Leveraging scientific credibility about Arctic sea ice trends in a polarized political environment

Kathleen Hall Jamieson[a,b,1] and Bruce W. Hardy[b,1]

[a]Annenberg School for Communication and [b]Annenberg Public Policy Center, University of Pennsylvania, Philadelphia, PA 19104

Edited by Dietram A. Scheufele, University of Wisconsin-Madison, Madison, WI, and accepted by the Editorial Board July 3, 2014 (received for review November 7, 2013)

This work argues that, in a polarized environment, scientists can minimize the likelihood that the audience's biased processing will lead to rejection of their message if they not only eschew advocacy but also, convey that they are sharers of knowledge faithful to science's way of knowing and respectful of the audience's intelligence; the sources on which they rely are well-regarded by both conservatives and liberals; and the message explains how the scientist arrived at the offered conclusion, is conveyed in a visual form that involves the audience in drawing its own conclusions, and capsulizes key inferences in an illustrative analogy. A pilot experiment raises the possibility that such a leveraging–involving–visualizing–analogizing message structure can increase acceptance of the scientific claims about the downward cross-decade trend in Arctic sea ice extent and elicit inferences consistent with the scientific consensus on climate change among conservatives exposed to misleadingly selective data in a partisan news source.

climate communication | biased assimilation | identity protection

If she believes that her audience is either unable or unwilling to process complex information, the scientist will rely on heuristic cues, such as consensus statements, to communicate what she and her colleagues know. If, by contrast, she envisions engaged readers, listeners, or viewers eager to grasp complex and sometimes counterintuitive findings, her communication will forsake telegraphy for detail. However, regardless of whether the offered menu is cue-reliant, data-rich, or somewhere in between, basic audience tendencies remain at play. Central among them is the disposition to disregard messages that threaten one's beliefs or group identity (1).

Among those holding polarized views, such biased assimilation (2) is a natural response to reports about a contentious topic. When identity-protective biased processing occurs, positions on policy-relevant fact become badges signaling membership in one's own group. As a result, the offered scientific fact is assimilated if it conforms to the group's position and challenged or rejected if it does not (3). This human tendency creates a conflict between two different sets of interests: the interest in sharing the beliefs of those who make up our community and the desire to "share in making use of the best available science to promote common welfare" (4). To activate the second rather than the first interest, science communicators should create a message environment conducive to granting the scientific evidence without forsaking a value central to one's group (4). Doing so requires minimizing or removing those cues that drive the individual to siphon the scientific evidence through an identity-protective filter (3, 4). Exemplars of this move exist. By highlighting the existence of scientists and religious groups that regard evolution as compatible with their faith and arguing that "[s]cience and religion are different ways of understanding," the National Academy of Science and Institute of Medicine's *Science, Evolution, and Creationism* minimized religious identity protection, even as it rejected creationism (5).

In this work, we will argue that scientists will be better able to sidetrack an audience's ideologically based identity-protective impulses if they not only eschew advocacy but also, convey that they are sharers of knowledge faithful to science's way of knowing and respectful of the audience's intelligence; the sources on which they rely are well-regarded by both conservatives and liberals; and the message explains how the scientist arrived at the offered conclusion, is conveyed in a visual form that involves the audience in drawing its own conclusions, and capsulizes key inferences in an illustrative analogy.

The proposed structure should be able to influence liberals who are more likely than conservatives to express "concern about genetically modified foods" (6) as well as conservatives who are more likely than liberals to doubt the existence of anthropogenic climate change (7, 8). Our reasoning is straightforward. There is no basis for believing that, overall, conservatives are more prone to identity protection than liberals or that, when motivated, one group is less capable than the other of making sense of patterns of evidence.

However, the nature of the selective evidence that we wish to counter does create a daunting test for our message strategy. Because they can be readily cast as here-and-now disconfirmation of the scientific consensus, recent data points at odds with a trend line—such as an unusually cold winter, a brief slowing in upward global temperatures, or an increase in Arctic sea ice extent—pose a challenge for those trying to communicate cross-decade climate warming trends. Complicating such messaging is the fact that basic human tendencies increase the likelihood that we will mistake a recent short-term fluctuation for reversal of a long-term trend. Not only do individuals overfeature the peak and last data points in trend lines (9) and as a result, extrapolate last data points into future expectations, but also, as prospect theory forecasts, they value a change, such as the 2013 Arctic sea ice one, that restores a prior loss over one seen simply as a gain not preceded by a loss (10).

Two factors prompt our focus on the 2013 rebound in Arctic sea ice from its 2012 low point: first, the difference between the approach that we will advance here and the one taken by three major scientific organizations in 2014 climate reports and second, conservative media efforts to cast that 2013 increase as evidence that climate models are suspect and that forecasts of a continuing downward trend are bogus. The headline in one British outlet even proclaimed global "cooling" (11), whereas another asked "Global warming?" and answered "No, actually we're cooling, claim scientists" (12). These accounts reflected a broader phenomenon. Discussions of climate change have become politicized, and public views have become polarized (13, 14), even among those who are scientifically literate (4) and well-educated (15).

Instead of contextualizing the 2013 increase in Arctic sea ice extent, as the strategy that we will offer in a moment does, three

This paper results from the Arthur M. Sackler Colloquium of the National Academy of Sciences, "The Science of Science Communication II," held September 23–25, 2013, at the National Academy of Sciences in Washington, DC. The complete program and video recordings of most presentations are available on the NAS website at www.nasonline.org/science-communication-II.

Author contributions: K.H.J. and B.W.H. wrote the paper.

The authors declare no conflict of interest.

This article is a PNAS Direct Submission. D.A.S. is a guest editor invited by the Editorial Board.

[1]To whom correspondence may be addressed. Email: kjamieson@asc.upenn.edu or bhardy@asc.upenn.edu.

major 2014 climate science reports did little to speak to it. Specifically, the US National Academy of Sciences and The Royal Society's joint publication *Climate Change: Evidence & Causes* (16), the American Association for the Advancement of Science's *What We Know: The Reality, Risks and Response to Climate Change* (17), and the US Global Change Research Program's *National Climate Assessment* (18) downplayed or disregarded the 2013 evidence. For example, the *National Climate Assessment* failed to take the 2013 change into account in its section on "Key Messages," when it contended that "[t]he sharp decline in summer Arctic sea ice has continued" (ref. 18, p. 21). The same omission occurred when it averred that "Arctic sea ice extent and thickness have declined substantially, especially in late summer (September), when there is now only about half as much sea ice as at the beginning of the satellite record in 1979" (ref. 18, p. 517), a claim no longer accurate in 2013. In the same vein, the American Association for the Advancement of Science report asserted that "Arctic sea ice has been shrinking dramatically, and the rate of loss is accelerating. In September 2012, Arctic summer sea ice fell to a new record low at half the historical average—a loss in area nearly twice the size of Alaska" (ref. 17, p. 3).

After reporting that "[s]ince the satellite record began in 1978 . . . the yearly minimum Arctic sea ice extent (which occurs in early to mid-September) has decreased by more than 40%" (ref. 16, p. 14), the US National Academy of Sciences and The Royal Society document offered as evidence a figure showing the September of 2012 record low. Without noting the size or picturing the extent of the 2013 increase, that document added: "In 2013, Arctic summer sea ice extent rebounded somewhat, but was still the sixth smallest extent on record" (ref. 16, p. 14). Masked by the word "somewhat" was the fact that, in mid-September of 2012, the extent was 1.32 million mi^2, and 1 y later, 1.97 million mi^2 (16, 19).

Importance of and Challenges Involved in Sidelining Partisan Heuristics

Communicating the existence of expert agreement matters because those granting a consensus behave differently from those who dispute it (20). As a 2008 political exchange confirms, taking partisanship out of the mix increases the probability that the public will accept the consensus position of experts, provided that it understands how and what the relevant authorities know. In the back and forth in question, the partisan heuristic was blunted in the debate over the merits of a summer gas tax holiday when both Republican presidential aspirant John McCain and Democratic contender Hillary Clinton announced their support for a 3-mo suspension of the tax. Democratic contender Barack Obama, instead, sided with the position of economists and historians who, after studying such holidays, concluded that they produce few benefits for consumers and shortchange the highway fund, which is supported by the tax. Without partisan cues to guide them, in a little more than 6-wk period, the public shifted toward the experts' position (21).

Two factors facilitated the opinion change: cross-party candidate support of the proposed 2008 gas tax holiday and the fact that news reports not only featured the evidence and logic underlying the experts' conclusion but also provided clear confirmation of the presence of the consensus itself. Notably, not even gas tax holiday advocate Hillary Clinton challenged the fact of that consensus when its existence was asserted by ABC's George Stephanopolous. Asked by him to name a single economist who favored the holiday, Clinton deflected the question (22).

By contrast to the gas holiday case, mediated messages about Arctic sea ice reach at least some conservatives wrapped in identity-protective cues, a conclusion consistent with the finding that "conservative media use decreases trust in scientists which, in turn, decreases certainty that global warming is happening" (23). Therefore, for example, a FoxNews.com piece (September 9, 2013) featured the mistaken outlier prediction of one team of climate scientists when that news site reported that the about 1-million mi^2 increase in the amount of the Arctic covered in ice in 2013 was "a dramatic deviation from predictions of an 'ice-free Arctic in 2013'." Only in passing did the piece note that the sea ice "coverage was still well below the 30-year average" (24). Likewise, conservative talk radio host Rush Limbaugh asserted (March 24, 2014) that "[i]n fact, the Arctic has more ice now than it's had in a long, long time. It's not melting. Everything they're saying is a lie" (25). He also dismissed some climate science conclusions as "designed to scare people into supporting Big Government. It's designed to make people feel guilty for destroying the planet, so they'll accept higher taxes and more punitive government proposals and regulations, all for absolution of sin for destroying the planet" (26).

Adapting the lesson of the 2008 gas tax holiday opinion shift, the leveraging, involving, visualizing, and analogizing (LIVA) message structure relies on data drawn primarily from a source valued by both conservatives and liberals, the National Aeronautics and Space Administration (NASA), and secondarily from another source trusted by conservatives, the Department of Defense. It then communicates the scientific consensus by visualizing and involving the audience in interpreting the evidence underlying the downward trend line and concludes by capsulizing the inference invited by the trend lines in an illustrative analogy.

Capitalizing on or Leveraging the Credibility of Science

The credibility of science is built on its record of advancing knowledge, its use of reliable methods in pursuit of that goal, and its embrace of norms, such as transparency, self- reporting of possible conflicts of interest, peer review, disclosure of data, replication, and self-correction designed to expose the effects that human biases, fraud, and error have on its processes. Because the overall credibility of science and scientists is higher than that of many communities (27), with only military leaders eliciting greater public confidence than the scientific community in 2012 (28), it is unsurprising that, even as partisans pit one set of scientific findings against another and conservatives place somewhat less trust in science than do those of other ideological bent (29), most tacitly grant its importance as a way of knowing. This credibility and particularly, the credibility of NASA can be leveraged to increase the likelihood that the public in general and conservatives in particular will accept the scientific consensus on the downward Arctic sea ice trend line, a conclusion central to the climate change debate (17).

Before laying out the strategy, permit us to telegraph our assumptions about the role that we would argue that the scientist and the reporter should play in the climate science-related policy discussion process. Doing so will make sense of the kinds of scientific evidence on which our message relies as well as the ways in which it will reach conservatives.

Leveraging the Scientific Persona and Role

A communicator's credibility is a function of factors that include what is known about the person and her professional identify, the audience's assumptions and biases, and the image of the communicator and audience bodied in the delivered message. Because it serves as a heuristic—a cognitive shortcut—in framing judgments (30–32), source credibility not only helps individuals isolate the messages worthy of attention (33) but increases their persuasiveness (34, 35). When identifiable characteristics of the source, content, delivery, and context prompt the conclusion that the communicator has expertise on the issue at hand and interests in common with the audience (36), source credibility increases. If the audience perceives that the scientist views it with disdain, is engaged in calculated persuasion, or is driven by an undisclosed agenda, the assumption that they share a common interest is undermined and with it, the scientist's effectiveness as a communicator of knowledge.

As rhetorical critic Edwin Black argued, acts of communication contain a first persona (the implied communicator) and a second persona (the implied audience) (37). The former in this model leverages the scientist's credibility by communicating that she is faithful to a valuable way of knowing, dedicated to sharing

what she knows within the methods available to her community, and committed to subjecting what she knows and how she knows it to scrutiny and hence, correction by her peers, journalists, and the public. A key reason for underscoring these facets of the scientific persona is that, despite the relatively high regard in which the scientific community is held, the public expresses sufficient ambivalence about its trustworthiness to provide detractors with an attitudinal base from which to leverage doubts if given the opportunity. Specifically, although in 2012, 41.8% of the American public expressed "a great deal of confidence" in leaders of the scientific community, almost one-half (51%) voiced only "some confidence," and 7% indicated "hardly any confidence at all" (28).

A scientist who can be construed as either self-interested or partisan risks the credibility carried by the scientific role (38). When the communicative act elicits the inference that the scientist is trying to persuade rather than inform, that perception can undercut trust in scientists and with it, our disposition to "engage with the issues being communicated" (39), a problem activated when a politicized environment "induce(s) suspicions about science communicators' true motives or expertise" (37). By requiring that the scientist eschew advocacy, the model (Fig. 1) is designed to minimize the likelihood that the persona of the scientist will elicit identity-protecting cues in the intended audience. By insisting that the scientist account for data that seems to undercut the scientific consensus, the model protects the scientist from communication strategies that elicit doubts about scientific competence or integrity.

The notion that scientists should offer recommendations that are "policy relevant but not policy prescriptive" (40) is consistent with a model (Fig. 1) that recognizes that "in the political sphere, the credibility of scientific knowledge is tied to cultural perceptions about its political neutrality and objectivity, which are crucial social resources for building consensus in ideologically polarized policy arenas" (29). Early proponents of such a model include Dewey (41), who noted that inquiry "is a work which devolves upon experts. But their expertness is not shown in framing and executing policies, but in discovering and making known the facts upon which the former depend" (41).

Because one's "salient self schema" can affect one's evaluation of a communicative act, the second persona, the self-concept of the audience, activated by the message matters as well (42). In the offered communication strategy, the intelligence and good will of the audience are presupposed. In so far as both are interested in making sense of the evidence that speaks to the consequential issue at hand, this projected image of the audience mirrors that of the scientist. Efforts to involve the audience in experiencing and making sense of the data affirm this second persona. Contrast this invited self-schema with one that implies that the reader is too ill-informed to notice the omission of 2013 sea ice data or too unsophisticated to understand that the 2013 rebound does not undermine the conclusion that the 1979–2013 trend line is downward.

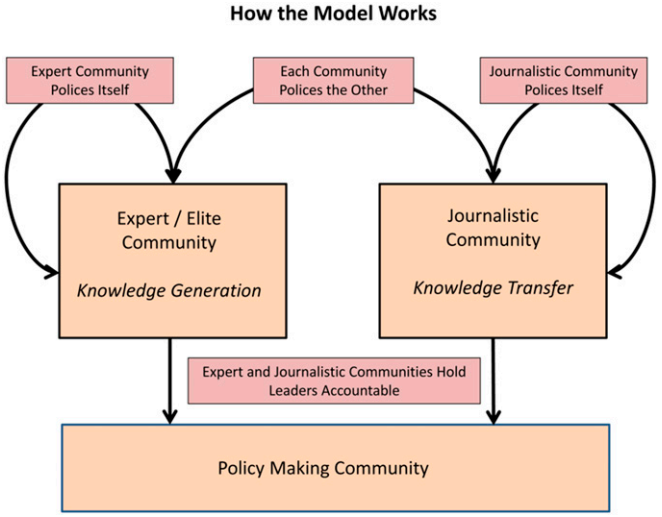

Fig. 1. How the model works. Reproduced with permission from K.H.J. (Annenberg Public Policy Center).

Role of Journalists in Communicating Scientific Consensus and Holding Those Who Make Claims About Science Accountable

Because two of journalism's key functions are serving as custodian and translator of the best available evidence and holding those who wield power accountable, in a world in which much of what the public knows about science comes to it through media (43), journalism too should be expected to protect the integrity of the process of gathering, transmittal, and use of scientific knowledge. In the offered model, journalists are responsible for fairly and accurately conveying what science knows and the certainty with which it knows it. They are tasked as well with exposing both instances in which scientists fail to live up to their ideals and cases in which policymakers or other journalists misrepresent scientific findings and consensus.

The ability of the press to perform this function is predicated on the assumption that it will vigorously police even the misleading statements of individuals whose candidacy its editorial pages favored. *The New York Times* satisfied this ideal when it responded to a statement by Democratic incumbent president Barack Obama (44) by noting that, when

> President Obama and his aides cited the state [of California] as an example of what could be in store ... as human-caused climate change intensifies ... they were pushing at the boundaries of scientific knowledge about the relationship between climate change and drought ... there is no scientific consensus yet that it is a worldwide phenomenon. Nor is there definitive evidence that it is causing California's problems" (45).

In this model, press credibility requires that statements by those on both the left and the right be held to the same standard: the accurate representation of what scientists know.

Challenges That Partisan Media Pose to the Public's Grasp of Scientific Consensus

The model's assumption of a dispassionate scientist and journalist is upended when partisan media feature the facts compatible with their audience's ideological dispositions and disregard countervailing ones. A central challenge for those seeking to communicate scientific consensus is breaking through the reinforcing cycle created when viewers select channels of information that both elicit identity protection and selectively distort the scientific record (46, 47). In the case of climate science, such partial accounts and uses of evidence are likely to go unquestioned (47), and ongoing selective exposure is likely to increase polarization (48), unless science communicators and journalists alike explicate the scientific consensus in venues that attract conservatives and do so in ways that do not elicit identity protection.

The notion that a scientific message ought to be able to contextualize selective partisan use of scientific evidence is predicated on the finding that our human bias toward attitude-consistent information is not matched by a disposition to avoid attitude-discrepant content (49, 50). Indeed, in one study of internet news users, exposure to attitude-discrepant information not only did not reduce the likelihood that a news item would be read but was associated with an increase in time spent reading it (51, 52). The proposed effort to contextualize is worth making in venues that attract conservatives and aspire to the journalistic norms reflected in the message structure offered here, because the audience for partisan media still consumes a substantial amount of mainstream news and public interest programming (53) and because the more

credible a news source, the more likely it is to be able to prime and frame the public's agenda (54, 55).

The voice of the scientist can reach a large audience, including one inclined to partisan identity protection, in three major media arenas: online, science programming, and mainstream news outlets (such as the nightly network newscasts and CNN) that still aspire, in principle at least, to the assumptions of the model in Fig. 1. Of these venues, online is the most often listed source (41.5%) of science and technology information (28). At the same time, it is also one to which comparable percentages of liberals and conservatives turn. Also of note is the fact that it lends itself to interactive visualizations of the sort proposed here. Both science programming and mainstream news attract conservatives as well and are hospitable to science's message. Importantly, the audience for nightly network newscasts is much larger than that for primetime cable news shows; moreover, 44% of Fox News viewers tune in to CNN, and substantial parts of the CNN audience also view Fox News (39%) and MSNBC (38%) (56). Because it has been shown to elicit positive views of science (57), televised science programming constitutes another buffer against misleading assertions in partisan news venues. As the Pew Research Center (58) reports, 67% of a national sample report regularly using "[t]elevision programs on channels about science like Nova and the Discovery Channel" (58). There is no statistical difference between the percent of conservatives and liberals saying that they use these channels.

Because, as a 2006 Pew study found, over one-half (54% in that 2006 study) of online science consumers report that they "go to the original source of the information or the original study it is based upon" (59), in news interviews, scientists can capitalize on this probably inflated admission to motivate behavior consistent with it by urging viewers to both explore the data and clearly contextualize it on identified websites. Although some of those who report seeking out the original study or source are probably expressing aspiration rather than behavior, to reach those whose actions match their self-reports, it is also important that major scientific organizations and agencies post easily accessible explanatory materials that assiduously avoid inviting identity-protective responses from either the right or the left and at the same time, actively involve the audience in making sense of the evidence.

Minimizing Identity-Protecting Responses by Leveraging NASA's Credibility

Our message on the downward trend in Arctic sea ice extent will address conservatives exposed to a partisan media outlet's selective use of available data. The goal is not persuading the target audience that anthropogenic climate change is a serious problem but rather, that Arctic sea ice extent is trending downward across recent decades, evidence intended to open the audience to the inference that the downward trend line is likely to continue.

In the proposed LIVA message strategy, the scientist bolsters her credibility by underscoring the assumption that both she and the audience are interested in understanding the best available evidence. At the same time, she reinforces NASA's credibility by reminding the audience of its favorable view of that agency. The message then depoliticizes potentially identity-threatening information by sourcing it to this trusted institution. The selective use of evidence that this message will recontextualize appeared on FoxNews.com, a website with conservative ideology that primes identity-protective responses. Appearing on September 9, 2013, its headline read "Arctic sea ice up 60 percent in 2013" (24). Reinforcing the headline are NASA satellite images contrasting the amount of sea ice coverage in 2012 and 2013 (24). Captioning the images is the statement "NASA satellite images show changing Arctic sea ice coverage from August 2012 (left) to August (2013)—a growth about a million square miles. NASA." (24). The article leads with this sentence: "About a million more square miles of ocean are covered in ice in 2013 than in 2012, a whopping 60 percent increase" (24). Absent from the report are images or a chart showing the across-time downward trend in sea ice coverage.

Our goal is deactivating partisan filtering and identity protection while communicating the scientific consensus that, although it will vary from year to year because of factors such as ocean currents and weather (e.g., predominant winds in one direction rather than another and location and timing of storms), Arctic sea ice extent is likely to continue its downward trend. In service of these objectives and to reinforce the credibility of the science involved in gathering and disseminating the data, the proposed message will embody the first and second personas outlined at the beginning of this work. To do so, it will engage the audience in the process of drawing the conclusions that NASA has monitored Arctic sea ice extent since 1979, Arctic sea ice extent in September of 2013 was the sixth lowest in the 1979–2013 satellite record, all of the seven lowest extents have occurred in the last 7 yr, and the overall trend line in Arctic sea ice extent from 1979 to 2013 is downward. Through this process, the message attempts to increase the likelihood that the audience will predict that the extent of Arctic sea ice will be lower in future years than it is now and decrease the likelihood that the audience will forecast that, within the next 5 yr, the extent of Arctic sea ice will return to where it was in 1979, an inference one could reasonably draw from the Fox-reported 60% increase in a single year and the accompanying NASA satellite images.

Capitalizing on the fact that the two images featured at the top of the FoxNews.com piece are from NASA, the message strategy begins by reinforcing the shared belief that NASA is an authoritative source whose work is consistent with conservatives' values. It then leverages NASA's credibility with the target audience by sharing information on how the agency gathers information on sea ice and recontextualizes the NASA pictures in the FoxNews.com post by graphically tracking NASA data on Arctic sea ice extent from 1979 to 2013.

NASA Has Benefited the National Defense and Economy and Is a Valued Source of Accurate Information

Unlike the Intergovernmental Panel on Climate Change, with ties to the United Nations that made it a target of suspicion among conservatives, Democrats and Republicans alike hold NASA in high regard, with 76% of Republicans rating it favorably in October of 2013 and 74% of Democrats doing the same (60). Seventy percent of self-identified conservatives, a group as large as self-identified moderates and significantly larger than self-identified liberals, share that view. The same is true of 84% of self-identified liberals. As a result, attributing climate change-relevant data to NASA should minimize the likelihood that the message elicits identity-protective biased processing.

To vivify NASA's credibility with conservatives, the NASA values reinforcement part of the overall message rehearses the consistency between the agency's work and conservatives' high regard for actions that bolster the nation's defense and economy (an explication of these conservative values is in ref. 61):

> After the Soviet Union bested the U.S. in the space race by placing Sputnik in orbit in 1957, NASA delivered on President John F. Kennedy's 1961 pledge that the U.S. would put a man on the moon. Since then, its accomplishments have included the Mercury, Gemini and Apollo projects among others.
>
> Additionally, NASA's Hubble and Kepler space telescopes have revealed galaxies we hadn't previously known existed. NASA also landed the Mars rover on that distant planet. NASA 3D satellite data benefit aviation by identifying ways to forecast volcanic ash plumes.
>
> As part of the Commercial Crew Development program (CCDev) NASA is partnering with private industry to develop space transport systems. And, of relevance to us here, NASA's Earth Science program orbits technology that monitors the parts of the surface of the earth covered by frozen water and known as the cryosphere.

How Does NASA Know What It Knows About Sea Ice?

To increase the likelihood that the audience conceives of itself as not conservative or liberal but rather, interested in weighing the best available evidence and also, to show the scientist's respect

for the capacities of the audience, the message then explains how NASA knows what it knows about sea ice. Specifically, in late 1978, NASA launched its Scanning Multichannel Microwave Radiometer (SMMR) satellite. The data in Fig. 2 come from that satellite and a Department of Defense satellite as well. Because the National Snow & Ice Data Center (NSIDC) collaborates with NASA to monitor sea ice and archives and distributes NASA sea ice data and information, we turn to that center for an explanation of how monitoring works:

> To monitor Arctic sea ice, NSIDC primarily uses the NASA Advanced Microwave Scanning Radiometer–Earth Observing System (AMSR-E) instrument on the NASA Terra satellite and the Special Sensor Microwave/Imager (SSM/I) instrument on the Defense Meteorological Satellite Program (DMSP) satellite. The satellites pass over the polar region several times each day to gather data; researchers can then form the data into images for analysis and publication (62).

Involving the Audience in Visualizing the Downward Trend Line in Arctic Sea Ice Extent

The chart visualizing the change in sea ice extent over time emphasizes each decline by underscoring it in red, primes each with "DECLINE!," and tracks the decline over time by superimposing a trend line as soon as the 2013 data point appears. To reinforce the link between NASA and the evidence, the iterative chart is introduced by two slides: one slide overlaying a print message on a picture of a satellite and one slide of simply text. The first slide reads "Average Monthly Sea Ice Extent. Sept. 1979-2013. From NASA Satellite Data." The second slide reinforces the link between NASA and the prodefense values of the target audience by reporting "Arctic sea ice extent documented by the National Aeronautics and Space Administration (NASA) Terra Satellite and Defense Meteorological Satellite Program (DMSP)."

To increase involvement with the message and invite the audience to experience the drops and rebounds, in the experiment testing the message, the trend line is plotted over a 20-s period. At the same time, the audience is involved in making sense of the chart by being asked after it is exposed to the analogy noted below to respond to questions with answers that, taken together, invite the inference that the cross-decade downward trend in Arctic sea ice extent is likely to continue in the future.

Analogy for the Increase in the Extent of Sea Ice in 2013

As Franklin D. Roosevelt's use of the garden hose analogy to increase support for the Lend Lease program attests, analogy "is a powerful cognitive mechanism that people use to make inferences and learn new abstractions" (63). Arguing for the need to lend Britain use of US destroyers to thwart Hitler's advance, Roosevelt told Congress "suppose my neighbor's home catches fire, and I have a length of garden hose four or five hundred feet away. If he can take my garden hose and connect it up with his hydrant, I may help him to put out his fire. Now, what do I do? I don't say to him before that operation, 'Neighbor, my garden hose cost me $15; you have to pay me $15 for it.' What is the transaction that goes on? I don't want $15—I want my garden hose back after the fire is over" (64).

Because of its capsulizing capacity and because, like metaphor (65), an analogy can persuade (66) and also, translate the less familiar concepts in the science into referents tied to the experiences of the audience, this comparison trope can play a powerful role in communication of science. To anchor the inference that the 2013 increase in Arctic sea ice extent should not elicit optimism about long-term sea ice recovery, an illustrative analogy is used: expecting sea ice extent to return to its 1979 level based on the improvement in 2013 is like earning a C on a first examination, a D on a second examination, an F on a third examination, and a D on a fourth examination and as a result of that recent D, anticipating an A on the final. Consistent with our desire to leverage NASA's credibility, the message attributes that analogy to a NASA scientist.

A Preliminary Test of the LIVA Message Structure

To test the effectiveness of an abbreviated LIVA message that included all of the elements just described other than the block of information about how NASA data are gathered, a pilot-controlled experiment was created involving 958 participants drawn from Research Now's US Consumer Panel. Because they are the prime focus of the study, self-identified conservatives were oversampled and make up 48.5% of the participants. Of the remaining subjects, 28.3% identified as moderates, and 23.2% identified as liberals.

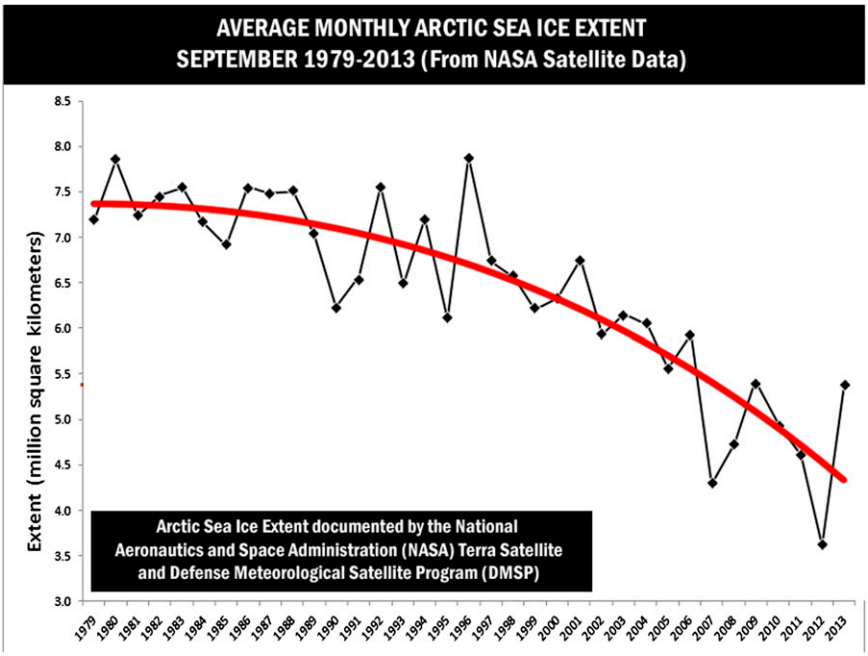

Fig. 2. Average Monthly Arctic Sea Ice Extent September 1979–2013. Data from the National Snow and Ice Data Center (Boulder, CO). Graph created by Gary L. Gehman, (Annenberg Public Policy Center, Philadelphia).

Three hundred and five participants (53.4% conservative) randomized to condition 1 were exposed solely to the FoxNews.com headline with NASA 2012 and 2013 pictures of Arctic sea ice extent, the captions about a "whopping 60 percent increase" (24), and the credit to NASA noted earlier; 326 respondents (48.5% conservative) randomized to condition 2 were exposed to that same stimulus plus the NASA values description, the iterative version of Fig. 2 with the drops primed, and the illustrative examination analogy (the LIVA model). Three hundred and twenty-seven participants (43.7% conservative) randomized to condition 3 were exposed to pictures of a baseball and information about the history of baseball and were not exposed to any information regarding Arctic sea ice extent or the environment. Overall randomization to condition was successful in the study as a whole; across conditions, there were no significant differences in demographic variables (sex, age, race–ethnicity, education, and income).

However, as the percentages indicate, conservatives are not equally distributed across conditions. Although the difference in conservatives between the Fox and LIVA conditions is not significant, the difference between each of these groups and the control group is significant. Because the part of the study that we report here focused on conservatives, we do not view this difference as problematic. This asymmetric distribution of conservatives does not affect the reported differences between the LIVA and Fox knowledge or the forecasting results reported below. Because our analysis focuses only on the conservatives in each condition, the higher percentage of conservatives in the LIVA condition than in the control should also not affect our comparison of postexposure knowledge in the LIVA and control conditions. There are no significant demographic differences among conservatives in the three conditions. Also, there are no significant differences in church attendance, identification as an evangelical or born-again Christian, or identification with the Green or Tea Parties.

As they answered the postexposure questions, those in each condition were able to review the stimuli by scrolling back, making it possible for those in condition 2 (FoxNews.com plus LIVA) but not conditions 1 (FoxNews.com alone) and 3 (control) to replay the iterative charting of sea ice extent credited to NASA and Department of Defense satellites, a message feature consistent with the nonpartisan evidence-seeking role envisioned in the second persona of the LIVA message. If these moves motivate attention to the message and increase audience capacity to process it (67), they should increase the likelihood that it is centrally processed and as a result, that its effects are more long-lived and resistant to counterpersuasion (68).

After exposure to the described conditions, participants were asked a series of questions designed to serve as a manipulation check [questions 1–5 (Q1–Q5) and Q24], assess knowledge gained from exposure to the iterative chart (Q6–Q14), and capture forecasts about sea ice (Q15–Q22).

Manipulation Check Questions (Question Order Not Randomized)

Q1) Arctic sea ice extent has been monitored by (select all that apply)
- *i*) A Department of Defense satellite (accurate and information briefly available in LIVA)
- *ii*) A United Nations satellite
- *iii*) A US Weather Service satellite
- *iv*) A Hubble Telescope
- *v*) A NASA satellite (accurate and information available repeatedly in LIVA and one time in Fox)
- *vi*) The Central Intelligence Agency

Q2) How accurate is it to say that Arctic sea ice extent has been monitored by NASA since 1979? (Correct answer: very accurate and information briefly available in LIVA).

Q3) How accurate is it to say that Arctic sea ice extent is currently being monitored by at least one Department of Defense satellite? (correct answer: very accurate; information available in LIVA but not Fox)

Q4) The first professional baseball league was created in which year?
- *i*) 1857
- *ii*) 1871 (correct answer; available only in the control condition)
- *iii*) 1921

Q5) How accurate is it to say that the extent of Arctic sea ice increased in 2013? (correct answer: very accurate; answer available in Fox and LIVA)

Knowledge Questions (Question Order Randomized; Q7–Q14 Use 1–10 Point Accuracy Scales with the Correct Answer Coded High and Answers Are Available Only in LIVA Except for Q13, the Answer for Which Is Not Available in Any Condition)

Q6) Compared with 2011, did the extent of Arctic sea ice increase, decrease, or stay the same in 2012?
- *i*) Increase
- *ii*) Decrease (correct answer)
- *iii*) Stayed the same

Q7) How accurate is it to say that the extent of Arctic sea ice was greater in 2013 than it was in 1979? (correct answer: not at all accurate)

Q8) How accurate is it to say that the extent of Arctic sea ice increased in 2012? (correct answer: not at all accurate)

Q9) How accurate is it to say that the extent of Arctic sea ice dropped from 1979 to 1980? (correct answer: not at all accurate)

Q10) How accurate is it to say that Arctic sea ice extent in September of 2013 was the sixth lowest in the 1979–2013 satellite record? (correct answer: very accurate)

Q11) How accurate is it to say that, in at least 12 earlier y, the extent of Arctic sea ice was lower than it was in 2013? (correct answer: not at all accurate)

Q12) How accurate is it to say that all of the seven lowest Arctic sea ice extents have occurred in the last 7 y? (correct answer: very accurate)

Q13) How accurate is it to say that, in recent years, Arctic sea ice thickness decreased from past decades? (not answerable from provided data in any condition)

Q14) How accurate is it to say that the overall trend of the extent of Arctic sea ice has been downward since 1979? (correct answer: very accurate)

Forecast Questions

Block 1: Question Order Not Randomized; Responses (Much Greater than 2013 to Much Lower than 2013; Five-Point Scale) Randomized; Scientific Consensus: Lower/Much Lower.

Q15) Think about 5 y from now. The extent of Arctic sea ice will be:

Q16) Think about 10 y from now. The extent of Arctic sea ice will be:

Q17) Think about 15 y from now. The extent of Arctic sea ice will be:

Q18) Think about 20 y from now. The extent of Arctic sea ice will be:

Block 2 Randomized: All Questions Use 1–10 Point Scale, Where Higher Numbers Indicate Greater Extent.

Q19) How likely do you think it is that the Arctic will have more sea ice in 20 y than it has now?

Q20) How likely do you think it is that the extent of Arctic sea ice will be lower in 10 y than it is now?

Q22) How likely do you think it is that, within the next 5 y, the extent of Arctic sea ice will return to where it was in 1979?
Q23) How likely do you think it is that, within the next 10 y, the extent of Arctic sea ice will return to where it was in 1979?

Second Manipulation Check (Question Asked After Knowledge, Forecast Questions, and Credibility Questions; Stimuli Were Not Available for Reference)

Q24) Earlier in the study, you may have seen a graph showing changes in the extent of Arctic sea ice. Was the information gathered by (check all that apply)
i) The National Weather Service
ii) The Department of Defense (accurate and information briefly available in LIVA)
iii) NASA (chart only available in LIVA but confirmation that NASA monitors sea ice also in Fox)
iv) I did not see an animation or graph showing changes in the extent of Arctic sea ice

With two exclusions, the mean of the knowledge questions was computed for each respondent to create an index ($\alpha = 0.77$). Q9 was not included, because it was not internally consistent with the other knowledge questions ($\alpha = 0.690$ with Q9). Q13 was excluded, because it cannot be answered from data provided in any condition. The forecast questions ($\alpha = 0.85$) were also indexed and are internally consistent.

Manipulation was successful. Almost all participants in both conditions 1 (93.5%) and 2 (91.2%) correctly reported (Q1) that NASA monitors Arctic sea ice extent compared with a little over two-thirds in the control condition [68.8%; $F(2, 955) = 50.37$, $P < 0.001$]. Those in condition 2 (Fox + LIVA) scored higher on the other manipulation questions except the baseball one, which 92.6% of respondents in condition 3 answered correctly. All differences are statistically significant in the expected direction [Q2: $F(2, 955) = 105.55$, $P < 0.001$; Q3: $F(2, 955) = 15.38$, $P < 0.001$; Q4: $F(2, 955) = 117.91$, $P < 0.001$; Q5: $F(2, 955) = 119.40$, $P < 0.001$]. Additionally, 22.0% of those in the LIVA condition cited the Department of Defense as a data source in our second manipulation check (Q24) compared with 6.4% in the Fox condition and 3.4% in the control [$F(2, 955) = 35.92$, $P < 0.001$]. Almost all participants (90.2%) in the LIVA condition cited NASA as a data source, and 78.2% did as well in the Fox condition. Only 7.7% cited NASA in the control [$F(2, 955) = 577.46$, $P < 0.001$]. The manipulation worked for conservatives as well.

Our focus in this study is on the conservatives in each condition. Among conservatives, LIVA significantly increased sea ice extent knowledge levels over those in both the Fox and control conditions and also blunted the Fox effect on forecasts that run counter to the scientific consensus. Specifically, those exposed to LIVA messaging scored significantly higher on the knowledge index ($t = 11.65$, df = 320, $P < 0.001$) and were less likely to forecast greater levels of Arctic sea ice extent ($t = -3.74$, df = 320, $P < 0.001$) than those in the Fox condition. Exposure to LIVA increased knowledge levels over those in the control condition as well (conservatives: $t = 5.19$, df = 289, $P < 0.001$). Although those in the Fox condition were significantly more likely to forecast greater extent than those in LIVA and control conditions (conservatives: $t = 5.44$, df = 315, $P < 0.001$), there was no difference between LIVA and the control on the forecast measure.

Evidence that the model works by creating accurate knowledge that then changes expectations of the future can be found in the fact that, in all three conditions, as the accuracy of responses to the knowledge questions (Q6–Q14) increases, the likelihood that one will give the scientific consensus responses to the forecast questions (Q15–Q23) also increases. In an ordinary least squares regression, controlling for ideology, age, sex, Hispanic, African American/black, and education, the knowledge index was significantly related to the forecast index and produced the largest coefficient in the model ($\beta = -0.573$, $P < 0.001$).

Limitations in the Pilot Study

The pilot study has a number of limitations. We do not know which of the elements in the model—the leveraging, the various elements in the visualization, the analogy, the audience involvement in seeking answers from the iterative chart, or some combination of these elements—produced the differences in answers to the forecasting questions. We also do not know whether some of these elements depressed the reported effects. We do know, however, that some part or parts or the parts taken as a whole did elicit results.

Conclusion

The power of exposing the like-minded to ideologically biased media is evident in the significant increase in conservatives holding the nonconsensus position on Arctic sea ice as a result of the very short burst of credibly presented selective evidence in the Fox report. Still, compared with Fox only, LIVA was able to communicate the downward trend in Arctic sea ice extent and also blunt the inference that longer-term recovery was likely. Importantly, LIVA also increased knowledge of Arctic sea ice extent compared with the control.

The LIVA communication strategy is premised on the notions that, if the credibility of science (here in the form of NASA and a Department of Defense satellite) is leveraged in a visualized fashion that involves the audience in making sense of the data and a key inference capsulized in an illustrative analogy, identity-protective impulses can be minimized. To this end, the personas of the scientist and the audience are positioned in nonpartisan psychological space constructed from a mutual desire to draw conclusions from full disclosure of the best available evidence. The message is not framed as a refutation of partisan media content, because doing so would invite counterargument (69) and elicit identity protection. Instead, it is cast as an act of sharing available knowledge and ways of knowing. Not only does the message rely on sources of evidence with credibility that is granted by the audience, but it also avoids cues that can be misconstrued as advocacy and credits the audience with the capacity to understand how the scientist has arrived at the offered conclusion.

Should additional testing confirm its effectiveness, implementing the LIVA communication strategy will require addressing three challenges: developing ways within existing media conventions for climate scientists to embody the first persona sketched here; motivating audiences to assume the intended second persona; and in that nonpartisan space, inducing them to attend to the message and centrally process values- reinforcing descriptions of a credible source, visualized evidence, and illustrative analogies.

ACKNOWLEDGMENTS. The authors thank Joseph Cappella, John Cacioppo, Dan Kahan, Walter Meier, Ellen Peters, the anonymous reviewers, and the editor, Dietram A. Scheufele, for their constructive counsel.

1. Lord C, Ross L, Lepper M (1979) Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *J Pers Soc Psychol* 37(11):2098–2109.
2. Corner A, Whitmarsh L, Xenias D (2012) Uncertainty, scepticism and attitudes towards climate change: Biased assimilation and attitude polarisation. *Clim Change* 114(3-4): 463–478.
3. Kahan D, Peters E, Dawson E, Slovic P (2013) *Motivated Numeracy and Enlightened Self-Government*. Available at http://ssrn.com/abstract=2319992. Accessed September 3, 2013.
4. Kahan D, et al. (2012) The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nat Clim Chang* 2(10):732–735.
5. National Academy of Sciences and Institute of Medicine (2008) *Science, Evolution, and Creationism* (National Academy Press, Washington, DC), p 47.
6. CBS News 60 Minutes/Vanity Fair (2013) *Poll: Genetically Modified Food/Sports/Gun Control* (The Roper Center, University of Connecticut, Storrs, CT).
7. McCright A, Dunlap R (2010) Anti-reflexivity: The American conservative movement's success in undermining climate science and policy. *Theory Cult Soc* 27(2-3):100–133.

8. Pew Research Center (2014) *Climate Change: Key Data Points from Pew Research*. Available at www.pewresearch.org/key-data-points/climate-change-key-data-points-from-pew-research/. Accessed January 27, 2014.
9. Fredrickson BL, Kahneman D (1993) Duration neglect in retrospective evaluations of affective episodes. *J Pers Soc Psychol* 65(1):45–55.
10. Gregory R, Lichtenstein S, MacGregor D (1993) The role of past states in determining reference points for policy decisions. *Organ Behav Hum Decis Process* 55(2):195–206.
11. Rose D (2013) And now it's COOLING! Return of Arctic ice cap as it grows by 29% in a year. *Mail Online*. Available at www.dailymail.co.uk/news/article-2415191/And-global-COOLING-Return-Arctic-ice-cap-grows-29-year.html. Accessed September 7, 2013.
12. Dixon H (2013) Global warming? No, actually we're cooling, claim scientists. *The Telegraph*. Available at www.telegraph.co.uk/earth/environment/climatechange/10294082/Global-warming-No-actually-were-cooling-claim-scientists.html. Accessed September 8, 2013.
13. McCright A, Dunlap R (2011) The politicization of climate change and polarization in the American public's views of global warming, 2001-2010. *Sociol Q* 52(2):155–194.
14. Lewandowsky S, Gignac GE, Oberauer K (2013) The role of conspiracist ideation and worldviews in predicting rejection of science. *PLoS ONE* 8(10):e75637.
15. Hamilton L (2011) Education, politics and opinions about climate change evidence for interaction effects. *Clim Change* 104(2):231–242.
16. US National Academy of Sciences and The Royal Society (2014) *Climate Change: Evidence & Causes*. Available at http://nas-sites.org/americasclimatechoices/events/a-discussion-on-climate-change-evidence-and-causes/. Accessed February 27, 2014.
17. American Association for the Advancement of Science (2014) *What We Know: The Reality, Risks and Response to Climate Change*. Available at http://whatweknow.aaas.org/wp-content/uploads/2014/03/AAAS-What-We-Know.pdf. Accessed March 6, 2014.
18. US Global Change Research Program (2014) *National Climate Assessment*. Available at http://nca2014.globalchange.gov/report. Accessed March 2, 2014.
19. NASA Earth Observatory (2013) *2013 Arctic Sea Ice Minimum*. Available at http://earthobservatory.nasa.gov/IOTD/view.php?id=82094. Accessed September 21, 2013.
20. Lewandowsky S, Gignac G, Vaughan S (2012) The pivotal role of perceived scientific consensus in acceptance of science. *Nat Clim Chang* 3(4):399–404.
21. Kenski K, Hardy B, Jamieson KH (2010) *The Obama Victory: How Media, Money, and Message Shaped the 2008 Election* (Oxford Univ Press, New York).
22. Stephanopoulos G (2008) Exclusive interview with Senator Hillary Clinton. *This Week with George Stephanopoulos*. Available at http://abcnews.go.com/ThisWeek/story?id=4783456&page=1&singlePage=true. Accessed November 1, 2013.
23. Hmielowski JD, Feldman L, Myers TA, Leiserowitz A, Maibach E (April 3, 2013) An attack on science? Media use, trust in scientists, and perceptions of global warming. *Public Underst Sci*.
24. Fox News (2013) Arctic sea ice up 60 percent in 2013. *FoxNews.com*. Available at www.foxnews.com/science/2013/09/09/arctic-sea-ice-up-60-percent-in-2013/. Accessed September 9, 2013.
25. Limbaugh R (2014) *What to Do About Al Gore's Movie in School?* Available at www.rushlimbaugh.com/daily/2014/03/24/what_to_do_about_algore_s_movie_in_school. Accessed March 24, 2014.
26. Limbaugh R (2014) *How We Saved a Biracial Tree—and Other Global Warming News*. Available at http://www.rushlimbaugh.com/daily/2014/03/18/quick_hits_page. Accessed March 18, 2014.
27. Scheufele DA (2013) Communicating science in social settings. *Proc Natl Acad Sci USA* 110(Suppl 3):14040–14047.
28. University of Chicago National Opinion Research Center (2012) *General Social Survey (Weighted Data)*. Available at www3.norc.org/GSS+Website/Download/SPSS+Format/. Accessed March 1, 2014.
29. Gauchat G (2012) Politicization of science in the public sphere: A study of public trust in the United States, 1974 to 2010. *Am Sociol Rev* 77(2):167–187.
30. Cobb M, Macoubrie J (2004) Public perceptions about nanotechnology: Risks, benefits, and trust. *J Nanopart Res* 6(4):395–405.
31. Macoubrie J (2006) Nantoechnology: Public concern, reasoning and trust in government. *Public Underst Sci* 15(2):2221–2241.
32. Metzger M, Flanagin A, Medders R (2010) Social and heuristic approaches to credibility evaluation online. *J Commun* 60(3):413–439.
33. Renn O, Levine D (1991) Trust and credibility in risk communication. *Communicating Risks to the Public*, eds Kasperson R, Stallen P (Kluwer, Norwell, MA), pp 175–218.
34. Eagly A, Chaiken S (1993) *The Psychology of Attitudes* (Harcourt Brace Jovanovich, New York).
35. Albarracín D, Vargas P (2010) Attitudes and persuasion: From biology to social responses to persuasive intent. *The Handbook of Social Psychology*, eds Fiske S, Gilbert D, Lindzey G (Wiley, Hoboken, NJ), pp 394–427.
36. Lupia A (2013) Communicating science in politicized environments. *Proc Natl Acad Sci USA* 110(Suppl 3):14048–14054.
37. Black E (1970) The second persona. *Q J Speech* 56(2):109–119.
38. Krosnick J (2012) *Trust in Scientists, Controversy and American Public Opinion on Climate Change: How Attitude Formation and Change Unfolds. National Academy of Sciences Lecture Video*. Available at www.youtube.com/watch?v=T95hk631MQo. Accessed September 9, 2013.
39. Rabinovich A, Morton T, Birney M (2011) Communicating climate science: The role of perceived communicator's motives. *J Environ Psychol* 32(1):11–18.
40. Dietz T (2013) Bringing values and deliberation to science communication. *Proc Natl Acad Sci USA* 110(Suppl 3):14081–14087.
41. Dewey J (1954) *The Public and Its Problems* (Ohio Univ Press, Athens, OH), p 365.
42. Cacioppo J, Petty R, Sidera J (1982) The effects of a salient self-schema on the evaluation of proattitudinal editorials: Top-down versus bottom-up message processing. *J Exp Soc Psychol* 18:324–338.
43. Nelkin D (1995) *Selling Science: How the Press Covers Science and Technology* (Freeman, New York).
44. The White House (2014) *President Obama Speaks on Response to the California Drought*. Available at www.whitehouse.gov/photos-and-video/video/2014/02/14/president-obama-speaks-response-california-drought#transcript. Accessed February 14, 2014.
45. Gillis J (2014) Science linking drought to global warming remains matter of dispute. *The New York Times*. Available at www.nytimes.com/2014/02/17/science/some-scientists-disagree-with-presidents-linking-drought-to-warming.html?_r=0. Accessed February 16, 2014.
46. Ding D, et al. (2011) Support for climate policy and societal action are linked to perceptions about scientific agreement. *Nat Clim Chang* 1(9):462–466.
47. Jamieson KH, Cappella J (2008) *Echo Chamber: Rush Limbaugh and the Conservative Media Establishment* (Oxford Univ Press, New York).
48. Stroud N (2010) Polarization and partisan selective exposure. *J Commun* 60(3):556–576.
49. Frey D (1986) Recent research on selective exposure to information. *Adv Exp Soc Psychol* 19:41–80.
50. Garrett R (2009) Politically motivated reinforcement seeking: Reframing the selective exposure debate. *J Commun* 59(4):676–699.
51. Garrett R (2009) Echo chambers online?: Politically motivated selective exposure among Internet news users. *J Comput Mediat Commun* 14(2):265–285.
52. Garrett R, Carnahan D, Lynch E (2013) A turn toward avoidance? Selective exposure to online political information, 2004–2008. *Polit Behav* 35(1):113–134.
53. Webster J (2007) Diversity of exposure. *Media Diversity and Localism: Meaning and Metrics*, ed Napoli P (Erlbaum, Mahwah, NJ), pp 309–326.
54. Wanta W, Hu Y (1994) The effects of credibility, reliance, and exposure on media agenda-setting: A path analysis model. *Journal Q* 71(1):90–98.
55. Miller J, Krosnick J (2000) News media impact on the ingredients of presidential evaluations: Politically knowledgeable citizens are guided by a trusted source. *Am J Pol Sci* 44(2):301–315.
56. Olmstead K, Jurkowitz M, Mitchell A, Enda J (2013) How Americans get TV news at home. *Pew Research Journalism Project*. Available at www.journalism.org/2013/10/11/how-americans-get-tv-news-at-home/. Accessed October 11, 2013.
57. Nisbet M, et al. (2002) Knowledge, reservations, or promise? A media effects model for public perceptions of science and technology. *Communic Res* 29(5):584–608.
58. Pew Research Center (2009) *Public Praises Science; Scientists Fault Public, Media*. Available at www.people-press.org/2009/07/09/public-praises-science-scientists-fault-public-media/. Accessed October 30, 2013.
59. Horrigan J (2006) *The Internet as a Resource for News and Information About Science. Pew 2006 Internet & American Life Project*. Available at www.pewInternet.org/~/media//Files/Reports/2006/PIP_Exploratorium_Science.pdf.pdf. Accessed October 30, 2013.
60. Pew Research Center (2013) *Trust in Government Nears Record Low, but Most Federal Agencies Are Viewed Favorably*. Available at www.people-press.org/2013/10/18/trust-in-government-nears-record-low-but-most-federal-agencies-are-viewed-favorably/. Accessed October 8, 2013.
61. McCarty N, Poole K, Rosenthal H (2006) *Polarized America: The Dance of Ideology and Unequal Riches* (MIT Press, Cambridge, MA).
62. National Snow & Ice Data Center (2013) *Quick Facts on Arctic Sea Ice*. Available at http://nsidc.org/cryosphere/quickfacts/seaice.html. Accessed September 8, 2013.
63. Gentner D, Holyoak KJ (1997) Reasoning and learning by analogy. *Am Psychol* 52(1):32–34.
64. FDR Library (1940) *Franklin Roosevelt's Press Conference*. Available at http://docs.fdrlibrary.marist.edu/odllpc2.html. Accessed March 1, 2014.
65. Sopory P, Dillard J (2002) The persuasive effects of metaphor: A meta-analysis. *Hum Commun Res* 28(3):382–419.
66. McCroskey J, Combs W (1969) The effects of the use of analogy on attitude change and source credibility. *J Commun* 19(4):333–339.
67. Petty R, Cacioppo J, Strathman A, Priester J (2005) To think or not to think. *Persuasion: Psychological Insights and Perspectives*, eds Brock T, Green M (Sage Publications, Thousand Oaks, CA), pp 81–116.
68. Petty R, Wegener D (1999) The elaboration likelihood model: Current status and controversies. *Dual-Process Theories in Social Psychology*, eds Chaiken S, Trope Y (Guilford, New York), pp 37–72.
69. Petty R, Cacioppo J (1979) Issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *J Pers Soc Psychol* 37(10):1915–1926.