scientist Aass). In this sense, the main object of control was the group of the scientists themselves. Such control was necessary because the scientists engaged in what could be called a guarded – or controlled – openness. As we saw above, the climate scientists emphasized the need to be open about uncertainties while being clear about what was certain – anthropogenic global warming – in a manner that preempted challenges. This suggests that the contrast between openness and control, which was presented in the theory section of the paper, is misleading. The communication strategies of the interviewed scientists seemed to contain elements of both. How can we best characterize this?

From Social to Political Robustness

As noted in the introduction, climate science has been under assault. It has been proposed that the potential trust deficit which may emerge from events such as "Climategate" should be met with more openness. The concept of social robustness (Gibbons, 1999; Gibbons et al., 1994) contains some fairly concrete ideas about what more openness could mean, namely making research work more transparent to the public, including an increased emphasis on the conduct of public proofs. How do such ideas about openness compare with how the climate scientists interviewed accounted for their efforts to publically communicate climate science?

With respect to the general public, a major concern among the climate scientists was their feared lack of knowledge about climate change and climate science. The interviewed climate scientists felt obliged to try to counter this deficit by informing about their research, which they largely did through the news media. We can see this effort as an engagement in public proofs, but – judging from the scientists' accounts – increased transparency with respect to their research work was not considered important. Moreover, the attempts to give public proofs were undertaken with the explicit understanding that climate skeptics would scrutinize every detail of their arguments, looking for mistakes they could use to undo the proofs and undermine public trust in climate science.

This situation demonstrates an important weakness with the concept of social robustness, namely the implicit assumption that science communication takes place in a situation in which all parties have a positive interest in learning. The main problem with the argument of Gibbons et al. (1994) is that they conceive of the agora – the place where science and society should interact – as being based on rational communication. The experience of the climate scientists interviewed was that they instead had to educate the public in a highly political space, filled with conflicting interests. This made them pursue openness in a cautious, controlled manner. Rather than using a communication strategy based on social robustness, we could characterize their efforts as going for what I will call *political robustness*.

Political robustness supplements the concept of social robustness by introducing the need to cope with a communication situation characterized by social, economic and political conflict. Even so, political robustness is not a back-to-the-ivory-tower strategy. It ensures some openness: we saw in the previous analysis how scientists accepted public accountability and openness in the sense of communicating their findings and interacting with the news media. This parallels the findings of Young and Matthews' (2007) interesting study which revealed

that distrust of the news media agora does not necessarily imply a rejection of public engagement activities.

The concept of political robustness addresses some of the potentially problematic issues with respect to how to exercise some control over how scientific information is received in situations where other parties incessantly try to deconstruct and debunk the information. Table 2 summarizes the argument by comparing the normative concept of social robustness and my, empirically grounded, concept of political robustness.

The findings in this paper should not be interpreted as a dismissal or falsification of social robustness as a potential ideal for science communication. However, what we empirically observe is that the climate scientists interviewed consider such openness as too risky. This is above all due to the strong medialization of climate science, with a high degree of controversy and politicization. Multiple groups of actors, with different political agendas and views, produce a high level of conflict. Scientists hence adopt political robustness as their main communication strategy to cope with this situation, while maintaining what they see as their public accountability and their obligation to deal with the perceived knowledge deficit. Social robustness may appear as a strategy that is too novel and unproven. Maybe it stands a better chance in other, less conflict-ridden scientific areas?

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Table 1 - The interviewed scientists (the names are pseudonyms to retain their anonymity)

Year when interviewed	**Interviewees**	**Age when interviewed**	**Media exposure**	**News media hits 2001-2011**
2005	"Dolmen" – research director	50-60	extensive	334
2005, 2009	"Pettersen" – research manager/ professor	40-50	extensive	152
2005	"Nannestad" – scientist	30-40	extensive	123
2005	"Jonassen" – research director	50-60	extensive	82
2005, 2009	"Carstensen" – research manager/ professor	50-60	extensive	73
2005	"Finstad" – professor	60-70	extensive	63
2009	"Nordheim" – research manager	40-50	some	28
2005	"Falkberg" – professor	50-60	some	17
2005	"Fredriksen" – professor	30-40	some	16
2005	"Brekke" – research manager	50-60	some	15
2005	"Bakken" – professor	50-60	some	13
2005	"Nilsen" – research dir./professor	50-60	little	10
2009	"Namdal" – department manager	60-70	little	8
2005	"Kronstad" – professor	60-70	little	7
2005	"Andersen" – research scientist	40-50	little	6
2005	"Aass" – research scientist	50-60	little	1

Table 2 - Social and political robustness – summary of main dimensions.

	Social robustness (after Gibbons, 1999 and Gibbons et al., 1994)	**Political robustness**
Role of the public	Included/involved – speaking back	Included as recipients of information, but not intended to speak back.
Strategy for making knowledge	Knowledge is constructed in dialogue with the public.	Knowledge is ready-made and fashioned to minimize misunderstanding, misuse and distortion.
Contestation	Controversy is seen as positive since it contributes to increased robustness of knowledge in the long term. Society should be allowed to speak back to science.	Controversy is considered dangerous since it may erode the public's confidence in science.
Strategy for communication	Emphasis on openness in the sense of transparency and participation, boundary work not important.	Cautious openness, emphasis on control of knowledge transfer, follows an education format, boundary work is important.
Openness rationale	Transparency and participation	Public accountability
Reason for communication	Including public concern into science	Educating the public, influencing policy, attitudes and behavior