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Communicating Climate Change: Why Frames Matter for Public Engagement

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Optimists hope that the time has finally arrived in the United States for major policy action on climate change. Fueling expectations, U.S. President Barack Obama has assembled a team of climate experts who are working with Congress, states, and foreign governments to propose legislation and broker international agreements. Although the Obama administration is committed to addressing climate change, the necessary level of public engagement with the issue still appears to be missing.

U.S. presidents, especially newly elected ones, are often given discretion to pursue their preferred legislative priorities. Yet research shows that presidential popularity is not enough to pass policy initiatives. The efforts of recent administrations to pass health care, welfare, or immigration reforms have depended on generating widespread public support and mobilization while effectively countering the communication efforts of opponents of these reforms.¹ When these conditions are not met, as in health care and immigration reforms, presidents have suffered major policy defeats.

There is no reason to suspect that climate change policy will be any different, especially given the long history of partisan gridlock in U.S. politics. In the context of two wars and an economic crisis, absent a shift in the polls and a surge in input from a diversity of constituents, it is unlikely over the next four years that a strong majority in Congress will accept the political risks needed to pass meaningful policy actions such as a cap-and-trade bill, carbon tax, or new international climate treaty.

More importantly, democratic principles are at stake. Policies to address climate change will bear directly on the future of Americans, impacting their pocketbooks, lifestyles, and local communities. These decisions are therefore too significant to leave to just elected officials and experts; citizens need to be actively involved.

Reframing the relevance of climate change in ways that connect to a broader coalition of Americans—and repeatedly communicating these new meanings through a variety of trusted media sources and opinion leaders—can generate the level of public engagement required for policy action. Successfully reframing climate change means remaining true to the underlying science of the issue, while applying research from communication and other fields to tailor messages to the existing attitudes, values, and perceptions of different audiences, making the complex policy debate understandable, relevant, and personally important.² This approach to public outreach, however, will require a more careful understanding of U.S. citizens' views of climate change as well as a reexamination of the assumptions that have traditionally informed climate change communication efforts.

Two Americas of Climate Perceptions

Historically, as a way to muster public resolve, most climate change communication efforts have focused on increasing the amount of quality news coverage about climate science. Many scientists and advocates expected this increased news attention to promote wider public understanding of the problem's technical nature, leading the public to view it with the urgency that they do. Communication is therefore defined as a process of transmission—that is, the scientific facts are assumed to speak for themselves with their relevance and policy significance interpreted by all audiences in similar ways.³

Unfortunately, quality news coverage is only likely to reach a small audience of already informed and engaged citizens. Just as in other

debates, such as stem cell research, abortion, or gun control, the rest of the public either ignores the coverage or reinterprets competing claims based on partisanship or self-interest, a tendency confirmed across several decades by public opinion research.⁴

Predictably, on climate change, poll analyses reveal politically polarized opinions, resulting in two Americas divided along ideological lines. Over the past decade, an increasing majority of Republicans question the validity of climate science and dismiss the urgency of the problem, while an increasing majority of Democrats accept climate science and express concern about the issue.⁵ This deep partisan division remains even after factoring in education and knowledge.⁶ In fact, the persistent gap in perceptions over the past decade suggests that climate change has joined a short list of issues such as gun control or taxes that define what it means to be a Republican or Democrat.

A closer look at polling results shows a more troubling trend for those trying to convey the urgency of climate change. Prioritization and opinion intensity on other issues eclipse general concern about climate change among the public.⁷ For example, when asked what should be the top priority in 2009 for President Obama and Congress in a December 2008 poll, just 1 percent of respondents cited climate change or the environment compared with more than 40 percent of respondents who cited the economy.⁸ Surveys over the past three years also show that when asked to rate the perceived priority of 20 policy problems, climate change consistently ranked at the bottom of the list, with just 30 percent of respondents naming it a “top priority” in a January 2009 Pew Research Center for The People & The Press poll⁹ (see Table 1). These findings are significant, since research concludes that opinion intensity is a central driver of participation on policy issues, predicting whether a citizen calls or writes to his or her elected official; discusses the issue with friends or coworkers; attends or speaks up at a public meeting; joins an advocacy group; or participates in a public demonstration.¹⁰

Table 1. Top domestic priorities for Obama and Congress				
Percent considering each as a "top priority"	January 2007	January 2008	January 2009	2008-09 change
Strengthening nation's economy	68	75	85	+10
Improving the job situation	57	61	82	+21
Defending U.S. against terrorism	80	74	76	+2
Securing Social Security	64	64	63	-1
Improving educational system	69	66	61	-5
Dealing with U.S. energy problems	57	59	60	+1
Securing Medicare	63	60	60	0
Reducing health care costs	68	69	59	-10
Reducing budget deficit	53	58	53	-5
Providing health ins. to uninsured	56	54	52	-2
Dealing with problems of poor	55	51	50	-1
Reducing crime	62	54	46	-8
Dealing with moral breakdown	47	43	45	+2
Strengthening the military	46	42	44	+2
Reducing middle class taxes	48	46	43	-3
Protecting the environment	57	56	41	-15
Dealing with illegal immigration	55	51	41	-10
Reducing influence of lobbyists	35	39	36	-3
Dealing with global trade	34	37	31	-6
Dealing with global warming	38	35	30	-5
SOURCE: The Pew Research Center For The People & The Press, "Economy, Jobs Trump All Other Policy Priorities in 2009, Environment, Immigration, Health Care Slip Down the List" (Washington, DC: The Pew Research Center For The People & The Press, 22 January 2009), http://people-press.org/report/485/economy-top-policy-priority (accessed 30 January 2009).				

The tendency to dismiss the urgency of climate change is exacerbated given the problem's complexity and its lack of immediate, visible impacts. Past environmental events centered on a particular place or striking visual, such as the toxic disasters of Love Canal, New York, and Bhopal, India; the *Exxon Valdez* oil spill in Alaska; or the iconic images of the ozone hole, helped trigger collective concern.¹¹ However, the complex nature of climate change means no single news headline or visual image will catalyze widespread public attention or policy action.

Another barrier to public communication is the increasingly fragmented nature of the U.S. media system. With so many different content choices via cable television and the Internet, an individual uninterested in science or public affairs news can easily avoid such coverage, paying attention to entertainment genres or, perhaps more problematically, his or her preferred ideological source of commentary. Although attention to climate change at news outlets such as the *New York Times* and *Washington Post* reached a record high in the past few years, because of increasing media fragmentation, this coverage may actually reach a proportionally smaller audience than a decade ago.¹²

Framing an Issue

To break through the communication barriers of human nature, partisan identity, and media fragmentation, messages need to be tailored to a specific medium and audience, using carefully researched metaphors, allusions, and examples that trigger a new way of

thinking about the personal relevance of climate change.

Framing—as a concept and an area of research—spans several social science disciplines. Frames are interpretive storylines that set a specific train of thought in motion, communicating why an issue might be a problem, who or what might be responsible for it, and what should be done about it.¹³ Framing is an unavoidable reality of the communication process, especially as applied to public affairs and policy. There is no such thing as unframed information, and most successful communicators are adept at framing, whether using frames intentionally or intuitively.

Audiences rely on frames to make sense of and discuss an issue; journalists use frames to craft interesting and appealing news reports; policymakers apply frames to define policy options and reach decisions; and experts employ frames to simplify technical details and make them persuasive.¹⁴ Framing, it should be noted, is not synonymous with placing a false spin on an issue, although some experts, advocates, journalists, and policymakers certainly spin evidence and facts. Rather, in an attempt to remain true to what is conventionally known about an issue, as a communication necessity, framing can be used to pare down information, giving greater weight to certain considerations and elements over others.

The earliest formal work on framing traces back four decades to anthropologist Erving Goffman, who described words and nonverbal interactions as helping individuals negotiate meaning through the lens of existing cultural beliefs and worldviews.¹⁵

In the 1970s, cognitive psychologists Daniel Kahneman and Amos Tversky applied framing in experimental designs to understand risk judgments and consumer choices, concluding in their Nobel Prize–winning research that “perception is reference dependent.”¹⁶ If individuals are given an ambiguous or uncertain situation to consider, the different ways in which a message is presented or framed—apart from the content itself—can result in very different responses, depending on the terminology used to describe the problem or the visual context provided in the message. For many members of the public, climate change is likely to be the ultimate ambiguous situation given its complexity and perceived uncertainty.

Over the past two decades, research in political communication and sociology has added to this early work on framing. The research explains how media portrayals in interaction with cultural forces shape public views of complex policy debates such as climate change.

Framing a policy problem or issue endows certain dimensions of the complex issue with greater apparent relevance than they would have under an alternative frame. To make sense of policy debates, audiences use frames provided by the media as interpretive shortcuts but integrate these media presentations with preexisting interpretations forged through personal experience, partisanship, ideology, social identity, or conversations with others.¹⁷

A frame links two concepts, so that after exposure to this linkage, the intended audience now accepts the concepts’ connection.¹⁸ However, in many cases, a specific frame only is effective if it is relevant—or applicable—to the audience’s preexisting interpretations. For example, by emphasizing the religious and moral dimensions of climate change, biologist and Pulitzer Prize–winning author E. O. Wilson, along with other scientists, has convinced many religious leaders that the issue is directly applicable to their faith and their respective communities.

Alternatively, many climate change advocates have used an unsuccessful frame that compares distortion of climate science to the George W. Bush administration’s misuse of evidence in making the case to go to war in Iraq or formulating policy on stem cell research. Among liberals and science enthusiasts, this connection activates negative emotions, yet for many Americans, the frame either cuts against their partisan leanings, and is therefore likely to be rejected, or does not hold strong personal significance, ignored as inside-the-beltway bickering.

Previous studies describe a set of frames that appear to reoccur across science-related policy debates. Originally identified by sociologists William Gamson and Andre Modigliani in an examination of nuclear energy ([see the box](#)),¹⁹ the typology was further developed in studies of food and medical biotechnology in Europe and the United States and has been applied to the debate over evolution.²⁰ Table 2 outlines this general typology from past research, describing the latent meanings of each interpretation.

Table 2. Typology of frames applicable to climate change	
Frame	Defines science-related issue as . . .
Social progress	A means of improving quality of life or solving problems; alternative interpretation as a way to be in harmony with nature instead of mastering it.
Economic development and competitiveness	An economic investment; market benefit or risk; or a point of local, national, or global competitiveness.
Morality and ethics	A matter of right or wrong; or of respect or disrespect for limits, thresholds, or boundaries.
Scientific and technical uncertainty	A matter of expert understanding or consensus; a debate over what is known versus unknown; or peer-reviewed, confirmed knowledge versus hype or alarmism.
Pandora's box/Frankenstein's monster/runaway science	A need for precaution or action in face of possible catastrophe and out-of-control consequences; or alternatively as fatalism, where there is no way to avoid the consequences or chosen path.
Public accountability and governance	Research or policy either in the public interest or serving special interests, emphasizing issues of control, transparency, participation, responsiveness, or ownership; or debate over proper use of science and expertise in decisionmaking ("politicization").
Middle way/alternative path	A third way between conflicting or polarized views or options.
Conflict and strategy	A game among elites, such as who is winning or losing the debate; or a battle of personalities or groups (usually a journalist-driven interpretation).
SOURCES: W. A. Gamson and A. Modigliani, "Media Discourse and Public Opinion on Nuclear Power: A Constructionist Approach," <i>American Journal of Sociology</i> 95, no. 1 (1989): 1–37; U. Dahinden, "Biotechnology in Switzerland: Frames in a Heated Debate," <i>Science Communication</i> 24, no. 2 (2002): 184–97; J. Durant, M. W. Bauer, and G. Gaskell, <i>Biotechnology in the Public Sphere: A European Sourcebook</i> (Lansing, MI: Michigan State University Press, 1998); M. C. Nisbet and B. V. Lewenstein, "Biotechnology and the American Media: The Policy Process and the Elite Press, 1970 to 1999," <i>Science Communication</i> 23, no. 4 (2002): 359–91; and M. C. Nisbet, "Framing Science: A New Paradigm in Public Engagement," in L. Kahlor and P. Stout, eds., <i>Understanding Science: New Agendas in Science Communication</i> (New York: Taylor & Francis, in press, 2009).	

Two key details about this typology are worth noting. First, frames as general organizing devices should not be confused with specific policy positions; any frame can include pro, anti, and neutral arguments, though one position might be more commonly used than others.²¹ For example, though many conservatives have used the economic consequences frame to oppose action on climate change, many environmental advocates now seek to turn this interpretation in their favor by emphasizing an opportunity to revitalize the economy through investment in clean energy technology.

Second, the latent meaning of any frame is often translated instantaneously by specific types of frame devices such as catchphrases, metaphors, sound bites, graphics, and allusions to history, culture, or literature.²² "Creating green jobs" is a frame device that immediately translates the economic development frame relative to climate change. (In the rest of this article and in the boxes, references to frames from the typology are italicized while frame devices are in quotes.)

Climate Change Frames that Reinforce Perceptual Divides

What explains the stark differences between the objective reality of climate change and the partisan divide in Americans' perceptions? In part, trusted sources have framed the nature and implications of climate change for Republicans and Democrats in very different ways.

Several conservative think tanks, political leaders, and commentators continue to hew closely to their decade-old playbook for

downplaying the urgency of climate change, which includes questioning whether human activities drive climate change while also arguing that any action to curb it will lead to dire economic consequences. Even over the past several years, as Republican leaders such as U.S. Senator John McCain (R-AZ) and California Governor Arnold Schwarzenegger have urged for action on global warming, the strength of these decade-old frames linger as salient in popular culture, political discourse, and the memory store of many audiences.²³

During the 1990s, based on focus groups and polling, Republican consultant Frank Luntz helped shape the climate skeptic playbook, recommending in a strategy memo to lobbyists and Republican members of Congress that the issue be framed as *scientifically uncertain*, using opinions of contrarian scientists as evidence. He also wrote that the “emotional home run” would be an emphasis on the dire economic consequences of action, impacts that would result in an “unfair burden” on Americans if other countries such as China and India did not participate in international agreements.²⁴

This framing strategy was effectively incorporated into talking points, speeches, white papers, and advertisements by conservative think tanks and members of Congress to defeat major policy proposals along with the adoption of the Kyoto Protocol, a treaty that would have committed the United States to cutting greenhouse gas emissions.²⁵ The communication campaign also promoted distortions in news coverage. As political reporters applied their preferred *conflict and strategy* frame to the policy debate—focusing on which side was winning, the personalities involved, and their message strategies—they also engaged in the same type of false balance that has been common to coverage of elections and issues.²⁶ In other words, by giving equal weight to contrarian views on climate science, journalists presented the false impression that there was limited expert agreement on the causes of climate change.

U.S. Senator James Inhofe (R-OK), former chair of the Senate Committee on Environment and Public Works, remains the loudest voice of climate skepticism. In speeches, press releases, and on his Senate Web log, Inhofe casts doubt on the conclusions of the Intergovernmental Panel on Climate Change and other major scientific organizations, selectively citing scientific-sounding evidence. To amplify his message, Inhofe takes advantage of the fragmented news media, with appearances at television outlets, such as Fox News, on political talk radio, and Web traffic driven to his blog from the *Drudge Report*.²⁷

For example, in a February 2007 *Fox & Friends* segment titled, “Weather Wars,” Inhofe deceptively argued that global warming was in fact due to natural causes and mainstream science was beginning to accept this conclusion. Inhofe asserted, unchallenged by host Steve Doocy, “those individuals on the far left, such as Hollywood liberals and the United Nations,” want the public to believe that global warming is manmade. Similar frames of *scientific uncertainty* and *economic consequences* continue to be pushed by other conservative commentators, including influential syndicated columnists George Will, Charles Krauthammer, and Tony Blankley.²⁸

Danish political scientist Bjørn Lomborg, author of *The Skeptical Environmentalist* and *Cool It*, offers an adaptation of these familiar frames.²⁹ While accepting that human activities have contributed to climate change, Lomborg questions the severity of those impacts and argues that the resources spent on dealing with climate change are better spent on problems such as malaria and poverty. These novel contrarian views provide fresh fodder for skeptic commentators such as George Will.³⁰

In contrast, former U.S. Vice President Al Gore, many environmentalists, and even some scientists have attempted to counter the *scientific uncertainty* and *economic consequences* frames by emphasizing a *Pandora’s Box* of looming “climate crisis.” To instantly translate their preferred interpretation, these advocates have relied on depictions of specific climate impacts, including hurricane devastation, polar bears perched precariously on shrinking ice floes, scorched, drought-stricken earth, blazing wild fires, or famous cities or landmarks under water due to future sea-level rise.

Publicity for Gore’s documentary on climate change’s effects, *An Inconvenient Truth*, dramatized climate change as an environmental Frankenstein’s monster, including a hurricane-shaped plume spewing from a smoke stack on its movie poster and a trailer telling audiences to expect “the most terrifying film you will ever see.” With an accent on visual and dramatic effects, the catastrophe strategy triggered similarly framed news coverage. For example, a 2006 *Time* magazine cover featured a polar bear on melting ice with the headline, “Global Warming: Be Worried, Be VERY Worried.”³¹

One of the unintended consequences of this line of communication is that it plays into the hands of climate skeptics and further reinforces the partisan divide in climate change perceptions. Andrew Revkin, who has covered climate change for nearly 20 years for the *New York Times*, argues these claims are effectively countered by critics, such as Inhofe, as liberal “alarmism,” since the error

bars of uncertainty for each of the climate impacts are much wider than the general link between human activities and global warming.³² These challenges, which are easier when the target of ridicule is a former political figure such as Gore, quickly reactivate a focus on *scientific uncertainty* and the heuristic of partisanship. In addition, the public is likely to translate these appeals to fear into a sense of fatalism, especially if this information is not accompanied by specific recommendations about how they can respond to the threats.³³

Revkin and others worry that the news media has moved from an earlier era of false balance to a new phase of overdramatization, one that skeptics can easily exploit to dismiss climate change as a problem.³⁴ Polls suggest that the public has picked up on critiques of the media by conservatives, likely filtering this information through their preferred partisan lens and their belief in liberal media bias. Such filtering results in Republicans who not only discount the climate change problem but who also agree that the mainstream news media is exaggerating its severity.³⁵

Many environmental advocates and scientists have focused on *public accountability* as an additional call-to-arms on climate change. These advocates accuse the George W. Bush administration of putting politics ahead of science and expertise on a number of issues, including climate change. For example, in the 2004 election, Democratic presidential candidate U.S. Senator John Kerry (D-MA) made strategic use of the public accountability frame, comparing distortions on climate change to the administration's use of intelligence to invade Iraq.³⁶

In 2005, journalist Chris Mooney's best-selling *The Republican War on Science* helped crystallize the public accountability train of thought, turning the "war on science" into a partisan rallying cry.³⁷ In 2007, Hillary Clinton, in a speech marking the 50th anniversary of Sputnik, promised to end the "war on science" in American politics, highlighting the prominence of this frame device. In a late 2008 transition speech, President Obama similarly invoked the *public accountability* frame and Gore's film while announcing his science policy advisers:

*Because the truth is that promoting science isn't just about providing resources—it's about protecting free and open inquiry. It's about ensuring that facts and evidence are never twisted or obscured by politics or ideology. It's about listening to what our scientists have to say, even when it's inconvenient—especially when it's inconvenient.*³⁸

The *public accountability* frame has outraged and intensified the commitment of scientists, environmental advocates, and many Democrats, motivating them to label climate skeptics as "deniers" and to engage in sharp rhetorical attacks on political opponents. Yet for other members of the public, "war on science" claims are likely ignored as just more elite rancor or only further alienate Republicans on the issue.

Reframing Climate Change to Break Perceptual Gridlock

Not every citizen cares about the environment or defers to the authority of science. Yet newly emerging perceptual contexts hold the promise of resonating with a broader coalition of Americans and social groups. Over time, these new meanings for climate change are likely to be key drivers of public engagement and, eventually, policy action.

In *Break Through: From the Death of Environmentalism to the Politics of Possibility*, environmentalists Ted Nordhaus and Michael Schellenberger advocate a move away from the "pollution paradigm," which offers a familiar storyline of dire environmental consequences if greenhouse gas emissions are not radically reduced.³⁹ They offer an alternative communication strategy, which involves turning the *economic development frame* in favor of action, recasting climate change as an opportunity to grow the economy. The two authors argue that only by refocusing messages and building diverse coalitions in support of "innovative energy technology" and "sustainable economic prosperity" can meaningful action on climate change be achieved. With this framing strategy, they seek not just to engage the wider public, but also catalyze a more diverse social movement—perhaps even engaging support for energy policies among Republicans, who think predominantly in terms of market opportunities, or labor advocates, who value the possibility of job growth.

Both 2008 U.S. presidential candidates emphasized this frame, which the Obama administration continues to promote, through the sound bite "creating green jobs and fueling economic recovery." Yet the techno-optimism of clean energy solutions is also open to the

counterframe of *uncertainty*. The case of corn-based ethanol is a warning not to oversell any path too quickly.⁴⁰ In this instance, the gasoline substitute initially was heralded as a way to benefit the economy and reduce greenhouse emissions, but subsequent research determined that the increased agricultural land use would actually boost emissions and increase food costs.⁴¹

E. O. Wilson offers a second potentially unifying interpretation in his best-selling book *The Creation: An Appeal to Save Life on Earth*.⁴² Wilson frames environmental stewardship as not only a scientific matter, but also as one of *morality and ethics*. In penning the book as an open letter to a Baptist minister, he acknowledges that as an atheist, he might hold a different belief regarding the origin of the Earth, but he shares a common value and respect for nature, what the Bible calls “creation.” In this manner, he engages Christian readers and media outlets that might not otherwise pay attention to popular science books or appeals related to climate change. Paralleling Wilson’s interpretation, an increasing number of Christian leaders, including Pope Benedict XVI and evangelicals, such as Richard Cizik and Rick Warren, are emphasizing the religious duty to be “stewards” of God’s creation. **(The box discusses a recent documentary that employs this framing strategy.)**

The *morality and ethics* frame is also featured in Gore’s WE campaign, which launched in Spring 2008. The WE campaign to “repower America” attempts to unify U.S. citizens by framing climate change as a solvable and shared moral challenge. For example, in television and print advertisements, the WE campaign aims to break the gridlock of partisan perceptions by pairing unlikely spokespeople such as Speaker of the House Nancy Pelosi (D-CA) with Republican and former Speaker of the House Newt Gingrich and self-professed liberal and conservative clergymen, respectively, Reverends Al Sharpton and Pat Robertson.⁴³

Other WE ads compare action on global warming to the U.S. Civil Rights Movement, the United States’ role in aiding allies in World War II, and the recovery from the Great Depression. More recent WE TV spots, which feature actors as ranchers, construction workers, and autoworkers, stress the *economic development* frame, emphasizing job creation and growth. Importantly, these ads are placed during daytime talk shows and entertainment programming and in leisure magazines, which all reach non-news audiences who might not otherwise pay attention to coverage of climate change.

Similar to the *Pandora’s Box* metaphor widely used in 2006, journalists have also started to echo this *morality and ethics* frame in their coverage of climate change. For example, *Time* magazine devoted its 2008 Earth Day cover to that interpretation. Calling to mind the iconic Iwo Jima flag-raising photograph, the cover featured an illustration of soldiers struggling to plant a tree and the headline, “How to Win the War on Global Warming.”⁴⁴ Managing editor Richard Stengel described the cover as “Our call to arms to make this challenge—perhaps the most important one facing the planet—a true national priority.”⁴⁵

Since the beginning of this decade, the public health implications of climate change have also emerged as a potentially powerful interpretive resource for experts and advocates.⁴⁶ This trend is an example of how a unique issue-specific frame may emerge that is not predicted by the general typology for science debates outlined in Table 2. The *public health* frame stresses climate change’s potential to increase the incidence of infectious diseases, asthma, allergies, heat stroke, and other salient health problems, especially among the most vulnerable populations: the elderly and children. In the process, the public health frame makes climate change personally relevant to new audiences by connecting the issue to health problems that are already familiar and perceived as important. The frame also shifts the geographic location of impacts, replacing visuals of remote Arctic regions, animals, and peoples with more socially proximate neighbors and places across local communities and cities. Coverage at local television news outlets and specialized urban media is also generated.

Conclusion

Despite two decades of ever-stronger scientific consensus and record amounts of news coverage, the United States still appears locked in a perceptual divide over climate change, particularly along partisan and ideological lines. The interaction between partisanship and selectively framed media portrayals that results in a “two Americas” of climate change perceptions is well understood, and in fact, as reviewed, predicted by research in political communication and related fields.⁴⁷ Survey and market segmentation techniques have begun to examine what specific groups in society want to know about climate change, their political interpretations, the perceived implications for their daily lives, the resonance or conflict with their values and social identities, where they are most likely to receive information, and who or what they are looking to for answers.

It is not enough, however, for research in this area to simply track, explain, and draw attention to this paralyzing divide. Social science expertise and knowledge needs to take steps to solve this communication problem.

The typology of frames reviewed in this article suggests a deductive set of mental boxes and interpretive storylines that can be used to bring diverse audiences together on common ground, shape personal behavior, or mobilize collective action. Additional research using in-depth interviews, focus groups, and sophisticated survey and experimental techniques needs to further explore, identify, and test these frames across audiences.⁴⁸ With so much focus on media portrayals and advertising campaigns, it is also important not to overlook interpersonal sources of information. One way to reach audiences is to recruit their influential peers to pass on selectively framed information about climate change that resonates with the background of the targeted audience and that addresses their personal information needs.⁴⁹

The Obama administration, government agencies, nongovernmental organizations, and science institutions can use the results of this audience research to design and target their messages about climate change. Journalists can also use this information to craft novel, accessible, and relevant narratives—such as the local public health implications of climate change—for nontraditional audiences across media formats, expanding their reach and impact.

These institutions and professional groups share the uncontroversial goal of calling attention to climate change as a pressing problem while empowering citizens to become involved in national and local decisionmaking. Yet despite these unified objectives, public engagement with climate change is still missing. If major policy change is to be achieved, new meanings and messengers for climate change are needed. Communication can no longer remain a guessing game. Careful research needs to be funded and translated into collective action.

NOTES

1. L. R. Jacobs and R. Y. Shapiro, *Politicians Don't Pander: Political Manipulation and the Loss of Democratic Responsiveness* (Chicago: University of Chicago Press); S. K. Schneider and W. G. Jacoby, "Elite Discourse and American Public Opinion: The Case of Welfare Spending," *Political Research Quarterly* 58 (2005): 367–379; and S. F. Schram and J. Soss, "Success Stories: Welfare Reform, Policy Discourse, and Politics of Research," *The Annals of the American Academy of Political and Social Science* 557 (2001): 49–65.
2. M. C. Nisbet, "Framing Science: A New Paradigm in Public Engagement," in L. Kahlor and P. Stout, eds., *Understanding Science: New Agendas in Science Communication* (New York: Taylor & Francis, in press, 2009).
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4. S. L. Popkin, *The Reasoning Voter: Communication and Persuasion in Presidential Campaigns* (Chicago: University of Chicago Press, 1991); and M. C. Nisbet, "The Competition for Worldviews: Values, Information, and Public Support for Stem Cell Research," *International Journal of Public Opinion Research* 17, no. 1 (2005): 90–112; and S. S. Ho, D. Brossard, and D. A. Scheufele, "Effects of Value Predispositions, Mass Media Use, and Knowledge on Public Attitudes Toward Embryonic Stem Cell Research," *International Journal of Public Opinion Research* 20, no. 2 (2008): 171–192.
5. R. E. Dunlap and A. M. McCright, "**A Widening Gap: Republican and Democratic Views on Climate Change**," *Environment* 50, no. 5 (2008): 26–35.
6. A. Malka, J. A. Krosnick, and G. Langer, "The Association of Knowledge With Concern about Global Warming: Trusted Information Sources Shape Public Thinking," *Risk Analysis* (forthcoming).
7. M. C. Nisbet and T. Myers, "Twenty Years of Public Opinion about Global Warming," *Public Opinion Quarterly* 71, no. 3 (2007): 444–70.
8. *Washington Post–ABC News Poll*, http://www.washingtonpost.com/wp-srv/politics/documents/postpoll_121508.html?sid=ST2008122001562&s_pos=top (15 December 2008) (accessed 22 January 2009).
9. The Pew Research Center for The People & The Press, "Economy, Jobs Trump All Other Policy Priorities in 2009, Environment, Immigration, Health Care Slip Down the List" (Washington, DC: The Pew Research Center for The People & The Press, 22 January

- 2009), <http://people-press.org/report/485/economy-top-policy-priority> (accessed 22 January 2009).
10. S. Verba, K. L. Schlozman, and H. Brady, *Voice and Equality: Civic Voluntarism in American Politics* (Cambridge, MA: Harvard University Press, 1995); and R. Goidel and M. C. Nisbet, "Exploring the Roots of Public Participation in the Controversy Over Stem Cell Research and Cloning," *Political Behavior* 28 (2006): 175–192.
11. These events and issues also lacked the extreme partisan messages that have unfortunately been consistent across the history of climate change.
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The Death and Resurrection of Nuclear Energy

Few Americans are likely to associate nuclear energy with slogans like "atoms for peace" or "electricity too cheap to meter."¹ Yet in its first two decades, nuclear energy production was framed almost exclusively in these terms, with the technology defined as leading to *social progress, economic competitiveness*, and a better way of life. From U.S. Presidents Dwight Eisenhower to Richard Nixon, the technology was promoted as a major way to grow the domestic economy and, through export abroad, a diplomatic strategy for winning allies against the former Soviet Union.²

New interpretations began to emerge in the mid-1970s, as consumer advocates reframed nuclear energy in terms of *public*

accountability, arguing that the industry had become a “powerful special interest.” Environmentalists also began to emphasize an oppositional *middle way* frame, focusing on other paths to energy independence, such as solar, hydro, and wind generation. Other groups, such as the Union of Concerned Scientists, turned the *economic competitiveness* frame against nuclear power, emphasizing that production was simply “not cost-effective.” Energy production was also readily connected to the “nuclear freeze” movement, as the Carter administration limited the export of civilian technology abroad while protestors swarmed nuclear power plants at home.³

The tipping point for the image of nuclear energy was the 1979 Three Mile Island accident, an event that coincided with *China Syndrome*, a popular movie released several weeks before the incident. With its focus on the energy industry’s secrecy and incompetence, the film reinforced the emerging interpretation of *public accountability* for energy companies. More importantly, with the film’s reactor meltdown climax, *China Syndrome* amplified a new frame focusing on the potential *runaway nature* of the technology. In this interpretation, nuclear power was portrayed as a Frankenstein-like monster beyond citizens’ control.

When news reports of Three Mile Island galvanized national attention, the prevailing frames of *public accountability* and *runaway technology* became the major modes of interpretation. In a classic example of a frame device instantly signaling *runaway technology*, a *Time* magazine cover featured an ominous picture of the Three Mile Island reactor and the headline “Nuclear Nightmare.” The accident helped set in motion a dominant media narrative that went on to spotlight additional examples of construction flaws, incompetence, faulty management, and potential risks at nuclear power plants across the country.⁴

The Chernobyl disaster of 1986 only strengthened the frames of *public accountability*, *runaway technology*, and *scientific uncertainty*. The event generated worldwide attention, with few news reports contextualizing the comparative safety record of the American nuclear energy industry, effectively leaving the prevailing frames unchallenged.⁵ The last nuclear power plants to be built in the United States were constructed in the 1970s, though more than 100 power plants remain in operation today.⁶

At the start of 2000, however, new focusing events began to shift the interpretative packages and mental categories applied to nuclear energy. In 2001, in reaction to rising energy costs and rolling blackouts in California, the George W. Bush administration launched a communication campaign to promote nuclear power as a *middle way path* to energy independence.⁷ The terrorist attacks of September 11, 2001, dampened the viability of this frame package, as experts and media reports focused on nuclear power plants as potential terrorist targets.⁸ But since 2004, as energy prices have climbed and as U.S. dependence on overseas oil has been defined by political leaders as a major national security issue, a renewed emphasis on the energy independence interpretation has surfaced. As of 2007, utility companies submitted more than 20 applications to build additional nuclear reactors across the country to the U.S.

Nuclear Regulatory Commission.⁹

The effort by the second Bush administration and the nuclear energy industry to reframe the relevance of nuclear energy has been complemented by an attempt to similarly sell nuclear energy as a *middle way* solution to greenhouse gas emissions. Former U.S. Environmental Protection Agency administrator Christine Todd Whitman, along with Greenpeace co-founder Patrick Moore, are among the sponsors of this interpretative package, arguing nuclear energy is “cleaner, cheaper, and safer” than coal-powered energy.¹⁰ According to their argument, if U.S. citizens are going to satisfy their energy demands while achieving the goal of cutting greenhouse gas emissions, the country needs to reinvest in nuclear energy.¹¹ While running for U.S. president, Senator John McCain (R-AZ) promoted a similar middle way interpretation, declaring in a 2008 campaign speech, “If we’re looking for a vast supply of reliable and low-cost electricity—with zero carbon emissions and long-term price stability—that’s the working definition of nuclear energy.”¹²

However, several oppositional frames invoked in the 1970s still resonate. Groups like the Union of Concerned Scientists continue to promote *uncertainty* and *public accountability* interpretations, demanding that nuclear plants be tightly regulated in light of safety problems, the “public’s right to know,” and a “failure of regulators to take effective action” on potential risks.¹³ Other environmental groups emphasize not only the potential runaway dangers of nuclear energy, but also question its cost-effectiveness. They emphasize that nuclear power is not safe, not cost effective (because of the need for government subsidies), and not needed.¹⁴

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Shared Values Between Scientists and Evangelicals

A 2007 segment of the PBS series *Now*, hosted by journalist David Brancaccio, vividly captures the ability of the *morality and ethics* frame to promote common ground and articulate shared goals between religious leaders and scientists on the reality and urgency of climate change.¹ The program documents a trip to the Arctic by prominent evangelicals and scientists led by Richard Cizik, former vice president of government affairs for the National Association of Evangelicals, and Eric Chivian, founder and director of the Center for Health and the Global Environment at Harvard Medical School. Notably, the report also features an explicit awareness among the participants that framing is central to bringing diverse groups together to face the shared challenge of climate change.

A brief exchange during the opening segment demonstrates the participants' understanding of framing as a way to stress the relevance and immediacy of climate change to different publics:

CHIVIAN: Scientists, I must say, are not terribly good at communicating with the general public. I mean, we're taught to speak in technical language.

BRANCACCIO: Chivian says science alone has failed to stir people to real action. So they are reaching out to a different voice: the spiritual and moral voice of evangelical Christians. Together, they hope to forge a compelling message that will wake people up to their cause.

*CHIVIAN: The moral example of, and sense of urgency that these two groups, that may still have differences, are saying this is so fundamental, so important to all of us, I think becomes a—a very powerful message to everyone.*²

The group includes Harry Jackson, an evangelical minister who begins the journey skeptical of climate change and its relevance to the church. "The way people talk about this whole scientific arena is so disconnected from real people that it—I didn't have any sense of real urgency concerning the problem," Jackson tells the journalists early on the trek. "So I hope to see something that frames this or puts a context around what everyone is talking about."³

Jackson discovered that moment when the group visited a native Alaskan village. The group witnessed a house, built on melting

permafrost, fall into the ocean. The message for the group, as Jackson later explains, was that the people who lived “most in tune with nature,” were the first people being hit by the impacts of climate change. Jackson describes his conversion to the problem: “Our friends back home need to know that this is not just an isolated situation. We do have a responsibility. We do need to help them now. But the greater lesson is [to] protect against this happening in the future. That’s what I’m getting [out] of this now.”⁴

The *Now* segment not only reveals the ability of the *morality and ethics* frame to engage nontraditional audiences, but also of social interaction and discussion to erode the awkwardness that sometimes exists between environmental scientists and religious leaders. As Chivian puts it: “I think a trust has developed. I think there’s nothing like, you know, sleeping on air mattresses and nobody showering to develop trust. It goes a long way, you know?”⁵

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