Cultural Characters and Climate Change: How Heroes Shape Our Perception of Climate Science*

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Objective. This research examines how narrative communication structures influence the public's perceptions of risk and policy preferences related to climate change. *Methods.* An Internet-based experiment is used to expose roughly 1,500 census-balanced U.S. respondents to climate change information. Four experimental treatments are operationalized: a baseline control fact list and three culturally nuanced narratives. *Results.* Ordinary least squares (OLS) regression analysis indicates that narrative structure, particularly through the hero character, plays a powerful role in shaping climate change perceptions of risk and policy preferences. *Conclusion.* Explanations of the public's perceptions of risk and climate change policy preferences should more explicitly account for the role of dominant climate narratives.

> . . . we have not even to risk adventure alone; for the heroes of all time have gone before us; the labyrinth is thoroughly known; we have only to follow the thread of the hero-path. And where we had thought to find an abomination, we shall find a god; where we had thought to slay another, we shall slay ourselves; where we had thought to travel outward, we shall come to the center of our own existence; where we had thought to be alone, we shall be with all the world.
>
> —Campbell (1949:18)

There is a clear consensus in the scientific community that the average temperature of the Earth is increasing and that this increase is the result of anthropogenic greenhouse gases (mostly CO_2). For the overwhelming majority of scientists, such findings are a settled matter, representing mere convention (see, for example, Doran and Zimmerman, 2009; Oreskes, 2004), with many scientists now focusing their attention on the severity and timing of expected consequences. Many of their predictions can be quite alarming, forecasting

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such ominous events as the spread of disease (e.g., Githeko et al., 2000), famine (Nelson et al., 2009), and the increasing frequency of extreme weather events (e.g., Lin et al., 2012), to name but a few. In light of the important economic, political, and social implications of these findings, it is understandable that scientists have attempted to communicate climate change information more broadly to the general public. Such communicative efforts, however, have failed to produce the same level of agreement in the general public that exists in the scientific community (e.g., Jenkins-Smith, Herron, and Silva, 2010:41–45; Leiserowitz, 2006; Nisbet and Myers, 2007). For example, as recent as March 2012, a Gallup poll reported that 41 percent of Americans believe that changes in mean global temperatures are caused by natural events, clearly diverging from the level agreement found in the scientific community.[1] Such a gross discrepancy, and others like it, has generated concerns. So much so that in 2010 the National Research Council (NRC) placed climate change communication at the top of its priority list, calling for a national task force to address the matter (National Research Council, 2010). The research presented here proceeds in the spirit of the NRC's call by examining one mode of communication frequently if not deliberately overlooked by the scientific community. It is a mode of communication used since human beings began to employ language and it is also our most preferred way of communicating on a day-to-day basis (see, for example, Abelson and Schank, 1995; Bruner, 1986; Polkinghorne, 1988; White, 1987). I am referring to the power of telling a story.

Past research has shown that narrative communication plays an important role in shaping opinion (McBeth, Lybecker, and Garner, 2010), preferences (Matilla, 2000, 2002), and perceptions of risk (Golding, Krimsky, and Plough, 1992), particularly when compared to more objectively oriented scientific (e.g., Small, Lowenstein, and Slovic, 2007) and abstract (Ricketts, 2007) styles of communication. However, the influence of narrative communication on climate change preferences and perceptions of risk has yet to be empirically assessed. Thus, the research question addressed here is *do narrative communication structures influence individual perceptions of risk and policy preferences related to climate change?* An Internet-based experiment is used to address several hypotheses derived from this question. Four experimental treatments are utilized, including a control and three narratives. OLS regression is then used to determine the influence of the narrative treatments on respondent perceptions of the personal and societal threat of climate change, affect for characters that appear in the narrative treatments, and three climate change policy solutions (cap and trade, nuclear energy, and renewable resources). The survey sample consists of roughly 1,500 nationally representative and

[1]Gallup Poll, March 8–12, 2012. $N = 1{,}024$ MOE $\pm$ 4: Question Wording: "And from what you have heard or read, do you believe increases in the Earth's temperature over the last century are due more to the effects of pollution from human activities, or natural changes in the environment?" PollingReport.com http://www.pollingreport.com/enviro2.htm. (Accessed June 22, 2012.)

census-balanced respondents, all of whom are randomly assigned to one of the four treatments.

Results indicate that narrative plays a central role in helping shape respondent opinion and perceptions of risk related to climate change. Specifically, narratives are found to influence respondent affective assessment of groups used as either heroes or villains in the narrative treatments. In turn, these same affective assessments are found to drive the respondents' reactions to arguments and assumptions within the narrative. Affect for heroes is found to significantly increase respondent perceptions of personal and sociotropic risk related to climate change as well as preferences for policy solutions championed in the narrative.

Scientific and Public Opinion on Climate Change

The scientific consensus on the reality that the Earth is warming and that human beings are the cause is well established (e.g., Doran and Zimmerman, 2009; Oreskes, 2004) and rooted in a torrent of scientific findings across many academic fields (see Dessler and Parsons, 2006; IPCC, 2007). Perhaps equally as well known is that, when polled, the American public does not demonstrate the same level of consensus as the scientific community (Jenkins-Smith et al., 2010:41–45; Kahan, Jenkins-Smith, and Braman, 2011; Leiserowitz, 2006; Nisbet and Myers, 2007). The current state of the public's attitudes about climate change has not necessarily followed a linear path.

Examining varied sources of public opinion polling data on climate change between the years 1986 and 2007, Nisbet and Myers (2007) provide perhaps the most comprehensive picture of climate change public opinion available for this time period. The authors identified several trends that the scientific consensus position would likely find promising. Between 1986 and 2006, public awareness about climate change grew dramatically from just over 30 percent to well over 90 percent. Self-reported knowledge about climate change also increased from 53 percent in 1992 to 76 percent in 2007. By 2007, most Americans (65 percent) reported believing scientists believe climate change is occurring, and most Americans found it an important issue as well (84 percent). Importantly, Nisbet and Myers also report that by 2005 over half of the American public believed climate change posed a significant threat. Other scholarship supports the Nisbet and Myers interpretation of the trends during this time period (see, for example, Brulle, Carmichael, and Jenkins, 2012; Leiserowitz, 2003, 2006; Marquart-Pyatt et al., 2011) and it is likely safe to surmise that by the mid-part of the last decade, nearly all Americans were aware of climate change, most believed they knew something about it, believed scientists thought it was a problem, and—for the most part—the public was moving in the direction of scientific opinion.

Beginning in about 2008, public opinion related to climate change began to diverge sharply from the previously described trend where opinion appeared

to be inching toward the scientific consensus. Examining recent polling data, Sandra T. Marquart-Pyatt and her colleagues (2011) describe these changes:

> numerous polls indicate a decline in public acceptance of [climate change] over the past two to three years (although some polls show a slight uptick since mid-2010). For example, Gallup Polls . . . show substantial declines from 2008 to 2010 in the percentages of Americans believing that global warming is already occurring (61 percent to 50 percent); that it is due more to human activities than natural changes (58 percent to 50 percent); and that most scientists believe it is occurring (65 percent to 52 percent). (2011:38)

Aggregating public opinion polling data about climate change into what the authors term a climate change threat index (CCTI) and looking at trends from 2000 to 2010, Brulle, Carmichael, and Jenkins (2012) report similar findings to Marquart-Pyatt and her colleagues. Brulle, Carmichael, and Jenkins, found that beginning in 2008 and moving through 2010, their CCTI measure declined to levels similar to 2002 through 2005, and stayed there. Given the current assessment of public opinion, it is reasonable to conclude that the American public has moved away from its initial willingness to fall in line with scientific consensus, and now shows sizable populations both agreeing and disagreeing with the scientists. A significant amount of research has been conducted that speaks to this gap between the lay public's opinions and perceptions about climate change and the scientific position.

Social Scientific Assessments of Public Climate Change Attitudes

The gap between lay and expert understanding on complex issues such as climate change is frequently understood as a science communication problem (e.g., Kahan, 2010). Many studies have been performed assessing some aspect of this gap across a host of issues ranging from the topic of interest here, climate change (e.g., Kellstedt, Zahran, and Vedlitz, 2008; Sterman, 2008), to other technical issues such as genetically modified foods (e.g., Hansen et al., 2003; Qin and Brown, 2006). When assessing why scientists believe climate change is happening, humans are the cause, that it poses a significant threat, and why a nontrivial portion of the American public believes otherwise, several explanations of varying import have been identified.

Referred to as the knowledge deficit model (Kellstedt, Zahran, and Vedlitz 2008), the first explanation finds that the public's lack of climate change knowledge can help explain the gap between lay and scientific opinion. Simply put, in complex issue areas the scientific community has access to specialized knowledge that the lay public does not and transferring that information to the public makes a difference. This vein of research has shown that the public generally shows a lack of knowledge about the causes of climate change (e.g., Read et al. 1994) and frequently conflates climate change with general pollution models (Bord, Fisher, and O'Connor, 1998). However, the

public has demonstrated the capacity to evaluate multiple dimensions of concern (e.g., precipitation and temperature) about climate change (Berk and Schulman, 1995) and when educated, views are found to better approximate the scientific community (Doble, 1995; Reynolds et al., 2010).

Weather and climate also play a role in shaping climate change opinion (Marquart-Pyatt et al., 2011). For example, recent research finds a relationship between extreme weather and the public's willingness to recognize climate change as a threat (Zahran et al., 2006). However, Marquart-Pyatt et al. (2011) observe that perceptions of the actual world (e.g., weather events, local temperatures, etc.) do not develop in a vacuum. Values and beliefs influence these perceptions and are also important predictors of climate change attitudes. For example, Jones (2011) found that "the more conservative a person is the less likely they are to believe climate change is real, that it is caused by humans, and that it poses a threat to them as an individual or society" (2011:721). Other studies mirror the Jones (2011) finding (e.g., Leiserowitz, 2006), and yet even more have identified other important value and belief predictors of climate change attitudes, including environmental beliefs (Kellstedt, Zahran, and Vedlitz, 2008), partisanship, and cultural orientation (e.g., Goebbert, et al., 2012; Jones, 2010). Values and beliefs can also be critically tied to how much trust the public ascribes to organizations and key individuals; and, given that individuals may not have the time, inclination, or aptitude to come to terms with climate science on their own, they will often rely on these trusted sources to help them sort it out (e.g., Siegrist, Earle, and Gutscher, 2007; Slovic, 1999).

The media also play an important role in shaping climate change attitudes. When covering virtually any issue, media have shown a propensity to focus on sensational facets such as conflict and debate (e.g., Gans, 1979; Graber, 1997), uncertainty (Zehr, 2000), and the partisan dimensions of the issue (Boycoff and Boycoff, 2007; Lahsen, 2005; McCright and Dunlap, 2003), all of which are likely to give the public the perception that things are contested, despite whatever reality may truly exist. These tendencies lead to extended coverage of sensational or scandalous events such as the hacked emails of the now infamous Climate Gate affair at East Anglia University in 2009, and the more recent coverage of the Heartland Institute's billboard depiction of climate change believers as Ted Kaczynski, the Unabomber. The media do this, of course, to secure viewership and sponsors for their programming, and thus the reporting of the actual science will often play a peripheral role. However, when the science is front and center, the very processes science has to adhere to lends itself to the sensational types of coverage media are prone to use. Science, by definition, requires an open epistemology where no claim (in theory) is made with 100 percent certainty and all findings and processes are open to criticism. This is how science works. Such processes, despite meticulously reported degrees of certainty, present fertile ground for media to employ their favored coverage tactics. In the case of climate change, such coverage has not conveyed scientific consensus; rather, the picture has been quite the opposite (see Boycoff and Boycoff, 2007).

Finally, there is also the issue of the structure of climate science communications, the subject of the research presented in this article. Referred to as communication frames in the social sciences (see Chong and Druckman, 2007), this category of explanatory variables is concerned with the foci of communications about climate change. For example, when communicating about climate change, scientists will generally attempt to be as neutral and objective as possible, while media communicators are concerned with promoting the contested and sensational aspects of climate change (e.g., Boycoff and Boycoff, 2007). Findings studying climate change communication indicate framing matters (see Nisbet, 2009). For example, climate change frames focusing on the costs of potential climate change policies are credited with having played an important role in the failure of the United States to adopt the Kyoto Protocol (McCright and Dunlap, 2003). Missing within the framing research on climate change, however, is an empirical assessment of the most commonly invoked frame in human communications: the story, or, more commonly in academic circles, the narrative.

Moving Forward: Cultural Narratives and Climate Change[2]

The typical way to understand message structure influence in the social sciences has been in terms of frames. A broad and abstract approach to understanding message structure influence, "a frame" is a categorization meant to capture one or more dimensions within a given message, for a particular issue that attracts an individual's attention—helping him or her make sense of the information therein (Chong and Druckman, 2007). For example, a framing study examining welfare policy found that individuals viewed welfare benefits differently when the "problem of welfare" was posed as a question of individual responsibility on the part of the welfare recipient or if the frame directed attention toward the innocent children who would suffer if welfare benefits were removed (Nelson and Oxley, 1999; but also see Feldman and Zaller, 1992). Framing research has provided a long list of findings across a broad range of issues ranging from crime (Valentino, 1999), to campaign finance (Grant and Rudolph, 2003), to gay rights (Brewer, 2002), to name but a few (see Chong and Druckman, 2007 for an overview of this literature). What constitutes a meaningful dimension in a given frame is also quite contextual (Chong and Druckman, 2007:106), often varying from issue to issue, although further theoretic refinement has usefully produced more general categories of frames, including episodic versus thematic (e.g., Iyengar, 1990), gains and losses frames (i.e., prospect theory) (Tversky and Kahneman, 1987), issue

[2]The research design and the subsequent data collection detailed in this research have appeared in other published works (see Jones, 2010, 2011; Jones and Song, 2011; Ripberger et al., 2012). Consequently, the descriptions presented in the design, data, and methods sections of these manuscripts are similarly structured and worded.

versus equivalency (e.g., Druckman, 2004; Chong and Druckman, 2007), and story frames (Berinsky and Kinder, 2006). As stories are likely a primary means by which human beings both communicate and cognitively organize information (see, for example, Herman, 2003; Berinsky and Kinder, 2006; Jones and Song, 2011) and practically useful in this regard, this study focuses on story frames, or more simply, and from this point forward—narratives.

Research examining the effect of narrative on preferences, attitudes, and information processing is truly interdisciplinary, spanning many fields of study. For example, marketing research has found that narrative advertising is more powerful than service-attribute-focused advertising in shaping consumer preferences (Matilla, 2000, 2002). Science communication research has found that narrative messaging is more effective than scientific messaging (Rook, 1987; Small, Loewenstein, and Slovic, 2007), most notably because it is more memorable (e.g. Golding, Krimsky, and Plough, 1992) and because respondents are more likely to follow safety prescriptions imbedded within the message (Ricketts, 2007). Work in political science (Berinsky and Kinder, 2006) and political psychology (Jones and Song, 2011) finds that narratives help individuals cognitively organize incoming information, likely influencing how that information is accessed in the future. And perhaps most telling, research in neuroscience has approximated the area in the brain responsible for narration (Troiani et al., 2006; Young and Saver, 2001) and determined that damage to this area—such as that caused by alcoholism and Alzheimer's disease—that inhibits the ability to think narratively is more detrimental to subjects than damage to other brain functions such as kinesthetic or mathematical (Ash et al., 2007; Young and Saver, 2001). It is considered more detrimental because the loss of the ability to narratively construct the future in terms of the stories of one's past is, in a sense, the loss of the ability to recognize the self. In short, narrative is at the center of how human beings make sense of the world and understanding how this specific type of frame influences how people form and maintain climate change attitudes will likely shed light on the gap between lay and scientific perspectives.

What is and is not a narrative is a hotly contested point in narrative scholarship. So much so that narrative research has its own version of the classic Hatfield and McCoy feud: the poststructuralists versus the structuralists.[3] Poststructural accounts of narrative focus on individual interpretations of texts with an emphasis on the unique nature of each and every interpretation; structuralists focus on generalizable facets of texts such as setting, plot, and characters, with an emphasis on how such structures are portable across different contexts (Huisman, 2005:39). The former approach is better suited to the humanities and qualitative studies. Given the focus on generalizable categories and structures, the latter structuralist approach is positioned well for social scientific hypotheses testing. Thus, the definition of narrative applied in this

[3]See Currie (2011:Introduction), Herman (2003:Ch. 1), and Jones and McBeth (2010:331–33) for discussions of the structural and poststructural divide.

research relies upon the structuralist account of narrative recently dubbed the narrative policy framework (NPF) (Jones and McBeth, 2010). According to the NPF, narratives have the following characteristics:

1. A *setting* that consists of fixed referents within the story that few contest (Stone, 2002). These setting objects could range from scientific information to legal rules, but the important point is that the setting affixes the story to referents some meaningful portion of the population will accept (Shanahan, Jones, and McBeth, 2011).
2. A *plot* that ties characters with the setting and usually assigns blame and/or causality (Stone, 1989). According to Stone (2002), common policy plotlines include the *story of decline*, *conspiracy, blame the victim*, and *stymied progress*, among others.
3. Every policy narrative must have *characters* (McBeth, Shanahan, and Jones, 2005; Verweij et al., 2006). There will be a villain who harms a victim and there will be a hero who offers a solution to either prevent or stop the victim from being harmed.
4. Finally, every policy narrative culminates in a policy solution (Stone, 2002), or *a moral to the story* (Ney and Thompson, 2000). That is, for a policy narrative to officially move beyond critique or argument, it must culminate in a solution that seeks to somehow control the policy outcome.

Relying on cultural theory (CT), a series of studies have gone to great lengths to describe three cultural stories about climate change that the authors of the studies argue dominate real-world discourses (Raynor and Malone, 1998; Ney and Thompson, 2000; Verweij et al., 2006). These stories provide an opportunity to test for the influence of narrative on perceptions of risk and policy preferences related to climate change.

First conceived by anthropologist Mary Douglas (1970) and later formalized by Thompson, Ellis, and Wildavsky (1990), CT measures belief systems along two dimensions of grid and group. Grid measures levels of group interaction, while the dimension of group captures the degree that these groups are expected to constrain beliefs and behavior (Thompson, Ellis, and Wildavksy, 1990).[4] Once surveyed, individuals can be placed on a two-dimensional space and classified as one of four types: fatalist, hierarch, individualist, and egalitarian. Each quadrant produced by the two dimensions provides an exclusive view of nature (Thompson, Ellis, and Wildavksy, 1990). Fatalists believe that nature is random and that individuals can do little to control their lives. Hierarchs believe that nature can be controlled, but in doing so individuals must be bound by tight societal prescriptions where experts manage their sphere. Individualists believe nature is resilient, and no matter what an individual

[4]CT has a rich history of explaining perceptions of risk and policy preferences (see Kahan and Braman, 2006; Mamadouh, 1999).

does, nature will return to equilibrium. Egalitarians view nature as dangerously fragile, where human activity always runs the risk of going too far and there is little opportunity to correct for previous mistakes. Thus, it should come as no surprise that egalitarians are shown to perceive climate change as more of a threat than hierarchs and individualists (Leiserowitz, 2005, 2006).[5] Reliant upon CT's dimensions of grid and group and views of nature, previous scholarship specifies three stories, one each for the individualist, hierarch, and egalitarian (Raynor and Malone, 1998; Ney and Thompson, 2000; Verweij et al., 2006).

Profligacy: An Egalitarian Story

In this story, the cause of global warming is overconsumption. For the egalitarians, global warming is a moral issue, where selfishness has driven the environment to the brink of destruction. The villains of this story are profit-driven corporations, governments that facilitate these corporations, and any group that supports the status quo. The heroes of the profligacy story are groups such as Ecodefense and Earthfirst that seek the elimination of greenhouse gases (GHGs) and advocate for fundamental changes in the human relationship with nature. The setting of this story is a fragile world where humans have overstepped their bounds, while the moral of the story is that humankind is doomed if it does not correct for past mistakes. The profligacy story favors renewable resources to deal with GHGs.

Lack of Global Planning: A Hierarchical Story

The hierarchical story views the cause of climate change as mismanaged societal systems that have led to excessive economic and population growth. The setting is a world where humans have not properly managed economic and societal systems to allow for growth at a responsible pace that the climate can tolerate. The heroes in this story are groups such as the Club of Rome, impartial scientists, and the governments that employ them. Hierarchs advocate for increased scientific management and governmental intervention to curtail climate change. The hierarchical story favors expert-driven solutions such as nuclear energy to solve the problem of GHGs.

Business as Usual: An Individualistic Story

The individualistic story's heroes are groups such as the Cato Institute and organizations like the *Wall Street Journal*. The cause of global climate change

[5]Fatalists are often difficult to study because of their predisposition to be disinterested in policy and politics. Consequently, it is commonplace to omit fatalists from CT research (see Mamadouh, 1999).

TABLE 1

Cultural Theory Climate Change Narratives: The Cast of Characters

Cultural Narrative	Hero	Villain 1	Villain 2	Moral of the Story (Policy Solution)
Individualist	The Cato Institute	The Club of Rome	Ecodefense	*Cap and Trade*
Hierarch	The Club of Rome	The Cato Institute	Ecodefense	*Nuclear Energy*
Egalitarian	Ecodefense	The Club of Rome	The Cato Institute	*Renewable Energy*

for these groups are generally naïve but dangerous idealists (egalitarians) and self-interested government representatives (hierarchs) that have fabricated the story (it is a hoax). Should they admit climate change is reality, they will find the only acceptable solution for climate change is to allow market forces to move naturally as individuals compete and innovate to create new technologies that reduce carbon emissions and allow adaptation. The moral of the story is that markets must operate with minimal interference, thus solutions to climate change that rely upon market mechanisms, such as cap and trade, are likely to be more acceptable to the individualist.

Experimental Treatments

To test for the influence of narrative structure on individual perceptions of climate change risk and policy preferences, the stories summarized in the previous section are used to construct experimental narrative treatments. Each story begins from the same fact-based setting where climate change is real and there are predictable consequences from the changing climate. Each story has the same stymied progress plot, where some progress has been made toward dealing with climate change, but that progress has now been halted. The victim is implied in each story, where this lack of progress is understood to hurt the reader and society more generally. Therefore, setting and plot are held constant, as is the victim character in each story. However, heroes and villains and the moral of the story are experimentally manipulated.

Specific to the other cultural types, each cultural narrative offers up two villains responsible for the halt in progress while presenting a hero championing a specific policy solution. Table 1 summarizes the character distribution in each narrative.

As Table 1 illustrates, the characters remain the same, but their role in each narrative changes, as does the policy solution championed by the hero character. Additionally, when the narrative admonishes each villain, the narrative

also admonishes the preferred policy solution of that hero. So, for example, when the individualist narrative mentions the Club of Rome, the story also negatively refers to nuclear energy.

In addition to the setting, plot, and victims being held constant other measures are taken to ensure experimental validity. Each experimental narrative treatment is slightly over 800 words long with the majority of the text comparatively the same. Each narrative is roughly 75 percent the same as the others.[6] In addition to holding structural narrative elements constant, a baseline control condition is included in the research design.

As mentioned earlier, defining narrative is a highly contentious point in narrative scholarship. While the poststructuralists argue that everything is implicitly narrative (e.g., Derrida, 1981), structuralist approaches to narrative search for generalizable story structure (e.g., Jones and McBeth, 2010). This disagreement will not be resolved here. Rather, and along with other narrative scholars (e.g., Herman, 2009; White, 1980), it is asserted that there are degrees of narrativity, where some messages will have less and others will have more. Narrativity, in this case, is understood as explicitly possessing those structural narrative characteristics defined by NPF: setting, plot, characters, and a moral of the story. Such a stance requires the baseline control treatment to possess visibly less narrativity than the narrative treatments. As has been done in other experimental designs testing the influence of narrative structure, a list stimulus is employed as a baseline control (e.g., Matilla, 2000, 2002). The control treatment contains the exact same information, bulleted in list form, as the information presented in the setting section of each narrative treatment.[7]

Data and Sampling

The national U.S. sample for this research was obtained via an Internet survey conducted between April 24th and April 27th, 2009 by Survey Sampling, Inc. (SSI).[8] Like Harris Interactive and YouGov (formerly Polimetrix, Inc.), SSI maintains a large panel of respondents and samples from within the panel to achieve a census-balanced sample based upon census-relevant demographics. Respondents were provided a three-dollar monetary incentive

[6]The story frames are described as roughly similar because similarity depends on how the text is compared. For example, given that there are three narratives in which each possess an admonishment of the other story frame heroes (i.e., the villain) the ordering of these characters is different across story frame conditions. Whereas the hierarch story frame chronologically discusses the egalitarian villain first, the individualist discusses the egalitarian villain second. Cross-comparing these texts (as opposed to the comparison of the villains chronologically in the text) produces a more favorable similarity percentage than the one reported here. Thus, the percentage reported here is a conservative estimate of story frame treatment similarity.

[7]Please see Appendix A for the exact wording of each experimental treatment.

[8]This project was in part funded by the Decision Risk and Management Sciences section of the National Science Foundation, grant number SBR 0962589. Please see http://www.surveysampling.com/ for more information about SSI.

TABLE 2

Survey Sample Demographic Representativeness, 2009

Demographic	Frequency	Respondent (%)	U.S. National Population (%)
Gender			
Male	688	43.4	48.1
Female	893	56.3	51.9
Age			
18–24	150	9.5	13.2
25–54	948	59.6	57.0
>54	488	30.8	28.8
Education			
High school grad or higher	1,538	97.3	83.1
College grad or higher	603	38.2	24.3
Race/Ethnicity			
White, non-Hispanic	1,075	67.8	72.7
Black	256	16.1	11.5
Hispanic	176	11.1	11.0
Other	72	5	4.7
Household Income			
$0–49,999	917	57.8	57.3
$50,000–99,999	509	32.1	29.3
$100,000 and above	124	7.8	13.4

U.S. National Population figures, Herron and Jenkins-Smith (2006:180).

to take the survey and all were randomly assigned to one of the four experimental treatments. For comparative purposes, Table 2 summarizes relevant data characteristics.

While the sample does approximate the U.S. population, Table 2 shows some differences. Notably, the young (ages 18–24) are slightly underrepresented, and the educated (both categories) and blacks are both overrepresented. Given that this research is interested in the relationships between specific variables (narrative structure and key dependent variables) and not specific characteristics of the sample's parent population, it is unlikely that these differences threaten the validity of any findings. Finally, two characteristics of the data are likely to concern the reader. First, the data are drawn from an Internet sample. Second, the sample is not a random sample. Both characteristics have been found to pose little validity threat when conducting experimental research as such samples are comparable to random digit dial (RDD) phone samples (see Berrens et al., 2003; Best et al., 2001).

Variable Descriptions

The central research question is *do narrative communication structures influence individual perceptions of risk and policy preferences related to climate change?*

Consequently, the analysis presented in this article will be dealing with several dependent variables. These variables include *Personal Risk*, *Sociotropic Risk*, *Cap and Trade*, *Nuclear Energy*, *Renewable Energy*, and *Character Affect*. Table 3 summarizes descriptive and measurement characteristics for these dependent variables as well as alphas for scales used in the OLS regression analysis.

The literature also identifies several important independent variables that need to be included as controls. First, *Climate Change Knowledge* is found to have a significant relationship with perceptions of climate change risk (e.g., Jenkins-Smith and Herron, 2008). Respondents are asked a total of 11 climate change questions related to what scientists expect and what scientists agree the causes of climate change are. Coded 0 for incorrect and 1 for correct, correct answers are summed for each respondent creating a score ranging from 0 to 11. *Ideology* is also found to play a role in how individuals perceive climate change risk, with conservatives viewing climate change as less of a threat than liberals (e.g., Leiserowitz, 2006). *Ideology* is measured by a single survey question where respondents are asked to place themselves on a scale from one to seven, where one is strongly liberal and seven is strongly conservative. Since all of the stories are populated by content drawn from qualitative CT studies, it makes sense to control for the cultural type of each respondent. Administered in random order to each respondent, subjects are given a total of three survey questions for each cultural type. Each question asks the respondent to place himself or herself on a scale from one to seven, where one is strongly disagree and seven is strongly agree. The three questions for each type are then totaled, producing a measure ranging from 3 to 21 (see Table 3 for scale reliability measures).

Additional controls include *Age*, *Education*, *Gender*, *Income*, and *Race*. All respondents are 18 or older. Ages range from 18 to 88. Education is coded on a scale ranging from one to seven, where one represents elementary or some high school, and seven represents a doctorate of any type. Gender is coded one for male and zero for female. Race is coded one for white/Asian, zero otherwise. Table 3 summarizes control variables employed in this research.

Findings

Each narrative treatment offers a story that asserts the reality of climate change, that GHGs are the cause, and makes a case for GHG reduction via a specific solution: cap and trade (individualist), nuclear energy (hierarch), or renewable resources (egalitarian). Taken in total, these narrative elements work together to create a general sense that climate change is a threat. Given that the control treatment makes no such case and that narrative communications are found to be more persuasive than nonnarrative messages (e.g., Matilla, 2000, 2002), it is hypothesized that exposure to any narrative treatment will increase the respondent's perception that climate change is both a threat to them personally and society more generally. And, for the same reasons, it is likely

TABLE 3

Variable Descriptive Statistics

Variable	Measurement	*n*	Mean	*SD*
Individualism (Composite, Chronbach's Alpha: 0.671)	Composite I1–I3 (3–21)	1,557	12.33	4.13
I1: Even if some people are at a disadvantage, it is best for society to let people succeed or fail on their own.	1 (disagree) to 7 (agree)	1,569	4.18	1.80
I2: Even the disadvantaged should have to make their own way in the world.	1 (disagree) to 7 (agree)	1,571	4.06	1.71
I3: We are all better off when we compete as individuals.	1 (disagree) to 7 (agree)	1,575	4.07	1.80
Hierarchism (Composite, Chronbach's Alpha: 0.576)	Composite H1–H3 (3–21)	1,559	11.61	3.86
H1: The best way to get ahead in life is to do what you are told to do.	1 (disagree) to 7 (agree)	1,573	3.30	1.66
H2: Our society is in trouble because we don't obey those in authority.	1 (disagree) to 7 (agree)	1,567	3.55	1.81
H3: Society would be much better off if we imposed strict and swift punishment on those that break the rules.	1 (disagree) to 7 (agree)	1,575	4.76	1.77
Egalitarianism (Composite: Chronbach's Alpha: 0.722)	Composite E1–E3 (3–21)	1,559	12.32	4.51
E1: What our society needs is a fairness revolution to make the distribution of goods more equal.	1 (disagree) to 7 (agree)	1,571	4.05	1.90
E2: Society works best if power is shared equally.	1 (disagree) to 7 (agree)	1,571	4.44	1.76
E3: It is our responsibility to reduce the differences in income between the rich and the poor.	1 (disagree) to 7 (agree)	1,574	3.84	1.95

TABLE 3—continued

Variable	Measurement	*n*	Mean	*SD*
Fatalism (Composite, Chronbach's Alpha: 0.637)	Composite F1–F3 (3–21)	1,566	9.85	4.03
F1: Most of the important things that take place in life happen by random chance.	1 (disagree) to 7 (agree)	1,574	3.29	1.71
F2: No matter how hard we try, the course of our lives is largely determined by forces outside our control.	1 (disagree) to 7 (agree)	1,575	3.77	1.81
F3: It would be pointless to make serious plans in such an uncertain world.	1 (disagree) to 7 (agree)	1,573	2.80	1.75
Ideology	1 (liberal) to 7 (conservative)	1,573	4.01	1.62
Income	1 (<10 K) to 20 (>200 K)	1,550	5.29	3.43
Age	18–88	1,586	46.01	14.99
Race	1 White; 0 Other	1,579	0.699	0.459
Gender	1 Male; 0 Female	1,581	0.435	0.496
Climate Change Knowledge	0 (low) to 11 (High)	1,508	7.74	1.82
Education	1 to 7	1,580	3.36	1.29
	Dependent Variables			
Personal risk	0 (no threat) to 10 (extreme threat)	1,572	5.75	2.86
Sociotropic risk	0 (no threat) to 10 (extreme threat)	1,571	6.27	2.56
Cap and trade	0 (completely disagree) to 10 (completely agree)	1,418	4.80	3.14
Nuclear energy	0 (completely disagree) to 10 (completely agree)	1,445	5.27	3.06
Renewable energy	0 (completely disagree) to 10 (completely agree)	1,450	5.88	2.79
The Cato Institute (character affect)	0 (completely negative) 10 (completely positive)	1,246	4.24	2.67
Club of Rome (character affect)	0 (completely negative) 10 (completely positive)	1,185	3.97	2.70
Ecodefense (character affect)	0 (completely negative) 10 (completely positive)	1,295	4.56	2.81

that the narrative treatment will positively influence respondent preferences for policy solutions championed in each story. Each narrative also invokes culturally linked groups or organizations deployed in each story as a hero or a villain. Narrative scholarship suggests that if a story is effective, readers will form emotional attachments with the characters (e.g., Dal Cin, Zanna, and Fong, 2004:177; Green and Brock, 2000, 2005:127; Hsu, 2008), particularly the hero character (Campbell, 1949).

Each column reported in Table 4 illustrates an independent OLS regression where the independent variable of interest is the respondent's random assignment to a narrative treatment (e.g., individualist, hierarch, or egalitarian—coded 0 for not present, 1 for present). Thus, each column also represents a discrete dependent variable, all of which are risk, character, or policy preference related (e.g, *Personal Risk*). The control treatment is necessarily omitted from the OLS regression (required by the inclusion of the dummy variables for each narrative), but the constant represents the baseline established by the control list treatment. Each regression controls for *Age, Education, Gender, Income, Race, Ideology, Climate Change Knowledge, Individualism, Hierarchy, Egalitarianism,* and *Fatalism* (see Appendix B for fully specified OLS regressions).

Statistically significant relationships are not found between narrative structure and *Sociotropic Risk*. However, several key dependent variables yield statistically meaningful relationships with narrative structure, including *Personal Risk*, the broad category of character affect (i.e., all heroes and villains), and policy preferences. Respondents randomly assigned to the egalitarian narrative treatment see their sense of *Personal Risk* increase by slightly less than a third of a point (0.322, $p < 0.05$); however, the remaining two narrative treatments show no statistical significance. Thus, there is insufficient evidence to suggest that narrative structure has any direct relationship with perceptions of either of the risk variables, *Sociotropic* or *Personal*. Characters, on the other hand, universally show a significant relationship with narrative structure.

Discussed earlier, characters are structurally essential to narrative as they drive plotlines and establish causal relationships. In the narrative experimental treatments, affective response to the cast of characters is measured by asking the respondent to rate the character on a scale from 0 to 10, where 0 is completely negative and 10 is completely positive. Table 4 shows that narrative structure plays an important role in shaping the emotional response (i.e., character affect) of subjects to the characters.

Given the range of 0 to 10, the partial regression coefficients in Table 4 are not trivial. The presence of the individualist narrative treatment results in a +0.718 ($p < 0.001$) increase in ratings for the Cato Institute (hero) and decreases of over a full point in assessments of Ecodefense (−1.614, $p < 0.001$) and the Club of Rome (−1.281, $p < 0.001$) (both villains). Similar relationships exist for both the hierarchical and egalitarians treatments. In the hierarch narrative, the Club of Rome (the hero) is assigned positive affect by respondents (+1.214, $p < 0.001$), while both Ecodefense (−1.509,

TABLE 4

Narrative Structure and Climate Change Risk Perceptions, Policy Preferences, and Group Affect

	Risk		Character Affect			Policy Preferences		
	Personal	Sociotropic	The Cato Institute	Club of Rome	Ecodefense	Cap and Trade	Nuclear Energy	Renewable Energy
Constant	4.787**	4.937**	4.011**	3.443**	6.019**	3.389**	0.164	4.522**
	(0.579)	(0.495)	(0.613)	(0.614)	(0.607)	(0.696)	(0.688)	(0.640)
Individualist narrative	0.005	0.157	0.718***	−1.281***	−0.1614***	0.776***	−0.355	−0.056
	(0.192)	(0.165)	(0.220)	(0.222)	(0.214)	(0.229)	(0.227)	(0.211)
Hierarch narrative	0.243	0.262	−1.530***	1.214***	−1.509***	−0.124	−0.211	−0.546*
	(0.197)	(0.169)	(0.223)	(0.230)	(0.220)	(0.234)	(0.232)	(0.216)
Egalitarian narrative	0.322*	−0.015	−1.754***	−1.553***	0.641**	−0.535*	−0.539***	0.366*
	(0.195)	(0.168)	(0.222)	(0.226)	(0.218)	(0.235)	(0.233)	(0.215)
Adj. R^2	0.197	0.265	0.182	0.231	0.258	0.128	0.090	0.057
F-stat	25.161	36.461	18.413	23.483	29.181	14.119	10.026	6.465
n	1,382	1,380	1,092	1,045	1,135	1,248	1,273	1,275

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ one-tailed test (std. errors reported in parentheses). Controls include *Ideology*, *Income*, *Age*, *Race*, *Gender*, *Education*, *Climate Change Knowledge*, *Individualism*, *Hierarchism*, *Egalitarianism*, and *Fatalism*.

$p < 0.001$) and the Cato Institute (-1.530, $p < 0.001$) are reacted to negatively by respondents (again, both are villains). In the egalitarian cultural narrative treatment, Ecodefense is responded to positively ($+0.641$, $p < 0.01$), while the villain characters, the Cato Institute (-1.754, $p < 0.001$) and the Club of Rome (-1.553, $p < 0.001$), are assigned more negative affect by respondents. These effects are large and distinct and all move in expected directions: heroes are liked; villains are disliked, even when controlling for demographics (e.g., age and education) and beliefs (i.e., ideology and cultural orientation).

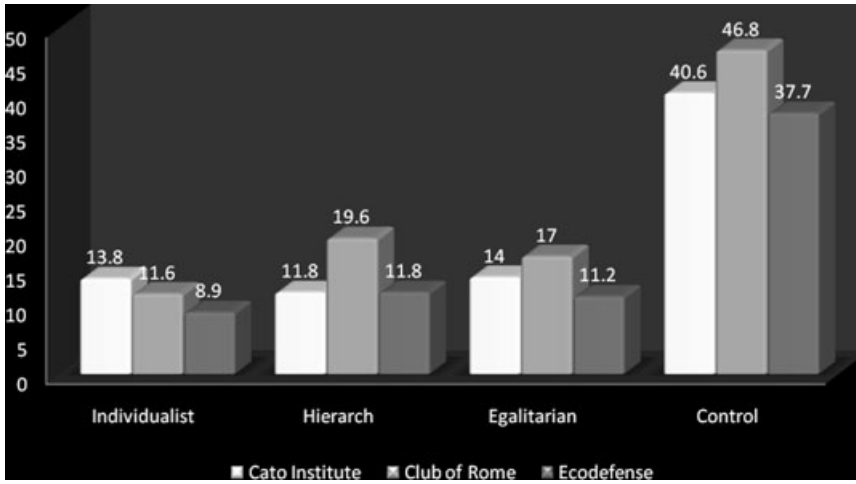
Each narrative presents a culturally specific policy solution (i.e., moral of the story) championed by the hero in each story, while simultaneously maligning the policy solutions of the other two cultural types. Table 4 summarizes respondent preferences for the policy solution offered in each track. Although there are significant findings in each track moving in expected directions, findings are inconsistent. As expected, the individualist narrative treatment increases preferences for cap and trade ($+0.766$, $p < 0.001$) and the egalitarian narrative increases preference for renewable energy (0.366, $p < 0.05$). Similarly and as expected for those solutions argued against, the hierarch narrative reduces preferences for renewable energy (-0.546, $p < 0.05$) and the egalitarian narrative reduces preferences for cap and trade (-0.535, $p < 0.05$) and nuclear energy (-0.539, $p < 0.001$). Overall, these findings suggest that narrative structure plays some role in shaping policy preferences in policy narratives; however, the results are too inconsistent to draw any broader claims beyond this study without further research.

The OLS analyses summarized in Table 4 show that the cultural narratives are remarkably effective at both increasing respondent affective ascriptions for heroes and reducing respondent affective ascriptions to villains. While the hero and villain treatment within each cultural narrative helps respondents form affective assessments of the groups in directions specified by the narrative, there is also evidence that the narratives help respondents form initial affective assessments. Figure 1 illustrates this point.

Each bar in Figure 1 represents the percentage of respondents who answered "don't know" (DK) when prompted to provide affect for each of the groups treated as heroes or villains in each treatment. The difference between the control group and the remaining treatments is large. In the control group, respondents receive no contextual cues as to what the group may do or what the group represents—it is strictly up to the respondent to know about the group. Unsurprisingly, the DK responses are in all cases higher than the narrative treatments, ranging from a low of 26.6 percent for Earthfirst to a high of 46.8 percent for the Club of Rome. In all cases the DKs noticeably drop in all narrative treatments, indicating that the narrative cues are effective in helping respondents assign affect to the groups. Having shown that the narratives in this research help respondents form initial affective appraisals of the groups treated as characters and that once formed the affective assessments of the character move in directions specified by the narrative, the next set of

FIGURE 1

Character Affect by Narrative Treatment, Percent of "Don't Know" Responses



analyses explore to what extent these affective ascriptions guide responses toward other assumptions and arguments built into each narrative. The point of these analyses is to assess if narratives work through the vehicle of characters as narrative scholars have come to think—positive affect for the hero should help the story's cause while positive affect for the villains should hurt the story's cause.

OLS regression analysis is performed on perceptions of climate change risk and policy preferences. The independent variables of interest in each regression are the character affective responses for heroes and villains by individuals randomly assigned to one of the three cultural narrative treatments. Measured in the same manner as detailed in the previous OLS regression analysis, controls include *Age, Education, Gender, Income, Race, Ideology, Climate Change Knowledge*, and CT type. Each OLS regression is performed on a subpopulation of the entire sample broken down by narrative treatment. Table 5 summarizes these findings (see Appendix C for fully specified OLS regressions).

The left-hand column in Table 5 indicates the character-independent variables of interest in each OLS regression. Moving from left to right, each column represents an independent OLS regression with discrete risk or policy preference dependent variables, reporting partial regression coefficients and significance for each OLS regression. Moving from top to bottom are the sample subdivisions of the analyses by narrative treatment. The hero character is set off from the remaining table by grayed table cells and outlined table rows. The remaining white table cells represent villain characters. In total, there are 15 OLS regressions where the character independent variables (as

TABLE 5

Character Affect, Perceptions of Climate Change Risk, and Policy Preferences

Individualist Narrative Treatment	*Personal Risk*	*Sociotropic Risk*	*Cap and Trade*	*Nuclear Energy*	*Renewable Energy*
Ecodefense	0.088	0.091	0.015	0.010	0.141*
	(0.080)	(0.065)	(0.088)	(0.100)	(0.085)
The Club of Rome	0.051	−0.031	0.181*	0.121	0.037
	(0.080)	(0.066)	(0.089)	(0.101)	(0.087)
The Cato Institute (Hero)	0.214***	0.141**	0.399***	0.010	0.193*
	(0.063)	(0.052)	(0.070)	(0.079)	(0.067)
Adj. R^2	0.248	0.280	0.153	0.067	0.033
F-stat	7.681	8.923	4.417	2.386	1.648
n	284	285	265	269	270
Hierarch Narrative Treatment	*Personal Risk*	*Sociotropic Risk*	*Cap and Trade*	*Nuclear Energy*	*Renewable Energy*
Ecodefense	−0.021	0.135*	0.345***	0.017	0.242***
	0.071	(0.066)	(0.088)	(0.085)	(0.087)
The Club of Rome (Hero)	0.312***	0.295***	0.130	0.451***	0.207**
	(0.065)	(0.061)	(0.080)	(0.079)	(0.081)
The Cato Institute	−0.113*	−0.123*	0.176	0.204*	0.113
	(0.065)	(0.073)	(0.096)	(0.093)	(0.096)
Adj. R^2	0.228	0.258	0.235	0.155	0.090
F-stat	5.976	6.863	5.861	3.986	2.557
n	236	236	221	228	221
Egalitarian Narrative Treatment	*Personal Risk*	*Sociotropic Risk*	*Cap and Trade*	*Nuclear Energy*	*Renewable Energy*
Ecodefense (Hero)	0.412***	0.283***	0.088	0.009	0.361***
	(0.061)	(0.056)	(0.087)	(0.087)	(0.072)
The Club of Rome	0.006	−0.011	0.108	−0.096	0.065
	(0.079)	(0.072)	(0.111)	(0.112)	(0.094)
The Cato Institute	0.009	−0.030	0.072	0.305*	−0.051
	(0.080)	(0.074)	(0.114)	(0.114)	(0.096)
Adj. R^2	0.438	0.473	0.171	0.103	0.198
F-stat	15.071	17.159	4.437	2.938	5.187
n	253	252	233	236	238

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ one-tailed test; (std. errors reported in parentheses). Controls include *Ideology*, *Income*, *Age*, *Race*, *Gender*, *Education*, *Climate Change Knowledge*, *Individualism*, *Hierarchism*, *Egalitarianism*, and *Fatalism*.

well as the control variables) are regressed on five different dependent variables demarcated by narrative treatment. The following discussion is broken down by dependent variable.

Measured on a scale from 0 to 10, where 0 means no threat at all and 10 means extreme threat, *Personal Risk* is a metric designed to assess how much of a threat respondents believe climate change poses to them personally. In all narrative treatments, there is a significant and positive relationship between affect for the hero character and *Personal Risk*. The villain character in the hierarch narrative, the Cato Institute, shows a statistically significant relationship with the *Personal Risk* dependent variable as well. A one-point increase in a respondent's affect for the Cato Institute corresponds with -0.113 ($p < 0.05$) of a point decrease in the respondent's assessment of *Personal Risk*. All significant findings for *Personal Risk* move in expected directions.

Measured in the same manner as *Personal Risk*, *Sociotropic Risk* is a metric designed to assess the respondent's perception of how much of a threat climate change poses for the United States over the next 50 years. In all cultural narrative treatments, the hero of each story achieves significance in the positive direction hypothesized. Additionally, in the hierarchical narrative both villains demonstrate a significant relationship with *Sociotropic Risk*. As affect for the Cato Institute increases, there is a corresponding negative decrease in *Sociotropic Risk*. The hero and the Cato Institute findings are as hypothesized. However, the remaining significant relationship between affect for the villain Ecodefense and *Sociotropic Risk* in the hierarch narrative moves in the opposite direction hypothesized. A one-point increase in affect for Ecodefense corresponds with a 0.135 ($p < 0.05$) increase in *Sociotropic Risk*.

Three policy preference variables and their relationship to character affect are analyzed in Table 5: *cap and trade*, *nuclear energy*, and *renewable energy*. Recall that the individualist narrative advocates cap and trade, the hierarch advocates nuclear energy, and the egalitarian advocates renewable energy. Each of the cultural narratives also maligns the favored policy solutions of the other two cultural narratives. Each preference is measured on a scale from 0 to 10, where 0 is completely disagree and 10 is completely agree.

Increase in respondent affect for the hero corresponds with an increase in preference for the policy solution offered in each narrative. We would expect that support for the villain will reduce support for the advocated policy solution in a given narrative. Two narratively preferred policy variables demonstrate a significant relationship with villain affect. Positive affect for the Club of Rome in the individualist narrative corresponds with increased preferences for cap and trade; increased affect for the Cato Institute in the hierarch narrative results in more support for nuclear energy. Two solutions argued against in the narrative treatments show relationships with villain characters in directions we would expect. Support for the villain Ecodefense in the individualist and hierarch narratives is positively related to support for renewable energy. Similarly, support for Ecodefense in the hierarch narrative

also corresponds to increased support for cap and trade. Hero coefficients move in directions hypothesized while significant villain regression coefficients show mixed results.

In total, 15 OLS regressions are presented in Table 5's summary of findings. In every case, positive affect for the hero character corresponds with an increase in measures designed to capture the assumptions and arguments presented in the cultural narrative treatments. Affect for villain characters is only intermittently significant, and occasionally in the wrong direction. The findings are strongly suggestive that narratives are working through the vehicle of the hero character.

Discussion and Conclusion

Interested in shedding light on the much publicized aggregate differences between scientists and the public's attitudes toward climate change, this research set out to address the question *do narrative communication structures influence individual perceptions of risk and policy preferences related to climate change*? The answer to the question is yes. Narrative structure is shown to play a prominent role in shaping many of the climate-change-opinion-related dependent variables examined in this research, including policy preferences and character affect. The final analyses presented in this article intended to isolate the driver of narrative persuasion by focusing on character affect. While findings for villain characters were scattered and in many cases moving in the opposite direction hypothesized, the results for hero characters were consistent and robust.

In each and every case, regardless of group or cultural content, more positive affect for the hero means higher respondent scores on measures of *Personal Risk*, *Sociotropic Risk*, and the preferred policy solution. This is an especially powerful set of findings when one considers other character-related findings presented in this research. First, recall that being exposed to the cultural narrative dramatically lowered the number of "don't know" responses for character affect relative to the control group. Respondents, when exposed to the cultural narrative, were better able to draw emotional conclusions about a group portrayed as either a villain or hero than respondents lacking a narrative stimulus in the control group. Second, OLS regression analysis shows that when exposed to a cultural narrative, respondents show higher levels of affect for the hero and lower levels of affect for the villains. In short, this research shows that narrative structure helps people form initial emotional assessments of characters, and helps steer those assessments in particular directions. Once in place, those same narratively directed assessments of characters play a powerful role in helping people support the assumptions and arguments imbedded in the narrative. It would seem that narrative structure matters. More specifically, respondents are persuaded through the vehicle of the hero.

Does this research cast light on why there are differences between lay and scientific attitudes toward climate change? Of course, this research does not directly address this question, so any light cast is from an adjacent room—illuminating from a distance via what conjectures may be inferred from a cross-sectional study experimentally testing the influence of stories that can be little more than simplistic caricatures of the rich climate change narratives people are experiencing over time. Despite the limitations brought on by the nature of the research design, the findings presented here do speak to this issue, even if indirectly. In coming to terms with attitudes about climate change, social scientists have identified several useful categories of explanatory variables, including knowledge deficits, real-world weather conditions, belief systems and values, source trust, and media coverage. The findings in this research do not speak to all of these categories, but they do offer meaningful insights into those categories most directly concerned with the structure of climate change messages. Specifically, knowing how narratives might shape climate change attitudes could significantly influence how we might better address knowledge deficits and provide a more nuanced assessment of the impact of media coverage, at least when such coverage takes on a recognizable narrative form.

Recall that the control group in this research received a simple list of facts taken from the IPCC 2007 report, the kind of message structure scientists are likely to embrace in their pursuit for objectivity and neutrality. Thus, the list lacked the narrative structure of the experimental treatments and was scrubbed of overt value statements and the cultural symbolism and content deliberately placed in the narrative stimuli. Respondents clearly show a positive reaction to the narrative treatments in the sense they are more persuaded by them and more willing to align their opinions with scientific opinion.

Importantly, then, we can conclude that climate change messaging is likely to be more effective if portrayed in narrative form. In terms of previous research, this means that the media is very likely to play a critical role in shaping opinions as the media is more likely to use narration and is also the public's primary source for climate change information. This also means that attempts at objective information dissemination are likely to be ineffective. The reason for the posited ineffectiveness is that any group that is able to put out its arguments in narrative format is also more likely to be more influential in shaping opinion than those that do not.

What this research does not speak to is the longevity of the narrative's influence on respondent perceptions of risk and preferences. The analysis conducted here involved a cross-section of the population, conducted at one moment in time, and represents only a snapshot of reality. It is an open question as to whether or not the persuasion effect sticks with the respondents. Despite the uncertainty of the long-term influence of narrative persuasion, it does seem likely that individuals exposed to the same narrative again and again are likely to comply with the assumptions and arguments of the narrative more

stridently than not. Again, this draws attention to the media. Individuals who selectively expose themselves to specific media outlets (e.g., Fox News or MSNBC) are likely to encounter reoccurring narrative themes that direct their opinions. Most importantly, this research shows that heroes, by helping people make sense of the world, are a core component of narrative persuasion.

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Appendix A

Control Treatment List

The issue of global climate change has been the subject of debate over the last few decades. Recently, a large group of scientists analyzed all of the existing studies on climate change and summarized these findings:

- Most agree that the Earth is warming and that over the past one hundred years the average temperature has increased by one to two degrees.
- During this same time period, human beings have increased the amount of GHGs in the atmosphere.
- The release of CO_2 from the burning of fossil fuels such as coal and oil are the main contributors to these increased GHGs.
- The summary of findings also confirmed that increases in GHGs tend to warm the planet.

The summary report by the scientists also made several predictions about what could happen in the United States:

- In the Northeast, there is 90 percent likelihood that coastlines will be exposed to coastal erosion.
- In Polar Regions such as Alaska, infrastructure (roads, bridges, etc.) and native ways of life are 80 percent likely to suffer significant harm from the effects of climate change. There is an 80 percent certainty that migratory birds, mammals, and higher predators will suffer significant harm from reductions in glaciers, ice sheets, and sea ice.
- It is 80 percent likely that heat waves in cities such as Chicago will increase in number, intensity, and duration during the course of the century.
- It is 66 percent likely that the Great Plains area will experience more severe summer droughts and a 90 percent likelihood that increased springtime flooding will damage crop yields.
- There is 80 percent certainty that warming in western mountains will lead to decreased snowpack, more winter flooding and reduced summer flows, which would increase competition for water in many western states.

Individualist Narrative

The issue of global climate change has been the subject of debate over the last few decades. Recently, a large group of scientists analyzed all of the existing studies on climate change and summarized these findings in a way that most involved in the debate agree with.

Most agree that the Earth is warming and that over the past one hundred years the average temperature has increased by one to two degrees. During this same time period, human beings have increased the amount of GHGs in the

atmosphere. The release of CO_2 from the burning of fossil fuels such as coal and oil are the main contributors to these increased GHGs. The summary of findings also confirmed that increases in GHGs tend to warm the planet. Few contest these findings.

The summary report by the scientists also made several predictions about what could happen in the United States. Although a bit technical, it is worth looking at some of these predictions:

- In the Northeast, there is 90 percent likelihood that coastlines will be exposed to coastal erosion.
- In Polar Regions such as Alaska, infrastructure (roads, bridges, etc.) and native ways of life are 80 percent likely to suffer significant harm from the effects of climate change. There is an 80 percent certainty that migratory birds, mammals, and higher predators will suffer significant harm from reductions in glaciers, ice sheets, and sea ice.
- It is 80 percent likely that heat waves in cities such as Chicago will increase in number, intensity, and duration during the course of the century.
- It is 66 percent likely that the Great Plains area will experience more severe summer droughts and a 90 percent likelihood that increased springtime flooding will damage crop yields.
- There is 80 percent certainty that warming in western mountains will lead to decreased snowpack, more winter flooding and reduced summer flows, which would increase competition for water in many western states.

As you can see, climate change is real and the potential consequences here in the United States are unsettling. It is also apparent that a reduction in green house gases is necessary. However, despite these potential consequences, real progress in reducing GHG emissions has been made nearly impossible by the efforts of destructive interests.

Government interests, represented by groups such as bureaucratic unions and the infamous Club of Rome, are attempting to use climate change to promote their own agenda. They push for programs that solidify bureaucratic control and increase the size and cost of government. These programs include reliance on unsustainable nuclear energy, restrictive international treaties, and some of the more frightening positions even advocate across the board population control. They argue that due to the size of the problem, only centralized authority can be trusted to solve the problem.

Environmental advocates, represented by organizations such as Ecodefense and the radical Earthfirst, are attempting to use climate change to destroy our capitalist system. These groups demand radical policies that destroy free competition and reduce our individual quality of life. These groups put faith in socialized community-owned energy, invasive consumer laws, and the more dangerous positions advocate isolated "eco-communities," where authority rests in environmental councils. They argue that due to the failure of free markets, only planned communities can be trusted to handle climate change.

It is clear that both big government and radical environmental types are using the facts about climate change to push a destructive agenda that obstructs any meaningful solutions to the problem. To solve this problem, we must invoke the value that has always served humans the best; that value is our historical reliance on free competition. The innovative cap-and-trade solution relies on this value by taking advantage of free competition to generate the cleanest substitutes for coal and oil. Thankfully organizations such as the Cato Institute have been tirelessly advocating for this solution.

The cap-and-trade energy solution drastically reduces the overall amount of GHGs, as businesses are limited by how much they can produce. Each business can buy or trade permits within these emissions limits. So, if a company releases GHGs below what its permits would allow, it may sell or trade its permits to a business that produces more. This solution lets companies that have traditionally produced more GHGs buy from those that produce less. The benefit of the cap-and-trade solution is businesses will have time to adapt to a more climate conscious economy while also competing with companies that find creative ways to cut costs and emissions.

The problem of climate change reminds us all that the world is rapidly changing. When change turns for the worse, it can only get better if we are free to adapt. The cap-and-trade solution provides a clear path for corporations to freely adapt, provide innovative solutions, and solve the problem of global climate change. Radical ideology and more big government are not the answer.

Hierarch Narrative

The issue of global climate change has been the subject of debate over the last few decades. Recently, a large group of scientists analyzed all of the existing studies on climate change and summarized these findings in a way that most involved in the debate agree with.

Most agree that the Earth is warming and that over the past one hundred years the average temperature has increased by one to two degrees. During this same time period, human beings have increased the amount of GHGs in the atmosphere. The release of carbon dioxide from the burning of fossil fuels such as coal and oil are the main contributors to these increased GHGs. The summary of findings also confirmed that increases in GHGs tend to warm the planet. Few contest these findings.

The summary report by the scientists also made several predictions about what could happen in the United States. Although a bit technical, it is worth looking at some of these predictions:

- In the Northeast, there is 90 percent likelihood that coastlines will be exposed to coastal erosion.
- In Polar Regions such as Alaska, infrastructure (roads, bridges, etc.) and native ways of life are 80 percent likely to suffer significant harm from the effects of climate change. There is an 80 percent certainty that migratory

birds, mammals, and higher predators will suffer significant harm from reductions in glaciers, ice sheets, and sea ice.
- It is 80 percent likely that heat waves in cities such as Chicago will increase in number, intensity, and duration during the course of the century.
- It is 66 percent likely that the Great Plains area will experience more severe summer droughts and a 90 percent likelihood that increased springtime flooding will damage crop yields.
- There is 80 percent certainty that warming in western mountains will lead to decreased snowpack, more winter flooding and reduced summer flows, which would increase competition for water in many western states.

As you can see, climate change is real and the potential consequences here in the United States are alarming. It is also evident that a reduction in green house gases is necessary. However, despite these likely consequences, real progress in reducing GHG emissions has been made nearly impossible by the efforts of destructive interests.

Environmental interests, represented by groups such as Ecodefense and the infamous Earthfirst!, are attempting to use climate change to promote their own agenda. They push for programs that ignore scientific evidence and dismiss how truly complex climate change is. These programs include reliance on unproven community-owned energy, ineffective consumer laws, and the more radical stances advocate isolated "eco-communities," where authority rests in environmental councils. They argue that due to the nature of the problem, only isolated communities can be trusted to solve the problem.

Corporate advocates, represented by organizations such as the Wall Street Journal and the radical Cato Institute, are attempting to use climate change to help generate larger profits. These groups demand radical policies that ignore societal responsibility and push pollution and costs onto citizens. They put faith in unregulated corporations, misinformed consumers, and the more dangerous positions advocate cap-and-trade policies that allow industry to sell the right to pollute. They argue that due to the failure of government regulations, only competitive markets can be trusted to handle climate change.

It is clear that both radical environmentalists and free market types are using the facts about climate change to push a destructive agenda that obstructs any meaningful solutions to the problem. To solve this problem we must invoke the value that has always served Americans the best; that value is our historical reliance on scientific expertise. The nuclear power solution relies on this value by taking advantage of scientific expertise to use the cleanest substitute for coal and oil. Thankfully groups such as the Club of Rome have been tirelessly advocating for this solution.

The nuclear energy solution drastically reduces the overall amount of GHGs, as nuclear energy produces none. Nuclear power costs less than coal, wind, or solar. It doesn't need the sun to shine or the wind blowing, so it is also more reliable than wind or solar. Nuclear power plants are also safer than coal for those that both work and live near them. The one drawback to nuclear

power is waste, which is easily dealt with by close monitoring and reprocessing waste into more nuclear energy. The benefits of the nuclear solution are a clean, plentiful, and inexpensive energy source that takes advantage of our greatest scientific accomplishments.

The problem of global climate change reminds us that the world is delicately balanced. When mankind disturbs this balance, we must rely on our expertise to bring things back into order. The nuclear energy solution provides a clear path for governments to reestablish control through expert management and solve the problem of climate change. Radical ideology and more corporate greed are not the answer.

Egalitarian Narrative

The issue of global climate change has been the subject of debate over the last few decades. Recently, a large group of scientists analyzed all of the existing studies on climate change and summarized these findings in a way that most involved in the debate agree with.

Most agree that the Earth is warming and that over the past one hundred years the average temperature has increased by one to two degrees. During this same time period, human beings have increased the amount of GHGs in the atmosphere. The release of carbon dioxide from the burning of fossil fuels such as coal and oil are the main contributors to these increased GHGs. The summary of findings also confirmed that increases in GHGs tend to warm the planet. Few contest these findings.

The summary report by the scientists also made several predictions about what could happen in the United States. Although a bit technical, it is worth looking at some of these predictions:

- In the Northeast, there is 90 percent likelihood that coastlines will be exposed to coastal erosion.
- In Polar Regions such as Alaska, infrastructure (roads, bridges, etc.) and native ways of life are 80 percent likely to suffer significant harm from the effects of climate change. There is an 80 percent certainty that migratory birds, mammals, and higher predators will suffer significant harm from reductions in glaciers, ice sheets, and sea ice.
- It is 80 percent likely that heat waves in cities such as Chicago will increase in number, intensity, and duration during the course of the century.
- It is 66 percent likely that the Great Plains area will experience more severe summer droughts and a 90 percent likelihood that increased springtime flooding will damage crop yields.
- There is 80 percent certainty that warming in western mountains will lead to decreased snowpack, more winter flooding and reduced summer flows, which would increase competition for water in many western states.

As you can see, climate change is real and the potential consequences here in the United States are terrifying. It is also obvious that a reduction in GHGs

is necessary. However, despite these terrifying consequences, real progress in reducing GHG emissions has been made nearly impossible by the efforts of destructive interests.

Government interests, represented by groups like the infamous Club of Rome and selfish politicians, are attempting to use climate change to promote their own agenda. They push for programs that reinforce existing inequalities and increase the wealth and power of politicians. These programs include reliance on unsafe nuclear energy, indulgent international treaties, and some of the more frightening positions even advocate population control for the poor. They argue that due to the complexity of the problem, only specialized experts can be trusted to solve the problem.

Corporate advocates, represented by organizations like the Wall Street Journal and the radical Cato Institute, are attempting to use climate change to exploit people for profit. These groups demand radical policies that destroy local communities and dramatically increase inequality around the globe. They put faith in greedy corporations, ill-informed consumers, and the more dangerous positions advocate cap-and-trade policies that allow industry to sell the right to pollute. They argue that due to the failure of community-level efforts only competitive markets can be trusted to handle climate change.

It is clear that both big government and free market types are using the facts about climate change to push a destructive agenda that obstructs any meaningful solutions to the problem. To solve this problem, we must invoke the value that has always served humanity the best; that value is our historical reliance on equal participation. The community-owned renewables solution relies on this value by taking advantage of equal participation to decentralize the cleanest substitutes for coal and oil. Thankfully groups such as Ecodefense have been tirelessly advocating for this solution.

The community-owned renewable energy solution drastically reduces the overall amount of GHGs, as wind and solar energy produce none. This plan involves local communities purchasing and maintaining their own renewable power. In cooperatively purchasing wind and solar farms, communities seize ownership from the cause of climate change: government and corporate greed. Community-owned renewables have demonstrated three times the job creation and four times the property value increases of their corporate counterparts. Local ownership also strengthens communal bonds as people work together to maintain something in which they all have a stake. The benefits of community-owned renewable energy are clean, plentiful, and inexpensive energy sources that help strengthen communities.

The problem of global climate change reminds us all that the world is fragile. When humanity loses sight of our relationship with nature, the environment will always retaliate for our carelessness. The community-owned renewable energy solution provides a clear path for humanity to correct our reckless behavior and solve the problem of global climate change. Governmental excesses and bottomless corporate greed are not the answer.

Appendix B

OLS Regressions, Fully Specified Narrative Structure Models

Variable	*Personal Risk*	*Sociotropic Risk*	The Cato Institute	Club of Rome	Ecodefense	*Cap and Trade*	*Nuclear Energy*	*Renewable Energy*
Constant	4.787**	4.937**	4.011**	3.443**	6.019**	3.389**	0.164	4.522**
	(0.579)	(0.495)	(0.613)	(0.614)	(0.607)	(0.696)	(0.688)	(0.640)
Age	−0.018**	−0.005	−0.011*	−0.012*	−0.021**	−0.020**	0.014*	−0.001
	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)
Education	0.002	−0.023	0.063	0.081	−0.008	0.072	0.190*	−0.229**
	(0.062)	(0.054)	(0.066)	(0.067)	(0.066)	(0.074)	(0.073)	(0.068)
Gender	−0.625**	−0.597**	0.285	0.047	0.180	−0.140	0.559*	−0.494*
	(0.144)	(0.124)	(0.154)	(0.154)	(0.152)	(0.173)	(0.171)	(0.160)
Income	0.003	−0.024	−0.019	−0.020	−0.009	−0.013	0.039	0.034
	(0.022)	(0.019)	(0.023)	(0.023)	(0.023)	(0.026)	(0.026)	(0.024)
White/Asian	−0.346*	−0.535**	−0.063	−0.194	−0.278	−0.111	0.231	0.235
	(0.159)	(0.137)	(0.168)	(0.168)	(0.166)	(0.192)	(0.190)	(0.176)
Ideology	−0.180**	−0.283**	0.003	−0.038	−0.204**	−0.145*	0.166*	−0.032
	(0.047)	(0.041)	(0.051)	(0.051)	(0.050)	(0.057)	(0.056)	(0.052)
Climate Change Knowledge	0.261**	0.284**	−0.028	−0.069	−0.025	−0.021	0.044	0.065
	(0.040)	(0.034)	(0.042)	(0.042)	(0.042)	(0.048)	(0.048)	(0.045)
Individualism	−0.099**	−0.088**	0.038	0.012	−0.098**	−0.024	0.102**	0.011
	(0.019)	(0.016)	(0.020)	(0.020)	(0.020)	(0.023)	(0.022)	(0.021)
Hierarchy	0.027	0.044	0.056*	0.067*	0.114**	0.092*	0.081**	0.025
	(0.021)	(0.018)	(0.022)	(0.022)	(0.022)	(0.025)	(0.024)	(0.023)
Egalitarianism	0.171**	0.164**	−0.003	0.060**	0.095**	0.140**	0.007	0.114**
	(0.018)	(0.015)	(0.019)	(0.019)	(0.019)	(0.021)	(0.021)	(0.019)

Continued

Appendix B—Continued

Variable	*Personal Risk*	*Sociotropic Risk*	The Cato Institute	Club of Rome	Ecodefense	*Cap and Trade*	*Nuclear Energy*	*Renewable Energy*
Fatalism	−0.029	−0.019	0.039	0.056*	0.014	0.056*	0.024	0.019
	(0.020)	(0.017)	(0.022)	(0.021)	(0.021)	(0.024)	(0.024)	(−0.008)
Individualist narrative	0.005	0.157	0.718*	−1.281**	−1.614**	0.776*	−0.355	−0.056
	(0.192)	(0.165)	(0.220)	(0.222)	(0.214)	(0.229)	(0.227)	(0.211)
Hierarch narrative	0.243	0.262	−1.530**	1.214**	−1.509**	−0.124	−0.211	−0.546*
	(0.197)	(0.169)	(0.223)	(0.230)	(0.220)	(0.234)	(0.232)	(0.216)
Egalitarian narrative	0.322*	−0.015	−1.754**	−1.533**	0.641**	−0.535*	−0.539**	0.366*
	(0.195)	(0.168)	(0.222)	(0.226)	(0.218)	(0.235)	(0.233)	(0.215)
Adj. R^2	0.197	0.265	0.182	0.231	0.258	0.128	0.090	0.057
F-stat	25.161	36.461	18.413	23.483	23.483	14.119	10.026	6.465
n	1,382	1,380	1,092	1,045	1,045	1,248	1,273	1,275

∗ $p < 0.05$, ∗∗$p < 0.01$, *** $p < 0.001$ one-tailed test (std. errors reported in parentheses).

Appendix C

OLS Regressions, Fully Specified Character Models, by Narrative Treatment

TABLE C1

OLS Regression Estimates, Character Affect, and the Individualist Narrative

Variable	*Personal Risk*	*Sociotropic Risk*	*Cap and Trade*	*Nuclear Energy*	*Renewable Energy*
Constant	3.441**	3.112**	0.794	0.006	2.504
	(1.258)	(1.030)	(1.405)	(1.594)	(1.354)
Age	0.000	0.006	−0.004	0.021	0.008
	(0.011)	(0.009)	(0.013)	(0.014)	(0.012)
Education	−0.030	−0.019	0.075	0.030	−0.104
	(0.127)	(0.104)	(0.142)	(0.162)	(0.137)
Gender	−0.639*	−0.475	−0.211	0.282	−0.490
	(0.317)	(0.259)	(0.363)	(0.404)	(0.347)
Income	0.013	−0.016	−0.007	0.045	0.025
	(0.045)	(0.037)	(0.050)	(0.056)	(0.049)
White/Asian	−0.250	−0.528	0.638	0.421	0.423
	(0.359)	(0.293)	(0.408)	(0.459)	(0.391)
Ideology	−0.240*	−0.222**	−0.276*	0.094	−0.136
	(0.104)	(0.085)	(0.116)	(0.131)	(0.111)
Climate Change Knowledge	0.304***	0.310***	0.140	0.002	0.099
	(0.086)	(0.070)	(0.096)	(0.109)	(0.094)
Individualism	−0.174***	−0.120***	0.044	0.128*	0.083
	(0.042)	(0.034)	(0.048)	(0.053)	(0.045)
Hierarchy	0.069	0.097**	0.074	0.106	0.036
	(0.046)	(0.038)	(0.052)	(0.059)	(0.050)
Egalitarianism	0.116**	0.135***	0.039	−0.052	0.028
	(0.039)	(0.032)	(0.044)	(0.050)	(0.042)
Fatalism	−0.038	−0.025	0.044	0.052	−0.038
	(0.043)	(0.035)	(0.048)	(0.054)	(0.046)
Ecodefense	0.088	0.091	0.015	0.010	0.141
	(0.080)	(0.065)	(0.088)	(0.100)	(0.085)
The Club of Rome	0.051	−0.031	0.181*	0.121	0.037
	(0.080)	(0.066)	(0.089)	(0.101)	(0.087)
The Cato Institute	0.214***	0.141**	0.399***	0.010	0.193*
	(0.063)	(0.052)	(0.070)	(0.079)	(0.067)
Adj. R^2	0.248	0.280	0.153	0.067	0.033
F-stat	7.681	8.923	4.417	2.386	1.648
n	284	285	265	269	270

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ one-tailed test (std. errors reported in parentheses).

TABLE C2

OLS Regression Estimates, Character Affect, and the Hierarch Narrative

Variable	*Personal Risk*	*Sociotropic Risk*	*Cap and Trade*	*Nuclear Energy*	*Renewable Energy*
Constant	3.226**	5.241***	0.876	−0.882	2.959
	(1.297)	(1.211)	(1.623)	(1.570)	(1.641)
Age	−0.019	0.002	−0.018	0.002	−0.012
	(0.011)	(0.011)	(0.014)	(0.014)	(0.014)
Education	0.061	0.035	−0.027	0.169	−0.216
	(0.134)	(0.131)	(0.167)	(0.160)	(0.162)
Gender	−0.151	−0.182	0.042	0.203	−0.484
	(0.331)	(0.310)	(0.412)	(0.399)	(0.408)
Income	−0.044	−0.091*	0.055	−0.031	0.044
	(0.048)	(0.045)	(0.062)	(0.059)	(0.059)
White/Asian	0.110	−0.478	−0.977*	0.117	0.024
	(0.340)	(0.317)	(0.429)	(0.413)	(0.419)
Ideology	−0.255*	−0.411***	−0.103	0.030	0.012
	(0.099)	(0.092)	(0.126)	(0.120)	(0.123)
Climate Change Knowledge	0.226*	0.244**	0.150	0.109	0.052
	(0.095)	(0.090)	(0.118)	(0.115)	(0.120)
Individualism	−0.043	−0.059	−0.033	0.109*	0.004
	(0.041)	(0.038)	(0.051)	(0.049)	(0.051)
Hierarchy	0.022	0.003	0.056	0.022	−0.017
	(0.045)	(0.042)	(0.056)	(0.054)	(0.055)
Egalitarianism	0.136***	0.065	0.127**	−0.030	0.044
	(0.036)	(0.033)	(0.045)	(0.043)	(0.046)
Fatalism	0.036	−0.008	0.000	0.014	0.033
	(0.044)	(0.041)	(0.054)	(0.053)	(0.054)
Ecodefense	−0.021	0.135*	0.345***	0.017	0.242***
	(0.071)	(0.066)	(0.088)	(0.085)	(0.087)
The Club of Rome	0.312***	0.295***	0.130	0.451***	0.207*
	(0.065)	(0.061)	(0.080)	(0.079)	(0.081)
The Cato Institute	−0.113	−0.123	0.176	0.204*	0.113
	(0.065)	(0.073)	(0.096)	(0.093)	(0.096)
Adj. R^2	0.228	0.258	0.235	0.155	0.090
F-stat	5.976	6.863	5.861	3.986	2.557
n	236	236	221	228	221

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ one-tailed test (std. errors reported in parentheses).

TABLE C3

OLS Regression Estimates, Character Affect, and the Egalitarian Narrative

Variable	*Personal Risk*	*Sociotropic Risk*	*Cap and Trade*	*Nuclear Energy*	*Renewable Energy*
Constant	2.447*	4.528***	3.451	−1.046	2.813
	(1.188)	(1.088)	(1.760)	(1.780)	(1.477)
Age	−0.023*	−0.015	−0.030*	0.015	0.013
	(0.010)	(0.009)	(0.014)	(0.014)	(0.011)
Education	0.099	0.045	0.017	0.141	−0.230
	(0.115)	(0.107)	(0.168)	(0.162)	(0.138)
Gender	−0.019	−0.375	0.141	0.321	−0.244
	(0.279)	(0.258)	(0.407)	(0.401)	(0.338)
Income	−0.027	−0.028	−0.027	0.071	0.059
	(0.047)	(0.043)	(0.070)	(0.067)	(0.056)
White/Asian	−0.209	−0.599*	0.092	0.302	−0.248
	(0.309)	(0.286)	(0.447)	(0.443)	(0.374)
Ideology	−0.172	−0.230*	−0.199	0.158	−0.020
	(0.097)	(0.090)	(0.145)	(0.141)	(0.118)
Climate Change Knowledge	0.289***	0.273***	−0.077	0.043	0.024
	(0.072)	(0.066)	(0.106)	(0.106)	(0.089)
Individualism	−0.086*	−0.147***	−0.050	0.124*	−0.004
	(0.036)	(0.034)	(0.052)	(0.052)	(0.044)
Hierarchy	−0.019	0.010	0.036	0.060	0.032
	(0.041)	(0.038)	(0.058)	(0.057)	(0.049)
Egalitarianism	0.148***	0.115***	0.141**	0.067	0.115**
	(0.036)	(0.033)	(0.052)	(0.052)	(0.044)
Fatalism	−0.004	0.060	0.096	−0.063	−0.028
	(0.038)	(0.035)	(0.056)	(0.055)	(0.047)
Ecodefense	0.412***	0.283***	0.088	0.009	0.361***
	(0.061)	(0.056)	(0.087)	(0.087)	(0.072)
The Club of Rome	0.006	−0.011	0.108	−0.096	0.065
	(0.079)	(0.072)	(0.111)	(0.112)	(0.094)
The Cato Institute	0.009	−0.030	0.072	0.305**	−0.051
	(0.080)	(0.074)	(0.114)	(0.114)	(0.096)
Adj. R^2	0.438	0.473	0.171	0.103	0.198
F-stat	15.071	17.159	4.437	2.938	5.187
n	253	252	233	236	238

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ one-tailed test (std. errors reported in parentheses).