

MESSAGES OF CHANGE: USING SYSTEM CONFIDENCE TO IMPROVE
CONSERVATIVES' INTENTIONS TO MITIGATE CLIMATE CHANGE

by
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Abstract

In the United States, belief in climate change and its anthropogenic origin are still debated by politicians, voters, and citizens alike. These debates have caused delays in action, which becomes increasingly dangerous as climate change becomes a more severe threat. In order to address this skepticism and increase acceptance of climate change messages, we turned to the theory of system confidence. System confidence describes the process through which an individual depends on external systems, such as the economic or social system in which they live, to understand and cope with psychological disturbances. This can cause those with high levels of system confidence in the United States' current status quo to mentally shut out messages about climate change, which is often perceived to a threat to the American way of life. Some individuals – in the United States, it is typically conservative Republicans – that have higher amounts of system confidence are more likely to be climate change skeptics. We assert that one technique that could be used to increase acceptance of climate change messages – especially those held by conservative individuals – is to frame messages in a way that aligns solutions to climate change and preservation of the U.S. status quo.

To better understand how this system-oriented frame can change climate change beliefs and mitigation behavioral intentions, we designed a five condition survey and distributed it online to U.S. adults (n = 448). We found that levels of belief in climate change were wholly unchanged by any of our five conditions. However, the use of a system-oriented frame, particularly one that did not use the term “climate change” directly, increased extreme conservatives' mitigation behavioral intentions. We also found that, to a lesser extent, a frame that included the term “climate change” and instead emphasized protecting the well-being of future generations also increased conservative individuals' intentions to act. These findings suggest that while conservatives are very likely to continue to identify as skeptical of climate change, they may be more willing to act in ways to mitigate it if the message is framed in a way that aligns with their other worldviews.

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1. Introduction

In the United States, the existence of climate change is still debated by politicians, voters, and citizens. While approximately 70% of the American population believes that global warming is happening, only 53% attributes it to human activities (Marlon et. al., 2017). These doubts have caused delays in action, which becomes increasingly dangerous as climate change becomes a more severe situation (IPCC, 2014). Warming temperatures could cause strange and potentially disastrous phenomena: e.g., change in patterns of precipitation, sea and glacial ice melt, sea level rise, and global and regional temperature increases (IPCC, 2014). These phenomena could lead to mass extinction, negative impacts on human health, drought, and famine (IPCC, 2014). Sea level rise in particular will displace millions of people worldwide, including many of those in the United States (IPCC, 2014).

To avoid these threats, it is imperative that we reduce levels of climate change skepticism and promote action against climate change. In the United States, the debate around the existence of climate change is highly politicized (Dunlap, 2013). This politicization causes inaction at the systemic level, as political candidates refuse to take action that may work against their political agenda (Dunlap, 2013). This politicization also perpetuates harmful stereotypes that present barriers at the individual level by tying conservative ideology to climate change disbelief (Dunlap, 2013; Unsworth & Fielding, 2014). While conservatives are more likely to be skeptical of climate change, it is now true that a minority of conservatives remain skeptical (Marlon et. al., 2017). Individuals who communicate climate change messages must move past techniques that have shown to be ineffective.

For example, campaigns that simply provide details about what climate change is (information-only campaigns) do not persuade people to believe in climate change (Whitmarsh, 2011). Though temptingly easy to execute, information-only campaigns have proved to be ineffective because communicators need to differentiate messages according to diverse values (Whitmarsh, 2011). There has been a plethora of work linking skepticism and worldviews (Feygina et. al., 2009; Graham et. al., 2009; McCright et. al. 2016; Morton et. al., 2011; Nisbet, 2009). Some of this work has based its origins in moral foundations theory, which asserts that interventions that appeal to keeping America's natural resources "pure" could impact levels of belief in conservatives (Graham et. al., 2009). Other work that attributes the spread of misinformation to climate change skepticism asserts that reinforcing scientific consensus could alleviate some skepticism (Dunlap, 2013).

We therefore need to identify who is skeptical of climate change in the United States. In the United States, climate change skeptics tend to be male, white, Republican and live outside of cities, whereas believers tend to be Democrats, live in more urban areas, and come from many demographic backgrounds (Center for Research on Environmental Decisions, 2009; Marlon et. al., 2017). Given the differences between these groups—both demographically and in terms of values—communicators must use different tools to reach out to each of them (Center for Research on Environmental Decisions, 2009; Whitmarsh, 2011).

1.1 Motivated Reasoning and System Confidence

One of the main drivers of climate skepticism is motivated reasoning (Campbell & Kay, 2014; Leiserowitz et. al., 2013). Motivated reasoning is a theory which proposes that all individuals are influenced by internal biases when perceiving the world and making decisions, even if those biases contradict factual information (Kahan, 2013). More specifically, through motivated reasoning an individual will tend to endorse a conclusion they would prefer to hear because it remains consistent with their personal beliefs and perceptions. These individuals will also tend to ignore or discount information which contradict with their worldview (Kahan, 2013).

Similar to motivated reasoning, system confidence (also known as system justification) is a theory that describes the process through which an individual depends on external systems, such as the economic or social system in which they live, to understand and cope with psychological disturbances (Shepherd & Kay, 2012). For instance, a person may mentally cope with the threat of an impending economic crisis by knowing that the government and U.S. economic system are set up in a way that will protect the status quo. The U.S. social system, while defined differently from person to person, generally comprises of ideals around the economy, government, and legal process. For example, the Constitution, Declaration of Independence, and Bill of Rights comprise many of America's core ideals, and supporting these ideals is considered patriotic. In cases where individuals feel like they lack enough information, they rely greater on their social system and have increased trust in their government (Shepherd & Kay, 2012). These individuals tend to reject information that poses a legitimate threat to their social system (Shepherd & Kay, 2012).

When paired together, motivated reasoning and system confidence present a particularly challenging dilemma for climate change beliefs and communication. That is because much of the way the U.S. social system operates devastates the natural world. Modernity and industrialization are closely linked to environmental degradation (Dunlap & Jorgenson, 2012), loss of biodiversity (Mikkelsen et. al., 2007), and increased atmospheric concentrations of greenhouse gases (IPCC, 2014). Specifically, countries that practice capitalism often suffer from increased levels of natural resource consumption and environmental destruction (Klein, 2014). The U.S. suffers from many of these destructive modern practices, from overconsumption of resources to pollution, which comprises major parts of the U.S. status quo. For those that have high levels of system confidence, the kind of drastic change to the status quo required to reverse the damage done to the environment may threaten their belief that the U.S. social system can withstand disastrous situations and protect their way of life. Paired with motivated reasoning, the suggestion of this change can cause those with high levels of system confidence in the American social system and its current status quo to voluntarily ignore or deny messages about climate change (Feygina et. al., 2009; Shepherd & Kay, 2012).

1.2 System Confidence, Conservative Ideology, and Climate Change Skepticism in America

In the U.S., conservative Republicans are more likely to have higher amounts of system confidence (Feygina et. al., 2009; Shepherd & Kay, 2012; van der Toorn & Jost, 2014). High levels of system confidence can account for a significant variance in climate change attitudes based on political ideology (Feygina et. al., 2009). Because of this, we believe that appealing to

system confidence within conservative individuals can increase climate change message acceptance.

We must, then, find a way to communicate and provide messages about climate change in a way that positively, and successfully, engages conservative and system-justifying audiences. One such technique is to frame messages in a way that aligns solutions to climate change with preservation of the U.S. economic and social system (Feygina et. al., 2009; McCright et. al. 2016; Morton et. al., 2011; Nisbet, 2009). By promoting climate-change fighting actions as patriotic (for example, “preserving the American way of life”), it may be possible to help convey the importance of taking action against climate change. This kind of messaging appeals to typical conservative worldviews with respect to the economy, patriotism, and the American way of life, thus increasing the chances of accepting the proposed message (Feygina et. al., 2009). Accepting this message could lead to a change in beliefs, behaviors, or ideals to a more pro-environmental viewpoint (Feygina et. al., 2009; Gifford, 2011; Shepherd & Kay, 2012; van der Toorn & Jost, 2014).

However, the extent to which the kind of patriotic frame described above is effective for *changing* beliefs in American conservatives has not been as thoroughly examined. This has provided us with an opportunity to gain a better understanding of the impacts that system-affirming framing can have. With this in mind, we determined our first hypothesis:

H_{1a}: Being exposed to a message frame regarding climate change’s potential impact to the current American societal structure will increase levels of climate change belief.

We predict that this effect will be greater in conservatives rather than liberals because many liberals believe in climate change and have lower levels of system confidence and are therefore less likely to be persuaded by a message that appeals to system confidence (Center for Research on Environmental Decisions, 2009; Feygina et. al., 2009).

H_{1b}: A system-oriented framed message will increase levels of climate change belief in conservative Americans more so than in liberal Americans.

1.3 Climate Change Skepticism, Pro-Environmental Behavior, and Solution Aversion

Reminding skeptical individuals of their political identity can make them less receptive to pro-environmental and climate change messaging (Unsworth & Fielding, 2014). By the nature of this experiment, we will be reminding individuals of their political identity and of their place in the U.S. economic and social systems. By aligning our message frames on climate change action and preservation of the American social system, we predict that our system-oriented messages will subvert this challenge.

However, in the United States, being a climate change skeptic tends to be perceived as being a part of being a typical conservative individual (Dunlap, 2013; Hobson & Neimeyer, 2013). Previous studies have found that traits and beliefs of a larger social group can be more important to an individual than aspects of their own personal identity (Onorato & Turner, 2004). Therefore, self-identifying as a climate change skeptic may be more important than actually being skeptical of climate change (Hobson & Neimeyer, 2013; Prati et. al., 2015). This may result in no change

in self-reported scores for levels of belief, even if our experimental conditions did have some impact on their beliefs or behavioral intentions.

Another contributing factor to a conservative's unwillingness to accept climate change messaging may be solution aversion. Solution aversion posits that when some individuals are averse to a proposed solution to a problem, they are more likely to reject the very existence of the problem in order to avoid the solution. Solution aversion has been used to show that individuals such as Republicans and political conservatives in America are not necessarily opposed to believe in climate change as a phenomenon, but instead are more resistant to the commonly proposed solutions to climate change mitigation (Campbell & Kay, 2014). Many of these typical solutions include increased government regulations, particularly on the private sector, and more taxes – such as a tax on carbon emissions (Andrew et. al., 2010). Increased government involvement in the affairs of the private sector directly conflicts with an essential principle of most conservatives in America, who often promote a free market above most other political priorities (Lewandowsky et. al., 2013). Solution aversion, in part, motivates political conservatives who endorse free market ideology to deny the existence of climate change (Campbell & Kay, 2014; Lewandowsky et. al., 2013).

We believe that either or both of these theories could present a barrier to changing self-reported levels of belief. To account for that, we posited a second research question that looks instead at intentions to adopt climate change mitigation behaviors. We chose intentions related to climate change mitigation behavior as our second variable of interest because it is not always the case that belief in climate change is necessary to act in pro-environmental, climate change mitigating ways (Hobson & Neimeyer, 2013; Prati et. al., 2015). For example, some skeptics do not deny climate change completely, but rather believe that it could potentially be a threat in the far-off future. These skeptics can be receptive to conversations about shifting major energy sources to renewables (Hobson & Neimeyer, 2013). Other works have shown that individuals with at least some history of pro-environmental behavior could be opening to adopting future pro-environmental behaviors, including some climate change mitigation behaviors (Prati et. al., 2015). Given that individuals may not need to believe in climate change to behave in a pro-environmental, climate change mitigating way, our second research question is as follows:

H_{2a}: Being exposed to a message frame regarding the potential impact of climate change on the current American societal structure will increase intentions to mitigate climate change.

We predict that this effect will be greater in conservatives rather than liberals because liberals tend to have lower levels of system confidence (Feygina et. al., 2009; van der Toorn & Jost, 2014). In addition, we believe by utilizing conservatives' feelings of confidence in the U.S social and economic systems, we may be able to overcome their feelings of solution aversion.

H_{2b}: A system-oriented framed message will increase levels of pro-environmental behavioral intentions in conservative Americans more so than in liberal Americans.

1.4 The present study

We created an online survey that exposed participants to one of five vignettes. These vignettes, apart from the control, were either framed in a system- or self-oriented way. In addition, we

tested whether the use of the term “climate change” would increase levels of belief or behavioral intentions. By testing the system confidence frame in this way, we are able to determine the effect of framing on the levels of climate change belief and pro-environmental behavioral intentions among participants. If effective, this kind of framing could be considered for use by scientific communicators who wish to reach skeptical or hesitant audiences.

2. Methods

2.1. Participants

Participants for this study were recruited via Amazon’s Mechanical Turk (MTurk). A total of 626 individuals who participated in the survey; 178 participants (28.4%) were removed for either failing the attention checks,¹ completing the survey in less than six minutes, or spending less than five seconds reading the treatment vignette. Pilot testing determined that the survey could not be completed with complete comprehension of the messages in less than six minutes. Participants who were removed from the dataset tended to be male, younger, and have a slightly higher level of education compared to those who were not eliminated. Of the remaining 448 participants, 44.4% were male, 55.6% were female, and < 0.01% answered other ($n = 1$). The ages of participants ranged from 19 to 80 ($mean = 37.90$, $SD = 11.73$). The mean education level was “associate degree/some college.” The mean income was between \$25,000 and \$50,000.

2.2. Procedure

Upon starting the survey, all participants read one paragraph about system confidence as previously used in Feygina et. al. (2009), with minor grammatical edits. Each participant was then randomly assigned to read one of five vignettes, one of which was a control. All written materials presented to participants is available in Appendix A. For the control vignette, each participant simply read a paragraph stating how scientists were investigating environmental issues. Each treatment vignette provided the participant with an additional statement composed of two components: a context and an orientation. The orientations framed the message in a self-oriented way or a system-oriented way, while the context used the words “climate change” or excluded that phrasing, instead using the word “environment.”

¹ There were four reverse-coded questions that served as attention checks within the survey. For example, in a scale measuring individuals’ feelings about the effect and efficacy of “green” solutions and policy, a reverse-coded attention check read “Environmentalism harms our societies and institutions.”

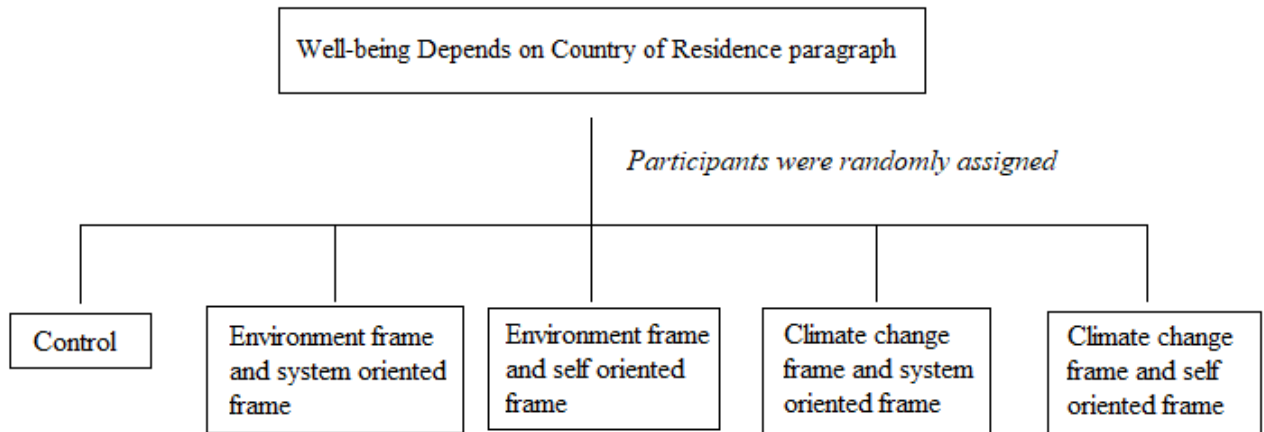


Figure 1: Experimental design

Table 1: Components of each vignette's frame.

Frames:	System-oriented frame	Self-oriented frame	
Environmental frame	(1) Environmental, system-oriented frame	(2) Environmental, self-oriented frame (asserts being pro-environmental allows us to protect the health and well-being of individuals, families, and communities)	(5) Control (researchers are looking into the relationship between the environment and people)
Climate change frame	(3) climate change, system oriented frame (addressing climate change is patriotic and preserves the American way of life)	(4) climate change, self-oriented frame (addressing climate change allows us to protect the health and well-being of individuals, families, and communities)	

After reading these vignettes, the participants completed the survey. A forced-response format was used, although participants were made aware that they could exit the survey at any time. Participants were compensated \$1.00 for their time.

While there were ten outcome variables measured in this survey, only four are of interest to the present study: political ideology, system confidence, belief in climate change, and an index of behavioral intention. These are described below:

Political ideology. Political ideology was measured on a self-reported 7-point Likert scale from 1 = “*extremely liberal*” to 7 = “*extremely conservative*” ($M = 3.93$, $SD = 1.85$).

System Confidence. Participants answered questions created for this survey measuring their levels of system confidence on a 7-point Likert scale from 1 = “*strongly disagree*” to 7 = “*strongly agree*.” These eight items were: (1) American society can easily handle changes and challenges, (2) Everyone is treated with respect and dignity in America, (3) America is the leader of global economic and industrial development, (4) The American economy provides everyone with opportunity to succeed, (5) America is the most politically powerful country in the world, (6) The American political system is fair, just, and equitable to all citizens, (7) American history is characterized by stability, peace, and prosperity, and (8) America provides people with a safe, stable, and secure place to live. The responses to these questions were used to create an index of behavioral intentions ($M = 4.27$, $SD = 1.20$). Cronbach’s alpha ($\alpha = 0.89$) indicated that the measure had good internal reliability.

Belief in climate change. Participants were asked “Do you think climate change is happening or not?” To answer this question, participants were given a sliding bar that ranged from -5: “*I’m certain that climate change is not happening*” to 5: “*I’m certain that climate change is happening*” ($M = 2.78$, $SD = 2.79$).

Behavioral Intentions Index. Participants were asked a series of eight behavioral intention questions on a 7-point Likert scale from 1 = “*strongly disagree*” to 7 = “*strongly agree*.” These eight items were chosen because they shared similar framing and focused on climate change mitigation behaviors, rather than adaptation behaviors. These eight items were as follows: I intend to... (1) increase how much of my waste I reuse, recycle and compost, (2) conserve electricity by turning off lights and electronics when not in use, taking shorter showers, and/or doing laundry with cooler water, (3) significantly cut down on driving by walking, biking, and/or using public transit, (4) purchase food and consumer products that are environmentally sustainable, (5) lobby my congressional representatives to address climate change, (6) join or provide financial support to organizations that are working on solutions to climate change, (7) actively rally for policies that are good for the environment, and (8) push for greater governmental regulation of environmentally harmful industry practices. The responses to these questions were used to create an index of behavioral intentions ($M = 4.25$, $SD = 1.33$, $\alpha = 0.90$).

2.3 Analysis

Data were analyzed using OLS regressions through the Stata statistical software (version 15.0).

3. Results

3.1 System confidence and ideology

A correlation confirmed a positive relationship between political ideology and the system confidence index, $r(442) = 0.46$, $p < .001$, replicating previous literature finding that conservatives tend to score higher on system confidence scales (Feygina et. al., 2009; Shepherd & Kay, 2012).

Next, we ran two hierarchical linear regressions, controlling for gender and education level, to understand the overall impact each of our conditions had on levels of climate change belief (H_1) and our climate change mitigation behavioral intentions index (H_2).

3.2 H_{1a} and H_{1b} : Condition impacts on belief in climate change

The full results of the regression between believe in climate change and ideology can be found below in Table 2. Belief in climate change was not significantly changed by any of our five conditions, including the control condition, even when testing for an interaction with ideology. Thus, we did not find evidence to support H_{1a} or H_{1b} .

Replicating previous studies, ideology was found to predict climate change belief ($B = -0.84$, $t(442) = -6.69$, $p < .000$). More conservative scores correlated with having a lower belief in climate change.

3.3 H_{2a} and H_{2b} : Condition impacts on climate change mitigation behavioral intentions

We then ran a regression examining how our conditions impacted climate change mitigation behavioral intentions (H_{2a}) by ideology (H_{2b}), again controlling for both gender and education. The full results of this regression can be found below in Table 3. Behavioral intentions were not influenced by any of our five conditions. On aggregate, behavior intentions were not influenced by any of our five conditions (failing to support H_{2a}).

Again, replicating previous literature, ideology by itself was found to predict behavioral intentions for individuals who considered themselves somewhat conservative ($B = -0.43$, $t(442) = -6.84$, $p < .000$). More conservative scores correlated with having less intention to change behavior.

The interaction of ideology and experimental condition on behavioral intentions was significant. Supporting H_{2b} , the environment, system-oriented frame was found to significantly increase behavioral intentions ($B = 0.29$, $t(442) = 3.046$, $p < .002$). In addition, the climate change, self-oriented frame was also found to significantly increase behavioral intentions to a lesser degree ($B = -0.19$, $t(442) = 1.98$, $p < .05$).

Table 2. Full regression results for self-reported levels of belief. Baseline for condition main effects is with respect to the control. $n = 443$. $p < .05^*$, $p < .01^{**}$, $p < .001^{***}$

Variable Category Variable	Predictions of levels of belief				
	Coeff.	SE	<i>t</i>	95% Confidence Interval	
Lower				Upper	
Condition Main Effects					
Environmental, system-oriented	-0.06	0.83	-0.07	-1.70	1.58
Environmental, self-oriented	0.13	0.78	0.16	-1.40	1.66
Climate change, system-oriented	0.65	0.84	0.77	-1.00	2.30
Climate change, self-oriented	-0.76	0.82	-0.92	-2.36	0.85
Ideology Main Effects	-0.84	0.13	-6.69***	-1.08	-0.59
Condition x Ideology Interaction Effects					
Environmental, System-Oriented Frame	0.10	0.19	0.53	-0.27	0.47
Environmental, Self-Oriented Frame	-0.10	0.18	-0.58	-0.46	0.25
Climate change, System-Oriented Frame	-0.12	0.19	-0.66	-0.49	0.24
Climate change, Self-Oriented Frame	0.21	0.19	1.08	-0.17	0.59
R ²	0.29				
F(11, 431)	17.74				
P > F	0.000				

Table 3. Full regression results for Climate Change Mitigation Behavioral Intentions Baseline for condition main effects is with respect to the control. $n = 443$. $p < .05^*$, $p < .01^{**}$, $p < .001^{***}$

Variable Category Variable	Predictions of levels of belief				
	Coeff.	SE	t	95% Confidence Interval	
Lower				Upper	
Condition Main Effects					
Environmental, system-oriented	-0.89	0.42	-2.14	-1.71	-0.75
Environmental, self-oriented	-0.45	0.39	-1.16	-1.21	0.31
Climate change, system-oriented	0.10	0.42	0.24	-0.72	0.93
Climate change, self-oriented	-0.44	0.41	-1.09	-1.24	0.36
Ideology Main Effects	-0.43	0.06	-6.84***	-0.55	-0.30
Condition x Ideology Interaction Effects					
Environmental, System-Oriented Frame	0.29	0.09	3.06**	0.10	0.47
Environmental, Self-Oriented Frame	0.12	0.09	1.35	-0.06	0.30
Climate change, System-Oriented Frame	-0.00	0.09	-0.03	-0.19	0.18
Climate change, Self-Oriented Frame	0.19	0.10	1.98*	0.00	0.38
R ²	0.22				
F(11, 431)	12.09				
P > F	0.000				

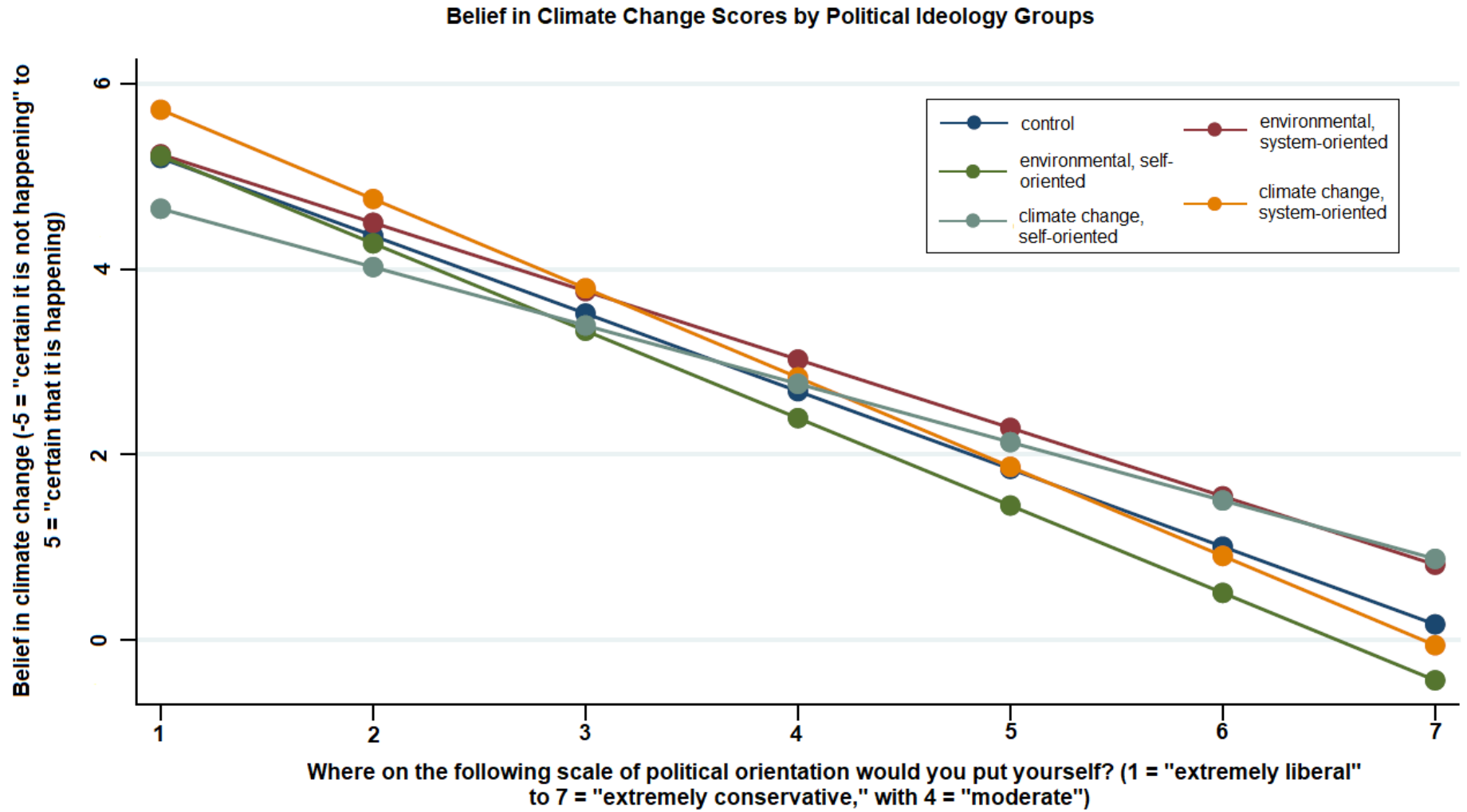


Figure 2: Belief in Climate Change Scores by Political Ideology Groups. $n = 443$.

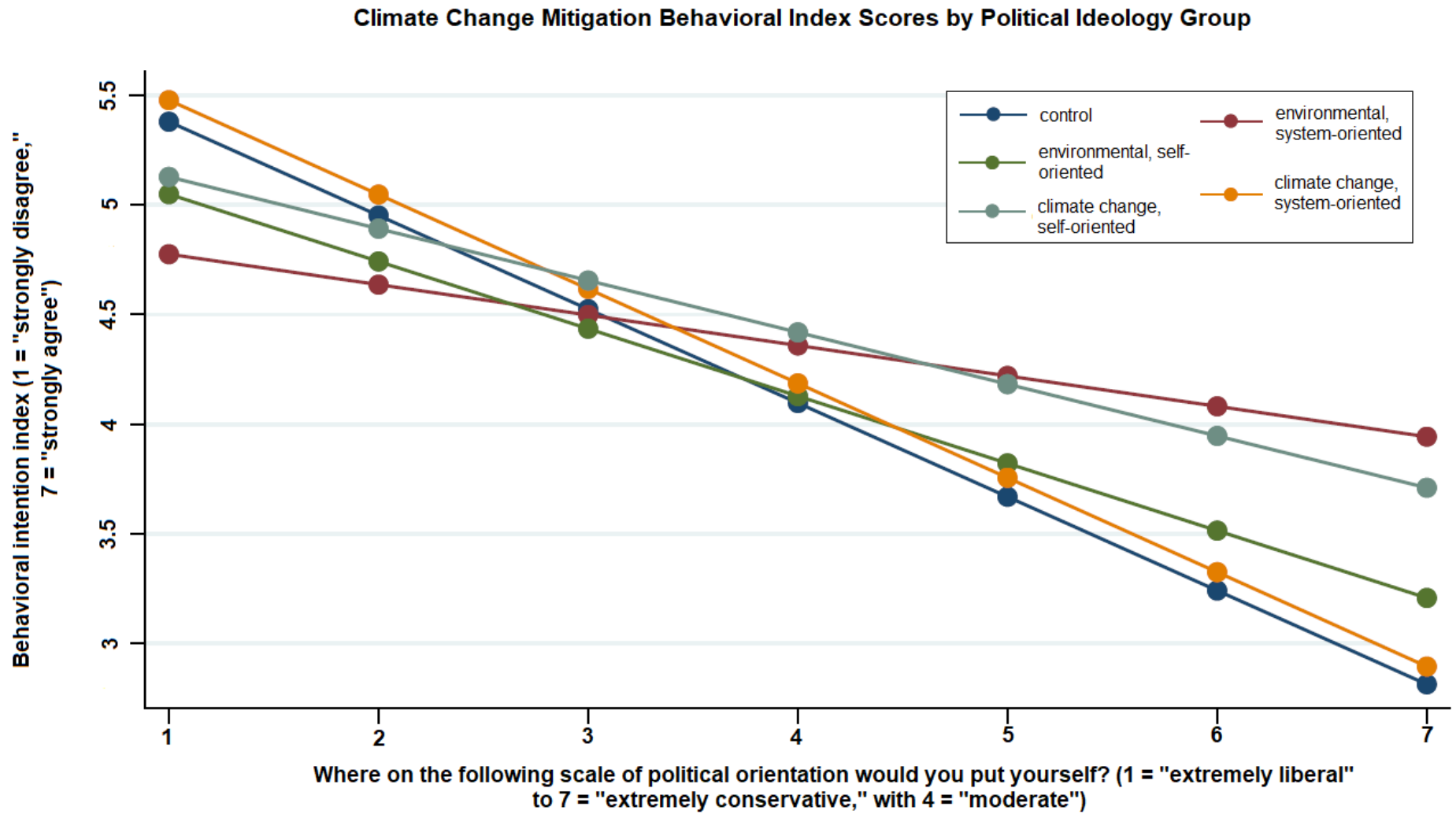


Figure 3: Climate Change Mitigation Behavioral Index Scores by Political Ideology Group. $n = 443$.

4. Discussion

We found that the environmental, system-oriented frame can increase climate change mitigation behavioral intentions among those with more conservative ideologies. To a lesser degree, our climate change, self-oriented frame was also successful at increasing behavioral intentions amongst conservatives. However, we did not find any evidence that a system-oriented message can influence belief in climate change. The implications of these findings are discussed below.

4.1 Beliefs may be closely tied to social identity

For all five of our conditions, belief in climate change was not significantly changed for any political ideology. Liberals, who tend to believe in the existence of climate change, exhibited low levels of system confidence. It is therefore unsurprising that our frame of interest, which focused on appealing to system confidence, had little impact on their beliefs. While the conservatives in our study scored higher on the system confidence scale, our results did not provide support for H_{1a} and H_{1b}: a system-oriented framed message will increase levels of climate change belief in conservative Americans. This result is not in line with a previous finding that high levels of system confidence accounted for a significant variance in climate change attitudes based on political ideology (Feygina et. al., 2009). Though the small sample size of this study may have contributed to this, we believe that since the debates around climate change have become increasingly polarizing in recent years, the polarization may have also contributed to this difference.

Today, the identity of being a climate change skeptic is closely tied with that of being a political conservative in America (Dunlap, 2013; Fielding & Hornsey, 2016; Hobson & Neimeyer, 2013). In fact, previous studies have found that even if individuals act in less skeptical ways – such as adopting new pro-environmental behaviors in light of information about climate change – conservatives may still self-identify as a climate change skeptic (Hobson & Neimeyer, 2013). In addition, for some conservatives, traits attributed to their social group are more important to their sense of self than individual characteristics they have themselves (Onorato & Turner, 2004). It is possible that due to the politicization of climate change, the stereotypical association between being a “climate change skeptic” and “political conservative” is a belief held strongly by conservative individuals (Dunlap, 2013; Fielding & Hornsey, 2016; Hobson & Neimeyer, 2013). This may cause individuals who identify as a climate change skeptic to feel as if it is ingrained into their conservative identity (Dunlap, 2013; Fielding & Hornsey, 2016; Hobson & Neimeyer, 2013). This would make it difficult to change their self-reported levels of belief, as it is skepticism motivated separately from their personal beliefs.

The present study did not account for how important an individual’s social identity could be to their sense of self. It is our recommendation that future studies trying to increase conservatives’ belief in climate change take the strength of social identity into consideration. It may be beneficial to attempt and dispel the stereotypical association between climate change skepticism and conservative ideology. Because skeptics are actually in the minority (in 2016, 50% of Republicans reported believing in global warming, 20% were unsure, and only 30% reported not

believing in global warming (Marlon et. al., 2017)), future studies may be able to test if it is effective, or even possible, to disassociate climate change skepticism and conservative ideology.

4.2 Environmental, system-oriented message frames increase conservatives' behavioral intentions

Throughout most of the range of self-reported political ideologies, our five conditions did not result in a difference in intentions related to climate change mitigation behaviors. However, for individuals with more conservative ideology, climate change mitigation behavioral intentions significantly increased after reading the environmental, system-oriented condition. In addition, within our sample, self-reporting as conservative correlated with having more intense feelings of system confidence. The presence of increased behavioral intentions for more conservative Americans provides support for H₂: a system-oriented frame message increased levels of pro-environmental behavioral intentions in conservative Americans more so than in liberal Americans. This finding supports and expands upon the initial findings in Feygina et. al. (2009), in which they found those with high levels of system justification were more willing to act in more pro-environmental ways after exposure to a system-oriented message.

By appealing to conservative individuals' confidence in the U.S social system and introducing them to a message that aligns taking pro-environmental action against climate change and preserving the American way of life, we were able to increase climate change mitigation behavioral intentions. We believe this given that typically, one of the main drivers of climate change skepticism is motivated reasoning (Campbell & Kay, 2014; Leiserowitz et. al., 2013). It has also been shown that conservatives, who tend to have high levels of system confidence, are often skeptical of climate change because of the threat it poses to the U.S. social and economic systems (Feygina et. al., 2009; Shepherd & Kay, 2012; van der Toorn & Jost, 2014). These conservatives who have high levels of system confidence may be motivated to ignore or reject most messages about climate change (Feygina et. al., 2009; Shepherd & Kay, 2012; van der Toorn & Jost, 2014). Though motivated reasoning and high levels of system confidence have previously been considered barriers to promoting action on climate change, we were able to avoid these barriers and increase behavioral intentions amongst conservatives.

The environmental, system-oriented frame reinforced the idea that taking action on climate change could help preserve the American way of life. This increased message acceptance. We know that a barrier to climate change action and belief, solution aversion, has shown that conservatives tend to be typically averse to proposed solutions to climate change (Campbell & Kay, 2014). The eight items that were included in our behavioral intentions index were mainly framed around individual behavioral intentions, such as the conservation of energy and water (see Behavioral Intentions Index included in the Methods for a full list of items included in the scale). Only one of these items referred to encouraging greater governmental regulation of environmentally harmful practices. By first increasing motivation to accept messages about climate change action with our environmental, system-oriented condition, and then proposing actions that can mitigate climate change that are mostly unrelated to increased government regulations, we were able to encourage behaviors that do not cause conservatives to become adverse to climate change mitigation.

We also believe our results give us an avenue to approach climate change communication even with the current polarized political climate within the U.S. Another important aspect of solution aversion is that conservatives are more likely to think about government policy implications while viewing climate change messaging, even if that messaging does not include information about policy implications (Campbell & Kay, 2014). In addition, conservatives are more likely to reject climate change messaging when reminded of their political orientation (Unsworth & Fielding, 2014). So, when conservatives view messages about climate change, they are reminded of their political orientation, and therefore more likely to reject the message.

How, then, can we depoliticize climate change messaging and calls for action against climate change? With the current American political climate, it may not be possible quite yet. However, our messages that appealed to system confidence may have reminded conservative individuals of their political ideology. Instead of trying to depoliticize our message about climate change, we were able to highlight how taking action to mitigate climate change can align with conservative beliefs and values. Indeed, we found that our environmental, system-oriented frame message significantly increased extremely conservative individuals' behavioral intentions.

4.3 Climate change, self-oriented message frames can increase conservatives' behavioral intentions

A second condition that was successful, though less so than our environmental, system-oriented framed message, at increasing climate change mitigation behavioral intentions amongst more conservative ideologies was the climate change, self-oriented framed condition. Though not the focus of our study, we believe it is important to elaborate as to why this message may have influenced our participants in a similar way as our system-oriented message. One explanation may have to do with psychological distance.

By its nature, climate change is a phenomenon whose impacts will be severe and long lasting, over a great period of time. This is particularly true for those in developed countries, such as the U.S., whose infrastructure and geography will cause most consequences of climate change to emerge in the coming years and decades (McDonald et. al., 2015; Weber, 2006). These consequences, such as increased extreme weather events, are on a severe time lag from the actions that caused them, such as greenhouse gas emissions (IPCC, 2014; McDonald et. al., 2015). This time lag makes it difficult for most people to associate their daily actions that contribute to the severity of climate change with its consequences (McDonald et. al., 2015; Weber, 2006). In addition, many common images and messages about climate change depict it happening to places outside of the U.S., like arctic ice melt, rainforest deforestation, and island nations being in danger of sea level rise (McDonald et. al, 2015; Weber, 2006). Therefore, it has been determined that climate change and its consequences seem “far away” to people when imagining it – both because of the time lag and association with climate change impacting others more than the U.S – meaning it has a high feeling of psychological distance (McDonald et. al., 2015; Weber, 2006).

This psychological distance has historically been a difficult barrier to overcome when trying to increase individuals and institutional action against climate change (McDonald et. al., 2015; Weber, 2006). In particular, political conservatives tend to feel like climate change is “further

away” than liberals (Myers, et. al., 2012). Conservatives are more likely to change their intention to act when provided with messages that can successfully decrease psychological distance (Myers, et. al., 2012). Our climate change, self-oriented frame highlighted preserving the health and well-being of individuals, communities, and future generations (see Appendix A for the full treatment statement). This frame successfully decreased psychological distance, and therefore increased participants in our study with more conservative ideology intentions to act.

In the past, messages that have tried to decrease this feeling of psychological distance have had to be careful of not inciting feelings of fear, which has been shown to cause psychological reactance, which ultimately makes individuals less likely to act (McDonald et. al., 2015; Weber, 2006). We focused on how taking action against climate change is able to successfully preserve the well-being of individuals and future generations, rather than framing it in a way that emphasizes how they are at risk, we were able to minimize the amount of fear an individual may feel. Instead, we focused on the potential efficacy of climate change mitigation action. Focusing on efficacious messages can improve individuals willingness to act (McDonald et. al., 2015; Myers et. al., 2012).

Therefore, though it contrasts with our environmental, system-oriented frame, the climate change, self-oriented frame was successful in its own way. By decreasing feelings of psychological distance that is typically held by conservative individuals, the climate change, self-oriented frame was able to increase climate change mitigation behavioral intentions.

4.4 System confidence compared to other climate change communication frames

Though we have shown that system confidence messaging can be effective to motivate behavioral change on its own, we believe that there additional messaging techniques that could be used in partner with system confidence to further increase message acceptance. A communicator who wishes to make one message especially effective may want to consider using more than one frame, or combining a couple frames, in order to make their message appealing to as many audiences as possible. Here, we propose two frames to partner with messages including system confidence.

Another common frame proposed to address climate change skepticism is rooted in the moral foundations theory, which posits that individuals see the world through the values they hold closest. The moral foundations theory establishes five core categories of human morality: harm/care, fairness/reciprocity, ingroup/loyalty, authority/respect, and purity/sanctity (Graham et. al., 2009; Haidt & Joseph, 2004). Harm/care and fairness/reciprocity refer to the context in which we care about the care and protection of other people, while making sure that they are treated fairly and justly (Haidt & Joseph, 2004). Ingroup/loyalty often pairs with authority/respect, as both refer to maintaining group loyalty and hierarchy (Haidt & Joseph, 2004). Purity/sanctity refers to the adverse reaction to the degradation of something that someone may consider natural and perfect (Haidt & Joseph, 2004). With respect to the American social system, liberals typically put the most weight in harm/care and authority/respect, while conservatives put more emphasis on the remaining three categories (Graham et. al., 2009). It is often posited that appealing to these three categories, specifically purity/sanctity, can increase conservative engagement with climate change (Feinberg & Willer, 2012). It would be possible to

consider the use of these frames when designing a message or intervention that is system-oriented, potentially heightening the impacts of the message. For example, pairing the results of Feinberg & Willer (2012) with a system confidence message may result in a message that describes pollution and environmental degradation that has happened in the United States, and how we can preserve the country's beauty by acting in pro-environmental ways.

Second, message acceptance can be increased by directly addressing the political discourse and the spread about misinformation about climate change (Cook et. al., 2017; Dunlap, 2013, van der Linden et. al., 2015). Though there are several explanations for the origin of political discourse over climate change belief and mitigation in the United States, one that stands out from the rest is the idea that a misinformation campaign was intentionally politically motivated (Dunlap, 2013). Dealing with this misinformation directly can be tricky. Some successful interventions to increase acceptance of climate change messages focused on pointing out flawed logic of these misinformation campaigns to help neutralize the effect they have on the reader (Cook et. al., 2017), while others have focused on reinforcing the fact that there is strong scientific consensus around climate change (van der Linden et. al., 2015). For the latter, it may be best to allow the reader to estimate the percentage of scientific consensus around climate change and then reveal the actual number, which can further internalize the reader's understanding of the scientific consensus around climate change (Myers et. al., 2015). Because these interventions are effective at increasing levels of climate change message acceptance, they may be ideal partners for messages with a system-oriented frame, which we have shown to be effective at increasing climate change mitigation behavioral intentions. A message that incorporates both of these frames or interventions may emphasize scientific consensus, and then go on to offer climate change mitigation behavior recommendations that would result in a more resilient United States.

Overall, messages that have been shown to increase levels of belief in climate change – such as those that appeal to the morals commonly held by conservatives, counteracting the spread of misinformation, and reminding readers of the scientific consensus around climate change – can be powerful message partners for system confidence framing.

4.5 Conclusion

30% of Americans are still not convinced that climate change is happening (Marlon et. al., 2017). These skeptics tend to be male, white, Republican and live outside of cities (Center for Research on Environmental Decisions, 2009; Marlon et. al., 2017). In America, political conservatives tend to have higher levels of system confidence (Feygina et. al., 2008; Shepherd & Kay, 2012; van der Toorn & Jost, 2014) In addition, contention around climate change is highly politically motivated, causing stereotypes to form between climate change skepticism and conservative ideology (Dunlap, 2013). Those who wish to promote messages about climate change, specifically climate change mitigation action, may find the current political climate difficult to navigate. In this study, we were unable to utilize system confidence messages in a way that increased levels of belief in climate change. However, we found that an environmental, system-oriented frame can greatly increase those with more conservative ideologies willingness to partake in climate change mitigation behaviors. We also found that, to a lesser extent, a climate change, self-oriented frame can increase conservatives' willingness to act in climate

change mitigating ways. We believe that the implications for this finding could greatly increase the chance of American citizens, even those who may identify as climate change skeptics, to take action against climate change. Inciting courses of action could help slow and curb the effects of climate change as it threatens to become more and more severe (IPCC, 2014). Unifying more American citizens, regardless of political ideology, could catalyze the positive changes we need to see.

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Appendix A: Full Vignettes

WELL-BEING DEPENDS ON COUNTRY OF RESIDENCE

Many people feel that the decision they make about where to live is a very important one. In fact, recent surveys report that even at age 40, people still think that where they chose to live was one of the most impactful decisions of their life. Sociological studies comparing the outcomes of residents of various countries show that there is truth to these perceptions. It seems that the country you live in has enormously broad effects on your life and well-being. In terms of financial success, for instance, the taxes you pay, the job and investment opportunities available to you, and the general state of the economy are to a large extent under the control of your country's government. But even in terms of social and personal well-being, the country you live in has substantial impacts: the quality of your social services (health and education), the leisure activities you have access to and time to pursue, even the likelihood that you will be happy with your life-partner - all these aspects of your life are ones that are to some degree dependent on the country you live in.

Conditions

1. Control:

Analysis of the environment: What's our relationship to the natural world?

Researchers have always been interested in the state of the natural environment, and have paid attention to how it has changed over the years. Today, researchers are especially interested in the relationship between people and the environment.

2. Environment: System-oriented

Analysis of the environment: What's our relationship to the natural world?

Researchers have always been interested in the state of the natural environment, and have paid attention to how it has changed over the years. Today, researchers are especially interested in the relationship between people and the environment.

Being pro-environmental allows us to protect and preserve the American way of life. It is patriotic to conserve the country's natural resources.

3. Environment: Self-oriented

Analysis of the environment: What's our relationship to the natural world?

Researchers have always been interested in the state of the natural environment, and have paid attention to how it has changed over the years. Today, researchers are especially interested in the relationship between people and the environment.

Being pro-environmental allows us to protect the health and well-being of individuals, families, and communities. Conserving the country's natural resources will ensure job security and economic prosperity now and for future generations.

4. Climate: System-oriented

Analysis of the environment: What's our relationship to the natural world?

Researchers have always been interested in the state of the natural environment, and have paid attention to how it has changed over the years. Today, researchers are especially interested in the relationship between people and the environment.

Addressing climate change allows us to protect and preserve the American way of life. It is patriotic to develop solutions and take action to prevent climate change.

5. Climate: Self-oriented

Analysis of the environment: What's our relationship to the natural world?

Researchers have always been interested in the state of the natural environment, and have paid attention to how it has changed over the years. Today, researchers are especially interested in the relationship between people and the environment.

Addressing climate change allows us to protect the health and well-being of individuals, families, and communities. Developing solutions and taking action to prevent climate change will ensure job security and economic prosperity now and for future generations.

Appendix B: Survey Items for Variables of Interest

Political Ideology

Where on the following scale of political orientation would you place yourself?

1			4			7
Extremely Liberal	2	3	Moderate	5	6	Extremely Conservative
0	0	0	0	0	0	0

System Confidence

Please indicate the extent to which you agree or disagree with each statement below.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly Agree
American society can easily handle changes and challenges.	0	0	0	0	0	0	0
Everyone is treated with respect and dignity in America.	0	0	0	0	0	0	0
America is the leader of global economic and industrial development.	0	0	0	0	0	0	0
The American economy provides everyone with opportunity to succeed.	0	0	0	0	0	0	0
America is the most politically powerful country in the world.	0	0	0	0	0	0	0
The American political system is fair, just, and equitable to all citizens.	0	0	0	0	0	0	0
American history is characterized by stability, peace, and prosperity.	0	0	0	0	0	0	0
America provides people with a safe, stable, and secure place to live.	0	0	0	0	0	0	0

Belief in Climate Change

Do you think that climate change is happening or not?

If you think it is, choose a positive number between 1 and 5, with 5 meaning you are absolutely certain that it is happening. If you think it isn't happening, choose a number between -1 and -5, with -5 meaning you are absolutely certain it isn't happening.

I'm certain that
climate change
is not
happening.

I'm certain that
climate change
is happening.



Behavioral Intention Index

Please indicate the extent to which you agree or disagree with each statement below.²

	Strongly Disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly Agree
I intend to increase how much of my waste I reuse, recycle and compost.	0	0	0	0	0	0	0
I intend to conserve electricity by turning off lights and electronics when not in use, taking shorter showers, and/or doing laundry with cooler water.	0	0	0	0	0	0	0
I intend to significantly cut down on driving by walking, biking, and/or using public transit.	0	0	0	0	0	0	0
I intend to actively rally for policies that are good for the environment.	0	0	0	0	0	0	0
I intend to purchase food and consumer products that are environmentally sustainable.	0	0	0	0	0	0	0
I intend to lobby my congressional representatives to address climate change.	0	0	0	0	0	0	0
I intend to join or provide financial support to organizations that are working on solutions to climate change.	0	0	0	0	0	0	0
I intend to push for greater governmental regulation of environmentally harmful industry practices.	0	0	0	0	0	0	0

² Items were provided in a randomized order.

Appendix C: Informed Consent

Welcome to the study!

You are invited to take part in a study designed to learn more about what people believe about themselves and the world around them. You must live in the United States and be 18 years or older to participate. If you agree to participate in this study, you will be asked to reply to questions about your beliefs and attitudes about yourself and the world. Your participation will take about 10-15 minutes to complete and you will be paid \$1.00 for completing this study. A written explanation of the research will be provided at the completion of the study, and we are available to discuss any questions you may have via email.

There are no known risks associated with your participation in this research beyond those of everyday life. Although you will receive no direct benefits for participation in this study, it may make you more aware of how your own beliefs impact your perception of the world around you, and help the researchers better understand how people perceive the world around them.

PLEASE NOTE: This study contains a number of checks to make sure that participants are finishing the tasks honestly and completely. As long as you read the instructions and complete the tasks, your HIT will be approved. If you fail these checks, your HIT will be rejected.

Taking part in this study is voluntary. You have the right to decline to participate and withdraw from the research now or at any time after the study has begun. However, if you withdraw from or do not complete the study, you will not be paid for the assignment.

Confidentiality of your research records will be strictly maintained. We will not collect any personally identifying information and will assign random codes to your responses to prevent linking of any responses to your identity. Results will only be analyzed and discussed in aggregate. Any reports and presentations about the findings from this study will not include your name or any other information that could identify you. We may share the data we collect in this study with other researchers doing future studies – if we share your data, we will not include any information that could identify you.

If there is anything about participating in this study that is unclear or if you wish to report a research-related problem, you may contact the investigators: Kaitlyn Teppert at kteppert@umich.edu or Dr. Irina Feygina at ifeygina@climatecentral.org.

The University of Michigan Institutional Review Board Health Sciences and Behavioral Sciences has determined that this study is exempt from IRB oversight.

If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study with someone other than the researcher(s), please contact the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board, 2800 Plymouth Rd., Bldg. 520, Room 1169, Ann Arbor, MI 48109-2800, (734) 936-0933 [or toll free, (866) 936-0933], irbhsbs@umich.edu.

By clicking next, you are consenting to participate in this research survey.