

BACKGROUND PAPER TO THE 2010 WORLD DEVELOPMENT REPORT

Cognitive and Behavioral Challenges in Responding to Climate Change

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Development Economics
World Development Report Team
May 2009



Abstract

Climate scientists have identified global warming as the most important environmental issue of our time, but it has taken over 20 years for the problem to penetrate the public discourse in even the most superficial manner. While some nations have done better than others, no nation has adequately reduced emissions and no nation has a base of public citizens that are sufficiently socially and politically engaged in response to climate change. This paper summarizes international and national differences in levels of knowledge and concern regarding climate change, and the existing explanations for the worldwide failure of public response to climate change, drawing from psychology, social psychology and sociology. On the whole, the widely presumed links between public access to information on climate change

and levels of concern and action are not supported. The paper's key findings emphasize the presence of negative emotions in conjunction with global warming (fear, guilt, and helplessness), and the process of emotion management and cultural norms in the construction of a social reality in which climate change is held at arms length. Barriers in responding to climate change are placed into three broad categories: 1) psychological/conceptual, 2) social and cultural, and 3) structural (political economy). The author provides policy considerations and summarizes the policy implications of both psychological and conceptual barriers, and social and cultural barriers. An annotated bibliography is included.

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Cognitive and Behavioral Challenges in Responding to Climate Change

Background Paper prepared for the World Development Report 2010

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CONTENTS

NATURE AND SCOPE OF THE PROBLEM.....	3
We Are All Affected, But Not Equally.....	3
NATIONAL AND REGIONAL DIFFERENCES IN RESPONSES: GLOBAL CONCERN AND AWARENESS REGARDING CLIMATE CHANGE	5
Information and understanding.....	6
Concern.....	8
Is there a link between information and concern?	12
Is there a link between information and action?	13
EXPLANATIONS FOR LACK OF RESPONSE	14
A disciplinary primer: assumptions and frameworks from relevant fields.....	16
Four existing explanations	17
“If people only knew”	17
“If people only cared”	23
Hierarchy of needs	24
“All is well”	25
THE SOCIAL ORGANIZATION OF CLIMATE DENIAL.....	26
“We don’t really want to know”	26
Risk, modern life and fears regarding ontological security	29
A series of negative emotions	30
Helplessness.....	30
Fear of guilt.....	31
Fear of “being a bad person”: Individual and national identity	32
Difficult to link to daily life	33
COGNITIVE AND BEHAVIORAL BARRIERS TO ACTION.....	33
Psychological and conceptual barriers.....	34
Social and cultural barriers	35
Political economic barriers	36
ANALYSIS OF CLIMATE CHANGE DISCOURSE IN MEDIA.....	38
Presence of climate change as a serious topic	38
Framing climate change in news media.....	39
Media messages about responses to climate change: can anything be done, and if so, what...	42
POLICY CONSIDERATIONS	43
ANNOTATED BIBLIOGRAPHY	48
ADDITIONAL WORKS CITED.....	72

NATURE AND SCOPE OF THE PROBLEM

Climate scientists have identified global warming as the most important environmental issue of our time, but it has taken over 20 years for the problem to penetrate the public discourse in even the most superficial manner. While some nations have done better than others, no nation has adequately reduced emissions. No nation has a base of public citizens that are sufficiently socially and politically engaged on the problem. Sociologists have identified a widespread lack of public reaction to scientific information regarding climate change. By “reaction” sociologists include the widest possible range of reactions from planning by federal and state officials, to social movement activity, to individual behavioral change, or even acknowledging the information by letting it cross our minds or talking about it with friends and family. Now the Intergovernmental Panel on Climate Change calls for reductions of 50 to 80% in greenhouse gas emissions by 2050 (IPCC 2007). Although public concern is beginning to arise, climate change has been neither a policy issue, nor publicly salient in the broadest sense. Why is this the case? And more importantly, given the seriousness of future climate scenarios, is there anything that can be done?

We Are All Affected, but Not Equally

On the one hand, scholars have suggested that climate change – as a profoundly serious and global environmental problem – offers a new opportunity for global solidarity and unity. After all, climate change is one of the few issues that is affecting or will affect everyone on the planet. Yet, although climate change will eventually impact each of us, differences in infrastructure and locality profoundly affect vulnerability (IPCC 2007). Poor people in some parts of the world already bear the brunt of the burden, while wealthy people in industrialized nations still feel climate change is abstract and distant from their daily lives (Norgaard, 2006, Nisbet and Myers 2007, Brechin 2008). We know that global warming will precipitate the most extensive and violent impacts to date against the poor and people of color of the globe. There are also regional differences in who feels the most severe impacts, with people living in the arctic, on islands, and in low lying coastal regions on the front lines (IPCC 2007, Baer and Singer 2009, Roberts and Parks 2007, Congressional Black Caucus Foundation 2004, Redclift and Sage 1998). For this

reason, in addition to being a major environmental problem, global climate change is a highly significant issue of global environmental justice (Athanasidou and Baer 2002, Baer et al. 2000, Agarwal and Narain 1991, Donohoe 2003, Roberts 2001, Roberts and Parks, 2007, Pettit 2004). Furthermore, industrialized nations of the Northern hemisphere emit greenhouse gases disproportionately to the global airshed, while lack of resources and infrastructure place poor nations most at risk (Watson et al. 1998). While the phrase environmental justice was at first applied mostly to domestic situations (e.g. Bullard 1990), there is increasing attention to a global environmental justice approach that identifies links between human rights and environmental degradation (Athanasidou and Baer 2002, Roberts and Parks 2007).

Climate change is an issue of global environmental justice on at least four dimensions: 1) wealthy industrialized countries of the Northern hemisphere contribute disproportionately to the pollution of the common global airshed (IPCC 2007); 2) low lying geography and weaker infrastructure mean that consequences of global climate change will be worse in the poorer nations of the Southern hemisphere (Watson, et al.. 1998, Roberts 2001, Roberts and Parks 2007, Guha 2002); 3) climate treaty negotiations have favored industrialized nations in terms of both outcome and process (Baer et al. 2002, CSE 1998); and 4) intergenerational equity: those alive today are negatively altering the earth's atmosphere and climate, reducing its capacity to sustain life for generations to come (Athanasidou and Baer 2002, Agarwal and Narain 1991, Howarth and Norgaard 1990).

The fact that not everyone is equally impacted by climate change will be discussed below in the context of behavioral and cognitive challenges that are posed in responding to it. Differential impacts are also important here in the context of patterns of response since part of differences in response are presumably due to differences in the directness of perceived effects. Indigenous communities in the Arctic and urban dwellers in wealthy industrialized nations form two opposite poles of this spectrum.

Indigenous communities in the Arctic are an example of a group on the front lines of experiencing direct impacts from climate change (IPCC 2007, Arctic Climate Impact Assessment 2004, Trainor, et al. 2008). This is so because of their location in the Arctic where changes happen faster, because cultural ties to land have not yet been severed such that people retain subsistence activities, because culture and social structure are organized around conditions of the

natural world, and because many communities have fewer economic resources to respond. For these reasons, northern indigenous people face a very different set of material as well as psychological experiences in the face of climate change. Yet while there are fewer mechanisms pointing towards denial as a psychological barrier to action, barriers in the form of social, political and economic capital are significant.

Developed Nations- Public Apathy? Public Ignorance? Despite the extreme seriousness of this global environmental problem, the pattern of meager public response in the way of social movement activity, behavioral changes or public pressure on governments is visible in all Western nations (Brechin 2003, Dunlap 1998). Countries of the “North” where citizens are well educated and have economic resources to make behavioral changes are not doing so as might be expected. Especially for urban dwellers in the rich and powerful Northern countries environmental concerns such as climate change are seen by many as “no more than background noise” (Brechin 2008). Instead there is a pronounced ability to “distance oneself from information” (Norgaard 2006a and 2006b, Stoll-Kleeman et al. 2001, Kellstedt et al. 2008).

NATIONAL AND REGIONAL DIFFERENCES IN RESPONSES: GLOBAL CONCERN AND AWARENESS REGARDING CLIMATE CHANGE

The Intergovernmental Panel on Climate Change was founded in 1988 and has produced widely publicized reports on the state of climate science since the first assessment was released in 1990. As we will see in the media analysis below, climate change has been visible in news media around the world for some time. What do people around the world understand of climate science? What level of concern do they express about these findings? Here I will review existing polling data on levels of citizen knowledge and concern of climate science. We also pose questions and examine some evidence regarding the relationship between information and concern, and information and action. These themes will be expanded upon in the section on existing explanations for lack of response. In general, existing work on knowledge and concern regarding climate change indicates that:

- § A lack of citizen understanding regarding the basics of climate science is an almost universal finding worldwide even though knowledge has increased over time. Especially notable is confusion between causes of climate change and ozone depletion, and confusion between weather and climate.
- § Americans know far less about climate change than their counterparts in the developed world
- § Accurate and complete understanding of information is not a pre-requisite for concern.
- § Concern is widespread around the world, but it may also be inversely correlated with the wealth and carbon footprint of a nation.
- § In some studies, more informed respondents reported less concern or sense of responsibility towards climate change.
- § People stop paying attention to global climate change when they realize that there is no easy solution for it. Many people judge as serious only those problems for which they think action can be taken.

Information and Understanding

We begin first with what citizens around the world understand about climate change. The earliest major academic studies were carried out by Bostrom and co-authors, (1994), Bord, Fisher and O'Connor (1998), and Dunlap (1998). There have also been a series of public opinion polls in the U.S. We include these via work by Nisbet and Myers in 2007 and Brewer (2005) who publish systematic reviews of polling data on climate change in the U.S. which extend back into the 1980s. Psychologist Paul Slovic and interdisciplinary scholar Anthony Lessierowitz have also conducted recent work. All studies are in agreement in finding widespread misunderstanding regarding climate science.

In 1994 Bostrom and co-authors use a “mental model” approach to assess American understanding of climate science. They report “widespread misinformation regarding climate change in the general public, including confusion between ozone hole and global climate change and between weather and climate.” The authors also report confusion regarding causes of climate change: “automobile use, heat and emissions from industrial processes, aerosol spray cans, and pollution in general were frequently perceived as primary causes of global warming.”

Two comparative international studies were published in 1998. Bord, Fisher and O'Connor (1998) review international survey data on public knowledge, concern, perceived risk and “willingness to pay” regarding global warming. While the authors find “solid awareness of

and support for general environmental goals” and some measure of awareness and concern regarding global warming, they also find a widespread poor understanding of climate change in the public around the world. Similarly, Dunlap (1998) reports results from a 1992 Gallup survey conducted in Canada, the US, Mexico, Brazil, Portugal, and Russia on public perceptions of global warming. Most respondents did not understand climate science well. In particular the study found, as have others, confusion between climate change and ozone depletion. Dunlap finds the public to be “poorly informed about global warming” (1998, 498).

More recently, work by Nisbet and Myers (2007) and Brechin (2003) provide updated coverage of the extent of public knowledge of climate science. Brechin (2003) compiles public opinion surveys on public understanding of climate change from 15 nations between 1991 and 2001. He finds that even as scientific consensus on climate science increases, knowledge regarding causes of climate change by the public is minimal. Brechin does find increased public understanding regarding the causes of climate change over the decade from 1991 to 2001, however citizens in all nations studied remain largely uninformed. In the 2001 survey, citizens of Mexico knew the most about the causes of climate change, but even here only one-quarter of respondents correctly identified burning fossil fuels as the primary cause of global warming. Americans, who were tied with the citizens of Brazil at 15%, were in the middle of the pack. Brechin laments the low level of awareness in the U.S.:

“In the most recent international study on knowledge about global warming, the citizens of Mexico led all fifteen countries surveyed in 2001 with just twenty-six percent of the survey respondents correctly identifying that burning fossil fuels was the primary cause of global warming. The citizens of the US, among the most educated in the world, were somewhere in the middle of the pack, tied with the citizens of Brazil at fifteen percent. Even the Cubans, at seventeen percent, were slightly more informed than the American public (2003, 125)”

In 2007 Nisbet and Myers published a systematic review of trends in US public opinion regarding global warming over the past 20 years. They summarize public opinion across several key dimensions including (a) public awareness of the issue of global warming; (b) public understanding of the causes of global warming and the specifics of the policy debate; (c) public perceptions of the certainty of the science and the level of agreement among experts; (d) public

concern about the impacts of global warming; (e) public support for policy action in light of potential economic costs; and (f) public support for the Kyoto climate treaty. This work provides a useful summary of a series of sometimes contradictory studies.

Overall they report that, “Twenty years after scientists and journalists first alerted the public to the potential problem of global warming, few Americans are confident that they fully grasp the complexities of the issue, and on questions measuring actual knowledge about either the science or the policy involved, the public scores very low. As of 1992, only 11 percent of the public answered that they understood the issue of global warming “very well,” and across Gallup surveys taken each year between 2001 and 2005, this figure ranged between only 15 percent and 18 percent of respondents, increasing to 22 percent of respondents in 2007” (ibid).

Concern

A second important category of public opinion polls on climate change are questions about the level of concern held by citizens. Here again we review a combination of studies focused solely on the US and those which provide international comparison. The earliest high profile cross national work was conducted by Riley Dunlap in 1998 as part of the Gallup Health of the Planet survey (mentioned above for measures of knowledge). Dunlap’s survey contains results also on concern (again, these data are from six nations: Canada, the US, Mexico, Brazil, Portugal, and Russia). Most respondents interviewed saw global warming as a problem, although it was not generally ranked as seriously as ozone depletion or rain forest destruction. Dunlap’s work points to two important issues. First, as predicted by the concept of a risk society, his results show that perceptions of global warming do not vary consistently across differing social strata within nations. Dunlap notes that: “Perhaps more directly supportive of the risk society hypothesis is that neither ratings of global warming nor of all seven problems combined correlate significantly and consistently with age, sex, education or residence across the six nations, suggesting that Beck (1992) is justified in arguing that concern over global mega-hazards is broadly diffused throughout society” (479). Secondly, despite limitations in knowledge, citizens in all nations except Russia believed that climate change would have consequences in their lifetimes. Thus he notes that detailed public understanding is not actually necessary for policy response.

Bord, Fisher and O'Connor (1998) also review international survey data on public knowledge, concern, perceived risk and willingness to pay regarding global warming. They found that at that time concern was highest in Canada, most of Europe and South America. Yet they report that, "although the public expresses considerable perceived threat from global warming, the threat is less so than for most other issues surveyed" (77). The other issues addressed in their study were air pollution, water pollution, loss of rainforest, loss of ozone, loss of species and contaminated soil. In conclusion, they find that although global warming is an issue of concern worldwide, it is not a 'front-burner' issue. They also find a "limited willingness to sacrifice" in response to climate change. The authors note that "Our own data support but go beyond earlier data by implying that global warming is not a salient issue, and that people across the globe will support global climate change initiatives that do not levy unusual hardships; but they cannot be expected to voluntarily alter their lifestyles" (75). Exactly why climate change is such a back burner issue may be answered in part by ethnographic work on denial to be discussed below. At least in wealthy nations few people see the connections between climate change and daily life (Norgaard and Rudy 2008).

Two more recent studies on the United States are especially important. Data on public concern is somewhat conflicting and varies by survey as well as how the questions are asked. Nisbet and Myers' (2007) review of US trends includes questions on concern. This work again provides a useful meta analysis of what is happening in the United States. Nisbet and Myers' review indicates that concern regarding climate change has increased since the mid-1990s in the United States. They summarize data showing that the proportion of Americans who say that global warming is either personally "extremely important" or "very important" increased from 27 percent in 1997 to 52 percent in 2007. When asked about climate change alongside other environmental issues however, it ranks lower than other problems (authors here cite data from Carroll 2006, 2007; Saad 2006). Nisbet and Myers also note that Americans "discount" the threat of climate change, perhaps because it is an environmental problem with consequences that are perceived to be far off in the future (see e.g. Moser and Dilling 2004). They provide data from poll trends that back up these conclusions.

Gallup asked respondents to evaluate the timeline for global warming effects.

Queried in 1997, and then each year between 2001 and 2005, only a bare majority

of Americans answered that the effects of global warming had already begun, with this figure rising to 60 percent in 2007. Other survey trends show that only about a third of the public believe that global warming will pose a threat within their lifetime.

A recent comparative study on concern takes a different angle. Hanno Sandvik (2008) published some very interesting findings based on a cross national sample of data on public concern for climate change from 46 countries. Sandvik builds on work by Norgaard and others to assert that public awareness and concern regarding climate change is not a function of scientific information alone, but psychological and sociological factors as well. Sandvik reports a negative association between concern and national wealth and carbon dioxide emissions, and a “marginally significant” tendency that nations’ per capita carbon dioxide emissions are negatively correlated to public concern. Sandvik writes, “these findings suggest that the willingness of a nation to contribute to reductions in greenhouse gas emissions decreases with its share of these emissions” (333). He concludes that such a relationship apparent is “in accordance with psychological findings, but poses a problem for political decision-makers.” Although Sandvik is the first to explicitly test a relationship between wealth and concern, his findings are in accordance with earlier work across spatial scales from the individual to the nation-state. For example, Zahran et al. (2006) found that citizens residing in U.S. states with higher emissions of climate gasses are somewhat less likely to support climate change policies. O’Connor et al. (2002) found that higher income negatively affected participants’ willingness to take some voluntary actions such as driving less (this finding did not hold across all actions). Similarly, an inverse relationship between wealth and concern is also reported in Dunlap’s 1998 cross national research, but with a smaller sample of nations. Although he does not give this relationship much discussion, Dunlap notes that “Quite importantly, despite the lower levels of understanding among citizens of the poorer nations in our study (Portugal, Brazil and Mexico), residents of these nations typically express more concern over global warming than do those in the more affluent nations (Canada, U.S., Russia)” (488). Furthermore, there are no examples of the reverse relationship, in which higher income is positively correlated with concern or support of climate protection policy. Especially because these findings are counter-intuitive to many, we will return to these findings in our section on policy considerations.

A second important set of studies on the United States using Gallup data shows an emerging partisan split between Democrats and Republicans (Dunlap, Xiao and McCright, 2001, and Dunlap and McCright 2008). On the one hand, this study provides updated data on a series of important questions including whether people believe that global warming is occurring, and whether they believe it will pose a serious threat within their lifetimes. The authors note that, “The percentage of Americans viewing global warming as a serious threat to themselves or their way of life during their lifetimes has moderately increased, from 25 percent in 1997 to 40 percent in 2008.” Asked in the 2008 Gallup poll when the effects of global warming will begin to happen, 61 percent of respondents said, “they have already begun.” The authors note that while this may only be a moderate increase from 1997, when only 48 percent gave this response, it still represents a significant shift from a large minority to a solid majority of the American public.

The main focus however is on a particularly interesting phenomenon in the United States, that of a prominent partisan split between Democrat and Republican perceptions on climate change. This split is important for two reasons. First, historically support for environmental protection in the United States has been relatively nonpartisan. After all it was Nixon who in 1970 declared the 1970s as the “environmental decade” and proceeded to pass the strongest environmental legislation the world had seen. Since 1994, however, a divide has been noticeable, especially among members of Congress. Data from the League of Conservation Voters indicate a growing divide in environmental voting records in both the House and Senate. And, “nowhere is the partisan gap on environmental issues more apparent than on climate change.” Members of Congress tend to be more ideologically polarized than the general public. Now a very large gap exists between self-identified Republicans and Democrats in terms of perceptions of global warming. Dunlap and McCright further write that, “Gallup Poll results on global warming spanning a decade, including results from Gallup’s 2008 Environment Poll conducted on March 12 suggest that this skepticism among Republican and conservative elites has led rank-and-file Republicans in the electorate to follow suit.” Thus, while overall in the United States citizen perceptions on the seriousness of climate change have increased, “What these overall trends generally mask, however, are highly divergent trends among Republicans and Democrats.” Specifically,

while more than three-fourths of Democrats (76 percent) believe global warming is already happening, only 42 percent of Republicans share that view in 2008. The resulting 34 percent gap stands in stark contrast to 1997, when nearly identical percentages of Republicans and Democrats (48 and 52 percent, respectively) indicated that global warming was already happening. Thus, despite all the attention given to global warming in the media, including coverage of IPCC reports, Republicans have become somewhat less likely over the past decade to believe that global warming is already occurring (from 48 to 42 percent), while Democrats have become much more likely to hold this belief (from 52 to 76 percent).

Not only is this split between Democrats and Republicans notable as a newer phenomenon, such a split is more significant on climate change than for other environmental issues. Finally, such a split is important because, as Dunlap and McCright highlight, it is a symptom of a new and now explicit link between party affiliation and the questioning of climate science (see also work by Jacques 2008).

Is There a Link between Information and Concern?

Whether and under what circumstances information leads to concern, action, (or to reports of action) are ongoing questions, and ones to which we will return throughout this document. A few summary comments of the above literature are provided here. Although the basic premise of an enlightened, democratic and modern society is that information (especially scientific information) will lead to concern and response on the part of the public and public institutions, the case of climate change poses a challenge to this paradigm (Jacques et al., 2008, Jacques 2008, Norgaard 2006). On the one hand, such results are deeply troubling to our enlightenment sensibilities in which we presume that knowledge will lead to rational action. Yet they need not have wholly negative policy implications. As mentioned above, Dunlap notes the positive perspective that despite limitations in knowledge, citizens in all nations except Russia believed that climate change would have consequences in their lifetimes (1998). Certainly we would do well to better understand the policy and political significance of such dynamics. Thus, as will be discussed in the policy section below, Dunlap makes the important observation that detailed

public understanding of highly complex issues such as global warming may be neither feasible nor necessary for effective policy making.

Paradoxically, as evidence for climate change pours in and scientific consensus increases, interest in the issue throughout many Western nations declined during the 1990s and into the early 2000s (e.g. Hellevik, 2002, Immerwahr, 1999, Saad 2002). For example, Gallup polls for the United States show that the percentage of people who, “personally worry a great deal about global warming” dropped from 35% in 1989 to 28% in 2001, while the percentage who worry “not at all” rose from 12 to 17% during the same time period (Saad 2002). Even more dramatically, biannual national level survey research in Norway finds a significant and steady downward trend in public interest and concern about global warming, with the percentage of respondents who replied that they were “very much worried” declining steadily from 40% in 1989 to less than 10% in 2001 (Hellevik 2002, Barstad and Hellevik 2004). See also work by Kellsted et al. 2008 discussed below.

Is There a Link between Information and Action?

On the one hand, if the public lacks complete information, neither concern nor action is likely. For example, Bostrom, et al. 1994 argue that this general public misunderstanding of climate science is part of the widespread failure of response: “When asked what could be done, respondents tended to focus on general pollution control rather than reductions of carbon dioxide emissions or energy consumption.” On the other hand, the research discussed above reports somewhat conflicting patterns regarding information as a pre-requisite for action.

For example, in their survey of 1,218 Americans, Bord, O'Connor and Fischer 2000 did find that the key determinant of stated behavioral intentions to address global warming is a correct understanding of the causes of global warming. They write that “Knowing what causes climate change, and what does not, is the most powerful predictor of both stated intentions to take voluntary actions and to vote on hypothetical referenda to enact new government policies to reduce greenhouse gas emissions.” Similarly, the authors found that those who did not know the causes of climate change were less likely to say they would take action or support for government policies. Thus they conclude that, “General pro-environmental beliefs and perceptions that global warming poses serious threats to society also help to explain behavioral

intentions. . . Translating public concern for global warming into effective action requires real knowledge. General environmental concern or concern for the negative effects of air pollution appear not to motivate people to support programs designed to control global warming.” Stated intentions are of course very different from engaging in actual behaviors.

The work of O’Connor et al. 2002 uses a heuristic model approach to compare cognitive, economic, and partisan explanations for who supports reductions in climate emissions. The authors conclude that so called “cognitive” explanations of support for reducing greenhouse gas emissions are more powerful than economic or partisan heuristic ones. “People want to reduce emissions if they understand the causes of climate change, if they perceive substantial risks from climate change if average surface temperatures increase, and if they think climate change mitigation policies will not cost them their jobs.” The authors find that people who can both accurately identify causes of climate change and who expect negative future climate scenarios are the most likely to support both government and voluntary actions. “Economic circumstances and anxieties are not important predictors, but the belief that environmental protection efforts do not threaten jobs for people like the respondent, limit personal freedoms, and hurt the economy is a strong predictor” (ibid). From another angle, Stanford social psychologist Jon Krosnic has studied various aspects of the relationship between efficacy, concern and willingness to take action. In recent work on public perceptions of climate change, Krosnic et al. 2006 observe that people stopped paying attention to global climate change when they realize that there is no easy solution for it. Instead they note that many people judge as serious only those problems for which they think action can be taken.

EXPLANATIONS FOR LACK OF RESPONSE

A wide range of scholars from multiple disciplinary backgrounds have addressed the question of why the public has largely failed to respond to climate change. The dominant disciplines to consider are psychology, social-psychology and sociology. Some scholars working on this topic approach non-response from highly theoretical orientations. Others conduct public opinion surveys take it at face value, but their work still offers insight into the dynamics of non-response.

Throughout this section we will consider examples from two case studies, one in Norway, the other in the United States.

In order to navigate these very different disciplinary perspectives on what is going on it is important to lay out some of the assumptions, terrain and language of each field. It is also important to note how these different theoretical and disciplinary perspectives may fit together under some circumstances, as well as how they fail to make sense together in other cases (as when basic assumptions about human nature are opposing).

Following this preliminary introduction, we will work through a series of explanations by theme, simultaneously considering work from psychology, social-psychology, sociology and political opinion polls as they apply to each of four broader answers to the question of why there is so little public response to climate change. These are: 1) people don't know enough to realize the danger, 2) people don't care enough to take action, 3) there is hierarchy of needs and climate change is not an immediate need, 4) people have trust that the government will fix the problem. From this survey of existing explanations, we extract a series of cognitive and behavioral limitations faced by the public in responding to climate change.

We then move to my own answer to the question of why well educated and relatively privileged people have failed to act, which blends psychology and sociology to lay out a conception of socially organized denial. Under this framework, information from climate science is known in the abstract, but disconnected from, and invisible within political, social or private life. Instead, people actually work to avoid acknowledging disturbing information in order to 1) avoid emotions of fear, guilt and helplessness, 2) follow cultural norms, and 3) maintain positive conceptions of individual and national identity. National identity may be in turn linked to subconscious economic self interest since "Citizens of wealthy nations who fail to respond to the issue of climate change benefit from their denial in economic terms. They also benefit by avoiding the emotional and psychological entanglement and identity conflicts that may arise from knowing that one is doing 'the wrong thing'" (Norgaard 2006b, 366). People described a sense of knowing and not knowing about climate change, of having information but not thinking about it in their everyday lives. In discussing this model, I incorporate material from psychology, social psychology as well as sociology of emotions, sociology of culture and political economy.

A Disciplinary Primer: Assumptions and Frameworks from Relevant Fields

Researchers in psychology, social psychology and sociology hold unique research approaches, methods, and terminology, and tend to publish in their own set of journals. Psychologists have conducted a great deal of work relevant to the perception and cognition of climate science, as well as work on the role of affect in shaping cognition. Psychological investigation of perception, cognition, identity, emotion, and behavior is often biologically based, and results are characterized as more universal phenomena. Although there are a variety of theoretical orientations, almost all psychology takes the individual as the unit of analysis. Experimental methods are common in many of the studies that will be discussed here. Social psychology focuses on the interaction between individuals and groups. As a discipline, social-psychology is complicated by the fact that it approaches questions from both the sociological and psychological angle. Social psychological work considered here has examined for example the effects of group, nation and social location on perceptions of climate change.

The field of sociology, although very broad in its scope, is characterized by its attention to the tension between individuals and society (known as the micro-macro link). For sociologists, questions about individual behavior are situated in a social context, and questions about widespread social patterns are in turn understood in the circumstance of individual wants and needs. Sociologists have addressed a wide range of questions related to climate change behavior including media discourses, the relationship between the state and corporations in structuring national climate policies, as well as how cognition and emotion are socially constructed. From a social problems perspective, not all potential issues make it onto the public agenda. Even problems which are quite serious and affect many individuals do not automatically receive space in the public eye. Rather the one criteria of whether an issue will make it to the level of a recognized “social problem” is that the condition can be solved through collective action. From this perspective it is taken as given that if no solution is perceived to be possible, people are more likely to “resign themselves to their fate.” In some cases psychological explanations for behavior can easily be integrated into sociological analysis (as when individual tendencies are understood to be modified by social context). In other cases, the sociological emphasis on the role of culture and social structure in cognition and perception for example, are counter to

psychological explanations which view individuals in isolation. In other words, sociologists are more inclined to ask questions about how cognition or perception may differ by social status, wealth or other demographic variables, while psychologists often treat these as biologically driven and/or subject to more universal laws.

Four Existing Explanations

“If people only knew”

Not surprisingly, given the extensive survey data discussed earlier on the public’s lack of knowledge regarding climate change, the dominant theme of research from fields as widespread as science and risk communication, environmental sociology and psychology, has emphasized the public’s lack of information and knowledge as a barrier to social action. Bostrom and co-authors write that, “To a significant degree the effectiveness with which society responds to this possibility depends on how well it is understood by individual citizens. As voters, citizens must decide which policies and politicians to support. As consumers, they must decide whether and how to consider environmental effects when making choices such as whether our resources are most efficiently deployed by using paper or polystyrene foam cups” (1994, 959). The sense that, “if people only knew,” they would act differently: i.e., drive less, “rise up” and put pressure on the government is widespread in popular discourse and environmental literature, and also underlies work from psychology, social psychology and sociology. Psychologists and social psychologists have described flawed cognitive and mental models that limit people’s ability to grasp what is going on, while sociologists have documented the manipulation of climate science (especially in the United States) and the media’s role in misinforming the public through magnifying the perception of uncertainty. Sociologists have also conducted opinion polls highlighting the lack of public understanding of climate science and espoused the need for greater awareness. Examples of each are reviewed below.

The “conceptual challenges” surrounding global warming have been primarily understood in terms of limitations of individual psychology (i.e., mental models, confirmation bias), or to media framing (see e.g. Bell 1994; Ungar 1992, Boykoff 2004, 2008). Psychologists have described the power of “faulty” decision making powers such as “confirmation bias”

(Halford and Sheehan, 1991). Bostrom et al. (1994), describe how effective public response is limited because “lay mental models of global climate change suffer from several basic misconceptions.” (P.968). For example, psychologists Grame Halford and Peter Sheehan write that “With better mental models and more appropriate analogies for global change issues, it is likely that more people, including more opinion leaders, will make the decision to implement some positive coping action of a precautionary nature” (1991, 606). From another angle, “affect” is considered by social psychologists to be the positive or negative evaluation of an object, idea, or image. Similar to emotions, but not as “full blown”, affect has been shown to powerfully influence both information processing and decision-making. Work in the area of risk perception and affect in the United States and Great Britain by Lorenzoni et al. (2006) found that, “the terms “global warming” and “climate change”, and their associated images, evoked negative affective responses from most respondents. Personally relevant impacts, causes, and solutions to climate change were rarely mentioned, indicating that climate change is psychologically distant for most individuals in both nations.” Other work describes how confusion results from the fact that people relate to global warming through other existing generalized “frames” or “mental models” such as “ecological problem” in general, “air pollution” or “ozone depletion” (Dunlap, 1998; Stern et, al, 1995).

Researchers have also asserted that part of the difficulty is that knowledge of global warming requires complex grasp of scientific knowledge in many fields (Johnassen, 2002). Researchers have lamented the confusion between global warming and the ozone hole (e.g. Bell 1994, Bostrom et al.. 1994, Read 1994), investigated the role of media framing (Bell 1994, Ungar 1992), and described how understanding global warming requires a complex grasp of scientific knowledge in many fields.

A more recent example of conceptual explanations for failed public response comes from Sterman and Sweeney (2007). These authors note the paradox that most Americans believe climate change poses serious risks, but also believe inaccurately that emissions reductions can be deferred until there is greater certainty surrounding climate science. “Such wait-and-see policies erroneously presume climate change can be reversed quickly should harm become evident, underestimating substantial delays in the climate’s response to anthropogenic forcing.” The authors conducted experimental work with graduate students at MIT which found that even these

highly educated adults had “widespread misunderstanding” of how climate change worked, misunderstandings that caused them to systematically underestimate the need for immediate action to stabilize the climate. In particular, research subjects conceived of the global climate as a system which was analagous to a bathtub filling over, once the input stops the tub level can be lowered right away. According to research however, once in the atmosphere, climate gases will continue to rise even if emissions fall. The authors write that, “these beliefs – analogous to arguing a bathtub filled faster than it drains will never overflow – support wait-and-see policies but violate conservation of matter. Low public support for mitigation policies may arise from misconceptions of climate dynamics rather than high discount rates or uncertainty about the impact of climate change.” Furthermore, the authors link this misunderstanding to the failure of response of U.S. policymakers.

Harriet Buckeley describes the assumption that information is the limiting factor in generating public response as the “information deficit model.” While information deficit explanations are indispensable, they do not account for the behavior of the significant number of people who do know about global warming, believe it is happening, and express concern (Hellevik and Høie 1999). From this perspective people are presented as individual agents acting “rationally” in response to information made available to them. According to the information deficit model of public response to environmental issues, the public needs to be given more knowledge about environmental issues in order to take action . . . In this approach the contextual dimensions of environmental concern are ignored so that public perceptions are seen as stable, coherent, and consistent, and to exist within individuals rather than being located within the inter-subjective contexts of institutions and discourse (2000, 315-316). Yet as Read et al. (1994) point out, two simple facts are essential to understanding climate change. If significant global warming occurs, it will be primarily the result of an increase in the concentration of carbon dioxide in the earth’s atmosphere. And the single most important source of carbon dioxide is the combustion of fossil fuels, most notably coal and oil. So how can it be that such highly educated people don’t know this basic fact?

Paradoxically, as evidence for climate change pours in and scientific consensus increases, interest in the issue throughout many Western nations declined during the 1990s and into the early 2000s (e.g. Hellevik, 2002, Immerwahr, 1999, Saad 2002). For example, Gallup polls for

the United States mentioned earlier show that the percentage of people who “personally worry a great deal about global warming” dropped from 35% in 1989 to 28% in 2001, while the percentage who worry “not at all” rose from 12 to 17% during the same time period (Saad 2002). Again, biannual national level survey research in Norway finds a significant and steady downward trend in public interest and concern about global warming, with the percentage of respondents who replied that they were “very much worried” declining steadily from 40% in 1989 to less than 10% in 2001 (Hellevik 2002, Barstad and Hellevik 2004). Hellevik writes, “A decline from such a high level of anxiety is to be expected. There are limits to how long it is possible for individuals to live with the extremely pessimistic environmental perspectives reflected in the 1989 results. Anxiety reduction mechanisms make people look for brighter aspects of development.” We see evidence of the same pattern in the United States. This finding parallels a study by the American Geophysical Union in the United States which reported that the percentage of people who worry a great deal about global warming dropped from 35% to 24% between 1989 and 1997 (Immerwahr, 1999). The AGU study links declining concern to a sense of hopelessness and frustration rather than greed or lack of information. The AGU study emphasized the public’s feelings of powerlessness and frustration connected to the issue of climate change rather than lack of information. This project conducted focus groups to explore public understanding of climate change (Immerwahr, 1999).² Their work concluded that rather than lack of information or concern, the public experienced frustration and paralysis with respect to the issue of climate change.

They said they care deeply about global warming, but their concern did not translate into any forward motion. As they thought about the problem, they seemed to run into brick walls, characterized by lack of clear knowledge, seemingly irreversible causes, and a problem with no real solution. As a result they were frustrated and eager for a solution but unsure of which way to go. The symptoms of this frustration are clear. The first is that people literally don't like to think or talk about the subject. Our respondents always seemed to want to move

²Their report, “Waiting for A Signal: Public Attitudes toward Global Warming, the Environment and Geophysical Research” is available of the web at http://www.agu.org/sci_soc/attitude_study.html

the topic from global warming itself to more familiar topics, such as moral deterioration, where at least they felt on firmer ground.

Immerwahr concluded that the public is waiting for two things: scientific consensus and a sense of efficacy: “As we have said earlier, informing the public of the problems can increase frustration and apathy rather than build support. Our research suggests that what the public is most skeptical about is not the existence of problems but our ability to solve them. What will make the public invest energy in these issues is not the conviction that the problems are real, but that we can do something about them.” This observation regarding efficacy in particular is supported by additional studies. For example, political scientist Paul Kellstedt and colleagues (2008) have found that increased levels of information about global warming have a negative effect on concern and sense of personal responsibility. The authors examine sense of personal efficacy, knowledge and concern regarding climate change, and a number of demographic variables. The research yields several striking and important results which are counter to the information deficit (or knowledge deficit) standpoint. In particular, respondents who are better informed about climate change feel less rather than more responsible for it. Furthermore, they find that “in sharp contrast with the knowledge-deficit hypothesis, respondents with higher levels of information about global warming show less concern” (120). However, respondents who feel personally responsible for climate change reported more concern regarding climate change. Unfortunately, (perhaps since their goal is to test the assumptions of knowledge-deficit model), the authors do little to explain the underlying mechanism of this relationship. Instead, Kellstedt et al. remark that this relationship, “raises provocative questions about what causes some people to feel personally responsible for global warming and climate change, and why others feel no sense of responsibility for the problem” (121). They go on to use their data to build a multivariate model of demographic and other possible predictors of personal efficacy. Older respondents were more likely to feel personally responsible for climate change, as were people who were holding environmental values. The authors also report the rather paradoxical finding (at least from the information-deficit perspective) that those respondents who express confidence in climate science reported significantly lower levels of concern about future climate risks. Here the authors speculate that this finding may be a result of greater trust in science and technology

as sources of solution (though the authors do not provide measures of trust in technological fixes to verify such a link). Along this vein is the earlier mentioned work by Krosnic et al. 2006 which found that people stopped paying attention to global climate change when they realized that there is no easy solution for it, and many people only judged problems as serious if they thought they could be effectively acted upon.

Most work on concern, knowledge and perception has taken the form of large scale surveys. Data from interviews and ethnographic observation can yield information on meanings and relationships between thinking and feeling in everyday life. Results from the few studies that use interview data also do not support the information deficit model. Instead, their results describe a complexity of response, situations of knowing and not-knowing, and the emotional ambivalence that characterizes denial. For example Harriet Buckeley (2000) writes, “there is concern that public ignorance and illiteracy about global environmental issues is leading to misinformed views, apathy, ill-considered calls for government action, and little change in personal behavior. This view of the relations between public knowledge, values and actions accords with what has been described as an information deficit model: Ignorance about climate change is preventing appropriate public action” (ibid, 328). Instead, Buckeley notes that, “Confusion, doubt and a degree of illiteracy concerning climate science did not prevent focus group participants from locating this global issue in their backyard” (ibid, 322), and “there is a need to move from a narrow conception of public knowledge towards recognition of the complex, fluid and contradictory nature of public understanding of global environmental issues” (ibid, 329).

It is important to note that while there are significant criticisms to the information deficit model, the idea that people do not need any information regarding climate science to develop concern or engage in action is not one of them. In other words, many of the issues discussed by researchers here will be returned to under the section on cognitive barriers to action. What is important to draw from this section however, is that information alone is not enough to produce action, and that “information” like caring as will be discussed below, cannot be thought of as generic isolated blocks of “facts” with universal meaning and significance across all communities. Instead, information is socially structured, given social meanings, and must be understood in social context. As I will illustrate below, information on climate change may be

accepted, resisted, navigated and interpreted differently depending upon the sense of efficacy, self esteem, and social support of the individuals receiving it.

“If people only cared”

A second general way of answering the question of why so few people respond to climate change is that people do not care about this problem. According to this perspective, few people are engaging because people are either too greedy or too selfish to bother about future generations, or don't care about climate change because they don't think it will impact them (note: the economic corollary that people cannot afford to care will be discussed below). At least in the U.S. public, this assessment is not uncommon. We look around, we see that smart people continue to carry on highly consumptive behaviors, even in the face of knowledge of their consequences, and assume that people are too self-interested to be motivated for change. My environmental studies students express this sentiment on a regular basis. Similarly, there is evidence for this perspective from the focus groups conducted by the American Geophysical Union on climate change: “Many respondents in our focus groups were convinced that the underlying cause of environmental problems (such as pollution and toxic waste) is a pervasive climate of rampant selfishness and greed, and since they see this moral deterioration to be irreversible, they feel that environmental problems are unsolvable. As a result, convincing people of the seriousness of the problems is at best only part of the solution, and may, in fact, be counterproductive.”

As discussed earlier, public opinion data on concern are varied however. Again we refer to the earlier mentioned study by Paul Kellstedt on relationships between efficacy, sense of responsibility and levels of concern regarding climate change, as well as parallel work by Krosnic. And while concern could be higher, the trend towards concern is worldwide. And that concern is increasing. As discussed earlier, Dunlap's Gallup survey conducted in Canada, the U.S., Mexico, Brazil, Portugal, and Russia on public perceptions of global warming found that most respondents saw global warming as a problem even as far back as 1992, even though most respondents did not understand climate science well. Since that time concern has increased in the United States and around the world (see earlier studies on concern). Thus, the notion that people do not respond because they do not care about climate change is inadequate.

Hierarchy of Needs

A related explanation to the above “if people only cared” angle emphasizes a kind of Maslow “hierarchy of needs,” in which people focus on immediate needs first and long term needs later (see e.g. Maslow 1970). In this line of reasoning, people cannot think about climate change because at best it will affect them in the future and they are too consumed with solving the problems of the present. Here we can identify the fact that for many wealthy people in industrialized nations climate change is still abstract and distant from their daily lives (Norgaard, 2006, Nisbet and Myers 2007, Brechin 2008, Lorenzoni et al. 2006). While there is no doubt that the hierarchy of needs approach holds weight – indeed each of us is clearly confronted with more issues than our attention can handle – this approach alone is insufficient to explain public apathy on the larger social level. Individuals in a particular social context may express the feeling that they don’t have time and/or may have a limited ability to respond. Yet from a sociological standpoint, this information tells us about the social norms, and the limits of concern of that particular society. “Needs,” however real they may feel, are a reflection, in affluent places like the United States, Japan and Western Europe, where not everybody lives “on the edge,” of social facts and local social and cultural norms. For example, in his work on cognitive sociology and the social organization of concern and caring, Eviatar Zerubavel writes,

After all, only through being socialized does one come to know whether the concern about feeding one’s dog should come before or only after the concern about feeding the homeless, or whether one ought to be more concerned about the well-being of fellow American businessmen in Southeast Asia or the Southeast Asian refugees living in one’s own neighborhood (1997, 47).

People in the United States and wealthy societies throughout the world may feel that they cannot use less fossil fuel because they “need” to be able to drive their kids to soccer practice or take an annual trip to Greece. But these kinds of needs are very much a product of social context (e.g. norms and expectations) rather than a hierarchy of needs per se. In fact, there is virtually no evidence to support the perspective that climate change just doesn’t pan out in a hierarchy of needs. For example, the European nation that is threatened most by sea level rise, the Netherlands, is at the very bottom of concern for climate change in ACNielsen’s 2007 global

study of nations. And in the U.S. Zahran et al. (2006) find that “respondents living within 1 mile of the nearest coastline at negative relative elevation to the coast are less (not more) likely to support government-led climate initiatives (p 783). Again in relation to the hierarchy of needs argument, consider the earlier discussed negative relationships between wealth and concern at individual, state level and national data (e.g. Sandvik 2008).

“All Is Well”

A fourth explanation for the fact that people around the world have engaged in so little response to climate change is that they believe that everything is fine. This could be either because they do not think climate change is happening, believe that their governments will take care of things, or that international agreements on emissions reductions will be effective. This perspective could be a variation of either “climate skepticism,” “faith in government” or “technological optimism.” A sense of all being well can also be a reflection of faith in a higher power, or a sense of fate. Let us consider an in depth example in Norway: In the past decades, the Norwegian government has become visibly involved in the issue of climate change. Perhaps residents felt that things were in good hands? Norwegian sociologist Ottar Hellevik explores the possibility of faith in the government as a causal factor behind the national pattern of declining concern about climate change since 1980. He does not, however, interpret optimism as the force behind the trend in declining concern. Rather, “results from the Monitor surveys tend to contradict such a trend of optimism, however. The percentage disagreeing with the proposition – “When negative environmental conditions are revealed, business takes the problem seriously and cleans up as soon as possible” – rose from 45 percent in 1995 to 56 and 55 percent in 1997, 1999 and 2001 respectively. The public thus seems to have become *more* rather than *less* skeptical with regard to the environmental status of business leaders. Further, when queried in 2001 as to anticipated development trends for selected areas of society, only 14 percent of the population believed that the situation with regard to environment and pollution would improve, while 31 percent expected deterioration (43 percent replied, “no major changes” and 10 percent “don’t know” (Hellevik, 2002, 13-14).³

³ p.13 in Ottar Hellevik “Beliefs, Attitudes and Behavior Towards the Environment” pp 7-19 in *Realizing Rio* in Norway. This phenomenon is also reported in the United States (see, e.g., Immerwahr, 1999).

THE SOCIAL ORGANIZATION OF CLIMATE DENIAL

We can understand this failure of information to move through the public awareness and into policy outcomes as a failure of communicative action. But to understand both why it is happening, and what to do next, we must look to the sociology of denial. Most research to date has examined denial on the level of individual psychology. Yet as a sociologist I will argue that both what individuals hear and choose to pay attention to, or ignore, must be understood within the context of both social norms shaping interpersonal interaction and the broader political economic context. This next section gives an outline of my own work (see also Norgaard 2006a and 2006b).

“We Don’t Really Want to Know”

Based on the above survey of psychological and sociological factors, it seems clear that how we respond to information that is highly disturbing (information for example about a lack of certainty of our future survival), information that challenges the basics of our social organization is a complex process. Traditionally a question like “how do we communicate climate science to the public” has been seen as a problem of science communication – which it obviously is. But the problem here is not only about the communication of scientific information, but how to communicate both scientific and social scientific information about climate change to the public in a way that the information engenders engagement with social and policy implications.

In my ethnographic and interview data, people described a sense of knowing and not knowing about climate change, of having information but not thinking about it in their everyday lives. Overall this situation can be described as a “double life.” Information from climate science is known in the abstract, but disconnected from, and invisible within political, social or private life. Contrary to widespread assumptions that people fail to respond to global warming because they are too poorly informed, too greedy or too individualistic, suffer from incorrect mental models or faulty decision-making processes, people I have interviewed in both the U.S. and Norway expressed feelings of deep concern and caring and a significant degree of ambivalence about the state of the world (Norgaard 2006a, 2006b). This data indicates that people want to protect themselves from disturbing information in order to 1) avoid emotions of fear, guilt and

helplessness, 2) follow cultural norms and 3) maintain positive conceptions of individual and national identity. Those interviewed described fears about the severity of climate change, of not knowing what to do, that their way of life was threatened, and showed concern that the government would not adequately handle the problem. They described feelings of guilt for their own actions, and the difficulty of discussing the issue of climate change with their children. Talking about global warming went against cultural norms of conversation. It wasn't a topic that people were able to speak about with ease - rather, overall it was an area of confusion and uncertainty. Yet feeling this confusion and uncertainty went against emotional norms of toughness and maintaining control. Furthermore, thinking about climate change threatens our sense of individual identity and our trust in our government's ability to respond. At the deepest level, large scale environmental problems such as global warming threaten people's sense of the continuity of life - what sociologist Anthony Giddens calls ontological security.

Ignoring the obvious can, however, be a lot of work. Both the reasons for and process of denial are socially organized; that is to say, both cognition and denial are socially structured. Denial is socially organized because societies develop and reinforce a whole repertoire of techniques or "tools" for ignoring disturbing problems. Individuals may block out or distance themselves from certain information in order to maintain coherent meaning systems (Gecas and Burke, 1995), desirable emotional states (Rosenberg, 1991, Meijndes et. al, 2001), a sense of self-efficacy (Gecas and Burke 1995), and in order to follow norms of attention, emotion (Hochschild, 1983), and conversation (Eliasoph, 1998). If society organizes patterns of perception, memory and organizational aspects of thinking (Zerubavel, 1997), then studies of perception that focus solely on individuals are unable to grasp the meaning of differences across cultures, subcultures or nationalities. More importantly, a focus on individuals in the absence of attention to immediate culture or economic context leaves out relationships between individual cognition and the larger social context.

In the community where I did my research, collectively holding information about global warming at arm's length took place by participating in cultural norms of attention, emotion, and conversation, and by using a series of cultural narratives to deflect disturbing information and normalize a particular version of reality in which "everything is fine." Emotions of fear and helplessness can be managed through the use of selective attention, such as controlling one's

exposure to information, not thinking too far into the future, and focusing on something that could be done.

People have told me many things about why it was difficult to think about global warming. In the words of one person who held his hands in front of his eyes as he spoke, “people want to protect themselves a bit.” They described feelings of guilt for their own actions and the difficulty of discussing the issue of climate change with their children. Again, earlier mentioned work by both Krosnic and Kelstedt tells us that such factors will decrease action and concern. In some sense, not wanting to know was connected to not knowing how to know.

Talking about global warming also went against conversation norms. Conversation is governed by rules called *conversation norms* that shape what is acceptable and not acceptable to say in different contexts (Eliasoph, 1998). In this case, climate change wasn't a topic that people were able to speak about with ease – rather it was an area of confusion and uncertainty. Conversation is the site for exchange of information and ideas, for human contact and the building of community. It is also an important site for the creation of collective meaning making and reality (see e.g. Gamson 1992, Eliasoph, 1998). Conversation can help people understand their relationships to the larger world, or obscure them. It can engage the sociological imagination, that “quality of mind necessary to grasp the constant interplay between our private lives and the political world” (Mills, 1959, 13). Conversation can also do the complete opposite.

Furthermore, feeling this confusion and uncertainty went against emotional norms of toughness and maintaining control. Knowing about global warming raised issues of ontological security, feelings of helplessness, feelings of guilt and was a threat to individual identity. Note that psychological phenomena discussed earlier underlie each of these tendencies (e.g. Kellstedt's work on the relationship between efficacy and action). Here I use the voices of community members to lay out a series of unpleasant emotions linked to climate change.

British sociologist Stanley Cohen describes three varieties of denial: literal, interpretive and implicative (2001). Literal denial is “the assertion that something did not happen or is not true” (ibid. 7). With respect to the issue of global warming, this form of denial is akin to the generation of counter-claims by oil companies that climate change is simply not happening (see e.g. McCright and Dunlap 2000, McCright and Dunlap 2003, Gelbspan 1997). A second variety is interpretive denial in which the facts themselves are not denied, but they are given a different

interpretation. Euphemisms, technical jargon and word changing are used to dispute the meaning of events. For example, military officials speak of “collateral damage” rather than the killing of citizens.

Cohen’s third category is implicative denial. In this case what is minimized is not information, but “the psychological, political or moral implications that conventionally follow” (ibid. 8). What I observed in my work has not been a rejection of information per se, but the failure to integrate this knowledge into everyday life or transform it into social action. As Cohen puts it, “the facts of children starving to death in Somalia, mass rape of women in Bosnia, a massacre in East Timor, homeless people in our streets are recognized, but are not seen as psychologically disturbing or as carrying a moral imperative to act . . . Unlike literal or interpretive denial, knowledge itself is not at issue, but doing the ‘right’ thing with the knowledge”(ibid. 9).

Risk, Modern Life and Fears Regarding Ontological Security

Automobile and plane crashes, toxic chemical spills and explosions, nuclear accidents, food contamination, genetic manipulation, the spread of AIDS, global climate change, ozone depletion, species extinction and the persistence of nuclear weapons arsenals: the list goes on. Risks abound and people are increasingly aware that no one is entirely safe from the hazards of modern living. Risk reminds us of our dependency, interdependency and vulnerability. Catastrophic risk is an even stronger reminder (Jaeger et al., 2001, 13).

Large scale environmental issues in general and global warming in particular threaten biological conditions, economic prospects and social structure. The impacts of global warming on human society are predicted to be widespread and potentially catastrophic. “Ontological security refers to the confidence that most human beings have in the continuity of their self-identity and the constancy of the surrounding social and material environments of action” (Giddens, 1991, 92). Norwegians described how merely thinking about climate change raised a series of questions related to ontological security. If the climate continues to warm, how are people going to survive in fifty years? – in one hundred? What will Norwegian winters be like without snow? What will happen to farms in the community in the next generation? Bjorn, a father in his mid-thirties, described how in as few as a hundred years it may not be possible to live on the planet:

. . . we have now come so far that we have begun to see that environment that can mean to protect or not to protect the environment we are living in, you know, in one hundred years it's possible that the environment will be damaged to the point that it isn't possible to live on earth any more, you know?

Giddens' notion of ontological security refers to the "Confidence or trust that the natural and social worlds are as they appear to be, including the basic existential parameters of self and social identity" (1984, 375). Yet Robert Lifton writes that today, "widespread imagery of extinction, of an end to humankind... casts doubt in each mind about the self's larger connectedness . . . Increasingly we have an amorphous but greatly troubling sense that something has gone wrong with our relationship to nature, something that may undermine its capacity to sustain life" (1982, 21).

A Series of Negative Emotions

Helplessness

Helplessness was a second emotion that the topic of climate change evoked. Trying to think about this problem could be overwhelming to people. The problem seemed so large: solving climate change would involve the cooperation and common work of people in many different countries, governments were unable to reach agreement, and perhaps entire economic structures would have to change. Even if all of this change were to be achieved, all the carbon dioxide released up to the present will still continue to cause climate change. Thus it is not surprising that, rather than feeling that there was much that could be done, one resident, Liv, a woman in her late sixties, pronounced that, "We must take it as it comes." And Lene told me, "And of course its climate change which is doing it. There isn't anything to be done about it."

Beyond the dimension of powerlessness that comes from the situation itself, yet still connected to it, is the possibility that those political and economic structures that have been set in place are inadequate to handle the problem. Thus for some residents, there was another layer to the feeling of powerlessness that came from considering the possibility that one's government and/or the world community at large could not be relied upon to solve this problem.

Fear of Guilt

Thinking about climate change was also difficult for people I spoke with because it raised feelings of *guilt*. People told me they were aware of how their actions contributed to the problem, and they felt guilty about it. Eirik describes the difficulty of living by his conscience:

We shouldn't consume so many resources. Drive so much, or travel so much by air. We know that it is bad because it increases CO₂ levels. And creates a worse situation. But at the same time of course we want to go on vacation, we want to go to the South, we want to, well, live a normal life for today. So many times I have a guilty conscience because I know that I should do something, or do it less. But at the same time there is the social pressure. And I want for my children and for my wife to be able to experience the same positive things that are normal in their community of friends and in this society. It is very... I think it is a bit problematic. I feel that I could do more, but it would be at the expense of, it would perhaps create a more difficult relationship between me and my children or my partner and in general. It really isn't easy.

Norwegian sociologist Anne Nilsen's interviews with Norwegian youth on climate change and their sense of the future contain similar expressions of both powerlessness and guilt. Here is an interview excerpt from a 23-year-old young woman in Nilsen's study. The respondent's reflections are in reaction to the environment and the Third World (she had just mentioned climate change in preceding passage):

It's terrible to think of, that we live so well while others live in such miserable circumstances. Of course it's very good to have a comfortable life . . . I enjoy it . . . but I feel so bad about the others, the rest. I have a guilty conscience, that's why I try not to think about it, keep it at a distance. . . I still think these are important matters, but it's as if I can't make myself be concerned all the time, not any more . . . Terribly important these matters, but I don't feel involved in a way, don't want

to get involved. There are so many things to care about, so much information, we know so much about the connections between things in the world, in a way you are obliged to understand and to care. I suppose that's why my family has become more and more important to me, my everyday life, that which is near (Nilsen, 184, 1999).

Fear of “Being a Bad Person”: Individual and National Identity

A related concern with awareness of climate change was the threat it implies for individual and national identities. Citizens of wealthy nations who fail to respond to the issue of climate change benefit from their denial in economic terms. They also benefit by avoiding the emotional and psychological entanglement and identity conflicts that may arise from knowing that one is doing “the wrong thing.” Social psychologists Victor Gecas and Peter Burke describe how “Various self-theories suggest that people's self-conceptions are valued and protected and that a low self-evaluation (on criteria that matter) is an uncomfortable condition which people are motivated to avoid. This may occur through increased efforts and self-improvement or (more typically) through such self serving activities as selective perception and cognition, various strategies of impression management, and restructuring the environment and/or redefining the situation to make it reflect a more favorable view of the self” (1995). Although coming from a different tradition, social psychological work on identity complements work on emotion and cognition and emotion management. In general, “People work hard to verify and maintain the self-concepts or identities they already hold, and do not easily change them” (1995). On a social psychological level, the fact that Trudi finds it unpleasant to think that she or other Norwegians might “distance themselves from others,” makes it less likely that she will want to pay attention to the situation that causes this unpleasant feeling. For example, the Norwegian public self-image has included a strong self-identification of being environmentally aware and humanitarian (Eriksen, 1993; 1996). Norwegians have been proud of their international leadership on a number of environmental issues including climate change. Yet information about climate change – including Norway's inability to reach Kyoto reduction quotas, increasing petroleum development, and its' participation in the umbrella group – contradicts the official national image

of environmental concern. People I interviewed in the community were widely aware of this issue.

Difficult to Link to Daily Life

No doubt a central challenge in our attempt to grapple with climate change is connected to qualities outlined in Ulrich Beck's work on the Risk Society. In particular, rather than a problem we can touch and see for ourselves, climate change is a threat which must be interpreted for us through scientific expertise, using complex instrumentation. As a result, the environmental problem of contaminated water feels invisible to those who can easily afford to buy their water bottled. And the issue of climate change will deeply affect (or perhaps now affects) nations with less infrastructure long before it will significantly touch the lives of Norwegians. As a result, ecological collapse seems a fanciful issue to those in the "safe" and "stable" societies of the North as we buy our fruits and vegetables from South America, our furniture from Southeast Asia, and send our wastes into the common atmosphere. And with the dynamics of global capitalism in which gaps between rich and poor increase, issues of global environmental justice and denial will become increasingly salient for what Stanley Cohen aptly terms "educated and comfortable people living in stable societies" (2001, xvi).

COGNITIVE AND BEHAVIORAL BARRIERS TO ACTION

Based on the above review (and additional articles in the annotated bibliography) we can place barriers to response into three broad categories: 1) psychological/conceptual barriers, 2) social and cultural barriers and 3) structural (political economy). The first two categories have been summarized in detail in the preceding section. Hopefully by this point it is clear that these categories are not mutually exclusive, and represent different disciplinary approaches to the question of failed response as much as anything else. It is also important to note that these barriers to response are for privileged people who do appear to have adequate information. There are millions of poor people around the world who face outright economic and structural barriers to their ability to effectively respond to climate change. This schema does not apply to them.

Psychological and Conceptual Barriers

Considered in detail under the previous section on existing explanations and in the annotated bibliography.

Table 1 Responding to Climate Change: Psychological and Conceptual Barriers		
Cognitive dissonance	Individuals may block out or distance themselves from certain information in order to maintain coherent meaning systems.	Summarized in Cohen, Stanley 2001
Desire to protect individual identity	People are motivated to avoid threats to identity. Such threats may be mitigated by selective perception and cognition, and/or redefining the situation to make it reflect a more favorable view of the self	Victor Gecas and Peter Burke 1995
Mental Models, conceptually flawed	Incorrect mental models lead to widespread confusion in the general public, including confusion between ozone hole and global climate change, between weather and climate, and regarding causes of climate change	Bostrom, Ann, M. Granger Morgan, Baruch Fischhoff and Daniel Read 1994
	“widespread misunderstanding” of how climate change works caused respondents to systematically underestimate the need for immediate action . . . Low public support may arise from misconceptions of climate dynamics.	Sterman and Sweeney 2007
Role of affect, efficacy and negative emotions as response barriers	<u>Affect</u> : Affect, the positive or negative evaluation of an object, idea, or mental image, has been shown to powerfully influence individual processing of information and decision-making. Climate change evokes negative affect.	Leiserowitz, Anthony 2006, 2007
	<u>Efficacy</u> : “People stop paying attention to global climate change when they realize that there is no easy solution for it. Many people judge as serious only those problems for which they think action can be taken.”	Krosnick, Jon, Allyson Holbrook, Laura Lowe and Penny Visser 2006
	<u>Efficacy</u> : Personal efficacy regarding climate change is strongest predictor of concern. Increased levels of information about global warming have a negative effect on concern and sense of personal responsibility.	Kellstedt, Paul, Sammy Zahran and Arnold Vedlitz 2008
	Individuals may block out or distance themselves from certain information in order to maintain a sense of self-efficacy	Gecas and Burke 1995
	<u>Negative emotions</u> : Individuals may block out or distance themselves from certain information in order to maintain desirable emotional states	Rosenberg Morris 1991, Stoll-Kleeman et al. 2001, Meijndes, Midden and Wilke. 2001.

Social and Cultural Barriers

These have also been considered in detail under the previous section on existing explanations and in the annotated bibliography.

Table 2 Social and Cultural Barriers to Responding to Climate Change		
National Identity	Information on high carbon footprints contradicts patriotic national pride	Norgaard, Kari 2006b, Sandvik, Hanno 2008
Risk Society	Complexity of modern life, knowledge specialization and overload	Ungar, Sheldon 2003
	Modern world risks disrupt underlying sense of stability e.g. our sense of ontological security	Anthony Giddens, 1991, Norgaard 2006 a, b
	“Disembeddeness:” Collapsing time and space, risks perceived as remote from daily life.	Anthony Giddens, 1991, Norgaard 2006a and 2006b
Cultural Cognition Norms	Society organizes many aspects of thinking, including patterns of perception and memory.	Zerubavel, Evitar 2006, 2008, Norgaard 2006a and 2006b
	Norms of space: Focus on the local	Norgaard 2006b, Bulkeley, Harriet. 2000
	Norms of time: Future is vague, feels distant.	Norgaard 2006b, Zerubavel, Evitar 2006
Emotional Norms and Emotion Management:	Fear, Helplessness	Norgaard 2006a Feeling fear or helplessness violates emotion These can be managed by these strategies of “Selective Attention” <ul style="list-style-type: none"> • Controlling Exposure to Information • Not thinking too far ahead • Focusing on something you can do
		Also Immerwahr 1999, Opatow and Weiss 2000, Giddens on ontological security.
	Guilt (related to threats to identity as a good person)	Violates emotion norms of national pride, managed in Norway by changing the angle of vision or “perspectival selectivity:” “‘At least we’re not as bad as the Americans” “Norway is a small country anyway”
		See also Sandvik, Hanno 2008, Opatow and Weiss 2000

Political Economic Barriers

At the broadest level, what individuals think and do is shaped by government policy and political climate. Scholars have identified a series of barriers to effective action on climate change that result from the relationship between the political system and the economy. These are: 1) the ability of the fossil fuel industry to influence government policy direction (the U.S. holds prominent examples), 2) the generation of climate skeptic campaigns funded by fossil fuel interest groups (almost exclusively an issue in the U.S.), 3) a lack of quality information on climate change in the media, and 4) the “normal” distortion of climate science through the “balance as bias phenomenon.”

The current economic system of all developed nations is organized around fossil fuel consumption and production. For this reason, all developed nations face major structural barriers in moving their economies away from high emissions scenarios. Additionally, there are vested interests in slowing change, especially for nations who receive revenue from fossil fuel production or have strong ties between government and auto or petroleum industries. For example, while it is in the best long term interest of all nations to reduce emission, it is not equally in the interest of powerful oil and coal companies to alter their course, at least not in the short term. The oil company Exxon Mobile has become the prime example of this phenomenon in which fossil fuel interests systematically manipulate government documents and carry out campaigns of misinformation regarding the state of climate science.

Many have now outlined the serious threat to democracy posed by capital’s control of the production and dissemination of knowledge – e.g. the fact that increased corporate control of media limits and molds available information about global warming (Dispensa and Brulle 2003), and corporate funded research centers generate conflicting knowledge (McCright and Dunlap 2003, McCright and Dunlap 2000). Such political economic barriers have far reaching and interactive effects with the other barriers discussed above.

Although discussion of climate skepticism may appear beyond the scope of cognitive and behavioral barriers to public response to climate change, there are at least three identifiable impacts of climate skepticism on the American public’s response to climate change. First, a portion of the public believes the skeptic claim that global warming is a hoax. Recent work by Dunlap et al. (2008) and others as outlined earlier indicate that some percentage of the public,

especially self identified Republicans do believe this. The second and third impacts of climate skepticism on public response are more pervasive and insidious. One of these, as brilliantly articulated by Boykoff (2004, 2008), is that the media have picked up on and expanded the influence of these actions through recreating a broader perception of uncertainty in the balance as bias mechanism described earlier. Also, the existence of a broader debate about climate science creates an atmosphere of wait and see, which allows a screen for those who do believe there is a problem, but are too uncomfortable to allow themselves to become further engaged.

Table 3 Structural or Political Economic Barriers in Responding to Climate Change

Lack of information in news media	Bell, 1994, Ungar 1992, Mazur, Allan 1998
Discourses and framing in media	Armitage, Kevin 2005 Jacques, Peter, Riley Dunlap and Mark Freeman 2008 McCright, Aaron M. and Riley E. Dunlap. 2000. McCright, Aaron M. and Riley E. Dunlap. 2003 Brossard, Dominique; Shanahan, James; McComas, Katherine 2004, Carvalho, Anabela 2007 and 2005 Dunwoody; Sharon 2007 Sonnnett, John H. 2006 Weiskel, Timothy 2005.
Balance as bias in news media	Boykoff series Grundmann, Reiner 2006 and 2007
Climate Skeptic misinformation campaign	Gelbspan, Ross 2004 Jacques, Peter, Riley Dunlap and Mark Freeman 2008 McCright and Dunlap 2003
Fossil fuel influence on policy discourse	Gelbspan, Ross 2004 McCright, Aaron M. and Riley E. Dunlap. 2000. McCright, Aaron M. and Riley E. Dunlap. 2003 Dispensa, Jaclyn Marissa and Robert J. Brulle 2003. Michaels, David and Celeste Monforton 2005. Freudenburg, William, Robert Gramling and Debra J. Davidson 2008.

ANALYSIS OF CLIMATE CHANGE DISCOURSE IN MEDIA

News media are the primary source of the public's information on climate change worldwide. Thus, if there is a link between information and public response, the presence or absence of information on climate change in news media would be important to consider. Cognitive sociologists have also pointed out that news media are important in shaping the social agenda. Whether something is important or not is communicated both by its presence on the news, and how it is portrayed. Furthermore, while there are a range of actions individuals can take in response to climate change, from behavioral changes that reduce their own carbon footprints, to participating in local and regional planning efforts and putting pressure on legislature and government officials. Some of these actions are significantly more effective than others. While all levels of response are necessary, climate change is a global problem, and national leadership will be required to bring the emissions of climate gasses down to the desired targets. Voluntary and individual actions alone will be ineffective. Thus in order to be an effective agent of change, the news media will need to 1) portray a sense of the seriousness of the problem, 2) communicate that climate change can and should be solved, and 3) give accurate messages about effective responses. Do news media around the world facilitate behavioral response to climate change, or do they prevent it? Meta analysis of existing studies indicates that none of these three criteria have been met.

Presence of Climate Change as a Serious Topic

Considering first whether or not climate change is visible in the news media, we look at several early studies. Although most of the English language material reviewed here focuses on the United States, work has addressed media in England, France and New Zealand, among others. In general, climate change has been visible in the news media worldwide at least as far back as 1988 when the Intergovernmental Panel on Climate Change was founded. The IPCC has produced widely publicized reports on the state of climate science since the first assessment was released in 1990. In the United States Nisbet and Myers (2007) note that there was minimal news attention to climate change during the first half of the 1980s, However, by September 1988, a record summer heat may have been behind a major upswing in media attention. Furthermore,

Nisbet and Myers (2007) do note a connection between media exposure to information and public concern: "Across dimensions of public opinion, we observed strong connections between patterns in media attention to global warming and shifts in poll trends. In no area is the connection clearer than the public's "discovery" of global warming as a problem." Information alone may not always translate to the public. For example, in a 1994 article Bell compares the public knowledge of climate change in New Zealand with media coverage in the preceding year. The author identifies "considerable mismatch" between media reporting of climate science and public understanding. In general Bell finds that despite accurate coverage in the news media, the public knows little about causes of climate change. Instead, the public overestimates temperature and sea level rise scenarios and is confused between the greenhouse effect and ozone depletion.

Although there has been climate coverage, scholars have noted one limitation is that issues follow a "media-attention cycle." This limits the continued presence of climate change in the public arena. Work on media coverage and the attention cycle by Alan Mazur (1998) indicates that climate change was present in the US media in the late 1980s up until 1990, after which point coverage declined, even though scientific consensus increased during that time, and the Clinton White House was sympathetic to environmental concerns from 1992 until 2000. Mazur also hypothesizes that attention to climate change spread from the US media to media coverage in other nations.

However, in their comparison of newspaper coverage of climate change in France and the US from 1987 to 1997, Brossard, and co authors observe that the "media-attention cycle," which is apparent for the American coverage, is not as significant in French coverage (2004). Furthermore, they find that France's coverage of climate change was more closely linked to events, focused more on international relations, and presented a more restricted range of viewpoints on global warming than did American coverage. American coverage emphasized conflicts between scientists and politicians, a trend that was not observed in France.

Framing Climate Change in News Media

A second key dimension of news coverage is whether climate change is portrayed as serious. Here a number of studies have examined the accuracy of media representations of scientific findings. For example, in order to address whether the U.S. media present a biased view of

global warming, Dispensa and Brulle conducted a content analysis of three countries' newspaper articles and two international scientific journals in (2000, 2003). U.S. media portray global warming as controversial, whereas media portrayals in Finland and New Zealand are on par with presentations commonly found in the international scientific journals. They next compare media presentations in the United States, New Zealand and Finland with the country's economy, industry and environment. Dispensa and Brulle conclude that in the US the fossil fuel industry, has a significant impact on the media coverage of global warming in comparison to New Zealand and Finland, where it does not.

Work on language and framing shapes the public perception of the seriousness of information, as well as whether or not there is anything that can be done. In a recent doctoral dissertation, John Sonnett (2006) notes differences in language representation between the scientific community, the news media and the oil industry: scientists speak of "climate change," the news media of "global warming," and the oil industry of "greenhouse gases."

Probably the most significant issue regarding news media framing of climate change concerns the coverage of scientific uncertainty. In the United States in particular, media are found to magnify the perception of uncertainty of climate scientists. Here a series of articles by Maxwell Boykoff, some co-authored with Jules Boykoff are centrally important. Boykoff describes how the journalistic norm of "balance" in which interview time or print space is provided to both sides of a controversial story in fact produces "biased" coverage. Journalists have provided space to both key climate scientists and climate skeptics. As a result, the scientific consensus regarding climate change is not translated to the public. Instead of providing balance, this norm magnifies the perception of uncertainty in the public mind, leading to a false appearance of uncertainty and debate. This perception of uncertainty has moved from the media into both public and policy discourse.

Boykoff has conducted a series of content analyses in both print and television media. For example in his analysis of television news coverage of climate change in United States network television and cable news from 1995 through 2004, Boykoff found that 70% of U.S. television news segments have provided 'balanced' coverage regarding anthropogenic contributions to climate change. Boykoff concludes that as a result of the journalistic norm of balanced reporting, United States television news coverage has "perpetrated an informational

bias by significantly diverging from the consensus view in climate science that humans contribute to climate change” (2008). Similar studies have been done in U.S. print media.

This trend seems to be most prominent in the United States. For example, comparative work mentioned earlier by Brossard, et al. (2004) between the U.S. and France found that American coverage emphasized conflicts between scientists and politicians, whereas this was not observed in France. Boykoff’s work comparing the United States and United Kingdom shows the same. The prevalence of “balanced” reporting in newspaper coverage of climate change in the United States and United Kingdom from 2003 and 2006 shows a significant “divergence” from scientific consensus in the U.S. in 2003–4, but no major “divergence” in UK reporting. Boykoff speculates that his findings “inform ongoing considerations about the spatially-differentiated media terms and conditions through which current and future climate policy is negotiated and implemented.”

The questioning of scientific certainty in the media is a recent phenomenon, and one worth devoting some attention to. The scientific process provides a mechanism for falsification, but not “proof.” This quality, together with the lack of public understanding of science has been manipulated in recent years. Given that all science contains a measure of uncertainty, if agencies can be prevented from imposing regulations until they are unambiguously “justified,” regulations can be defeated or postponed, often for decades. For example, sociologist Reiner Grundmann compares the relationship between scientific certainty and policy prescriptions in the cases of ozone layer protection and climate change (2006). Although scientific expertise is obviously a requirement for policy development in either case, Grundmann notes that highly successful policies to combat ozone depletion were agreed upon under conditions of far less scientific certainty than currently exists for climate change. And despite the greater scientific consensus, climate agreements attempted by world political leaders have been far less successful.

Authors Michaels and Monforton provide a historical view into the process of "manufacture uncertainty" in the United States by opponents of public health and environmental regulations (2005). Michaels and Monforton provide historical data from the tobacco and other industries and document the rise of the label "junk science" to de-legitimize research that threatens powerful interests. This process is carried out as industries question the validity of scientific evidence on which the regulations are based. They highlight that the industry strategy

of manufacturing uncertainty is in opposition to the public health model, under which decisions should be made using the best available evidence in order to ensure the protection of the public's health and the environment.

Similarly, Freudenburg, Gramling and Davidson (2008) trace the increasing call for scientific certainty, or “proof” in public discourse before policies can be implemented. This practice of calling for continued further study has allowed profitable but potentially risky activities to continue unabated. Based on their review of previously documented controversies, the authors suggest that “such calls may reflect not just a fundamental misunderstanding of the nature of science, but a clever and surprisingly effective political-economic tactic—“Scientific Certainty” Argumentation Methods, or SCAMs.” They further suggest that such SCAMs are both more widespread than has been previously recognized, and should be the focus of more attention in the future.

In addition to analyses of total numbers of news stories, the language, frames, and discourses employed, several authors have addressed indirect influences of the media on the dominant social perception of climate change. Timothy Weiskel (2005) describes a “politics of distraction” in the US media which he argues accounts for at least part of why the public fails to respond to climate change. Weiskel describes the movement of celebrities into the White House as well as increased ties of the news media to the entertainment industry. Sociologist Anabela Carvalho describes two “background” ways that news media contribute to the normalization of climate change (2007). On the one hand, “the media is a culprit that instigates materialism by constantly promoting wealth and consumption while acting almost in collusion with the main forces that foment global warming for sake of advertising revenue.” Furthermore, Carvalho observes that mainstream media provide news mainly from the Northern hemisphere, Western Europe and American-based news. As a result, it steers the gaze of viewers away from parts of the world where climate impacts may be most visible.

Media Messages about Responses to Climate Change: Can Anything Be Done, and If So, What

Work from both psychology and sociology indicates that in order for the public to respond to a problem, in addition to information they must have information, a sense that something can be

done and accurate direction about effective action. Significantly less attention has focused on media representations along these dimensions. However, given that the U.S. media are not consistently portraying climate change as serious, it is reasonable to expect that U.S. media are also not providing a sense that something can be done, or direction as to what that would be.

Krosnick, Holbrook and Visser 2000 examine the effect of the Clinton campaign to put global climate change into the spotlight during the fall of 1997 in order to build support for Kyoto. The authors examine (1) What were Americans' beliefs and attitudes about global warming before the debate? (2) Did the debate catch the public's attention? and (3) Did the debate change people's beliefs and attitudes about global warming? They observed that a majority of the American general public endorsed the views advocated by Clinton before the media campaign began. They concluded that “the debate did attract people's attention and strengthened the public's beliefs and attitudes,” but “produced almost no changes in public opinion when the nation's population is lumped together.”

Regarding effective messages for action in the United States, even the film that many believe finally popped the bubble of complacency in the United States, An Inconvenient Truth, contains primarily suggestions for individual behavioral changes rather than institutional and political change.

POLICY CONSIDERATIONS

One of the basic premises of a modern democratic society is that we can use scientific expertise to inform rational public policy. On the one hand, much of the literature we have reviewed points to failures in this model (e.g. the lack of applicability of the information deficit model). How can the knowledge that there are psychological and social barriers to our effective action be turned into a basis of pro-active public policy? Here we draw upon a combination of literature from social psychology, social movements about what motivates people to participate, and the specific findings discussed above.

Barriers to effective engagement in response to climate change exist on all scales from the individual to the institutional, and these dimensions clearly interact. We develop the following practical implications in response to the psychological, social/cultural, and political

economic response barriers outlined in Tables 1-3. A visual presentation of key response barriers by category and possible policy implications is provided in Tables 4, 5 and 6 below. Note that there are numerous barriers outlined earlier, not all of which translate obviously into tangible policy directions.

The single most important policy implication from the literature summarized in this report is that a significant opportunity exists for generating greater engagement in response to climate change. Data from the above studies indicate that people DO care about climate change, and do support stronger climate policies. The notion that people already want to “do the right thing” is an extremely hopeful piece of information which can and should be used as the centerpiece of developing successful policy. The presence of such support has been masked by our misinterpretation of the psychological mechanisms of denial. This implication is woven through the following charts where appropriate.

Although psychological, social and political economic barriers are listed as separate categories, they are obviously related to and reinforce one another. An example of this is the fact that so many well informed individuals feel unable to make change in a world where the fossil fuel industry has so much power. It is important to acknowledge that such “psychological” barriers are in response to very real conditions of political inequality. In order to counter the fact that people don’t like to feel powerless, we must not only design policies in which citizens appear more powerful, but we also need to provide a playing field upon which their actions actually do matter.

Table 4 Policy Implications in light of Psychological and Conceptual Barriers	
Cognitive dissonance (blocking certain information in order to maintain coherent meaning systems).	To the extent possible and realistic, frame climate message in ways that are non-threatening, see below also. Provide media information campaigns and participation opportunities that build on a favorable view of the self. Present information and design policies that appeal to a positive sense of self.
Desire to protect individual identity (people avoid threats to identity).	
Mental models of public are conceptually flawed.	Although these do matter, information per se may not be as limiting as presumed.
Role of affect, efficacy and negative emotions as response barriers. (Climate change evokes negative affect; thinking about it leads to negative emotions; thinking about it is disempowering).	<p>Create positive associations, especially through providing opportunities to participate in response efforts.</p> <p>General strategies:</p> <ol style="list-style-type: none"> 1) Address tendencies for denial head on. Correct interpretation of these tendencies can help educators and policymakers from confusing denial with lack of caring or political will. 2) Create a set of realistic opportunities for participating in positive actions. This will contradict isolation, build community, create positive frames of reference that are needed to counter these psychological barriers to action. 3) Rather than focusing overly on information, focus on what can and should be done. Convey a message that it is not too late, that action can be taken that will make a difference Making a difference can be highlighted BOTH in immediate economic terms (which are important as they appear more tangible) and climate impacts. 4) Create an atmosphere for people to experience both positive emotions and a positive view of the self. This must include real opportunities for change.

Table 5 Policy Implications in light of Social and Cultural Barriers	
National Identity (high carbon footprints contradicts national pride)	Develop other ways of appealing to national identity and national pride e.g. through emission reduction efforts
Risk Society	Knowledge of the risks of the modern world disrupt the underlying sense of order. To some extent this is inevitable, but research shows that when faced openly such fears are less paralyzing.
	“Disembeddeness:” Collapsing of time and space such that risks are perceived as remote and disconnected from daily life. Make these links explicit, see below.
Cultural Cognition Norms	Norms of space: Provide information on how local events are connected to global phenomenon.
	Norms of time: Discuss future climate scenarios for specific places at specific future dates so that they can be better visualized.
Emotional Norms and Emotion Management:	Contradict fear by providing honest information, open discussion (e.g. acknowledgement of the risks) but also hopeful examples. Contradict helplessness through providing opportunities for effective engagement. Combat guilt by acknowledging the present and providing opportunities to engage in more responsible behavior.

Table 6 Policy Implications in light of Political Economic Barriers	
1) Lack of information in news media	While information per se is extremely important and increasing the availability of accurate scientific information must be a priority, more emphasis needs to be placed on the framing of information, see below.
2) Discourses and framing in media	Develop explicit media information campaign parallel to the one executed so successfully by the American Petroleum Industry.
3) Balance as bias in news media	
4) Climate Skeptic misinformation campaign	Develop limits on the ability of the fossil fuel industry to influence policy debate.
5) Fossil fuel influence on policy discourse	

In reality the public sphere is not the equal playing field that we might hope. And while it is in all of our best short and long term economic interest to respond to climate change, there are powerful interests (namely the coal, petroleum and auto industries) who stand to lose. Thus one of the most powerful barriers to our social change is the demonstrated ability of these groups to hijack the public process through public misinformation campaigns.

Because the majority of people are already concerned about climate change and how to make a difference, individuals and communities CAN be mobilized for response, if negative psychological pitfalls are to be avoided. Here's how:

- Build on positive stories of success.
- Encourage and integrate efforts at community, state and federal levels.
- Create a sense of community by building on the knowledge that individuals are part of a larger committed and motivated citizenry.
- Highlight the caring which IS present in order to build a sense of pride and community.
- Provide specific opportunities to engage in realistic actions. For example, engage in local "Impact Assessments," "Disaster Preparedness" and "Mitigation Planning." The development of these may serve to make climate information "real," bringing it close to home. These actions are predicted to reduce the gap between climate change information and daily life, decrease the sense of a double reality, and bring home the impacts in economic, infrastructural, and physical terms. Such plans will also serve the second strategy of providing hopeful action.
- It is very important that suggestions be realistic in order to be deemed credible. They should highlight doable changes at the same time as they encourage significant action. In order to elicit a response, people must be given not only information, but something to do. Communities should be encouraged to think carefully about what actions COULD and MUST be undertaken on all scales, and engage in hopeful collective action. Honest conversation about how much reduction is needed, where it could come from, what the benefits will be of responding, and what the costs will be of not responding should be encouraged. The trouble with many proposals which are "doable" is that they are inadequate and may thus appear to be little more than a smokescreen for business as usual. Instead, highlight tangible, positive outcomes. For example, a number of studies have highlighted the ability to respond to climate change while achieving other social benefits (e.g. energy efficiency has economic benefits in the short and long term, independent of any climate benefits).

ANNOTATED BIBLIOGRAPHY

Citizen Knowledge and Attitudes Regarding Climate Change

Bostrom, Ann, M. Granger Morgan, Baruch Fischhoff and Daniel Read 1994. "What Do People Know About Global Climate Change? I Mental Models" Risk Analysis 14(6): 959-970.

The authors conduct three exploratory studies that employed "mental model interviews." Results indicate widespread misinformation regarding climate change in the general public, including confusion between ozone hole and global climate change, and between weather and climate. Confusion regarding causes of climate change was also observed ("automobile use, heat and emissions from industrial processes, aerosol spray cans, and pollution in general were frequently perceived as primary causes of global warming"). When asked what could be done, respondents tended to focus on general pollution control rather than reductions of carbon dioxide emissions or energy consumption. The authors argue that this general public misunderstanding of climate science is part of the widespread failure of response.

Bord, Richard, Ann Fisher and Robert O'Connor 1998. "Public Perceptions of Global Warming: United States and International Perspectives." Climate Research 11 (1):75-84.

The authors review international survey data on public knowledge, concern, perceived risk and willingness to pay regarding global warming. While the authors find "solid awareness of and support for general environmental goals" and some measure of awareness and concern regarding global warming, they also find a widespread poor understanding of climate change in the public around the world. Concern tends to be highest in Canada, most of Europe and South America. Although the public expresses considerable perceived threat from global warming, the threat is less so than for most other issues surveyed. In conclusion, they find that although global warming is an issue of concern worldwide, it is not a 'front-burner' issue. They also find a "limited willingness to sacrifice" in response to climate change. In conclusion, the authors note that "Our own data support but go beyond earlier data by implying that global warming is not a salient issue, and that people across the globe will support global climate change initiatives that do not levy unusual hardships; but they cannot be expected to voluntarily alter their lifestyles."

Bord, Richard, Robert E. O'Connor and Ann Fischer 2000. In what sense does the public need to understand global climate change? Public Understanding of Science, 9(3): 205-218.

In a survey of 1,218 Americans, the key determinant of behavioral intentions to address global warming is a correct understanding of the causes of global

warming. Knowing what causes climate change, and what does not, is the most powerful predictor of both stated intentions to take voluntary actions and to vote on hypothetical referenda to enact new government policies to reduce greenhouse gas emissions. Identifying bogus causes (e.g., insecticides) correlates with the belief that the globe will warm, but is only weakly related to voluntary actions and not at all related to support for government policies. General pro-environmental beliefs and perceptions that global warming poses serious threats to society also help to explain behavioral intentions. The explanatory power of an air pollution framework is substantial in bivariate analyses, but has little explanatory power in multivariate analyses that include knowledge, risk perceptions, and general environmental beliefs. Translating public concern for global warming into effective action requires real knowledge. General environmental concern or concern for the negative effects of air pollution appear not to motivate people to support programs designed to control global warming.

Brechin, Steven 2003. "Comparative Public Opinion and Knowledge on Global Climatic Change and the Kyoto Protocol: The U.S. versus the World?" International Journal of Sociology and Social Policy 23(10): 106-134.

Brechin compiles public opinion surveys on public understanding of climate change from 15 nations between 1991 and 2001. He finds that even as scientific consensus on climate science increases, knowledge regarding causes of climate change by the public is minimal. There is some evidence for increased public understanding regarding the causes of climate change over the decade from 1991 to 2001, however citizens in all nations studied remain largely uninformed. In the 2001 survey, citizens of Mexico knew the most about the causes of climate change, but even here only one quarter of respondents correctly identifying burning fossil fuels as the primary cause of global warming. Americans, who were tied with the citizens of Brazil at 15%, were in the middle of the pack. The article includes survey data collected shortly after President Bush's withdrawal from the Kyoto Protocol in 1991 on attitudes regarding this event. The U.S. public is much more supportive of Bush's withdrawal than were the citizens of European nations (where there was considerable outrage expressed).

Brechin, Steven R 2008. Ostriches and Change: A Response to 'Global Warming and Sociology' Current Sociology 56(3): 467-474.

The threat of climate change should be more than sufficient to mobilize the world to respond meaningfully and quickly. However, Brechin considers reasons why this has not been the case, including the fact that response must be made to conditions not yet fully realized. Brechin claims that most people in the rich and powerful Northern countries do not really feel like they are living on the edge. Environmental concerns such as climate change are seen as "no more than background noise."

Brewer, Thomas 2005 "U.S. Public Opinion on Climate Change Issues: Implications for Consensus building and Policymaking" Climate Policy, 4: 359-376.

Brewer compiles and analyzes over 40 U.S. public opinion surveys from 1989 through 2004. He concludes that a substantial majority want the government to take stronger steps on climate change and welcome U.S. participation in the Kyoto protocol, and do not support "key elements of the Bush administration policies." Mandatory emissions reductions on industry and economic assistance to developing countries are both supported.

Dunlap, Riley E. 1998. "Lay Perceptions of Global Risk: Public Views of Global Warming in Cross-National Context." International Sociology 13:473-498.

Dunlap reports results from a 1992 Gallup survey conducted in Canada, the U.S., Mexico, Brazil, Portugal, and Russia on public perceptions of global warming. Most respondents saw global warming as a problem, although it was not generally ranked as serious as ozone depletion or rain forest destruction. Most respondents did not understand climate science well. In particular the study, as have others, found confusion between climate change and ozone depletion. Despite limitations in knowledge however, citizens in all nations except Russia believed that climate change would have consequences in their lifetimes. As predicted by the concept of a risk society suggest, public perceptions of global warming do not vary consistently across differing social strata within nations. Dunlap makes the important consideration, however, whether detailed public understanding of highly complex issues such as global warming is feasible or even necessary for effective policy making.

Dunlap, Riley E.; Xiao, Chenyang McCright, Aaron 2001. Politics and Environment in America: Partisan and Ideological Cleavages in Public Support for Environmentalism Environmental Politics 10(4): 23-48.

Surveys U.S. trends in concern and level of information regarding climate change. Notes especially a new and growing divide between perceptions of Democrats and Republicans. The authors note that historically support for environmental protection in the United States has been relatively nonpartisan, but that especially since 1994 a partisan divide has been noticeable, especially among members of Congress (who tend to be more ideologically polarized than the general public). Data from the League of Conservation Voters on voting scores indicated a chasm in both the House and Senate over the past decade. Also, "nowhere is the partisan gap on environmental issues more apparent than on climate change." Currently a very large gap exists between self-identified Republicans and Democrats in terms of perceptions of global warming. See below for more updated and detailed information on this trend.

Dunlap, Riley and Aaron M. McCright. 2008. "A Widening Gap: Republican and Democratic

Views on Climate Change." *Environment* 50 (September/October): 26-35.

This paper expands on the original essay (2001) grounding the analysis in literature on partisan polarization and adding updated correlation results to reinforce the evidence of growing polarization. The latest survey data demonstrate that the relationships between party identification and global warming views are not spurious, and that the polarization is stronger among respondents who believe they understand global warming. The percentage of Americans viewing global warming as a serious threat to themselves or their way of life during their lifetimes has moderately increased, from 25 percent in 1997 to 40 percent in 2008. The percentage saying that global warming will pose a serious threat within their lifetimes has also increased moderately, although it is still a minority position at 40 percent (up from 25 percent in 1997). "What these overall trends generally mask, however, are highly divergent trends among Republicans and Democrats. As noted above, the proportions of Democrats agreeing that global warming is already happening, that most scientists believe it is occurring, and that it poses a serious threat have increased substantially over the past decade. In contrast, the proportion of Republicans agreeing that global warming is already happening has declined a bit, while the proportions agreeing that most scientists believe global warming is occurring and that it poses a serious threat have both increased only modestly. The proportion of Republicans who believe news of global warming's seriousness is exaggerated has grown considerably over the past decade, while the proportion of Democrats expressing this view has declined. A similar pattern of diverging partisan views has also occurred on the issue of attributing global warming to human activities." Dunlap and McCright suggest that this skepticism among Republican and conservative elites has led rank-and-file Republicans in the electorate to follow suit.

Krosnic, Jon, Allyson Holbrook, Laura Lowe and Penny Visser 2006 "The Origins and Consequences of Democratic Citizen's Policy Agendas: A Study of Popular Concern about Global Warming" *Climate Change* 77:7-43.

Stanford social psychologist Krosnic has a long history of work in this area. This paper contributes to work on the complexity of the relationship between efficacy and action regarding climate change. The authors evaluate both causes and consequences of Americans' judgments of the seriousness of global warming using data from two surveys. They find that judgments about global warming are a function of beliefs about the existence of global warming, attitudes toward it, the certainty with which these beliefs and attitudes are held. Judgments and beliefs about human responsibility for causing global warming, and people's ability to remedy it. They also find that beliefs about whether global warming is a problem are a function of relevant personal experiences (with the weather) and messages from informants (in this case, scientists), that attitudes toward global warming are a function of particular perceived consequences of global warming, and that certainty about these attitudes and beliefs is a function of knowledge and

prior thought. More specifically they observe that people stopped paying attention to global climate change when they realized that there is no easy solution for it. Instead they note that many people judged as serious only those problems for which they thought action could be taken.

Krosnick, Jon, Allyson Holbrook and Penny Visser 2000 The Impact of the Fall 1997 Debate about Global Warming on American Public Opinion. Public Understanding of Science 9: 239-260.

Krosnik and co-authors examine the effect of the Clinton campaign to put global climate change into the spotlight during the fall of 1997 in order to build support for Kyoto. The authors examine (1) What were Americans' beliefs and attitudes about global warming before the debate? (2) Did the debate catch the public's attention? and (3) Did the debate change people's beliefs and attitudes about global warming? They observed that a majority of the American general public endorsed the views advocated by Clinton before the media campaign began. They conclude that "the debate did attract people's attention and strengthened the public's beliefs and attitudes," but "produced almost no changes in public opinion when the nation's population is lumped together." They do note differences between Republican and Democratic support for the President's position on Kyoto (observations which are repeated in work by McCright and Dunlap as well as others in this bibliography).

Nisbet, Matthew and Teresa Myers 2007. The Polls – Trends: Twenty Years of Public Opinion about Global Warming. Public Opinion Quarterly Vol. 71(3): 444–470.

Nisbet and Myers conduct a systematic review of trends in public opinion regarding global warming. They summarize public opinion across several key dimensions including (a) public awareness of the issue of global warming; (b) public understanding of the causes of global warming and the specifics of the policy debate; (c) public perceptions of the certainty of the science and the level of agreement among experts; (d) public concern about the impacts of global warming; (e) public support for policy action in light of potential economic costs; and (f) public support for the Kyoto climate treaty.

O'Connor Robert , Richard J. Bord , Brent Yarnal and Nancy Wiefek 2002. Who Wants to Reduce Greenhouse Gas Emissions? Social Science Quarterly 83(1):1 – 17.

The authors use a heuristic model approach to compare cognitive, economic, and partisan explanations for who supports reductions in climate emissions. Based on survey data from a mail survey of 623 residents in Pennsylvania, the authors find that people who can both accurately identify causes of climate change and who expect negative future climate scenarios are the most likely to support both government and voluntary actions. "Economic circumstances and anxieties are not important predictors, but the belief that environmental protection efforts do

not threaten jobs for people like the respondent, limit personal freedoms, and hurt the economy is a strong predictor.” Similar to later work by Dunlap and McCright, the authors find that Democrats are more likely than Republicans to support government efforts to reduce emissions. The authors conclude that so called “cognitive” explanations of support for reducing greenhouse gas emissions are more powerful than economic or partisan heuristic ones. “People want to reduce emissions if they understand the causes of climate change, if they perceive substantial risks from climate change, if average surface temperatures increase, and if they think climate change mitigation policies will not cost them their jobs.” Although not inherently so, the assumptions of this article place it in the information deficit camp of why people fail to respond, which is criticized by Norgaard and Buckeley.

Sterman, John and Linda Booth Sweeney 2007 “Understanding public complacency about climate change: adults’ mental models of climate change violate conservation of matter” Climatic Change (2007) 80:213–238.

Sterman and Sweeney 2007 note the paradox that most Americans believe climate change poses serious risks but also believe inaccurately that emissions reductions can be deferred until there is greater certainty surrounding climate science. “Such wait-and-see policies erroneously presume climate change can be reversed quickly should harm become evident, underestimating substantial delays in the climate’s response to anthropogenic forcing.” The conducted experimental work with graduate students at MIT which found that even these highly educated adults had “widespread misunderstanding” of how climate change worked, misunderstandings that caused them to systematically underestimate the need for immediate action to stabilize the climate. In particular, research subjects conceived of the global climate as a system which was analagous to a bathtub filling over, once the input stops the tub level can be lowered right away. However research shows once in the atmosphere, climate gases will continue to rise even if emissions fall. The authors write that, “these beliefs – analogous to arguing a bathtub filled faster than it drains will never overflow – support wait-and-see policies but violate conservation of matter. Low public support for mitigation policies may arise from misconceptions of climate dynamics rather than high discount rates or uncertainty about the impact of climate change.” Furthermore, the authors link this misunderstanding to the failure of response by U.S. policymakers.

Climate Skepticism

Armitage, Kevin 2005. State of Denial: The United States and the Politics of Global Warming Globalizations 2(3): 417–427.

Similar to work by McCright and Dunlap, as well as Boykoff, Armitage addresses the unique ways that climate science has been politicized in the United States, and

the result in terms of public perception of uncertainty. The author outlines the role of right-wing politicians and think tanks in falsely depicting greenhouse science as uncertain, and the way that this has been portrayed in media. The author traces links between corporate media, fossil fuel industry and the federal government as arguments for the lack of political action against global warming in the United States.

Dunlap, Riley and Aaron McCright 2008 A Widening Gap: Republican and Democratic Views on Climate Change Environment: Science and Policy for Sustainable Development September/October.

Jacques, Peter, Riley Dunlap and Mark Freeman 2008 The organisation of denial: Conservative think tanks and environmental skepticism Environmental Politics 17(3): 349-385.

The authors analyze 141 English-language environmentally skeptical books published between 1972 and 2005, linked to conservative think tanks (most also published in the United States). The authors also examine conservative think tanks involved with environmental issues, finding that 90 per cent espouse environmental skepticism. The authors highlight how environmental skepticism denies the seriousness of environmental problems, and examine the use of the label 'junk science'. They conclude that “skepticism is a tactic of an elite-driven counter-movement designed to combat environmentalism, and that the successful use of this tactic has contributed to the weakening of U.S. commitment to environmental protection.”

McCright, Aaron M. and Riley E. Dunlap. 2000. "Challenging Global Warming as a Social Problem: An Analysis of the Conservative Movement's Counter-Claims." Social Problems 47:499-522.

McCright and Dunlap examine the activities of the anti-environmental conservative movement in the United States as an explanation for the U.S. failure to ratify the Kyoto treaty. They examine conservative movement activities regarding climate change from 1990 to 1997, describing how conservative think tanks challenged claims of climate science by aligning themselves with prominent American climate skeptics. McCright and Dunlap identify a relationship between these climate skeptic scientists and the fossil fuels industry. They conclude, “This study demonstrates how a powerful countermovement effectively challenged the environmental community's definition of global warming as a social problem and blocked the passage of any significant climate change policy.”

—. 2003. "Defeating Kyoto: The Conservative Movement's Impact on U.S. Climate Change Policy." Social Problems 50:348-373.

McCright and Dunlap argue that a major reason the United States failed to ratify

the Kyoto Protocol was the opposition of the American conservative movement, a key segment of the antienvironmental countermovement. They examine movement mobilization from 1990 to 1997, during which time the movement successfully constructed an argument regarding the non-problematicity of global warming. The authors also describe how conservative think tanks mobilized to challenge the claims of mainstream climate science, as well as how these countermovement organizations aligned themselves with prominent American climate change skeptics known for their staunch criticism of mainstream climate research, and their affiliations with the fossil fuels industry. The authors also examine how the efforts of these conservative think tanks were enhanced by the shift in the political opportunity structure created by the 1994 Republican takeover of Congress. The authors conclude, "This study demonstrates how a powerful countermovement effectively challenged the environmental community's definition of global warming as a social problem and blocked the passage of any significant climate change policy."

Apathy and Denial

Brechin, Steven R. 2008. "Ostriches and Change: A Response to 'Global Warming and Sociology'." Current Sociology 56:467-474.

Brechin writes that despite the fact that climate change is the most serious environmental and social challenge of our time, for most people, especially citizens in the rich and powerful Northern nations who emit the highest levels of carbon dioxide, and where people are not living economically on the edge, environmental concerns have become background noise.

Bulkeley, Harriet. 2000. "Common Knowledge? Public Understanding of Climate Change in Newcastle, Australia." Public Understanding of Science 9:313-333.

Buckeley claims that public understanding of climate change not only involves knowledge of its physical processes, but also encompasses wider issues concerning the relation between society and nature. Based on her examination of the conclusions and assumptions of previous research on the public understanding of climate change, Buckeley argues that in each case, in accordance with the "information deficit model," recorded levels of ignorance are seen as a barrier to effective public involvement in the policy process. However, she offers data from her work in Newcastle, Australia to show that whether and how people understand climate change is a function of both scientific information, and local knowledge, values, and moral responsibilities. Further, respondents connected the issue to their communities, and suggested that individual action is morally sanctioned, despite concerns for the efficacy of such action and the lack of government or industry support. She suggests that rather than focus on the provision of information, "policy attention should be directed to the social and institutional barriers that act to constrain public involvement in addressing global

environmental issues.”

Cohen, Stanley States of Denial: Knowing About Atrocities and Suffering, Polity Press, 2001.

Cohen provides in depth coverage of how people avoid uncomfortable situations on the personal level, as well as how personal avoidance is translated into political avoidance and vice versa. Using case studies from the Holocaust as well as other cases of genocides, torture and political massacre, Cohen examines the denial behaviors of both perpetrators and bystanders, discussing the phenomena of the "passive bystander" and "compassion fatigue."

Immerwahr, John 1999. Waiting for a Signal: Public Attitudes toward Global Warming, the Environment and Geophysical Research. Public Agenda/ American Geophysical Union.

One of the first studies to examine why there is an indirect link between a person's knowledge of climate science and whether or not they take action (e.g. to go against the information deficit approach). Immerwahr conducts focus groups on climate change (and other issues) and concludes regarding climate change in particular that respondents, "seemed to have hit a wall." Respondents did show deep concern regarding global warming, but their concern did not translate into action: "our research suggests that what the public is most skeptical about is not the existence of problems but our ability to solve them." Thus, Immerwahr cautions that "informing the public of the problems can increase frustration and apathy rather than build support." In order to promote action regarding climate change the author suggests not more information, but actions that can be taken.

Kellstedt, Paul, Sammy Zahran and Arnold Vedlitz 2008. Personal Efficacy, the Information Environment, and Attitudes Toward Global Warming and Climate Change in the United States Risk Analysis 28(1): 113-126.

Authors use survey data to examine the role of information, confidence in scientists and personal efficacy in shaping respondent's risk assessment regarding climate change. Their results strongly counter the information deficit approach. Specifically, they find that the degree of information a person has regarding climate change, their confidence in scientists and their personal efficacy regarding climate change interact so that the more informed respondents both feel less personally responsible for global warming and also show less concern.

Krosnick, Jon, Allyson Holbrook, Laura Lowe and Penny Visser 2006 "The Origins and Consequences of Democratic Citizen's Policy Agendas: A Study of Popular Concern about Global Warming" Climate Change 77:7-43.

Stanford social psychologist Krosnic has a long history of work in this area. This paper contributes to work on the complexity of the relationship between efficacy and action regarding climate change. The authors evaluate both causes and

consequences of Americans' judgments of the seriousness of global warming using data from two surveys. They find that judgments about global warming are a function of beliefs about the existence of global warming, attitudes toward it, the certainty with which these beliefs and attitudes are held, and beliefs about human responsibility for causing global warming and people's ability to remedy it. They also find that beliefs about whether global warming is a problem are a function of relevant personal experiences (with the weather) and messages from informants (in this case, scientists), that attitudes toward global warming are a function of particular perceived consequences of global warming, and that certainty about these attitudes and beliefs is a function of knowledge and prior thought. More specifically they observe that people stopped paying attention to global climate change when they realize that there is no easy solution for it. Instead they note that many people judge as serious only those problems for which they think action can be taken.

Sandvik, Hanno 2008 Public concern over global warming correlates negatively with national wealth Climatic Change 90(3): 333-341

The author builds on work by Norgaard and others to assert that public awareness and concern regarding climate change is not a function of scientific information alone, but psychological and sociological factors as well. Sandvik examines data on public concern for climate change from 46 countries, with results pointing to a negative association between concern and national wealth (GDP) and carbon dioxide emissions and a “marginally significant” tendency that nations’ per capita carbon dioxide emissions are negatively correlated to public concern. Sandvik concludes that such a relationship is “in accordance with psychological findings, but poses a problem for political decision-makers.”

Sterman, John and Linda Sweeney 2007 “Understanding Public Complacency About Climate Change: Adults Mental Models of Climate Change Violate Conservation of Matter” Climate Change 80: 213-238.

Stoll-Kleemann, Tim O’Riordan and Carlo Jaeger “The Psychology of Denial Concerning Climate Mitigation Measures: Evidence from Swiss Focus Groups” Global Environmental Change 11: 107-117.

See above

Norgaard, Kari Marie. 2006a. "People Want to Protect Themselves a Little Bit': Emotions, Denial, and Social Movement Nonparticipation." Sociological Inquiry 76:372-396.

Emotions can be a source of information and an impetus for social action, but the desire to avoid unpleasant emotions and the need for emotion management can also prevent social movement participation. Ethnographic and interview data from a rural Norwegian community describes how people avoided thinking about

climate change in part because doing so raised fears of ontological security, emotions of helplessness and guilt, and was a threat to individual and collective senses of identity. In contrast to existing studies that focus on the public's lack of information or concern about global warming as the basis for the lack of public response, my work describes the way in which holding information at a distance was an active strategy performed by individuals as part of emotion management. Following Evitar Zerubavel, I describe this process of collective avoiding as the social organization of denial. Emotions played a key role in denial, providing much of the reason why people preferred to avoid information. Emotion management was also a central aspect of the process of denial, which in this community was carried out through the use of a cultural stock of social narratives that were invoked to achieve "perspectival selectivity" and "selective interpretation."

Norgaard, Kari. 2006b. "We Don't Really Want to Know' The Social Experience of Global Warming: Dimensions of Denial and Environmental Justice" Organization and Environment 19(3): 347-470.

Meager public response in the form of social movement activity, behavioral changes, or public pressure on governments is noteworthy in all Western nations. Existing research emphasizes lack of information as a limiting factor for failed public response. This explanation cannot account for the significant population that knows about and express concerns for global warming. Ethnographic and interview data from a rural Norwegian community indicate that non-response is at least partially a matter of socially organized denial. Because Norwegian economic prosperity is tied to oil production, collectively ignoring climate change maintains Norwegian economic interests. Most environmental justice research focuses on people facing disproportionate exposure to environmental problems. This project examines wealthy citizens who perpetuate global warming as they turn a blind eye. Environmental justice implications of socially organized denial are discussed for global warming and beyond.

Opatow, Susan and Leah Weiss 2000. "New Ways of Thinking About Environmentalism: Denial and the Process of Moral Exclusion in Environmental Conflict" Journal of Social Issues 56, 3, 475-490.

The authors examine "moral orientations" that influence environmental conflict. Opatow and Weiss create a typology of three kinds of denial in environmental conflict: denial of outcome severity, denial of stakeholder inclusion, and denial of self-involvement. Opatow and Weiss describe how these forms of denial work together to produce "moral exclusion." The article concludes with implications of this analysis for theory and practice.

Ungar, Sheldon 2003. "Misplaced Metaphor: A Critical Analysis of the 'Knowledge Society'" Canadian Review of Sociology and Anthropology 40(3): 331-347.

Ungar rejects the conception of a “knowledge society” metaphor, arguing instead that we live in a “knowledge averse” culture. The author examines the idea of the well-informed citizen, the notion that our present society contains institutional arrangements and social expectations for being knowledgeable, and the role of the Internet in providing critical underpinnings of a “knowledge society.” Ungar argues that while social processes create a high degree of knowledge specialization in the workplace, this very phenomenon may increase ignorance across society in general.

Zerubavel, Eviatar. Social Mindscapes: An Invitation to Cognitive Sociology, Harvard University Press, 1997.

For Zerubavel, we think not as individuals but as members of social groups. Therefore we must be aware of the ways that society shapes our sense of memory, what we pay attention to, what we ignore, and every aspect of cognition.

Zerubavel, Eviatar. The Elephant in the Room: Silence and Denial in Everyday Life New York: Oxford University Press, 2006.

Wide ranging and persuasive analysis of the social organization of denial. Zerubavel notes that denial normally studied on the psychological level, but it is our society that tells us what to pay attention to and what to ignore, what to worry about and what is acceptable. Therefore we must study denial with a sociological lens. Numerous examples on this topic.

Emotions and Identity

Leiserowitz, Anthony 2007 “Communicating the risks of global warming: American risk perceptions, affective images and interpretive communities” in Moser, Susanne C. and Lisa Dilling, eds Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change. New York: Cambridge University Press.

Even though a large majority of Americans believe global warming is occurring and is a serious problem, there lacks a sense of urgency and remains a low priority relative to other national and environmental issues. The author examines the risk perceptions and connotative meanings of global warming in the American mind, finding that Americans perceive climate change as “a moderate risk that will predominantly impact geographically and temporally distant people and places.” Leiserowitz identifies distinct interpretive communities (segments of the public that conceptualize and respond to the issue in very different ways) and provides strategies to communicate about global warming that either resonate with the values and predispositions of particular audiences, or that directly challenge fundamental misconceptions.

Lorenzoni, Irene, Leiserowitz, Anthony, De Franca Doria, Migue, Poortinga, Wouter and Nick Pidgeon. 2006. "Cross-National Comparisons of Image Associations with "Global Warming" and "Climate Change" Among Laypeople in the United States of America and Great Britain" Journal of Risk Research 9: (3):265-281.

"Affect" is considered by social psychologists to be the positive or negative evaluation of an object, idea, or image. Similar to emotions, but not as "full blown", affect has been shown to powerfully influence both information processing and decision-making. This paper in the area of risk perception and affect in the United States and Great Britain found that, "the terms "global warming" and "climate change", and their associated images, evoked negative affective responses from most respondents. Personally relevant impacts, causes, and solutions to climate change, were rarely mentioned, indicating that climate change is psychologically distant for most individuals in both nations." The authors also note that "personally relevant impacts, causes, and solutions to climate change, were rarely mentioned, indicating that climate change is psychologically distant for most individuals in both nations."

Meijnders, Anneloes Cees Midden and Henk Wilke 2001 "Role of Negative Emotions in Communication about CO2 Risks" Risk Analysis 21(5): 955-966.

The authors use an experiment regarding the risks of carbon dioxide emissions to support their claim that both emotion and information are factors influencing effective risk communication. In the experiment, inducing fear of carbon dioxide risks leads participants to more effectively process information about energy conservation, which in turn results in more favorable attitudes toward energy conservation. "Exposure to strong arguments resulted in more positive attitudes towards the energy-efficient light bulb than exposure to weak arguments in the moderate fear condition." This positive role of the emotion of fear in information processing may be counter to ethnographic and interview work by Norgaard and work from focus groups by Immerwahr, although the latter focus on negative emotions as barriers to action, not barriers to information processing per se. The authors note that extreme fear can reduce information processing effectiveness, but do not characterize climate change in the realm of extreme fear as the impacts are in the future (a questionable assumption).

Meijndes Anneloes, Cees Midden and Henk Wilke. 2001. "Communications 'About Environmental Risks and Risk-Reducing Behavior: The Impact of Fear on Information Processing'" Journal of Applied Social Psychology 31(4): 754-777.

Similar to the companion piece, this article addresses the role of emotions (specifically fear) in how people respond to information. Authors set up an experiment through which the emotions of fear and the strength of arguments

regarding the seriousness of climate change were varied. Next participants were exposed to a message about energy efficient light bulbs. Participants in the groups with higher levels of fear did a better job processing information about the light bulbs. "The results indicate that both moderate and high levels of fear had an impact on attitudes. Moderate fear resulted in more positive attitudes toward energy-saving bulbs, but only when strong arguments in favor of these bulbs were provided. High fear had a positive effect on attitudes, regardless of argument strength." The authors conclude that fear regarding future climate scenarios may influence attitudes towards energy conservation both directly and indirectly.

Moser, Susanne, 2007 "More bad news: the risk of neglecting emotional responses to climate change information" in Moser, Susanne C. and Lisa Dilling. eds Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change. New York: Cambridge University Press.

Norgaard, Kari Marie. 2006. "'People Want to Protect Themselves a Little Bit': Emotions, Denial, and Social Movement Nonparticipation." Sociological Inquiry 76:372-396.

Emotions can be a source of information and an impetus for social action, but the desire to avoid unpleasant emotions and the need for emotion management can also prevent social movement participation. Ethnographic and interview data from a rural Norwegian community describes how people avoided thinking about climate change in part because doing so raised fears of ontological security, emotions of helplessness and guilt, and was a threat to individual and collective senses of identity. In contrast to existing studies that focus on the public's lack of information or concern about global warming as the basis for the lack of public response, my work describes the way in which holding information at a distance was an active strategy performed by individuals as part of emotion management. Following Evitar Zerubavel, I describe this process of collective avoiding as the social organization of denial. Emotions played a key role in denial, providing much of the reason why people preferred to avoid information. Emotion management was also a central aspect of the process of denial, which in this community was carried out through the use of a cultural stock of social narratives that were invoked to achieve "perspectival selectivity" and "selective interpretation."

Stern, Paul. 1992. "Psychological Dimensions of Global Environmental Change" Annual Review of Psychology 43: 269-302.

In this early piece on the topic, Paul Stern reviews existing knowledge from the field of psychology regarding global change mitigation, and adaptation. Stern also identifies a research agenda with emphasis on environmental attitudes, the determinants of specific human activities such as energy use, conservation and participation in the environmental movement and the ways people may perceive, respond to, or be affected by global environmental changes.

Social Movements

Jacques, Peter 2006 The Rearguard of Modernity: Environmental Skepticism as a Struggle of Citizenship Global Environmental Politics 6:1.

See above.

Moser, Susanne C. and Lisa Dilling. 2007. Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change. New York: Cambridge University Press.

This edited volume tackles climate change communication and social change, see more detail under specific entries.

Norgaard, Kari Marie. 2006. "'People Want to Protect Themselves a Little Bit': Emotions, Denial, and Social Movement Nonparticipation." Sociological Inquiry 76:372-396.

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Culture

Bell, Alan. 1994. "Climate of Opinion: Public and Media Discourse on the Global Environment," Discourse and Society. 5(1): 33-64.

Bell compares the public discourse on climate change in New Zealand with media coverage in the preceding year. The author identifies "considerable mismatch" between media reporting of climate science and public understanding. In general the Bell finds that the public knows little about causes of climate change. Confusion in the public is characterized by overestimates of temperature and sea

level rise scenarios and confusion between the greenhouse effect and ozone depletion. Bell concludes that, “this misunderstanding is socially and politically disabling because it misleads people away from dealing with an issue at the heart of western consumer society—the consumption of fossil fuels.”

Jacques, Peter 2006. “ The Rearguard of Modernity: Environmental Skepticism as a Struggle of Citizenship” Global Environmental Politics. 6(1): 76-101.

See above.

Ungar, Sheldon 2003. “Misplaced Metaphor: A Critical Analysis of the ‘Knowledge Society’” Canadian Review of Sociology and Anthropology 40(3): 331-347.

Ungar rejects the conception of a “knowledge society” metaphor, arguing instead that we live in a “knowledge averse” culture. The author examines the idea of the well-informed citizen, the notions that our present society contains institutional arrangements and social expectations for being knowledgeable, and the role of the Internet in providing critical underpinnings of a “knowledge society.” Ungar argues that while social processes create a high degree of knowledge specialization in the workplace, this very phenomenon may increase ignorance across society in general.

Ungar, Sheldon 2007 “Public scares: changing the issue culture” in Moser, Susanne C. and Lisa Dilling, eds Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change. New York: Cambridge University Press.

Ungar, Sheldon 2008. “Ignorance as an under-identified social problem. British Journal of Sociology, 59(2): 301-326.

Similar to earlier paper on the misplaced metaphor of a knowledge society, Ungar examines “the persistence of ignorance in the ostensible knowledge society.” Ungar identifies contradictory dynamics of the knowledge society, specifically information explosions in the knowledge economy and the resultant “knowledge-ignorance paradox.” Ungar counters that “pockets of observed public knowledge - rather than ignorance - are exceptional and require specific explanation.” While ignorance among individuals, as well as experts and organizations, is a serious social problem with potentially deadly consequences, ignorance remains relatively unrecognized since it has major liabilities as a marketable issue. Ungar argues that we are in need of more research on “the cultural and institutional production of ignorance.”

Media Analysis

Boykoff, Maxwell T. and Jules M. Boykoff. 2004. "Balance as Bias: Global Warming and the

US Prestige Press." Global Environmental Change Part A 14:125-136.

The authors conduct a content analysis of coverage of global warming from 1988 to 2002 in the New York Times, the Washington Post, the Los Angeles Times, and the Wall Street Journal. Similar to other articles by Maxwell Boykoff, the authors describe how the press's adherence to "balance" produces "biased" coverage of both anthropogenic contributions to global warming by amplifying the perception of uncertainty in climate science in the public mind. The authors describe how this "significant divergence of popular discourse from scientific discourse" is the result of tactical media responses and practices guided by widely accepted journalistic norms.

Boykoff, Maxwell 2008 "The Cultural Politics of Climate Change Discourse in UK Tabloids" Political Geography 27: 549-569.

Boykoff examines cultural issues of identity and discourse through claims and frames on climate change in four daily 'working class' tabloid newspapers in U.K.: The Sun (and News of the World), Daily Mail (and Mail on Sunday), the Daily Express (and Sunday Express), and the Mirror (and Sunday Mirror). Data show that news articles on climate change were predominantly framed through weather events, charismatic megafauna and the movements of political actors and rhetoric, while few stories focused on climate justice and risk. Headlines with tones of fear, misery and doom were most prevalent.

Boykoff, Maxwell 2008 Lost in Translation? The United States television news coverage of anthropogenic climate change 1995-2004 Climate Change 86 1-11.

The author illustrates the significant difference between this television coverage and scientific consensus regarding anthropogenic climate change from 1996 through 2004. Boykoff does this by conducting a content analysis of television news coverage of climate change in United States network television news (ABC World, News Tonight, CBS Evening News and NBC Nightly News) and cable news (CNN WorldView, CNN Wolf Blitzer Reports and CNN NewsNight) from 1995 through 2004. Results show that 70% of U.S. television news segments have provided 'balanced' coverage regarding anthropogenic contributions to climate change. Boykoff concludes that as a result of the journalistic norm of balanced reporting, United States television news coverage has "perpetrated an informational bias by significantly diverging from the consensus view in climate science that humans contribute to climate change." As a result, the scientific consensus regarding climate change is not translated to the public, instead the media has produced an appearance of uncertainty and debate. This perception of uncertainty has then moved from the media into both public and policy discourse.

Boykoff, Maxwell "Flogging a dead norm? Newspaper coverage of anthropogenic climate change in the United States and United Kingdom from 2003 to 2006" Area 39(4): 470-481.

Boykoff describes a journalistic norm of 'balanced' reporting in which writers give roughly equal coverage to both sides in any significant dispute. Boykoff describes how this norm incorrectly leads to the perception of greater uncertainty in climate debates in the public mind than in the scientific community, or a "divergence" in understanding regarding climate change between the scientists and the public. The author then compares the prevalence of "balanced" reporting in newspaper coverage of climate change in the United States and United Kingdom. The sample in time period from 2003 and 2006 shows a significant "divergence" from scientific consensus in the US in 2003–4, but no major "divergence" in UK reporting. Boykoff speculates that his findings "inform ongoing considerations about the spatially-differentiated media terms and conditions through which current and future climate policy is negotiated and implemented."

Boykoff, Maxwell 2007. "From convergence to contention: United States mass media representations of anthropogenic climate change science" Transactions of the Institute of British Geographers 32: 477–489.

Similar to the framework of his other articles, but here Boykoff compares the prevalence of "balanced" reporting in newspaper coverage of climate change in the United States and United Kingdom. The sample in time period from 2003 and 2006 shows a significant "divergence" from scientific consensus in the US in 2003–4, but no major "divergence" in UK reporting. Boykoff speculates that his findings "inform ongoing considerations about the spatially-differentiated media terms and conditions through which current and future climate policy is negotiated and implemented."

Brossard, Dominique; Shanahan, James; McComas, Katherine 2004. "Are Issue-Cycles Culturally Constructed? A Comparison of French and American Coverage of Global Climate Change" Mass Communication and Society 7(3):359-377.

The authors conduct a comparison of newspaper coverage of climate change in France and in the US (1987-1997) as a case study to analyze the impact of culturally bound journalistic practices on media attention cycles. They find that France's coverage was more event-based, focused more on international relations, and presented a more restricted range of viewpoints on global warming than American coverage did. American coverage emphasized conflicts between scientists & politicians. Downs's "media-attention cycle," which is apparent for the American coverage, does not manifest as visibly in French coverage. They suggest that research on media coverage of global environmental issues needs to move beyond studies at the national level; cross-cultural comparisons are essential to understand how different news regimes might affect public opinion

Carvalho, Anabela 2007. "Communicating global responsibility? Discourses on climate change and citizenship" International Journal of Media and Cultural Politics 3(2):180-183.

Carvalho describes two "background" ways that news media contribute to the normalization of climate change. On the one hand, "the media is a culprit that instigates materialism by constantly promoting wealth and consumption while acting almost in collusion with the main forces that foment global warming for sake of advertising revenue." Furthermore, Carvalho observes that mainstream media provides news mainly from the Northern hemisphere, Western Europe and American-based news. As a result, it steers the gaze of viewers away from parts of the world where climate impacts may be most visible.

Carvalho, Anabela 2005. "Representing the Politics of the Greenhouse Effect: Discursive Strategies in the British Media" Critical Discourse Studies 2(1): 1-29.

The author uses critical discourse analysis to identify the discursive strategies of political actors and the media in their re-constructions of climate change. The author compares representations of climate change in three British newspapers -- The Guardian, The Independent, and The Times.

Dunwoody; Sharon 2007 "The challenge of trying to make a difference using media messages" in Moser, Susanne C. and Lisa Dilling. eds Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change. New York: Cambridge University Press.

Mazur, Allan 1998. Global Environmental Change in the News: 1987-90 vs 1992-6 International Sociology, 13 (4): 457-472.

Early work on media coverage of climate change by Alan Mazur (1998) indicates that global environmental hazards including climate change and other issues were both present in the US media in the late 1980s up until 1990, after which point it declined, even though scientific consensus increased during that time and the Clinton White House was sympathetic to environmental concerns from 1992 until 2000. Mazur also hypothesizes that attention to climate change spread from the US media to media coverage in other nations.

Sonnett, John H. 2006 "Representing the Earth: Global climate issues in popular, political, scientific, business, industry, and environmentalist news: A new old sociology of knowledge" Dissertation Abstracts International, A: The Humanities and Social Sciences, 67(02): 743.

John Sonnett (2006) notes differences in language representation between scientific community, news media and the oil industry: scientists speak of "climate change," the news media of "global warming," and the oil industry of "greenhouse gases." He observes that each term is "embedded within risk discourses, structured primarily by scientific uncertainties and political fears."

Weiskel, Timothy 2005. "From Sidekick to Sideshow -- Celebrity, Entertainment, and the Politics of Distraction: Why Americans Are "Sleepwalking Toward the End of the Earth" American Behavioral Scientist 49(3): 393-409.

Timothy Weiskel describes a "politics of distraction" in the US media which he argues accounts for at least part of why the public fails to respond to climate change. Weiskel describes the movement of celebrities into the White House as well as increased ties of the news media to the entertainment industry.

Political Economy

Dispensa, Jaclyn Marissa and Robert J. Brulle 2003. "Media's Social Construction of Environmental Issues: Focus on Global Warming – A Comparative Study" International Journal of Sociology and Social Policy. 23(10): 74-105.

In order to address whether the US media present a biased view of global warming, the authors examine media coverage of global warming from a content analysis of three countries' newspaper articles and two international scientific journals in 2000. They compare media presentations in the United States, New Zealand and Finland with the country's economy, industry and environment. Dispensa and Brulle conclude that in the US the fossil fuel industry has a significant impact on the media coverage of global warming in comparison to New Zealand & Finland where it does not. US media portray global warming as controversial whereas media portrayals in Finland and New are on par with presentations commonly found in the international scientific journals.

Jacques, Peter, Riley Dunlap and Mark Freeman 2008 "The organisation of denial: Conservative think tanks and environmental skepticism" Environmental Politics 17(3): 349-385

The authors conduct a quantitative analysis of 141 English-language environmentally skeptical books published from 1972 to 2005. They find that over 92 percent of these texts are associated with conservative think tanks. The authors also examine those conservative think tanks who produce information on the environment, finding 90 per cent of such think tanks espouse environmental skepticism. The authors describe skepticism as a tactic of an elite-driven counter-movement that is designed to combat environmentalism. They further claim that the successful production of skepticism regarding scientific certainty has contributed to the weakening of U.S. commitment to environmental protection at the political level.

Michaels, David and Celeste Monforton 2005. "Manufacturing Uncertainty: Contested Science and the Protection of the Public's Health and Environment" American Journal of Public Health 95(S1): S39-S48.

The authors provide a historical view into the process of "manufacture uncertainty" in the United States by opponents of public health and environmental regulations. This process is carried out as industries question the validity of scientific evidence on which the regulations are based. They highlight that the industry strategy of manufacturing uncertainty is in opposition to the public health model, under which decisions should be made using the best available evidence in order to ensure the protection of the public's health and the environment. Michaels and Monforton provide historical data from the tobacco and other industries and document the rise of the label "junk science" to de-legitimize research that threatens powerful interests.

Science Communication

Freudenburg, William, Robert Gramling and Debra J. Davidson 2008. "Scientific Certainty Argumentation Methods (SCAMs): Science and the Politics of Doubt" Sociological Inquiry 78(1):2-38.

Science provides falsification, but not "proof." The authors trace the increasing call for scientific certainty, or "proof" in public discourse before policies can be implemented. Given that all science contains a measure of uncertainty, if agencies can be prevented from imposing any regulations until they are unambiguously "justified," most regulations can be defeated or postponed, often for decades. This practice has allowed profitable but potentially risky activities to continue unabated. Based on their review of previously documented controversies, the authors suggest that "such calls may reflect not just a fundamental misunderstanding of the nature of science, but a clever and surprisingly effective political-economic tactic—"Scientific Certainty" Argumentation Methods, or SCAMs." They further suggest that such SCAMs are both more widespread than has been previously recognized and should be the focus of more attention in the future.

Grotzer, Tina and Rebecca Lincoln 2007. "Educating for 'intelligent environmental action' in an age of global warming" in Moser, Susanne C. and Lisa Dilling, eds Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change. New York: Cambridge University Press.

Meijnders, Anneloes Cees Midden and Henk Wilke 2001 "Role of Negative Emotions in Communication about CO2 Risks" Risk Analysis 21(5): 955-966.

The authors use an experiment regarding the risks of carbon dioxide emissions to support their claim that both emotion and information are factors influencing effective risk communication. In the experiment, inducing fear of carbon dioxide risks leads participants to more effectively process information about energy conservation, which in turn results in more favorable attitudes toward energy conservation. "Exposure to strong arguments resulted in more positive attitudes

towards the energy-efficient light bulb than exposure to weak arguments in the moderate fear condition.” This positive role of the emotion of fear in information processing may be counter to ethnographic and interview work by Norgaard and work from focus groups by Immerwahr, although the latter focus on negative emotions as barriers to action, not barriers to information processing per se. The authors note that extreme fear can reduce information processing effectiveness, but do not characterize climate change in the realm of extreme fear as the impacts are in the future (a questionable assumption).

Sturgis, Patrick and Nick Allum 2004 Science in society: re-evaluating the deficit model of public attitudes Public Understanding of Science. 13: 55–74.

Within literature on public perception of science, the “deficit model” holds that public understanding of science is a determinant of public attitudes towards science. The authors’ research does support the dominant model that knowledge is a determinant of attitudes toward science. However, the authors provide evidence that this relationship between knowledge and attitudes is more complex than has been presumed.

Policy

Brewer, Thomas 2005 “U.S. Public Opinion on Climate Change Issues: Implications for Consensus building and Policymaking” Climate Policy, 4: 359-376.

Brewer compiles and analyzes over 40 US public opinion surveys from 1989 through 2004. He concludes that a substantial majority want the government to take stronger steps on climate change, welcome US participation in the Kyoto protocol, and do not support “key elements of the Bush administration policies.” Mandatory emissions reductions on industry and economic assistance to developing countries are both supported.

Bulkeley, Harriet. 2000. "Common Knowledge? Public Understanding of Climate Change in Newcastle, Australia." Public Understanding of Science 9:313-333.

Buckeley claims that public understanding of climate change not only involves knowledge of its physical processes, but also encompasses wider issues concerning the relation between society and nature. Based on her examination of the conclusions and assumptions of previous research on the public understanding of climate change, Buckeley argues that in each case, in accordance with the “information deficit model,” recorded levels of ignorance are seen as a barrier to effective public involvement in the policy process. However, she offers data from her work in Newcastle, Australia to show that whether and how people understand climate change is a function of scientific information, local knowledge, values, and moral responsibilities. Further, respondents connected the

issue to their communities, and suggested that individual action is morally sanctioned, despite concerns for the efficacy of such action and the lack of government or industry support. She suggests that rather than focus on the provision of information, “policy attention should be directed to the social and institutional barriers that act to constrain public involvement in addressing global environmental issues.”

Dunlap, Riley E. 1998. "Lay Perceptions of Global Risk: Public Views of Global Warming in Cross-National Context." International Sociology 13:473-498.

Dunlap reports results from a 1992 Gallup survey conducted in Canada, the U.S., Mexico, Brazil, Portugal, and Russia on public perceptions of global warming. Most respondents saw global warming as a problem, although it was not generally ranked as serious as ozone depletion or rain forest destruction. Most respondents did not understand climate science well. In particular the study, along with others, found confusion between climate change and ozone depletion. Despite limitations in knowledge, however, citizens in all nations except Russia believed that climate change would have consequences in their lifetimes. As predicted by the concept of a risk society, public perceptions of global warming do not vary consistently across differing social strata within nations. Dunlap makes the important consideration, however, of whether detailed public understanding of highly complex issues such as global warming is feasible or even necessary for effective policy making.

Freudenburg, William, Robert Gramling and Debra J. Davidson 2008. “Scientific Certainty Argumentation Methods (SCAMs): Science and the Politics of Doubt” Sociological Inquiry 78(1):2–38.

Science provides falsification, but not “proof.” The authors trace the increasing call for scientific certainty, or “proof” in public discourse before policies can be implemented. Given that all science contains a measure of uncertainty, if agencies can be prevented from imposing any regulations until they are unambiguously “justified,” most regulations can be defeated or postponed, often for decades. This practice has allowed profitable but potentially risky activities to continue unabated. Based on their review of previously documented controversies, the authors suggest that “such calls may reflect not just a fundamental misunderstanding of the nature of science, but a clever and surprisingly effective political-economic tactic—“Scientific Certainty” Argumentation Methods, or SCAMs.” They further suggest that such SCAMs are both more widespread than has been previously recognized and should be the focus of more attention in the future.

Grundmann, Reiner 2006. “Ozone and Climate: Scientific Consensus and Leadership” *Science, Technology, and Human Values* 31(1): 73-101.

Grundmann compares the relationship between scientific certainty and policy prescriptions in cases of ozone layer protection and climate change. Although scientific expertise is obviously a requirement for policy development in either case, strong international and highly successful policies to combat ozone depletion were agreed upon under conditions of far less scientific certainty than currently exists for climate change. Despite the greater scientific consensus, climate policies have been far more modest. Grundmann's analysis of media discourse in the two cases indicates that both a high level of expectation of negotiators and pressure from leading nations are crucial variables for successfully negotiating strong policies.

Grundmann, Reinart 2007. "Climate Change and Knowledge Politics" Environmental Politics 16(3): 414-432.

Grundmann notes that although the Intergovernmental Panel on Climate Change has reached a broad consensus, nations around the world pursue different, if not opposing policies, a fact which he believes challenges the traditional belief that scientific knowledge is objective and can be more or less directly translated into political action. The author compares the use of science in media and policy between the United States and Germany, finding that media in each country rely on different sources of scientific expertise when reporting on global warming. Furthermore, the US and German governments each use these different sources for legitimising their contrasting policies. Grundmann calls for a better understanding of the relation between science and public policy in modern society.

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