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Abstract

Nationally representative surveys conducted in 2008 and 2010 found significant declines in Americans' climate change beliefs, risk perceptions, and trust in scientists. Drawing upon the Social Amplification of Risk Framework, this analysis empirically examines the impact of "climategate"—an international scandal resulting from the unauthorized release of emails between climate scientists in England and United States. The results demonstrate that "climategate" had a significant effect on public beliefs in global warming and trust in scientists. The loss of trust in scientists, however, was primarily among individuals with a strongly individualistic worldview or politically conservative ideology. Nonetheless, Americans overall continued to trust scientists more than other sources of information about global warming. Several other explanations for the declines in public understanding are also explored, including the poor state of the economy, a new administration and Congress, diminishing media attention, and abnormal winter weather.

Keywords

"climategate", trust, public opinion, climate change, risk perception

In 2007 and 2008, climate change reached the top of the international agenda, with world leaders discussing the issue at international summits. Former vice president Al Gore and the Intergovernmental Panel on Climate Change shared the 2007 Nobel Peace Prize for their efforts to alert the world to the threat. Media coverage and public

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concerns about global warming reached historic highs. Barack Obama, who had campaigned, in part, on the need to address climate change, won the U.S. presidential election along with a large majority of Democrats in both houses of the U.S. Congress. On June 26, 2009, the House of Representatives passed the first major piece of climate change legislation in American history. Meanwhile, the nations of the world were negotiating an internationally binding treaty to be concluded in Copenhagen in December 2009.

By the end of 2009, however, the situation had changed dramatically. The climate bill stalled in the U.S. Senate. President Obama remained mired in a bruising fight over health care reform, and Copenhagen failed to produce a new internationally binding treaty. Climate science itself was attacked on several fronts after a server at the Climate Research Unit (CRU) at the University of East Anglia in the United Kingdom was breached and more than a thousand emails and other documents were posted on the Internet. A few of these emails were cited by climate change critics as evidence that British and American scientists had changed their results to make global warming appear worse than it is, suppressed global warming research they disagreed with, and conspired to delete communications relevant to freedom of information requests.

One series of emails in particular attracted widespread interest. In conversations between Phil Jones, director of the CRU, and Michal Mann, director of the Earth System Science Center at Pennsylvania State University, Jones described a “trick” employed to allegedly “hide the decline” in warming over the past half century as recorded by some tree ring records (*New York Times*, 2009). Jones, Mann, and other scientists argued that both statements had been taken out of context and misinterpreted. Meanwhile, the story moved from the blogosphere into mainstream newspapers and television news and opinion programs. Dubbed “climategate” by climate skeptics and some in the media, the scandal generated considerable press attention across the United States and around the world, with articles and editorials published in major newspapers and scientific journals and stories broadcast on major television and radio networks. Several books were quickly written by climate change deniers who used the controversy as “proof” that climate change is not happening or is a hoax (e.g., see Sussman, 2010). More broadly, “climategate” became the latest in a series of events and arguments climate change dismissives have used in a two-decade campaign to convince the world that climate change is not occurring (Hoggan & Littlemore, 2009; Oreskes & Conway, 2010).

The scandal also had significant ramifications for the scientists involved. Phil Jones temporarily stepped down as director of the CRU, pending an independent investigation, although he has since been exonerated (Russell, Boulton, Clarke, Eyton, & Norton, 2010). Michael Mann was also subject to a university review, which subsequently exonerated him on all four charges (Pennsylvania State University, 2010). Both men and other scientists received physical and death threats, and in an interview Jones admitted that he had contemplated suicide “several times” (*Sunday Times*, 2010).

The consequences were also felt within the broader climate science community. The Intergovernmental Panel on Climate Change (IPCC), for example, faced allegations

that these scientists had pressured the IPCC to ignore several contrarian articles as part of the 4th Assessment Report, a claim the IPCC denied. Since the email scandal, however, several errors were identified in the 4th Assessment Report, leading the United Nations to order an independent review of the IPCC review process (BBC, 2010). The allegations also swirled through the Copenhagen Climate Summit and into the halls of the U.S. Congress, where Senator James Inhofe of Oklahoma (R) called for criminal investigations of 17 climate scientists by the U.S. Department of Justice (U.S. Senate, 2010).

Although American public understanding of the reality of anthropogenic climate change had been increasing since the late 1990s (Nisbet & Myers, 2007), these events coincided with widespread declines in public acceptance that global warming is happening, human-caused, or a serious threat (e.g., Pew, 2009a; Gallup, 2009, 2010a; Leiserowitz, Maibach & Roser-Renouf 2009, 2010). This article reports results from a national study on the impact of "climategate" on public beliefs in global warming and trust in climate scientists, and describes several additional factors that likely contributed to the overall declines in American public opinion.

Theoretical Background: The Social Amplification of Risk

The study of the social amplification of risk aims to examine broadly, and in social and historical context, how risk and risk events interact with psychological, social, institutional, and cultural processes in ways that amplify or attenuate risk perceptions and concerns, and thereby shape risk behavior, influence institutional processes, and affect risk consequences. (J.X. Kasperson, Kasperson, Pidgeon, & Slovic, 2003, p. 2)

In particular, the theory describes an interconnected system or network of communication, in which messages about risk emerge from one part of the system (e.g., scientists discover that smoking causes cancer), the threat is then amplified by other actors in the system (e.g., doctors and public health groups) and downplayed by other actors (e.g. cigarette companies), leading over time to changes in mass media coverage, public opinion, consumer markets, and government policy (R. E. Kasperson et al., 1988). The secondary and tertiary ripple effects of this process can occasionally be quite large, leading to the collapse or emergence of entire markets, new laws, regulations, institutions, and changes in mass behavior, as the smoking example illustrates.

In particular, this approach examines how different representations of risk and uncertainty diffuse through a society and are selectively amplified, attenuated, or reinterpreted in the process, leading to changes in individual decision making and public policy. Different actors and organizations within the system, including scientists and scientific institutions, special interest groups, the private sector, government officials, reporters and the mass media, and the public, all play critical roles in this process

(Flynn, Slovic, & Kunreuther, 2001; Leiserowitz, 2004; Pidgeon, Kasperson, & Slovic, 2003). Some risk signals diffuse quickly through the system, encountering little resistance and a lot of amplification (e.g., recent concern about the H1N1 virus or “swine flu”), whereas other risk signals diffuse slowly, receiving relatively little media attention (e.g., radon). Finally, some risks are highly controversial, with different actors competitively trying to either amplify or attenuate the risk signal.

Climate change science and policy are an excellent case in point, in which new scientific findings and assessments, extreme weather events, mass media events (e.g., *An Inconvenient Truth*), and proposed government policies have generated a complex set of amplification and attenuation efforts by a broad range of actors within the system over several decades. Likewise, scientific, economic, and political uncertainties are often deployed strategically by various actors within the social amplification system. Climate skeptics often try to amplify uncertainties or doubts about climate science to delay action (Dunlap & McCright, 2010; Hoggan & Littlemore, 2009; McCright & Dunlap, 2003). Uncertainty about the technical feasibility, economic cost, and efficacy of solutions are also often used as a delaying tactic (“this will bankrupt the economy,” “the Kyoto Protocol won’t make any difference”). Meanwhile, environmentalists may attempt to amplify other scientific uncertainties to *motivate* action (e.g., the possibility of abrupt and catastrophic climate change) (Nisbet, 2009).

Drawing upon two nationally representative survey studies, this article reports a significant decline in the American public’s beliefs that climate change is happening, human-caused, and a serious threat, along with declines in public trust in climate science and scientists. The social amplification of risk provides a conceptual framework that helps to identify several key factors that likely contributed to these large-scale trends. In particular, we empirically examine the impact of “climategate” as a risk attenuation event, amplified by climate skeptics within particular online and media networks, on different segments of the American public.

Methods

Survey Method

From 2008 to 2010, we conducted two nationally representative surveys of American adults to assess shifts in public climate change beliefs, risk perceptions, policy preferences, and behaviors, and the impact of “climategate” on public opinion.

2008. From October 7 through November 12, 2008, we conducted a nationally representative survey of American adults aged 18 or older using KnowledgePanel, an online panel operated by Knowledge Networks. Recruited nationally using random-digit dialing (RDD) telephone methodology, KnowledgePanel is representative of the U.S. population. The panel tracks closely the December 2007 Current Population Survey (CPS; published jointly by the U.S. Census Bureau and the Bureau of Labor Statistics) on age, race, Hispanic ethnicity, geographic region, employment status, and other demographic variables. Completed questionnaires were received from 2,164 respondents, a 54% within-panel completion rate, with a margin of sampling error of plus or minus 2%, with 95% confidence.

2010. From December 24, 2009 to January 4, 2010, we conducted a second nationally representative survey of American adults ($n = 1,001$), again using KnowledgePanel. Completed questionnaires were received from 1,001 American adults, aged 18 or older, a 53% within-panel completion rate. The margin of sampling error was plus or minus 3%, with 95% confidence.

To reduce the effects of any nonresponse and noncoverage bias in the overall panel membership, poststratification weights were applied to both survey datasets using demographic distributions from the most recent CPS for each survey. Benchmark distributions for Internet access among the U.S. population of adults were obtained from KnowledgePanel recruitment data since this measurement is not collected as part of the CPS. The poststratification variables were as follows: Gender (male/female); Age (18–29, 30–44, 45–59, and 60+); Race/Hispanic ethnicity (White/non-Hispanic, Black/non-Hispanic, other/non-Hispanic, 2+ races/non-Hispanic, Hispanic); Education (less than high school, high school, some college, bachelor and beyond); Census Region (Northeast, Midwest, South, West); Metropolitan Area (yes/no); Internet Access (yes/no).

Measures

In both surveys, respondents were asked whether they believed global warming is happening, what they believed is causing it, how worried they were about it, and how much they trusted a variety of information sources on the issue. In the 2010 survey, respondents were additionally asked whether they had heard of “climategate”; how closely they had followed the stories about it; what impact, if any, the stories had on their levels of certainty that global warming is or is not happening; and their trust in scientists as sources of information about global warming. Questions assessing cultural worldviews and sociodemographics were also asked.

Belief was assessed by asking, “Recently, you may have noticed that global warming has been getting some attention in the news. Global warming refers to the idea that the world’s average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world’s climate may change as a result. What do you think? Do you think that global warming is happening?” (1) Yes; (2) No; and (3) Don’t know. A follow-up question asked those who responded either “yes” or “no” how certain they were of their belief: (1) *not at all certain*; (2) *somewhat certain*; (3) *very certain*; or (4) *extremely certain*.

Causation was assessed by asking, “Assuming global warming is happening, do you think it is . . . (1) Caused mostly by human activities; (2) Caused mostly by natural changes in the environment; (3) Other (Please specify); (4) None of the above because global warming isn’t happening.” The first and second response options were rotated to control for order effects, and the “other” text responses were content analyzed to create two additional categories: (5) Caused by both human activities and natural changes in the environment; and (6) Don’t know.

Worry was assessed by asking, “How worried are you about global warming?” (1) *Not at all worried*; (2) *not very worried*; (3) *somewhat worried*; (4) *very worried*.

Source trust was assessed by asking, “How much do you trust or distrust the following as a source of information about global warming?” (1) *Strongly distrust*; (2) *somewhat distrust*; (3) *somewhat trust*; (4) *strongly trust*. The 2008 survey included a randomized list of nine sources for respondents to rate; the 2010 survey included a partly overlapping list of eight. Those items common to both surveys were scientists, television weather reporters, religious leaders, the mainstream news media, Al Gore, and Barack Obama.

“*Climategate*” awareness and impact were assessed in the 2010 survey with a short series of questions: Respondents were first asked, “Have you heard anything in the news recently about controversial emails between climate scientists in England and the US? Some news organizations have called the release of these emails ‘Climategate.’” (1) Yes; (2) No; (3) Don’t know.

Respondents who answered “yes” were then asked, “How closely have you followed the news stories about the controversial emails?” (1) *Not at all*; (2) *a little*; (3) *somewhat closely*; (4) *very closely*.

The impact of the stories on people who followed them was then assessed with several items: Respondents who answered “a little,” “somewhat closely,” or “very closely,” were asked,

1. “Would you say the news stories about the controversial emails made you:” (5) *Much more certain that global warming IS happening*; (4) *somewhat more certain that global warming IS happening*; (3) *they had no influence on my level of certainty*; (2) *somewhat more certain that global warming IS NOT happening*; (1) *much more certain that global warming IS NOT happening*.
2. “Have these stories about the controversial emails caused you to have more or less trust in climate scientists?” (5) *Much more trust*; (4) *somewhat more trust*; (3) *no change in my level of trust*; (2) *somewhat less trust*; (1) *much less trust*. For regression analyses, this item was recoded to create a 3-point scale: Increased trust and no change in trust (responses 5 through 3) were collapsed into a single category to reduce the skew caused by the small numbers who said their trust had increased.
3. “How much do you agree or disagree with the following statements?” (4) *Strongly agree*; (3) *somewhat agree*; (2) *somewhat disagree*; (1) *strongly disagree*. The order of the four statements was randomized.
 - “Scientists changed their results to make global warming appear worse than it is.”
 - “Scientists conspired to suppress global warming research they disagreed with.”
 - “Nothing in the emails contradicts the scientific conclusion that global warming is happening.”
 - “Climate skeptics are intentionally taking the emails out of context in order to cast doubt on the reality of global warming.”

Cultural worldviews of egalitarianism and individualism were assessed using a series of questions derived from cultural theory and from scales used by Dake (1992), Peters and Slovic (1996), and Leiserowitz (2006). For analysis, egalitarianism and individualism indices were created, each with a high reliability score ($\alpha = .78$ and $.85$, respectively).¹

Sociodemographic information assessed included gender, age, education, household income, ethnicity, political ideology (liberal-conservative), and political party identification (Democrat, Independent, Republican).

Results

A Decline in Public Understanding

In 2008, 71% of Americans said “yes,” global warming is happening. By 2010, however, this number had dropped to 57%. Meanwhile the proportion that said “no,” global warming is not happening doubled from 10% to 20%, whereas those who said “don’t know” increased from 19% to 23% of the public ($\chi^2 = 80.94, p < .001, n = 3,149$).² Those respondents who said “yes” were then asked how sure they were that global warming is happening. By 2010, only 59% said they were “very” or “extremely sure” global warming is happening—a 13-percentage-point drop from 2008 ($t = 5.54, p < .001, n = 2,104$). Respondents who said global warming is not happening did not become significantly more certain of their views ($t = 0.66, ns, n = 403$).

All respondents were then asked whether global warming is mostly human or naturally caused. In 2008, more than half of Americans (57%) said human activities were causing global warming. By 2010, however, this had dropped 10 points to 47%. Meanwhile those attributing global warming to natural changes rose 3 points to 36%. Those who volunteered the answer “both human and natural changes” increased 1 point to 6%. Finally, the proportion of Americans who said “none of the above, because global warming isn’t happening” rose 6 points to 9% ($\chi^2 = 68.52, p < .001, n = 3,468$). In line with the declines in public understanding that global warming is happening and human-caused, by January 2010 only 50% of Americans said they were “somewhat” or “very worried” about global warming; a 13-point drop from 63% in 2008 ($t = 7.29, p < .001, n = 3,125$).

Importantly, the study also found a 9-point drop ($t = 5.85, p < .001, n = 3,076$) since the fall of 2008 in public trust (strong or somewhat) in scientists as a source of information about global warming.³ In January 2010, 22% of the public “strongly trusted” and 52% “somewhat trusted” scientists, whereas 19% “somewhat distrusted” and 7% “strongly distrusted” them. Despite the decline, however, scientists (74%) remained much more trusted than weather reporters (56%), President Obama (51%), Al Gore (47%), religious leaders (45%), or the mainstream media (36%) as sources of information on global warming.

The Impact of “Climategate”

To investigate the impact of “climategate” on American public opinion, we included a set of questions on the survey we conducted from December 24 to January 3, nearly 2 months after the emails were first posted online and approximately 1 month after the story finally entered mainstream news publications and broadcasts. The survey found that 29% of Americans said they had heard of the story, whereas 56% said they had not and 16% said they didn’t know.

The 29% who had heard of the story were then asked how closely they had followed it. Of these respondents, 14% said they had followed it “very closely,” 30% said “somewhat closely,” 41% said “a little,” and 16% said “not at all.” Subtracting those who said “not at all,” approximately 1 out of 4, or 58 million, American adults had both heard of and followed the “climategate” story.

Those respondents who had at least followed the story a little were then asked whether the news stories had made them more or less certain that global warming is happening or not. Forty-seven percent said the stories had made them somewhat (18%) or much more certain (29%) that global warming is *not* happening. Forty-one percent said the stories had no influence on their level of certainty, and 11% said the story had actually made them somewhat (8%) or much more certain (3%) global warming is happening.

The respondents were then asked, “Have these stories about the controversial emails caused you to have more or less trust in climate scientists?” Over half (53%) said that the stories had caused them to have much less (29%) or somewhat less (24%) trust in scientists, whereas 43% said it had not affected their level of trust. Five percent said they had more trust in scientists as a result of the news stories.

Finally, respondents were asked several questions to investigate the conclusions they had reached about the scandal itself and its wider meaning for the issue of global warming. Of those Americans paying attention to the story, 69% said that they somewhat (36%) or strongly agreed (33%) with the statement, “Scientists changed their results to make global warming appear worse than it is” (Figure 1). Likewise, 66% somewhat (33%) or strongly agreed (33%) that “Scientists conspired to suppress global warming research they disagreed with.”

More broadly, 64% of Americans attentive to the story somewhat (29%) or strongly disagreed (35%) with the statement, “Nothing in the emails contradicts the scientific conclusion that global warming is happening.” Finally, 54% somewhat (22%) or strongly disagreed (32%) that “Climate skeptics are intentionally taking the emails out of context in order to cast doubt on the reality of global warming.”

Extrapolated to the entire U.S. adult population, approximately 25% of Americans were aware of and followed the news stories about “climategate.” About 12% to 13% of all Americans said that the stories had led them to become more certain that global warming is not happening and to have less trust in scientists. Roughly 17% of all Americans said that the scientists involved in the scandal had either falsified their results or conspired to suppress contrary research. Likewise, 16% of all Americans

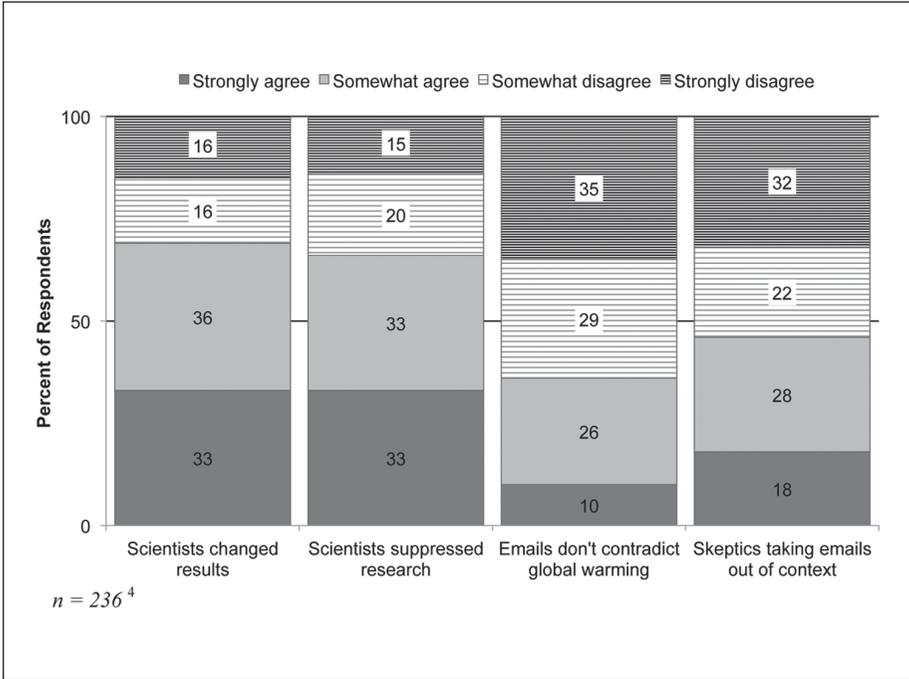


Figure 1. Public interpretations of “climategate”.

believed the emails undermined the conclusion that global warming is happening. These findings all suggest that the scandal had a significant impact on overall public opinion, despite the fact that a large majority of Americans had not heard of it, at least as of early January 2010. The email story also appears to have influenced the public’s opinions of both climate science and scientists.

But the American public is neither homogeneous nor monolithic. Some Americans were more influenced by “climategate” than others. For example, whereas 80% of the self-identified conservatives who followed the story reported less trust in scientists as a result of “climategate,” only 9% of the liberals who followed the story had this response. To determine more fully which Americans lost trust in climate scientists as a result of the scandal, we constructed multiple regression models to test the individual and combined influence of demographics (i.e., sex, age, education, income, and race), political orientation (conservative vs. liberal and political party), and underlying cultural worldviews (egalitarianism and individualism) on public interpretations of and responses to the scandal (Table 1).

In *Model 1: Sociodemographics*, Whites were slightly more likely to have lost trust in climate scientists, due to the scandal ($p < .05$; $F = 1.60$; Adj. $R^2 = .011$). In *Model 2: Political Orientation*, political ideology and political party were strong predictors of

Table 1. Change in Trust in Scientists, by Demographics, Political Orientation, and Values.

| | Model 1: Sociodemographics | Model 2: Political orientation | Model 3: Worldview | Model 4: Full model |
|---------------------------------|-------------------------------|--------------------------------------|-----------------------|---------------------------|
| Gender | -.059 | | | -.128** |
| Age | .075 | | | .144*** |
| Education | .083 | | | .041 |
| Household income | -.094 | | | .031 |
| Race/ethnicity | -.127* | | | .031 |
| Political ideology | | -.409*** | | -.256*** |
| Republican | | -.267*** | | -.035 |
| Independent, other, or no party | | -.323** | | -.154** |
| Egalitarianism | | | .355*** | .302*** |
| Individualism | | | -.472*** | -.385*** |
| Adjusted R ² | .011 | .368 | .471 | .569 |
| F | 1.60 | 53.13*** | 123.19*** | 36.36*** |
| N | 278 | 268 | 274 | 268 |

Note: The question was, “Have these stories about the controversial emails caused you to have more or less trust in climate scientists?” (2 = no decline in trust; 1 = some decline in trust; 0 = large decline in trust). Cell entries are standardized regression weights. Negative values indicate a loss of trust. For gender, female is coded as the higher value. For the race/ethnicity variables, non-Hispanic Whites are compared to all other groups: Blacks, Hispanics, “Others,” and mixed-race respondents. For the dummy coding of political party, the excluded category was Democrat.
 *p < .05. **p < .01. ***p < .001.

public loss of trust in climate scientists. Conservatives were the most likely to have lost trust, whereas Republicans, Independents, other party members, and individuals with no party affiliation lost significantly more trust in scientists than Democrats, the omitted dummy variable group. Together, political ideology and party identification explained 37% of the variance in the loss of trust ($F = 53.13, p < .001$). In *Model 3: Worldview*, individualism was a strong predictor of the loss of trust, whereas egalitarianism was a strong predictor of those Americans who did not lose trust in scientists. Worldview explained 47% of the total variance ($p < .001; F = 123.19; \text{Adj. } R^2 = .471$). Finally, in Model 4, the demographic, political, and worldview variables were all included in a full model. Individualism was the single best predictor of public loss of trust, followed by conservative political ideology, whereas egalitarianism strongly predicted those Americans that reported no loss of trust. This model explained 57% of the total variance in public loss of trust in scientists due to “climategate” ($F = 36.36, p < .001$).

In short, the impact of “climategate” on those who followed the story varied considerably and mainly affected the views of those who were ideologically predisposed to be skeptical of global warming to begin with.

Discussion

The Impact of “Climategate”

The results reported above strongly suggest that the “climategate” scandal in November and December of 2009 deepened and perhaps solidified the observed declines in public beliefs that global warming is happening, human-caused, and of serious concern. It also helps to explain the erosion of public trust in scientists as sources of information on global warming.

These results also demonstrate the important roles that cultural worldviews, political ideology, and motivated reasoning play in mediating public interpretations of and responses to global warming. Prior research has found that the underlying cultural worldviews of egalitarianism and individualism are strongly correlated with climate change risk perceptions and policy preferences. Egalitarians are predisposed to perceive climate change as a serious risk and to support a variety of policies to address it. Individualists, however, are predisposed to perceive climate change as a nonexistent or low-risk and to generally oppose climate specific policies, especially those that involve government action (Leiserowitz, 2006). These cultural orientations have also been found to predict public responses to a variety of other risks, including nuclear power, nanotechnology, vaccinations, and genetically modified organisms (e.g., Slovic & Peters, 1998; Steg & Sievers, 2000; Kahan, 2010).

Likewise, political orientation has long been recognized as a significant factor in public perceptions of climate change, with liberals and Democrats generally more concerned about climate change, and conservatives and Republicans less so (Krosnick, Visser & Holbrook, 1998); these differences have been increasing over time (McCright & Dunlap, 2011). Our results demonstrate that climate change continues to be a sharply partisan and ideological issue and that much of the decline in public trust in scientists came from drops among political conservatives and Americans with a strongly individualistic worldview. Interestingly, however, a few liberals and egalitarians who followed the news story said they became more convinced that climate change is happening and more trusting of climate scientists as a result.

Both patterns are consistent with motivated reasoning. People are not dispassionate consumers of information. Instead, their motivational states—their values, wishes, and preferences—influence what information they pay attention to, how they evaluate data, and the conclusions they draw (Dawson, Savitsky, & Dunning, 2006; Ditto, Scepansky, Munro, Apanovitch, & Lockhart, 1998; Kunda, 1990). As a result, people are often inclined to accept data and interpretations that appear to validate their prior views. They may search for any evidence that their preferred conclusion is valid and stop once confirmation is found. By contrast, people tend to view with suspicion data that contradict their preferences and beliefs. They give greater scrutiny to and look for reasons to reject the validity of contradictory claims (Dawson, Gilovich, & Regan, 2002; Ditto & Lopez, 1992). Because most real-world bodies of evidence—and certainly those related to climate change—have flaws, inconsistencies, and ambiguities,

people motivated to accept or reject a claim can often find at least some grounds for doing so.

Motivated reasoning has been shown to play a significant role in the evaluation of scientific evidence (Munro, Leary, & Lasane, 2004); the formation and maintenance of political beliefs (Jost, Glaser, Kruglanski, & Sulloway, 2003; Taber & Lodge, 2006); the communication of uncertain information (Schweitzer & Hsee, 2002); underestimation of risk (Knaüper, Kornik, Atkinson, Guberman, & Aydin, 2005); and censoring of data about potentially serious, but unchangeable, conditions (Dawson et al., 2006). Our finding that individualists and political conservatives were significantly more likely to lose trust in scientists, whereas some egalitarians and liberals were more likely to gain trust in scientists, suggest that “climategate” was in some ways like a Rorschach test—a set of ambiguous impressions, leading to widely divergent interpretations, and revealing as much about the interpreters as of the objective facts.

Other Potential Contributing Factors to the Decline in Public Understanding

2009 also witnessed the confluence of several other large-scale events that collectively created “a perfect storm” that cascaded through the climate change social amplification of risk system, leading to dampened risk perceptions of climate change among the American public.

The economy. In October 2008, unemployment in the United States stood at 6.6%. By December 2010, it had risen substantially to 10.0% (Bureau of Labor Statistics, 2010). Public opinion polls found that the economy became the overwhelming number one priority of Americans by the fall of 2008 (Gallup, 2010c; Pew, 2009b). By contrast, the Pew Center for People & the Press found that by January 2010, only 28% of the public said addressing global warming should be a top priority, down 10 points from 2007 (Pew, 2009b). Other issues, including protecting the environment, energy, illegal immigration, and crime had also dropped in national priority. The drop in the priority of other issues is consistent with the psychological finding that individuals have a “finite pool of worry” (Linville & Fischer, 1991; Weber, 2006). As concerns about one risk increase (e.g., the economy), concerns about other risks tend to decrease. Likewise, a recent study using county-level data by Kahn and Kotchen (2010) found that high unemployment rates were significantly correlated with declines in public concern for the environment and support for policies designed to mitigate climate change. Thus, it is likely that soaring public worries about jobs and the state of the economy contributed to the decline in public concerns about climate change and other issues.

A new administration and Congress. The George W. Bush administration was widely perceived as antagonistic to many environmental issues, including climate change. In 2001, President Bush renounced a campaign pledge to regulate carbon dioxide as a pollutant; withdrew the United States from the Kyoto Protocol negotiations; and

proposed national energy legislation to increase drilling for oil and natural gas, increase mining for coal, and build more than a thousand new fossil fuel–burning power plants (Leiserowitz, 2005, 2006). In the fall of 2008, however, the United States elected President Barack Obama, a Democrat who had campaigned, in part, upon a platform to improve environmental quality and address climate change. Democrats also established stronger control over the House of Representatives and achieved a filibuster-proof majority in the Senate for the first time since the 1970s. As Democrats took control, public optimism about the outlook for environmental quality increased. In 2008, only 26% of the public believed that environmental quality was getting better. By 2009 and 2010, surveys by Gallup found that this perception of environmental quality had increased 15 points to 41%. The surge was almost entirely driven by the changing views of Independents and Democrats. This increased optimism about the prospect of improved environmental quality under a Democratic administration and Congress among these groups may also have contributed to the decline in public worries about climate change (Gallup, 2010b), although they cannot explain the separate drop in public beliefs that global warming is happening.

Media attention. The media can play an important agenda-setting role (Dearing & Rogers, 1996), especially for issues like climate change, which are largely imperceptible to most Americans except through media accounts. Carbon dioxide and other greenhouse gases are invisible and the consequences are typically perceived as distant in time and space (Leiserowitz, 2005; Lorenzoni, Leiserowitz, Doria, Poortinga, & Pidgeon, 2006). Most Americans only learn about the issue through media reporting, and when the quantity and quality of media coverage changes, it likely influences public opinion. For example, in North America newspaper coverage of global warming peaked in 2007 and steadily declined through 2008 and 2009, dropping to roughly one third of the peak before a spike of news stories before and during COP15 in Copenhagen, followed by a subsequent drop back to the relatively low levels of 2009 (Boykoff & Mansfield, 2010). A separate analysis found that nightly news coverage of global warming on NBC, CBS, and ABC also peaked in early 2007, but by 2009, it had dropped to approximately one fifth of the peak, again with a temporary increase in the month surrounding Copenhagen (Brulle, 2010). These patterns in the sheer quantity of media reporting demonstrate that the media have not kept climate change readily present, available, and salient in the minds of much of the public. Moreover, climate change has never been a significant proportion of total news and has almost always been dwarfed by other news stories, ranging from economic and political affairs to celebrity scandals. For example, the Pew Project for Excellence in Journalism found that in 2007 and 2008, the environment as a whole (not just climate change), accounted for only 1.7% of national news stories (Pew, 2010).

Abnormal winter weather. Across the United States, 2009 was 0.2°C (0.3°F) above the 20th century average. At a regional level, the Southwest to Louisiana and Florida had slightly above average temperatures, the Midwest experienced slightly below average temperatures, and the rest of the nation was near normal (NOAA, 2009a). Thus, contrary to some perceptions, there was no national-scale, unidirectional

cooling trend in 2009. One of the first surveys to identify a significant downward trend in public opinion occurred in the spring (Gallup, 2009). Several other surveys documenting declines in public opinion were conducted in November, in the run-up to Copenhagen (e.g., Washington Post-ABC, 2009b; AP-Stanford, 2009). Nationally, however, November 2009 was the third warmest in U.S. history, with the national average temperature 2.2°C (4.0°F) warmer than the 20th century average (NOAA, 2009b). All of these results suggest that the declines in public opinion identified through most of 2009 were not being driven by the experience of unusually cold weather.

Our survey, however, was conducted from December 24 to January 7, 2010—at the end of an unusually cold and wet December that brought record snowfalls to the Southeast and above normal precipitation to the East and Central regions of the country (NOAA, 2009c). It is possible that for this study conducted at this time, some Americans may have shifted their opinions based on their own direct experience of these events. It is also possible that some opinions changed not because of individual experience, but due to the influence of media reports—both of the event itself (e.g., “Snowmagedon”) and of climate change opponents who used record snowfalls as “proof” that climate change is not occurring. Nonetheless, significant declines in public belief that global warming is happening were identified months before the events of December 2009 (e.g., Gallup, 2009; Pew, 2009a), so these weather events alone are an inadequate explanation.

Prognosis

These observed changes in public opinion should be viewed in context. Although there have been significant declines since 2008 in public beliefs that global warming is happening, human-caused, and a serious threat, as of May 2011 a majority of Americans (64%) believed it is happening. A plurality (47%) believed that it is caused mostly by human activities, and approximately half said they were worried about it (52%). Scientists remained by far the most trusted source of information on global warming (76%), despite the fact that a plurality of the public (40%) believed there is a lot of disagreement among scientists about whether global warming is happening (Leiserowitz, Maibach, Roser-Renouf, & Smith, 2011). Moreover, the declines occurred amidst a serious national recession with high unemployment, an intensely partisan political environment, a significant drop in media attention, an unusually cold December, and a series of scandals and attacks on climate science and scientists. We also found that the loss of trust in scientists among those Americans who followed the “climategate” scandal was primarily among Americans already predisposed, for ideological or cultural worldview reasons, to disbelieve climate science. Each of these events, as interpreted and amplified by a variety of actors in the social amplification of climate change system, contributed to the dampening of public perceptions of climate change as a serious and/or urgent threat.

What happens to public opinion from here? Is this just a temporary drop that will soon rebound to prior levels, a new plateau, or the middle of a continuing trend of declining public belief in and concern for climate change? Public responses to climate change are influenced by multiple factors, and it is impossible to predict what will happen as events unfold. However, it may be safe to assume that the economy will eventually improve, unemployment will decline, and Americans will again feel more secure addressing a problem still viewed by most as relatively distant. Certainly the memory of the unusual weather events of December will fade, perhaps to be replaced by the experience of record high temperatures or extreme weather events in the future. Media coverage, however, is likely to remain episodic, and deeper structural changes in the media will have significant implications for climate change and scientific reporting in general, as news organizations downsize and cut science and environmental reporters. Continued efforts to pass federal climate legislation will probably amplify partisan and worldview divides, as core values are engaged in political debate.

As trusted information sources, scientists can play an important role in helping to improve public understanding of the causes, consequences, and potential solutions to climate change, and help lay the foundations for informed decision making for years to come. Scientists still have strong credibility with most of the public, although there does appear to be growing distrust of scientists by conservatives and individualists, at least regarding climate change. Finding ways to rebuild this trust should become an important priority for the scientific community, lest it risk marginalization of science-based information in the policy-making process. At a minimum, the scientific community needs to engage in more effective dialogue with key stakeholders and the public and develop more effective communication skills. Serious concerns held by key stakeholders should be taken seriously and addressed directly.

Finally, the climate system itself will likely play an ever-greater role in shaping public risk perceptions, policy preferences, and behaviors. As Americans begin to directly experience and are taught to observe the impacts of climate change occurring locally, regionally, and nationally, these recent declines may eventually reverse. The key question is whether this “tipping point” in public engagement will come too late to avoid dangerous climate change (Leiserowitz, 2005).

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Notes

1. Methodological details about the indices are available from the authors upon request.

2. Using differently worded measures, Pew (2009a) and Gallup (2010a) also found similar declines since 2008.
3. Polls taken 2 weeks apart by AP-Stanford (2009) and Washington Post-ABC (2009a) used identical questions and found an 11% drop in “trust in the things scientists say about the environment.”
4. Due to small sample size ($N = 236$), confidence intervals for these results are $\pm 6\%$.

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