

An Inconvenient Group: The Effect of Motivated Messages on
Climate Change Attitudes and Behaviors of Skeptic Audiences

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Abstract: Climate change presents a serious threat to humanity, and its impacts will be felt for generations to come. As global temperatures continue to increase, the need to act on climate change becomes more urgent. Efforts to combat climate change face a major obstacle: deniers and skeptics. This study uses a survey experiment to better understand how motivated reasoning can bolster the persuasive effects of targeted climate change messaging. The results of this survey suggest that social norms play a significant role in attitude formation and behavioral intentions. Norms seem to be more important than values and information. Survey results also show that the path from believing climate change is a real phenomenon to supporting government action against climate change may not be straightforward.

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Chapter 1: Introduction

“[T]here's been scientist that say there's climate change going on those other scientists saying it's just a natural cycle of the earth's climate that's always happen for thousands and millions of years so frankly it's all really very confusing but it seems like it's also used for political gain was certain groups as well which also makes it confusing.” – Unedited statement from a participant in this study

Climate change has been a topic of discussion and research among the scientific community for decades. Nearly all scientists studying the topic of climate change between 1990 and 2013 arrived at the same conclusion: climate change is real and it has been induced by human activities. A now famous study determined 97% of all climate researchers are in consensus with this statement (Cook et al., 2013). Following the publication of this study, the 97% number has been widely incorporated into arguments from a range of groups in favor of acting on climate change. In addition to citing the scientific consensus on climate change, activists and governments alike have attempted to spur action on climate change by parsing out future damages climate change will incur. In short: climate change will profoundly alter nearly every aspect of human (and non-human) life. This message has been relayed to the public through social media campaigns, documentaries, popular culture, and government reports alike.

However, this message has failed to resonate with a notable portion of the United States' population. Climate change denial persists at high levels and serves as a major obstacle to action against climate change. In the United States, public opinion drastically diverges from the wide acceptance of climate change among the scientific community. Most commonly, deniers argue that recent shifts in climate are a part of earth's natural cycles, and would be occurring regardless of human activity levels. Others believe that climate change is a hoax invented by some combination of climate scientists and the mainstream media to make money (Dunlap &

McCright, 2011; Bolsen & Druckman, 2018; Uscinski, Douglas, & Lewandowsky, 2017). These arguments have been recycled by deniers for years in spite of mass climate change campaigns.

Although environmentalism is not historically a partisan issue in the United States, in recent years public opinion and the opinions of political elites on climate change developed along party lines. Presently, the largest predictors of an individual's climate change beliefs are political party affiliation and age (Hornsey et al., 2016). Climate change skeptics and deniers overwhelmingly identify themselves as Republicans. Likewise, self-identified Democrats report high levels of belief in human-induced climate change and support for action on climate change. This disparity creates a clear subset of the population that campaigns can directly target, but, thus far, campaigns have notably failed, if not backfired and fueled skepticism (e.g., Hart & Nisbet, 2012).

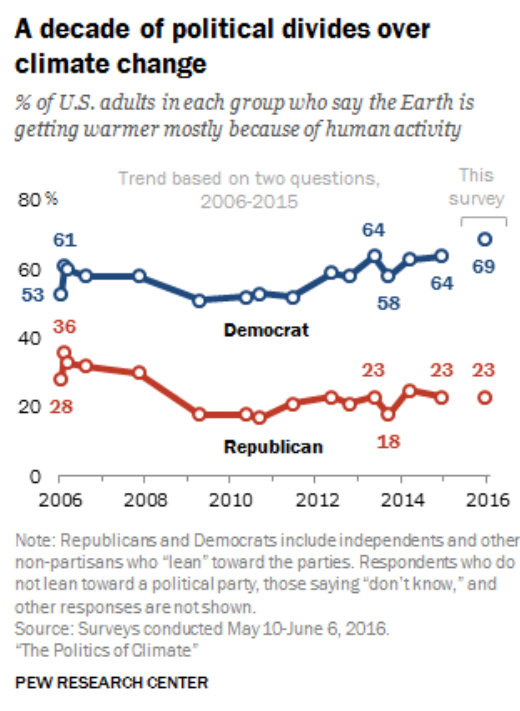


Figure 1: Partisan Divide Over Time

Over time, the gap between Democrats and Republicans' attitudes on climate change has grown. As shown in Figure 1, Pew Research Center polling indicates that since 2006, this gap has widened as much as 21 percentage points (Pew Research Center, 2016). The growing partisan divide over climate change suggests increasing polarization on the issue. Climate change opinions have become ingrained in party ideology, making legislative action on climate change increasingly difficult. As shown in Figure 2, Pew Research Center Polling indicates that the majority of Democrats believe the government should prioritize protecting the environment and addressing global warming, while the vast majority of Republicans do not believe the government should prioritize these issues (Pew Research Center, 2016). Without support and pressure for government action on climate change from both parties, it is improbable that politicians will enact strong policy combating climate change.

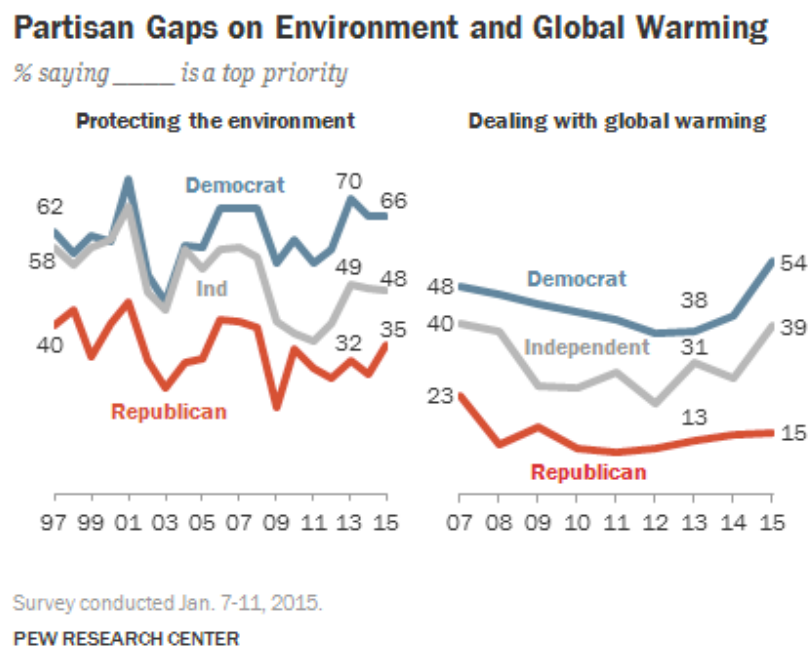


Figure 2: Partisan Environmental Priorities

There are a number of explanations for the partisan divide on climate change, and specifically why Republicans tend to be less supportive. First, to some extent, addressing

climate change is inherently at odds with core Republican values. Many scholars have argued that upholding and defending capitalism is at the center of Republican ideology; to act on climate change would contradict these values (McCright et al., 2016; Lewandowsky, Oberauer, & Gignac, 2013). Excessive production and consumption are, by and large, the greatest contributors to climate change. Preventing further greenhouse gas emissions would require the government to impose regulations on private firms, such as a tax on corporate carbon emissions. At the core of Republican ideology is opposition to government intervention, which partially explains Republican opposition to emission policies and other climate change-related regulations. However, this explanation does not offer an adequate explanation as to why Republicans are especially prone to outright denying climate change as a real phenomenon.

Second, other scholars suggest that certain religious beliefs –particularly those found among a large subset of Republicans – play an integral role in climate change opinion formation, as they refute the impact of human activity on global climate conditions (Sherkat et al., 2011). For instance, Christian fundamentalists may believe that climate change is the will of a higher power and that humans are too insignificant to have induced a global phenomenon such as climate change. The Republican Party often acts in defense of traditional religious values and, so, it would make sense for Republicans to be more skeptical of climate change. Conversely, other individuals of the same faith might believe that humans are obligated to practice good stewardship and therefore be motivated to adopt climate-friendly attitudes (Schuldt, Pearson, Romero-Canyas, & Larson-Konar, 2017). The connection between religion and climate change is more complex and less overt than liberal market values. Climate change is not a topic at the forefront of most religious discussions, but for many individuals, it can play a role in how their climate change opinions come together.

A third explanation for widespread Republican skepticism is that skeptic and denialist messages are communicated and advanced by partisan elites, conservative media outlets, and large corporations. Every year, a significant amount of money is spent promoting messages to spread and reinforce skepticism on climate change (Brulle, 2014). Considering the social power of political elites and the media, the average person is especially susceptible to forming their opinions around these coordinated messaging campaigns. As the majority of climate change deniers and skeptics are Republicans, it appears that those with pre-existing Republican ideologies are especially vulnerable to counter climate change messages and cues.

With these various challenges in mind – value, religious, and communication hurdles – the partisan divide on climate change is clearly a complex issue with no simple solution. This is highly problematic because climate change cannot be comprehensively addressed when a large portion of the population does not acknowledge it. However, some research suggests that the beliefs held by climate change skeptics are not necessarily strongly held beliefs. Poortinga et al. (2014) suggest that there is at least one avenue that can be navigated to influence the attitudes of these conservative-minded populations: targeted messaging in the media. Targeted messaging alone will not solve climate change, but may be an important tool to overcome policy inaction on climate change. In order to understand the role targeted messaging may have within climate change campaigns, it is helpful to observe past cases in which coordinated messaging campaigns successfully influenced public opinion on a progressive political issue. The following section explores the public debate on same-sex marriage in the United States as an example of a successive persuasive strategy that led to rapid shifts in public opinion.

How Understanding the Gay Marriage Debate Might Help Climate Change

In 2003, the Massachusetts Supreme Court ruled that the state of Massachusetts was required to legally recognize same-sex marriages by its Constitution. Then President George W. Bush responded to this ruling as follows:

A strong America must also value the institution of marriage. I believe we should respect individuals as we take a principled stand for one of the most fundamental, enduring institutions of our civilization. Congress has already taken a stand on this issue by passing the Defense of Marriage Act, signed in 1996 by President Clinton. That statute protects marriage under Federal law as the union of a man and a woman, and declares that one state may not redefine marriage for other states. Activist judges, however, have begun redefining marriage by court order, without regard for the will of the people and their elected representatives. On an issue of such great consequence, the people's voice must be heard. If judges insist on forcing their arbitrary will upon the people, the only alternative left to the people would be the constitutional process. Our Nation must defend the sanctity of marriage.¹

Eleven years later, the former president penned his signature alongside the signatures of several other high-profile Republicans in a legal brief arguing in support of gay marriage (Stolberg, 2013). At the time, this was in direct opposition to the party's dominant view on the issue. George W. Bush is, of course, just one Republican, but his shifting views on gay marriage are indicative of a broader shift towards acceptance.

On the surface, public opinion on LGBTQ+ rights and climate change have little in common. However, there are several characteristics shared by the debates surrounding both topics (prior to the landmark Obergefell v. Hodges case). Opinions on both issues are politically contentious and religiously charged. Both cases also have divergent opinions over time aligned heavily with political party. However, only one case has resulted in major policy action. Studying the preference change and policy action surrounding gay marriage lends some optimism to climate change.

¹ State of the Union Address, 2004

George W. Bush likely did not wake up one morning with drastically different attitudes and preferences regarding gay marriage. It is more plausible that this change occurred as a result of public opinion on gay marriage shifting towards acceptance. Between 1984 and 2012, public acceptance of same-sex couples nearly doubled, with significant shifts occurring in the late 2000s and early 2010s (Flores, 2014). This change in public opinion directly challenged the predominant view of the Republican Party, creating pressure for public figures like George W. Bush to alter their views. Although this change is hardly the reason the Defense of Marriage Act was struck down, it does correspond with a significant shift towards the acceptance and normalization of gay marriage among the American public, and within the Republican Party.

Public opinion and messaging directed at the public on gay marriage developed simultaneously. As Brewer notes, public discussion about gay rights became more prominent in the political sphere as increasing attention was paid towards the legal rights of LGBTQ+ individuals. These legal frames pushed the gay marriage debate out of stagnant discussions of traditional moral values and resonated with the public as well as politicians. Throughout the 1990s and into the 2000s, politicians at the state level passed laws advancing the legal rights of LGBTQ+ individuals. Simultaneously, public opinion became more supportive of LGBTQ+ rights and more socially accepting of LGBTQ+ individuals (Brewer, 2008). These two processes reinforced each other and changed the public discussion of LGBTQ+ social and political issues, leading to increased pressure on politicians to create policy supporting LGBTQ+ individuals.

The gay marriage debate offers valuable insights into how changing public opinion can change party norms, which may be the key to overcoming polarization on climate change. In the case of gay rights, changing message strategies brought about unprecedented substantive changes

towards equal rights for LGBTQ+ individuals. Changing messaging strategies in the climate change debate may similarly open up new possibilities for action on climate change.

Chapter 2: Climate Change Messaging: What We Know

Preference formation is a complex process affected by competing information, values and social pressures. Individuals have diverse sets of knowledge, face different social pressures, and hold certain values that can shape their political preferences (Druckman & Lupia, 2016). To change a preference, an audience typically has to be persuaded. Successful persuasion involves shifting political preferences to more desirable preferences and can occur when messages appeal to audiences due to their content or apparent source (Druckman & Lupia, 2000). The debate surrounding climate change has brought about a great deal of literature studying the effectiveness of different persuasive messages with strategically designed content.

Climate change skepticism prompted the development of a growing body of scholarly work on framing climate change communications. In these works, scholars use different frames regarding climate change and study the effectiveness of these frames on changing political attitudes and preferences. Typically, these studies use survey experiments to isolate message effects on political attitudes and preferences. Three categories dominate the frames used in this literature: scientific consensus on climate change, values, and social norms.

Many scholars posit that climate change skepticism and denial are a result of misinformation that can be corrected by simply presenting people with facts regarding climate change. This approach usually entails informing participants about the scientific consensus on climate change, and holds that educating people on climate change is sufficient to alter individuals' climate change beliefs and preferences. Van der Linden, Leiserowitz, and Maibach (2015) find that when participants are exposed to a message emphasizing the overwhelming scientific consensus on climate change, their beliefs and actions become more environmentally-conscious. Based on these findings, they propose the Gateway Belief Theory: once an individual

recognizes and has confidence in the science of climate change, the effects of party polarization on climate change beliefs quickly fall away in favor of believing climate change is a real phenomenon and supporting action against climate change.

However, a follow-up paper offers some nuance to the effectiveness of the Gateway Belief Theory. In a similar study, Bolsen and Druckman (2018) find that this gateway belief model holds for all groups except high knowledge Republicans. Significantly, Republicans with high levels of political knowledge do not demonstrate increased belief in climate change when exposed to information about scientific consensus. Moreover, they find that the messages do not move policy support for any group. Even Democrats, whose belief in climate change strengthens after receiving the consensus message the consensus, do not become more supportive of climate mitigation policies. These results suggest that exposing audiences to information on the scientific consensus is not sufficient to persuade subsets of Republicans, which ultimately suggests communicating the scientific consensus alone is not enough to shift predominant climate change views within the Republican Party.

An alternative approach to shifting climate change attitudes and preferences entails creating messages that appeal to moral values of participants. These approaches have found that Republicans and Democrats have different perceptions of morals in the climate change debate, and that distinct values appeal to these groups. Feinberg and Willer (2013) find that conservatives do not view pro-environmental behaviors as inherently moral, but do positively respond to messages that frame climate change to invoke purity/sanctity morals that emphasize the importance of stewardship. This differs drastically from the values that appeal to liberals, who respond more positively to social-justice oriented frames. Building on Feinberg and Willer (2013), a similar study finds that conservative participants positively respond to a different set of

values than do liberals and identify messages containing these values as being from “their people” (Wolsko, Ariceaga, & Seiden, 2016). The values that are most appealing to conservatives tend to have religious undertones, as they stress that humans are obliged to maintain earth’s purity. However, the findings of Severson and Colemon’s (2015) study caution against creating messages too obviously religious, such as including the phrase “God’s creation.” In this case, frames that are too overtly religious failed to positively shift climate change beliefs or boost support for action against climate change. These studies indicate that values appeals need to be strategically constructed for a target audience in order to be effective.

Content-centered studies have also used social norms to drive attitude and preference shifts regarding climate change. A key finding in Hart and Nisbet’s (2012) study is that when called upon to consider the negative impacts climate change may have on the lives of others, Republicans perceive themselves as being socially distant from the victims of climate change, and therefore less likely to be in favor of policies that mitigate the effects of climate change. This finding implies that drawing on social norms may not be an effective way to bolster pro-environment climate change attitudes and preferences among Republican audiences. However, another similar study finds that both liberals and conservatives are willing to engage in altruistic action against climate change when simply presented with a statement that the “majority of Americans” believe in climate change (Bolsen, Leeper, & Shapiro 2014). One important caveat to this 2014 study is it also presented participants with information about the scientific consensus on climate change, making it difficult to discern if the social norms message had any real effect.

It is also important to note that the widely discussed theory of culture cognition implies strong social norm effects. This theory implies that Republicans do not believe in climate change because they believe it would signal not being a “good member of the group.” Kahan (2018: 1-2)

states, “[F]orming beliefs contrary to the ones that prevail in one’s group risks estrangement from others on whom one depends for support, material and emotional.” Yet, the theory has not explicitly tested if norms are at work. Effectively, if people learn that members of their social or political group (e.g., Conservatives or Republicans) hold certain views, those people will follow suit.

A missing element in the discussed literature is an understanding of people’s motivations for processing messages in one way or another. That is, we know that information, values, and norms can sometimes influence climate change opinions and other times not. Exploring the conditions in which a message succeeds or fails is a first step to understanding individual motivations and their influence; this is consistent with psychological literature on directional motivated reasoning (e.g., Molden & Higgins, 2012, Druckman & McGrath, 2019). There is a notable political science literature that shows how directional motivation can induce defensiveness of pre-existing opinions (Taber & Lodge, 2008), partisan identity (Lavine et al., 2012; Bolsen et al., 2014), and defense of political ideologies or values (Campbell & Kay, 2014; Washburn & Sitka, 2017; Mullinix, 2016). I now turn to a more detailed discussion of motivated reasoning theory and current spaces for additional research.

Chapter 3: Motivated Reasoning as a Means to Understanding Climate Message Effects

An important aspect of science communication currently under-researched is the underlying goals of communications. In order to communicate effectively, it is important to consider what the communication aims to achieve (National Academies of Sciences, 2017). The goals of science communication typically fall into two distinct categories: science consideration and science consistent outcome. Science consideration goals center on the content of the specific message and hope that audiences will retain and consider the content in later decision making. For example, a science consideration objective may be to get audiences to consider research findings on the effects of climate change when forming their opinion on the gravity of climate change. Alternatively, a science consistent outcome goal attempts to induce audiences to make a decision that coheres with a scientific consensus on an issue. In this case, the objective of a message is to change audience behavior or preferences. With regard to climate change, an example of a science consistent outcome goal is discussing climate change in such a way that audience acknowledge the human-driven nature of the issue and support mitigation policies. Another current example of a science consistent outcome goal is getting audience members to vaccinate themselves and their children. In both examples, it is possible for the message to push audience members towards a decision because of an existing scientific consensus, but the scientific consensus is not necessarily the main factor in an audience member's decision-making.

Science consistent outcome goals are important for two reasons. First, when a science consistent outcome goal is achieved it can create behaviors that improve well-being on a large scale. Using the examples above, one could be that an increase in vaccination rates creates herd immunity and decreases the risk for those who cannot be vaccinated for legitimate medical reasons. Secondly, science consistent outcome goals may compensate for the shortcomings of

science consideration goals. For instance, government officials may ignore consensus on climate change and may not consider the scientific consensus in policy formation. However, a science consistent outcome goal can drive their constituents to support climate mitigation policies, thus pushing the official to create climate mitigation policies.

Prior assessments of climate change communications largely have a science consistent outcome goal. The existing body of work tests the ability of a variety of message types to change audience attitudes or behaviors. As previously mentioned, the results of these tests have largely been inconsistent. This is likely because the existing work is not sufficiently audience-centric. Audience motivations significantly contribute to their decision-making processes, and the existing work has failed to account for audience motivations. Motivated reasoning occurs when audiences process information in accordance with an individual goal. In order to understand how scientific outcome goals can be achieved, it is critical to understand the role motivations play in decision making. This work aims to do so by directly manipulating prior motivations, whereas the extant literature tests messages and makes inferences about motivations based on observed outcomes.

This study uses directional and non-directional (accuracy) motivations (Molden & Higgins, 2012). Accuracy motivations encourage audiences to arrive at the most accurate conclusion based on the information with which they are presented, and arrive at the “best” conclusion (Kahan et al., 2017). This type of motivation aims to achieve outcomes consistent with the specific information audiences encounter.

Directional motivations differ from accuracy motivations as they induce audiences to process messages in order to arrive at a desired conclusion or reinforce an existing affinity. These kinds of motivations can push individuals to form preferences or attitudes that confirm a

value system or a group identity, regardless of the specific information of the message.

Essentially, directional motivations cause individuals to view messages that affirm their pre-existing values or identities as good and to adapt their opinions accordingly regardless of the specific content. Under directional motivations, outcomes are driven by individuals' perceptions that the message aligns with values systems or identities they subscribe to, not directly by the information the message relays.

There are many pre-existing beliefs and affinities that can factor into directional motivated reasoning. Due to a large number of potential directional goals, this study focuses on group conformity and value defensive motivations. Group conformity and value defensive motivations correspond well with the types of messages used in the extant literature and were selected for this reason. The aforementioned work tends to assume that informational messages fail because of directional motivation, and this work hopes to understand the role of directional motivation by isolating the directional motivation applied (Druckman & McGrath 2019).

The nature of the issue discussed in a message may inherently make some motivations more relevant than others. Issues that directly related to an individual's well-being, for example, are more likely to create an accuracy motivation because the personal salience of an issue prompts deliberative thinking (Fazio, 1995). Climate change, on the other hand, is usually an issue with a low-level of personal saliency and is generally thought of as a collective good issue. This might make accuracy motivations relatively weaker, all else constant, than the value defensive and group conformity motivations.

The central hypothesis of this work is that the content of a message will have the largest effects when individuals are primed with a relevant motivation. In other words:

1. Scientific information will have the largest effect when individuals are motivated by accuracy goals. Science is a guide to provide accuracy opinions; when motivated by accuracy, people will accept the science (Dietz, 2013).
2. Value appeals will have the largest effect when individuals are motivated by directional value goals. The logic here is that when people are prompted to form opinions that confirm their values, the value message will be effective.
3. Group norms appeals will have the largest effect when individuals are motivated by directional conformity goals. Here individuals are motivated to fit into their groups; following norms via group appeals will thus be effective.

These predictions may sound straightforward, but it is important to note that no prior work has considered a) the explicit role of motivations, b) clearly compared the three types of messages studied here, or c) isolated which of those messages is most effective in “natural settings” where no motivations are primed.

There is one other hypothesis that comes from extant work that suggests informational messages that counter one’s pre-existing beliefs can backfire or boomerang. Backfiring or boomerang effects occur when message content contradicts an individual’s values or identity, making the individual defensive and strengthening their pre-existing views. (e.g., Hart & Nisbet 2012, Zhou 2016; although see Guess & Coppock, 2018; Porter, Wood, & Kirby, 2018). This study also provides the opportunity to study backfiring or boomerang effects in conditions where motivations do not align with messages. In this study, backfiring and boomerang effects can be studied by comparing condition groups reading the information message that are accuracy motivated to those that received a directional motivation prime.

Another notable drawback of prior work is its inconsistent use of outcome variables. The vast majority of previous studies include outcome variables measuring climate change beliefs, such as measures of belief that climate change is occurring and that it is caused by human activity. Much of the existing work also includes outcome variables on support for policy, such as supporting a tax on corporate carbon emissions. Another common outcome variable in the literature is individual climate-related behavioral intentions, such as how likely an individual is to switch to LED lightbulbs or bike to work instead of driving after encountering a message. While most studies measure some combination of beliefs about climate change, support for policy and individual climate-related behavior, they rarely include all three. Occasionally, these measures are not even precise, as Wolsko et al., (2016) equate support for policy action as a “need for societal action.” This study incorporates all three outcome variables because of a key prediction: Republican audience might produce distinct outcomes depending on treatment group:

1. The information message will likely affect all outcome variables, given the goal and message processing is to be accurate from an objective standpoint.
2. The value and group messages will be less likely to influence policy beliefs that involve government actions. In these treatment groups, the goal and message confirm values and identities, and those are not consistent with governmental intervention even if it does facilitate beliefs about climate change and individual actions.

Chapter 4: Experiment

This section explores the survey experiment I designed to test how motivated reasoning impacts audiences' processing and application of different approaches to climate change messaging. A survey experiment was the best choice to study this question because it allows for manipulations to take place in isolation, and for the effects of these manipulations to be studied on an individual scale. I am able to make clear causal inferences using a representative sample – it is for this reason that this method is used in much of the literature. This survey was hosted by Qualtrics and administered by Bovitz, Inc.² Bovitz, Inc. distributed the survey online to their existing participants who are selected into the pool to be a representative sample of the U.S. Respondents were paid a previously agreed upon rate (via Bovitz). Bovitz, Inc. collected responses from February 15th to February 23rd, 2019.

Sample:

I limited participation in the survey to self-identified Republicans. As explained, Republicans' climate change beliefs are characterized by drastically higher levels of skepticism than Democrats, making their climate change preferences and attitudes more interesting to study (Bolsen et al. 2015). In prior studies, Democrats tend to hit ceilings because they already believe in climate change and support taking action to combat its effects. Additionally, the group conformity message will likely have no effect on Democrats, because they are already aware that other Democrats demonstrate high levels of concern about climate change. Finally, the values message in this study was designed with values specifically held by Republicans. Including Democrats in my sample would require a values message directed at Democrats, which would be tricky to compare to the Republican message (as their values sets differ immensely), and would

² <http://bovitzinc.com/>

make the number of conditions in this survey infeasible. In the literature, it has also become increasingly common to include only a single party (Campbell & Kay, 2014, Zhao 2016).

This study's approach to using Republicans only differs from some of the major literature it builds off of, which operationalizes political orientation with an eight-item issue/group scale and labeled participants as liberal or conservative based on their responses (Wolsko, Ariceaga, & Seiden, 2016). This study uses party identification over social ideology because partisanship is a stronger social identity than political ideology (Huddy et al., 2015). The strength of the Republican party as a social identity with distinct values is a key point in the group conformity message, as well as the values message. Furthermore, party lines have been sorted on an ideological basis in recent years (Levendusky, 2009). As such, this study assumes that Republicans and conservatives would respond similarly when exposed to this study's treatments.

In the end, 1,964 participants took part in this survey. Notably, 92.7% of this sample identified themselves as white, meaning only 7.3% of the sample was African American, Hispanic, Asian, Middle East/North African, Native American or another race. Additionally, nearly 85% of participants in this survey reported themselves to be either Catholic or Protestant. These demographics are not representative of America as a whole, *but* do accurately represent the Republican Party – as mentioned, Bovitz draws its sample in a representative fashion. Indeed, as presented in Table 3, when compared to the demographics of my sample, Republican participants in the probability based American National Election Study survey are quite similar demographically.³

³ Some of the demographics questions asked in this survey do not perfectly align with questions asked in the ANES. For instance, income ranges in this survey vary slightly from the income ranges offered in ANES questions. Other questions, such as questions about participants racial background have different response choices. For example, our survey offers Middle

	Our Sample	2016 American National Election Studies (Web and Face to Face Weighted Sample)
Age	18-24: 4.33%; 25-34: 14.77%; 35-50: 33.25%; 51-65: 32.79%; Over 65: 14.87%	18-24: 10.66%; 25-34: 13.97%; 35-50: 23.88%; 51-65: 31.61%; Over 65: 19.87%
Religion	Protestant: 65.12%; Catholic: 19.40%; Jewish: 2.09%; Muslim: 0.25%; Hindu: 0.10%; Other: 1.93%; Not religious: 11.10%	Protestant: 60.16%; Catholic: 22.70%; Jewish: 1.16%; Muslim: 0%; Hindu: 0.24%; Other: 3.34%; Not religious: 12.40%
Race/Ethnicity	White: 92.77%; Hispanic or Latino: 3.82%; Black or African American: 2.58%; Asian or Pacific Islander: 2.80%; Middle Eastern/Northern African: 0.15%; Native American: 1.83%; Other: 0.61%	White: 91.65%; Hispanic or Latino: 6.75%; Black or African American: 2.58%; Asian or Pacific Islander: 3.60%; Native American: 2.93%; Other: 4.08%
Education	Less than high school: 2.14%; High school graduate: 23.22%; Some college: 39.61%; College degree: 25.10%; Advanced degree: 9.93%	Less than high school: 7.90%; High school graduate: 26.82%; Some college: 32.72%; College degree: 21.44%; Advanced degree: 11.11%
Income	Less than \$30,000: 21.84%; \$30,000 - \$69,000: 40.89%; \$70,000 - \$99,000: 19.35%; \$100,000 - \$200,000: 16.34%; Over \$200,000: 1.58%	Less than \$30,000: 25.21%; \$30,000 - \$69,000: 14.17%; \$70,000 - \$99,000: 27.52%; \$100,000 - \$250,000: 29.17%; Over \$250,000: 3.94%
Ideology	Very liberal: 0.10%; Mostly liberal: 0.10%; Somewhat liberal: 0.81%; Moderate: 17.11%; Somewhat conservative: 20.67%; Mostly conservative: 34.93%; Very conservative: 26.27%	Extremely liberal: 0.34%; Liberal: 0.93%; Slightly liberal: 2.75%; Moderate: 19.51%; Slightly conservative: 24.09%; Conservative: 42.47%; Extremely conservative: 9.91%
Partisanship	Independent leans Republican: 10.28%; Weak	Independent-Republican: 28.28%; Not very strong

Eastern/North African as racial background, but the ANES does not. This survey and the ANES, therefore, are not perfectly comparable but they are pretty close.

	Republican: 32.80%; Strong Republican: 56.98%	Republican: 30.03%; Strong Republican: 41.69%
Gender	Male: 48.17%; Female: 51.78%	Male: 51.69%; Female: 48.31%

Table 1: Sample and ANES Demographics

Pre-Treatment Survey Items

The first section of the survey consisted of political knowledge, interest and participation questions. Interest and participation questions asked participants to report how interested they are in politics generally, how often they participate in political activity and how often they talk about politics with friends and family.

The second section of this survey consisted of basic demographic questions. In this portion of the survey, participants answered questions about their age, religion, education level, gender identity, household income and race for later analysis.

Following basic demographic questions was a series of questions about participants' trust in government and climate scientists. Another section of the survey measured participants' underlying values, based on moral foundations theory (Haidt & Graham, 2007). Additionally, participants answered if they thought "we have gone too far in pushing equal rights in this country" and "if the government spent less time trying to fix everyone's problems, we'd all be a lot better off." These questions measure an individual's hierarchical dispositions and individualism, and were included for later analysis (Kahan & Corbin, 2016).

After answering the just discussed questions, participants were randomly sorted into one of the following groups (as described in Table 2):

Condition 1: Control condition with no motivation and no message.

	Information Message	Values Message	Group Norms Message
No Motivation	2	3	4
Value Threat	5	6	7
Group Conformity	8	9	10
Accuracy Motivation	11	12	13

Table 2: Condition Groups

Condition 1 was a control group that simply answered the below discussed outcome variables. In conditions 2-13, respondents received one of three articles which I next discuss. Participants in conditions 5-13 also received a motivational prime before reading an article. I next discuss these primes and then I will describe the(ir) messages.

Accuracy Motivation:

Those in the accuracy motivation group were instructed to fairly assess the message and consider the information within the message. Importantly, those within the accuracy motivation group were told they would later be asked about how they formed their answers to questions about the message. This prime was constructed to induce a non-directional accuracy motivation in participants by prompting them to pay close attention to the message content and encouraging less-biased evaluations of the message content. The goal of this prime is to motivate people to focus on the specific content of the message and form a “correct opinion” based on that content. Therefore, the information message should be the most relevant to the accuracy motivation (Bolsen et al., 2014).

Values Threat:

Participants in the values threat motivation group were first asked about their political views and party affiliation. Next, participants answered questions about the strength of their affiliation to the Republican Party, and how important that identity is to them. Finally,

participants read a short text claiming that the Republican Party's focus on gaining power has caused the party to stray from its core traditional values of decency and purity. Participants were asked if they agreed with this statement or not. Collectively, this prime was designed to make participants consider the Republican Party as a group they belong to, and a group that's values are in danger. This prime is meant to make participants more likely to seek out and agree with their party's stance on values issues and therefore create directional motivation. The values threat aims to make individuals defensive of their values, and therefore, more likely to endorse messages that align with and reinforce the values they perceive as under threat (Dunning, 2015).

Group Threat:

The group norms motivation group was similar to the values threat motivation group. Participants in this group answered the same questions about their political views and affiliation in addition to the same questions about the strength and importance of their affiliation. After answering these questions, participants read a text claiming the Republican Party is becoming increasingly divided on important issues. This text claimed this growing in-party divide will ultimately weaken the Republican Party. Participants were then asked about their level of agreement with the text. This prime is also meant to induce directional motivation as it was constructed to make participants more likely to seek out and agree with their group's opinion. The group threat motivation will likely make participants respond most strongly and positively to norms messaging, as it is most conducive to group conformity.

No Motivation:

Three of the groups did not receive a motivational prime. These groups, therefore, were only able to read and formulate their responses based on the content of the messages alone. This allows the "real world" effectiveness of the messages to be assessed.

Participants in condition groups 2-13 read one of the following messages. Each of the messages corresponded with a picture to draw additional attention to the message. These pictures were small and somewhat connected to the message content, but were not included to make a statement separate from the message content.

Information:

The information message consisted of a short paragraph about climate change and the need for action on climate change in addition to another longer paragraph highlighting the Volume II of the *Fourth National Climate Assessment*. Much of this second paragraph drew on real news coverage from *The New York Times*, which describes the report as a

major scientific report issued by 13 federal agencies [that] presents the starkest warnings to date of the consequences of climate change for the United States, predicting that if significant steps are not taken to rein in global warming, the damage will knock as much as 10 percent off the size of the American economy by century's end. The report, which was mandated by Congress and made public by the White House, is notable not only for the precision of its calculations and bluntness of its conclusions, but also because its findings are directly at odds with President Trump's agenda of environmental deregulation, which he asserts will spur economic growth (Davenport & Pierre-Louis, 2018).

In addition to *The New York Times* coverage, this message used language from a *Science* article specifically regarding the report's discussion of the scientific consensus on climate change (Malakoff, 2018). Following a note about consensus, the text then discusses the economic loss predicted within the report before suggesting individuals adopt more eco-friendly habits to act on climate change. The information message did not cite these specific sources of information because how participants view these sources could influence their perception of the message content. This message should be most effective in condition 11, in which participants first received the accuracy prime.

Values:

The values message began with the same short paragraph as the information message. The second paragraph in the values message frames the environment as inherently pure. Presently, it claims the environment and people alike are suffering because of pollution. This message largely drew upon language used in Feinberg and Willer (2013) and Wolsko et al.'s (2016) studies, blending Christian values and patriotism. The values message is overtly religious, claiming that protecting the environment will be “honoring all of Creation.” According to this text, it is the responsibility of Americans to be good stewards of the environment and to work to make their environment pure again in the name of patriotism. When paired with the values threat motivation (condition 6), this message should be more effective than when paired with the accuracy or norms motivation.

Group Norms:

The group norms message started with the same short paragraph as the messages listed above. The second paragraph of the group norms message details recent polling on climate change. Central to this message is the argument that the majority of Republicans actually do believe in climate change, contrary to popular belief. This argument is bolstered by another recent poll indicating that the majority of Republicans are individually acting on climate change and support broader policy action to fight climate change. Specifically, this message was designed to induce descriptive norms, which put pressure on individuals to conform to the behaviors and attitudes of a social group (Davis, Hennes, & Raymond, 2018). The group norms message should be most effective in condition 10, where individuals were first primed with the group threat motivation.

Like the information message, the content of the group norms message drew on real news articles and polls. Indeed, it cites statistics from a recent *New York Times* article entitled: “More

Republicans Than You Think Support Action on Climate Change.” Just like the information message, the group norms message also did not name *The New York Times* to prevent perceptions of the source affecting the strength of the text. Additionally, this message drew on information from a forthcoming article that suggests Republicans project their views on other members of their party, and thus underestimate the true number of Republicans that believe in climate change (Abeles, Howe, Krosnick, & MacInnis, forthcoming). Based on these findings, this message reporting a shift in group norms within the Republican Party will likely be new and surprising for participants.

Post-Treatment:

Questions designed to measure outcome variables made up the third section of the survey. Treatment groups that received one of the messages were asked if they felt the message came from people they identified with, and the perceived political party affiliation of the author. Additionally, treatment groups that received one of the messages were asked how negatively or positively they felt about the message. The last question explicitly stated that the message was about climate change and the environment.⁴ Those in control group (condition 1) did not receive these questions.

All condition groups answered the rest of the outcome measures. These measures included questions about individuals’ opinions surrounding climate change. Four categories make up the main outcome variables: belief about the scientific consensus on climate change, belief in climate change, individual climate-change related behaviors, and support for policies mitigating the impact of climate change.

⁴ Questions about perceptions of the message’s author did not yield interesting results, and so these results are not reported further in this thesis.

Belief in the scientific consensus on climate change was asked as a single question: “To the best of your knowledge, what percentage of climate scientists have concluded that human-caused climate change is happening? (0% -100%)?” The survey allowed participants to fill in an answer between 0-100%.

Outcome measures consisted of a series of similar questions about beliefs, behavioral intentions and policy support surrounding climate change. Questions about climate change beliefs focused on the participant’s acceptance or rejection of climate change as a real, and important, phenomenon. The first question about climate change beliefs introduced climate change as “a long-term change in Earth’s climate due to an increase in the average atmospheric temperature,” and asked if participants thought climate change is happening. The following question asked if participants agreed that climate change is a result of human activity. Other questions about climate change beliefs asked if the participant felt their opinion on climate change is important, and if climate change is an issue the US needs to address. Together, these questions measured a participant’s belief that climate change is occurring, that it has been induced by humans, and that it is an issue the government and individuals need to address.

Behavioral intentions were measured by a series of questions focusing on individual consumption habits. These questions asked if participants were likely to buy a more fuel-efficient car or drive less, use energy efficient lightbulbs, adjust their thermostat settings, and buy green electricity. Collectively, these questions centered on the individual’s willingness to change their spending and energy consumption habits to more environmentally-friendly habits. It is worth noting that these changes are easy to implement, and do not require larger lifestyle shifts.

Support for policies mitigating the impact of climate change, for example, was made up of questions about participant’s support for mitigation policies that largely intervene in the

marketplace. Although these questions focused on different policies, each question pertained to a government intervention in the marketplace to mitigate the effects of climate change.

Specifically, these questions asked if participants supported or opposed increased government regulations on industries and business that produce emissions, and if they would support a tax on these high emitters. Additionally, these questions introduced the concept of cap and trade and asked if participants would support or oppose such a policy. Another proposed a tax credit to individuals addressing climate change, such as buying a hybrid vehicle. Participants were also asked if they support drilling on federal lands, which creates greater greenhouse emissions.

Finally, participants were asked if the government should invest more or less money researching climate change. These measures are all related to commonly proposed government interventions in the marketplace that can be implemented within existing government and economic structures.

In later analysis, questions related to each of the main three outcome variable were scaled together into a single coefficient for each of the main outcome variables. Survey results demonstrate that the questions within each composite outcome variable worked well together, as responses within each outcome variable highly correlate. Questions about beliefs, behavioral intentions and policy support had respective alpha scores of .87, .81 and .87. This relationship made it possible to take an average for each category and create a scale.

Chapter 5: Results

Mechanical Turk Survey

Before turning to the main results, I report results from a pilot experiment conducted on Amazon's Mechanical Turk (MTurk) platform. Although Democrats and Republicans both took this pilot survey, only data from Republicans is important as the primary survey experiment was designed for only Republicans. 89 Republicans participated in this survey. This survey was conducted entirely on January 30, 2019.

This short survey was designed to test the strength of each message. During the survey, participants answered basic demographic questions and read each message in random order. Following each message, participants answered if they thought the message was good or bad, if it was weak or strong, if it was harmful or beneficial, and if it was foolish or weak. Each outcome question consisted of a seven-point scale.

A key assumption of the main survey is that the information message will be perceived as the strongest message to accuracy motivated individuals. For this reason, participants were instructed to think carefully and consider if the argument presented is persuasive.

The pilot survey confirmed that the information message was perceived to be the strongest message when accuracy motivations are induced. For the purpose of analysis, the individual evaluation responses were summed into a single evaluation score per message. The information, value, and evaluation messages had aggregate evaluation scores of 4.87, 4.54, and 4.44, respectively. Analysis by t-test shows that the mean evaluation scores for the information message are significantly higher than those of the values and group norms message (see Appendix IV). Relatedly, the analysis also indicates that evaluations of the group norms message and values message do not significantly differ from each other. The point here was to confirm

that, as suggested, when people are accuracy motivated, the information message provide the strongest effect (i.e., condition 11).

Message	Responses	Mean Evaluation	SD
Information	86	4.869186	1.191716
Values	85	4.541176	1.133137
Group Norms	84	4.443452	1.265477

Table 3: MTurk Survey Results

Main Survey Experiment Results

Before analyzing the outcome variables of this survey experiment, a balance check was performed to ensure that conditions were randomly assigned. This balance test confirmed that conditions were randomly assigned, as there were no significant coefficients beyond what one would expect by chance (see Appendix V). Once confident that treatment groups were randomly assigned, outcome variables were tested against the control condition, in which participants received no motivational prime nor message.

I start with variables that were not my main outcomes but still of interest: the perceived positivity of the message (relative to condition 2 in this case since the control condition did not answer that item) and the perceived percentage of climate scientists who believe in climate change. Starting with model 2 in Table 4 (i.e., perceived percentage), I find that the accuracy motivation/information message condition was the sole condition that increased belief about the scientific consensus on climate change. This result makes sense, as participants in this group were urged to pay close attention to the content of the message, and should report high levels of scientific consensus consistent with the message they read (since the message emphasized the consensus). As I will elaborate later, conditions that do not report higher levels of belief that there is a scientific consensus on climate change exhibit changes in other outcome variables.

This supports this study's foundational assumption that science consistent outcome goals can take place regardless of one's understanding of the underlying science.

VARIABLES	(1) Message Evaluation	(2) Belief About Climate Consensus
No Motivation x Information Message (2)		2.996 (3.099)
No Motivation x Values Message (3)	1.114*** (0.182)	2.413 (3.067)
No Motivation x Group Norms Message (4)	0.710*** (0.178)	4.828 (3.005)
Values Threat x Information Message (5)	0.156 (0.184)	2.082 (3.128)
Values Threat x Values Message (6)	1.067*** (0.178)	3.862 (3.001)
Values Threat x Group Norms Message (7)	0.644*** (0.183)	2.530 (3.110)
Group Conformity x Information Message (8)	0.109 (0.189)	3.528 (3.210)
Group Conformity x Values Message (9)	0.935*** (0.179)	0.658 (3.019)
Group Conformity x Group Norms Message (10)	0.537*** (0.178)	4.368 (3.010)
Accuracy Motivation x Information Message (11)	0.088 (0.193)	7.163** (3.269)
Accuracy Motivation x Values Message (12)	0.730*** (0.181)	4.750 (3.057)
Accuracy Motivation x Group Norms Message (13)	0.535*** (0.181)	4.092 (3.062)
Constant (1)	3.445*** (0.130)	59.620*** (2.148)
Observations	1,805	1,953
R-squared	0.052	0.004

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Message Evaluation and Consensus Beliefs Regression Results

Based on the results of the Mechanical Turk study, one would anticipate the information message again to be evaluated as the strongest message. The results of the primary survey are, however, not consistent with those of the Mechanical Turk study. Model 1 in Table 4 shows that when motivations are induced, both the group norms message and the values message are

perceived more favorably than the information message. This suggests, in light of what I next present, that message evaluations are not the mediational mechanisms at work. People instead perhaps view the messages as a means to motivational goal.⁵

Evaluating Hypotheses

As explained, message effectiveness, when designed to create a science consistent outcome goal, depends on shifting participants' behaviors and attitudes regarding climate change. The three primary outcome variables, climate change beliefs, individual climate-related behaviors, and support for climate change mitigation policies, are used to measure the effectiveness of conditions at meeting science consistent outcome goals. Results from this survey ultimately support the main hypothesis— that messages will be most effective when paired with the relevant motivational prime. Each message, when matched with the corresponding motivation, resulted in significant positive shifts in climate change beliefs and climate change behaviors.

This is made clear in Table 5, which presents the main survey results regressing each key scale against the experimental conditions. The first model shows that matching messages to the appropriate motivation positively increases climate change beliefs. Respectively, conditions 6, 10, and 11 display a 0.403, 0.426, and a 0.349 shift on a 7-point scale, respectively. These shifts fall between a 5-6% movement, which is non-trivial. Condition 6, 10, and 11 also generated shifts in climate change behavioral intentions, with respective 0.215, 0.240 and 0.207 shifts on a 5-point scale. These shifts are between a 4.1-4.8% difference which is not as strong, but still significant. Positive shifts in climate change beliefs and climate change behavioral intentions

⁵ The group norms message was also the only message identified as being “from my people,” whereas the other messages were perceived as being from a source the majority of participants did not identify with. This is sensible because the group norms message reads like a Republican informing other Republicans that more people within their party than they might think care about climate change.

support the main hypothesis. This is a *critical* finding then in support of my main hypotheses – the particular type of climate message “works” when it matches the individual’s processing motivation. Prior work has found mixed results probably because there has been no accounting for motivation, much less a comparison across different types of messages.

VARIABLES	(1) Climate Change Beliefs	(2) Climate Change Behaviors	(3) Climate Change Policy Attitudes
No Motivation x Information Message (2)	0.103 (0.157)	-0.075 (0.112)	-0.036 (0.170)
No Motivation x Values Message (3)	0.109 (0.155)	0.028 (0.111)	-0.209 (0.168)
No Motivation x Group Norms Message (4)	0.386** (0.152)	0.209* (0.108)	0.171 (0.164)
Values Threat x Information Message (5)	0.199 (0.158)	0.165 (0.112)	0.186 (0.171)
Values Threat x Values Message (6)	0.403*** (0.152)	0.215** (0.108)	0.139 (0.165)
Values Threat x Group Norms Message (7)	0.439*** (0.157)	0.233** (0.112)	0.011 (0.170)
Group Conformity x Information Message (8)	0.229 (0.162)	0.049 (0.115)	0.222 (0.175)
Group Conformity x Values Message (9)	0.221 (0.153)	0.131 (0.109)	0.181 (0.165)
Group Conformity x Group Norms Message (10)	0.426*** (0.153)	0.240** (0.109)	0.054 (0.165)
Accuracy Motivation x Information Message (11)	0.349** (0.166)	0.207* (0.118)	0.118 (0.179)
Accuracy Motivation x Values Message (12)	0.096 (0.155)	-0.001 (0.110)	-0.111 (0.168)
Accuracy Motivation x Group Norms Message (13)	0.073 (0.155)	0.058 (0.110)	-0.100 (0.168)
Constant (1)	4.162*** (0.109)	3.426*** (0.077)	4.270*** (0.118)
Observations	1,964	1,964	1,963
R-squared	0.012	0.011	0.008

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Main Outcome Variables Regression Results

Interestingly, when paired with the corresponding motivation, these messages did not alter participants' attitudes about climate change policies. In fact, none of the conditions shifted climate change policy attitudes. Thus, it seems the conditions for message effectiveness only concern attitudes and behavioral intents – it is very difficult to move policy opinions. This is likely the case because Republicans generally view climate policy as intervention-based of and oppose it (Campbell & Kay 2014). We can move attitudes and behaviors; future work will need to explore how to move policy views.

That said, Table 6 is a correlation matrix of the main outcome composites. This test indicates how well the composites are related. Policy attitudes are the most correlated with beliefs. The correlation between policy attitudes and beliefs complicates the apparent lack of significant movement of policy attitudes. Although none of the conditions demonstrate significant shifts in policy attitudes, climate change beliefs and behavioral intentions are related to policy attitudes. Thus, it may be that a strategy could be developed to boost climate change beliefs and behavioral changes, which can then facilitate policy support changes.

	Climate Change Beliefs	Climate Change Behaviors	Climate Change Policy Attitudes
Climate Change Beliefs	1.0000		
Climate Change Behaviors	0.6138	1.0000	
Climate Change Policy Attitudes	0.7236	0.5812	1.000

Table 6: Correlation Matrix of Main Outcome Composites

Perhaps even more important is a finding that was not anticipated: the relative effectiveness of the group norms message. Even without any induced motivations, this message significantly shifted climate change beliefs and behavior intentions by 0.368 and 0.209, or 5.2%

and 4.2%. No other message generated movement without being matched with the corresponding motivation. This evidence suggests the group norms message is exceptionally powerful.

The group norms message also worked with the values threat motivation, creating shifts of 0.439 and 0.233, or 6.3% and 4.7%. It is possible that this is because the values threat and group conformity motivations were induced in a similar manner. But if this was the case, one would expect the group conformity threat to result in the same positive shifts when matched with the values message. As the results of the survey do not show the values threat and the group conformity threat to be interchangeable, it suggests the group norms message is particularly strong.

To ensure the accuracy of these results, each outcome was tested with controls (see Appendix VI). Although controls marginally change the results of this survey (e.g., size of the effects), the key differences are still significant. Interestingly, with controls, the condition most effective at shifting climate change beliefs and individual behaviors is the values threat motivation paired with the group norms message. This indicates that threatening group values may be an effective way to motivate individuals to agree with their group, even if the group itself is not directly under threat.

Figures 3-6 on the following pages visually display the main outcome results. These figures show the positive and significant effects of motivational match and the relative strength of the group norms messages in all cases except for the accuracy motivated condition.

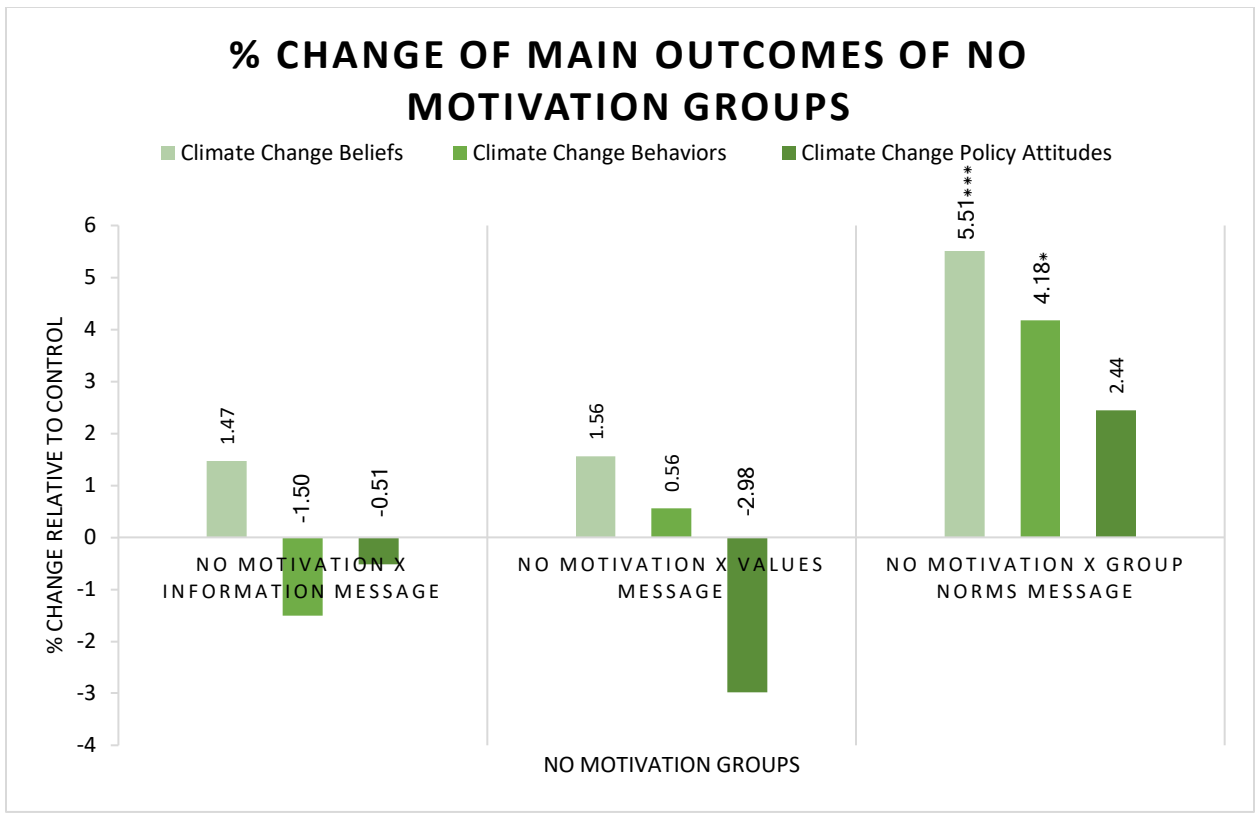


Figure 3: Main Outcome Results of No Motivation Groups

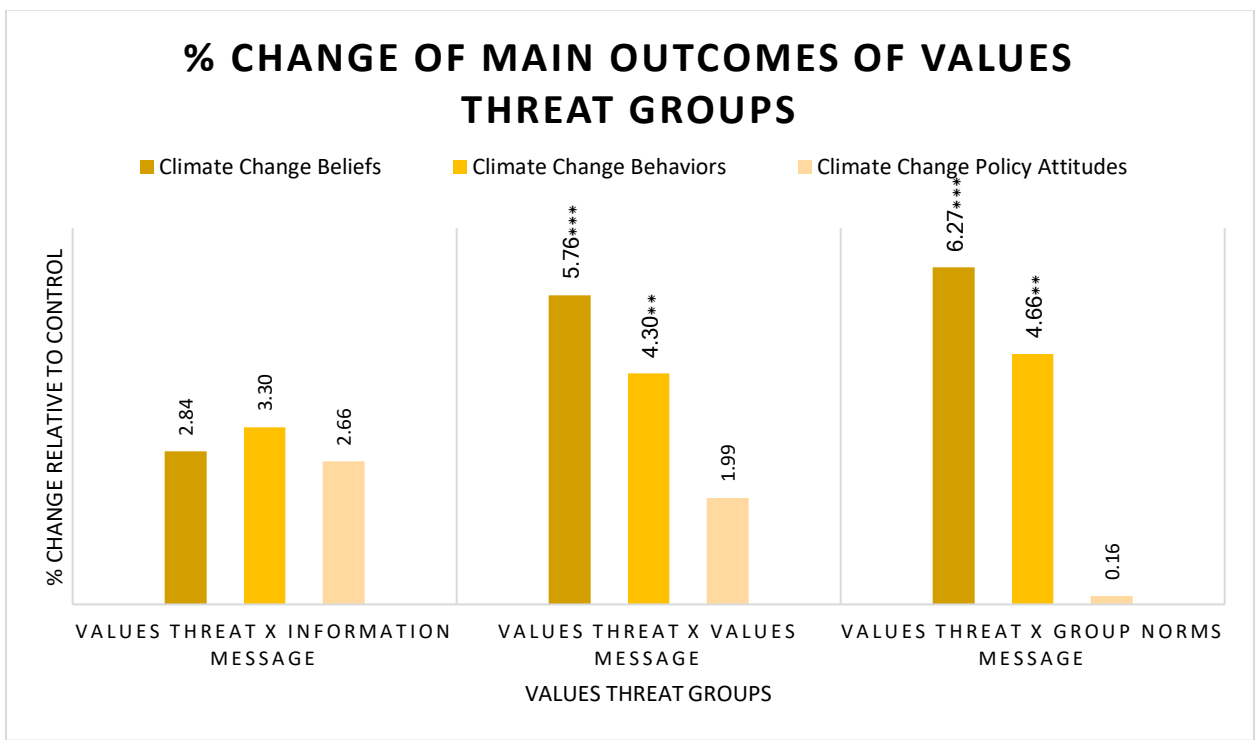


Figure 4: Main Outcome Results of Values Threat Groups

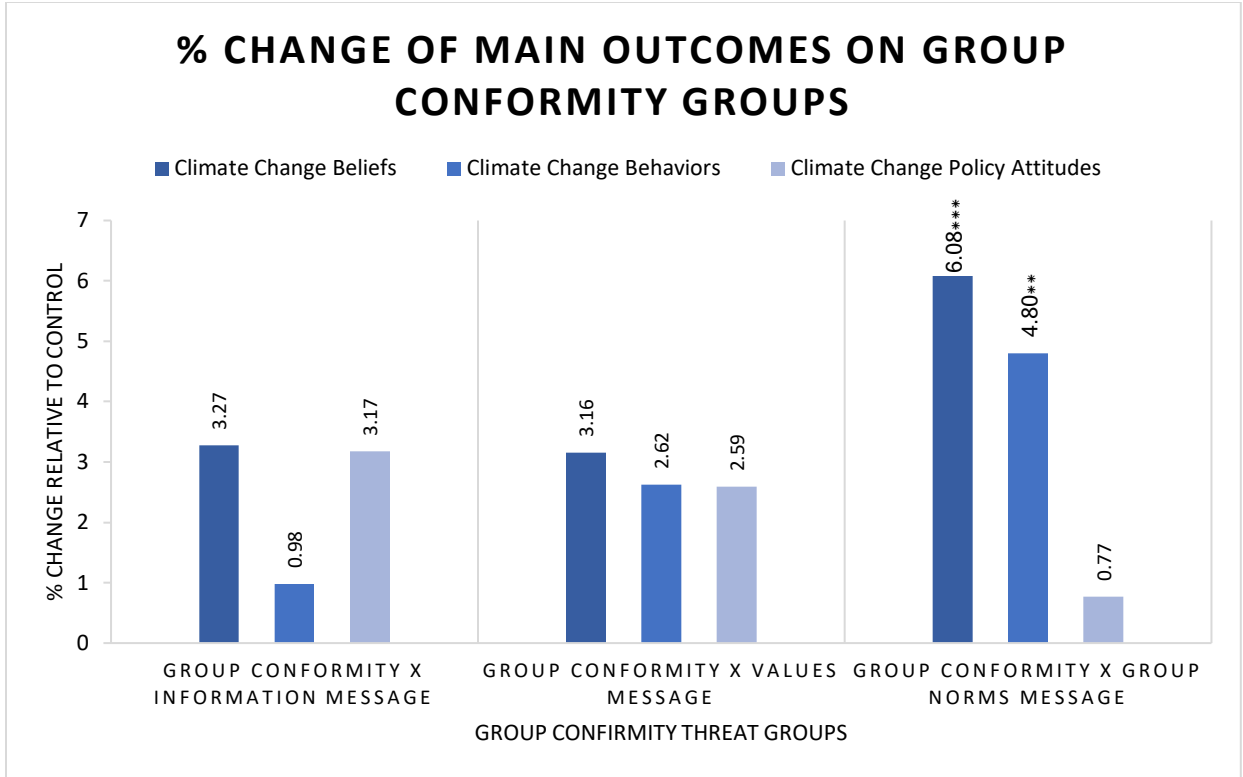


Figure 5: Main Outcome Results of Group Conformity Groups

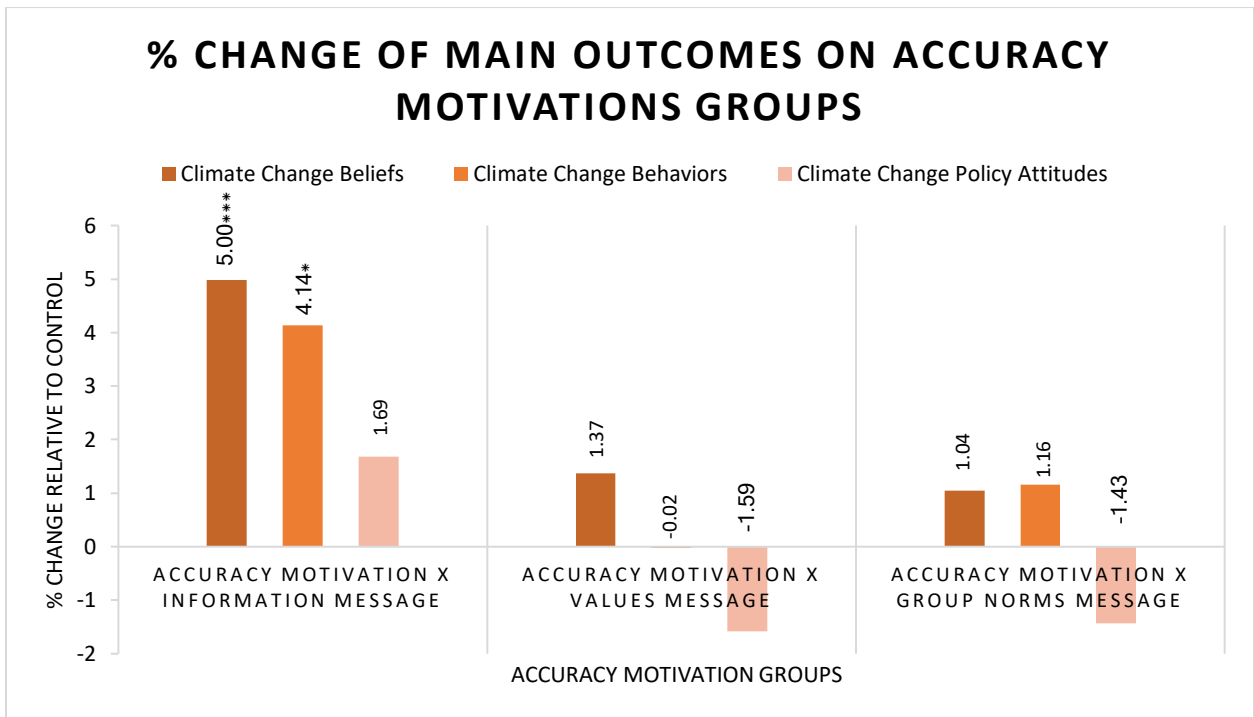


Figure 6: Main Outcome Results of Accuracy Motivations Groups

This study also made several other predictions, which ultimately proved to be false:

1. This study was also an opportunity to study the effect of proposed backlash or boomerang effects when audiences are presented with information that contradicts their prior beliefs.

The results of this survey show no significant negative shifts, and therefore no backlash or boomerang effects. In conditions 5 and 8, where directionally-primed participants read the information message, there are no negative coefficients. Even when primed to be more defensive of their pre-existing values or group identity, participants did not negatively react to information that contradicts the predominant views of their values systems of group identities.

2. The information message will likely affect all outcome variables, given the goal and message processing is to be accurate from an objective standpoint.

This prediction proved to be false. When matched with the accuracy motivation prime, the information message only significantly shifted one's climate change beliefs. To some extent, this condition did positively impact one's climate change behaviors but did not shift participants towards support for mitigation policies.

3. The value and group messages will be less likely to influence policy beliefs that involve government actions. In these treatment groups, the goal and message confirm values and identities, and those are not consistent with governmental intervention even if it does facilitate beliefs about climate change and individual actions.

Although this study correctly predicted that the values and group messages did not influence policy beliefs, this prediction can be thrown out because none of the conditions were effective at altering attitudes towards mitigation policies.

The results of this experiment demonstrate that message effectiveness depends on underlying individual motivations, and that norms messages are particularly powerful. When motivations are paired with a relevant message, the messages generate more positive outcomes than without their corresponding motivation. Of all the message types, norms proved to be the most effective at positively shifting climate change beliefs and behavioral intentions. As noted in the literature review, directional motivations and norms messaging have been underutilized in climate change messaging. Directional motivation and norms messages can be used in climate change messaging more commonly to get past polarization and stagnation.

Chapter 6: Conclusion

As noted in previous chapters, this work is the first to test information, values, and group norms messages in a single survey. It found that across message type, relevant motivations result in significant shifts towards beliefs that climate change is a real phenomenon that needs to be addressed and behavioral intentions related to climate change. The group norms message proved to be particularly powerful, significantly shifting beliefs and behavioral intentions in groups with no motivations, values treat motivations and group conformity motivations. Within that finding, the strength of the group norms message without motivational primes has the broadest implications for “real world” climate change campaigns. This finding implies that the majority of Republicans caring about climate change is surprising, new information that effectively sways the preferences and attitudes of Republican audiences.

In the introduction of this thesis, I discussed how LGBTQ+ activism successfully drove major legislation change when campaigns switched to a strategy rooted in shifting social norms. Adopting a similar strategy would likely advance the agenda of climate change activists. Doing so, however, would require activists to abandon traditional messaging strategies that emphasize the scientific consensus on climate change.

In order to accomplish any major changes in climate change policy, the public needs to put substantial pressure on political actors. Such pressure requires the public to have a similar understanding of what climate change is and what strategies can be employed to mitigate its effects. To get to this point, this work suggests climate change campaigns devote more attention to shifting norms within social groups. Importantly, this kind of messaging is most effective when it comes from sources identifiable audiences recognize. In the first chapter of this thesis, I discussed how George W. Bush and other high-profile Republicans’ statement in support of gay

marriage defied party norms, and how that might have signaled to others within the party to adopt more progressive attitudes and preferences. Similar actions can be taken on a smaller scale, with Republican members of the public who believe in climate change publically discussing their views. This would likely catch the attention of policymakers and key party figures, who may conform to the dominant views of their party's "regular" people. In turn, these high-profile Republicans speaking out about their changed climate change beliefs would likely shift the opinions of more party members, leading to somewhat of a snowball effect of shifting party views on climate change. Public opinion and elite cues, in this ideal scenario, both demonstrate opinion leadership and play a role in shifting party norms (Nisbet & Kotcher, 2009). In this scenario, messages that stress how Republicans are needlessly divided on climate change or that predominate Republican attitudes about climate change are not in accordance with their values may be more successful than more traditional science-based climate change messaging.

Another type of social group that may be salient in the climate change debate is religious groups. Like political parties, religious groups are typically structured in an organized fashion and have predominant views on issues. The perceived strength of the values message and its relative effectiveness highlights the role religion plays in the climate change debate. In the accuracy motivation group, participants were prompted with an open-ended question to share how they arrived at their answers.⁶ Some of these responses included religious language and claimed that climate change was not worth worrying about because it was all part of God's plan. Although the overwhelming majority of participants reported an affinity with a religious group, these responses make up a small share of the overall responses. It is unlikely that such firm

⁶ This data was ultimately not reported as a part of the results section because only the accuracy group answered this question, so responses could not be accurately compared across conditions.

beliefs will be moved, but more norms change could potentially be accomplished in more progressive religious groups with effective opinion leadership. However, discussing politics in religious settings has varied effects on political participation, and may only be effective when religious leaders signal their climate change views (Scheufele & Nisbet, 2003).

Survey results reported in the previous chapter are small shifts that some may think are negligible. This thesis does not propose that motivated climate change messaging is the complete solution to combating the threat of climate change. Rather, it is a tool that can be employed to bolster support for action against climate change. Further research needs to be done studying the effects of frequent exposure to motivated climate change messaging, as it is unlikely that a single message will dramatically change pre-existing views. Instead of offering a comprehensive solution to climate change, this research offers insights into how to effectively shift pockets of resistant public opinion about climate change.

One of the major shortcomings of this work is its failure to include misinformation messages. In order to better understand how individuals engage with climate change messaging, it is critical to understand why denial messages resonate with such a large number of people, and what underlying motivations make people susceptible to misinformation on climate change. Further research is necessary to uncover what misinformation messages are effective at forming climate change denial and/or skepticism.

The findings of this survey also suggest that even with evolving beliefs on climate change, and increases in individual climate-friendly behaviors, getting the public to back major climate change mitigation policies will be an uphill battle. Unfortunately, results of this survey demonstrate that more science-consistent beliefs on climate change do not necessarily correspond with increased support for policy change. This is perhaps because the suggested

policy changes involved government intervention in the marketplace, which is generally opposed by Republican audiences. However, results also indicate that environmentally-conscious beliefs about climate change and intentions to adopt more climate friendly behaviors are related to an individual's policy preferences. Sharper shifts in climate change beliefs and adopting climate-friendly behaviors might thus drive increased policy support. Overcoming opposition to climate mitigation policies within the Republican Party will likely require coordinated campaigns designed to target Republican audiences. Ultimately, the findings of this survey lay the foundation upon which any climate change campaign can build.

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Appendix I: Survey Messages

Information Message:

Climate change poses major threat to United States, new scientific report concludes



Climate change is being felt in communities across the United States, and will cause growing harm to the environment. We need to take concerted action on human-induced climate change so as to protect our environment from desecration.

That is the sobering message sent by a major scientific report released in November that examines climate change impacts on different U.S. regions, economic sectors, and ecosystems. The 29-chapter report, formally known as Volume II of the *Fourth National Climate Assessment*, was assembled by some 300 expert scientists and involved collecting public comment at events in more than 40 cities. The report concludes that “Earth’s climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities... the evidence consistently points to human activities, especially emissions of greenhouse or heat-trapping gases, as the dominant cause.” The report also states that without “substantial and sustained global efforts,” climate change will “cause growing losses to American infrastructure and property and impede the rate of economic growth over this century.” This report suggests that these efforts will have to come, in part, from individuals taking environmentally thoughtful actions such as driving less, using energy efficient products, and adjusting thermostats. The report makes clear the time to act is now.

Values Message:

Climate change poses major threat to United States, challenging our fundamental values



Climate change is being felt in communities across the United States, and will cause growing harm to the environment. We need to take concerted action on human-induced climate change so as to protect our environment from desecration.

Indeed, there is something entirely pristine about the natural environment. When we drink polluted water, live near toxic sites, or inhale dirty, smog-filled air, we contaminate our bodies with chemical impurities. The good news is that we can act to protect and decontaminate the environments we live in, making them pure once again – before the full effects of climate change are felt. Simply adjusting thermostats, choosing to use energy efficient appliances, and driving less can make a big difference. By taking a tougher stance on protecting the natural environment,

you will be honoring all of Creation. It should be every good American's goal to cleanse the environment, so our children and our children's children can experience the uncontaminated purity and value of nature. Take pride in your country and perform your patriotic duty by taking responsibility for caring for yourself and the land you call home. You can make a difference.

Group Norms Message:

Most agree – Democrats and Republicans – that climate change poses major threat to United States



Climate change is being felt in communities across the United States, and will cause growing harm to the environment. We need to take concerted action on human-induced climate change so as to protect our environment from desecration.

This is actually a point on which there is more agreement than many people realize. A recent representative survey of Americans found that citizens underestimate the percentage of Americans, Democrats and Republicans, who think climate change is happening. For example, when asked to guess how many Republicans believe in climate change, the average guess is 43%. Yet, perhaps surprisingly, a clear majority – nearly 75% or almost $\frac{3}{4}$ ths – of Republicans actually believe climate change is happening. Overall, Americans view their fellow citizens, even members of their own political party, as more different than they really are. The reality is that even the bulk of Republicans believe in climate change, worry about how it will impact the environment, and are in favor of taking action (e.g., driving less, using energy efficient products, adjusting thermostats). Another recent poll shows that a clear majority of Republicans take actions themselves to help the environment. As one report put it: “More Republicans Than You Think Support Action on Climate Change.” The right thing to do is for *all* Republicans to recognize this new consensus and unite themselves so as to take individual actions to combat climate change.

Appendix II: Survey Primes

Group Conformity and Values Threat:

How important is being a Republican to you?

<u>Not at all</u> important	<u>Not very</u> important	<u>Somewhat</u> important	<u>Very</u> important	<u>Extremely</u> important
--------------------------------	------------------------------	------------------------------	--------------------------	-------------------------------

How well does the term Republican describe you?

<u>Not at all</u> well	<u>Not very</u> well	<u>Somewhat</u> well	<u>Very</u> well	<u>Extremely</u> well
---------------------------	-------------------------	-------------------------	---------------------	--------------------------

When talking about Republicans how often do you use “we” instead of “they”?

<u>Never</u>	<u>Rarely</u>	<u>Some of</u> the time	<u>Most of</u> the time	<u>All of</u> the time
--------------	---------------	----------------------------	----------------------------	---------------------------

To what extent do you think of yourself as being a Republican?

<u>Not at all</u>	<u>Not too much</u>	<u>Somewhat</u>	<u>A good deal</u>	<u>A great deal</u>
-------------------	---------------------	-----------------	--------------------	---------------------

Group Conformity:

You just reported that you identify with the Republican Party. A lot of people say that the Republican Party is falling apart. They point to Democratic wins in the 2018 midterm election. They also point to the decreasing consensus within the Republican Party on important issues such as trade, foreign policy, and economic development. There is also worry that this lack of cohesion will reduce Republicans’ opportunities to use and maintain their political power. How much do you agree that the Republican Party is falling apart?

<u>Agree</u> Somewhat	<u>Agree</u> Quite a Bit	<u>Agree</u> A Lot	<u>Agree</u> Very Much	<u>Agree</u> Completely
--------------------------	-----------------------------	-----------------------	---------------------------	----------------------------

Values Threat:

You reported that you identify with the Republican Party. A lot of people think that Republicans these days have strayed from their core values. They say Republicans no longer care enough about decency, purity, and the country’s well-being. They say Republicans have disregarded the traditions of government, which has created chaos and disorder. And, they say that Republicans have shown a love for power rather than a love of country. How much do you agree that Republicans have strayed from their values?

<u>Agree</u> Somewhat	<u>Agree</u> Quite a Bit	<u>Agree</u> A Lot	<u>Agree</u> Very Much	<u>Agree</u> Completely
--------------------------	-----------------------------	-----------------------	---------------------------	----------------------------

Appendix III: Sample Survey Questions

Whose responsibility is it to determine if a law is constitutional?

President

Congress

Supreme Court

Don't know

Who is the current U.S. Vice President?

Rex Tillerson

James Mattis

Mike Pence

Paul Ryan

Don't know

What is your age?

Under 18

18-24

25-34

35-50

51-65

Over 65

What is the highest level of education you have completed?

Less than
High school

High
school graduate

Some
college

4 yr college
degree

Advanced
degree

To what extent do you disagree or agree that: "If the government spent less time trying to fix everyone's problems, we'd all be a lot better off"?

strongly
disagree

moderately
disagree

slightly
disagree

neither disagree
nor agree

slightly
agree

moderately
agree

strongly
agree

How negatively or positively did you feel about the message you just read about climate change and the environment?

completely
negative

largely
negative

somewhat
negative

neutral

somewhat
positive

largely
positive

completely
positive

To what extent do you disagree or agree that: "The message I just read feels like it came from 'my people'"?

strongly
disagree

moderately
disagree

slightly
disagree

neither disagree
nor agree

slightly
agree

moderately
agree

strongly
agree

Climate change refers to a long-term change in Earth's climate due to an increase in the average atmospheric temperature. What do you think? Do you think that climate change is happening?

definitely
is NOT
happening
very likely
is NOT
happening
probably
is NOT
happening
not sure
probably
is happening
very likely
is happening
definitely
is happening

When it comes to issues that the United States needs to address, would you say climate change is unimportant or important?

extremely
unimportant
very
unimportant
somewhat
unimportant
neither
unimportant
somewhat
important
very
important
extremely
important

Do you oppose or support increased government regulation on industries and businesses that produce a great deal of greenhouse emissions linked to climate change?

1
strongly
oppose
2
moderately
oppose
3
slightly
oppose
4
neither oppose
nor support
5
slightly
support
6
moderately
support
7
strongly
support

Do you oppose or support increased taxes on industries and businesses that produce a great deal of greenhouse emissions linked to climate change?

1
strongly
oppose
2
moderately
oppose
3
slightly
oppose
4
neither oppose
nor support
5
slightly
support
6
moderately
support
7
strongly
support

Regardless of what you have done in the past, please report how unlikely or likely you are to engage in each activity in the future.

	Very Unlikely	Moderately Unlikely	Neither Unlikely Nor Likely	Moderately Likely	Very Likely
Buy a more fuel efficient automobile and/or drive less					
Use only energy efficient lightbulbs					
Adjust thermostat settings (so it is warmer in the summer and cooler in the winter)					
Buy Green Electricity					

Appendix IV: Mechanical Turk Survey T-Tests

```
. ttest evalinfo = evalvalue
```

```
Paired t test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
evalinfo	85	4.894118	.1275562	1.176011	4.640458	5.147777
evalvalue	85	4.541176	.1229059	1.133137	4.296765	4.785588
diff	85	.3529412	.1552249	1.431103	.0442593	.661623
mean(diff) = mean(evalinfo - evalvalue)					t =	2.2737
Ho: mean(diff) = 0					degrees of freedom =	84
Ha: mean(diff) < 0		Ha: mean(diff) != 0		Ha: mean(diff) > 0		
Pr(T < t) = 0.9872		Pr(T > t) = 0.0255		Pr(T > t) = 0.0128		

```
. ttest evalinfo = evalnorm
```

```
Paired t test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
evalinfo	84	4.880952	.1283945	1.176755	4.625581	5.136324
evalnorm	84	4.443452	.1380749	1.265477	4.168827	4.718078
diff	84	.4375	.1743706	1.598133	.0906839	.7843161
mean(diff) = mean(evalinfo - evalnorm)					t =	2.5090
Ho: mean(diff) = 0					degrees of freedom =	83
Ha: mean(diff) < 0		Ha: mean(diff) != 0		Ha: mean(diff) > 0		
Pr(T < t) = 0.9930		Pr(T > t) = 0.0141		Pr(T > t) = 0.0070		

```
. ttest evalvalue = evalnorm
```

```
Paired t test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
evalvalue	84	4.553571	.1237438	1.134131	4.30745	4.799693
evalnorm	84	4.443452	.1380749	1.265477	4.168827	4.718078
diff	84	.110119	.1491244	1.366748	-.1864833	.4067214
mean(diff) = mean(evalvalue - evalnorm)					t =	0.7384
Ho: mean(diff) = 0					degrees of freedom =	83
Ha: mean(diff) < 0		Ha: mean(diff) != 0		Ha: mean(diff) > 0		
Pr(T < t) = 0.7688		Pr(T > t) = 0.4623		Pr(T > t) = 0.2312		

Appendix V: Randomization Balance Test

```
. mlogit condition intpolitics partipolitics talkpolitics poliknow age educat protestant catholic
jewish norelig female income minority govtrust govbigint ideology pid equaltoomuch govout
moralfound trustclimsci needcog
```

```
Iteration 0: log likelihood = -5024.2481
Iteration 1: log likelihood = -4873.6484
Iteration 2: log likelihood = -4872.1511
Iteration 3: log likelihood = -4872.1437
Iteration 4: log likelihood = -4872.1437
```

```
Multinomial logistic regression      Number of obs   =      1,962
LR chi2(264)                        =      304.21
Prob > chi2                          =      0.0449
Log likelihood = -4872.1437         Pseudo R2       =      0.0303
```

condition	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
1						
intpolitics	.1249611	.1555418	0.80	0.422	-.1798951	.4298174
partipolitics	.0324236	.0961616	0.34	0.736	-.1560497	.2208969
talkpolitics	-.082185	.0634783	-1.29	0.195	-.2066002	.0422301
poliknow	.0731073	.1113254	0.66	0.511	-.1450865	.2913012
age	-.1762258	.1154246	-1.53	0.127	-.4024538	.0500022
educat	-.1022547	.1322335	-0.77	0.439	-.3614276	.1569183
protestant	.2783992	.8380158	0.33	0.740	-1.364082	1.92088
catholic	.0728044	.8600213	0.08	0.933	-1.612806	1.758415
jewish	-1.625597	1.356178	-1.20	0.231	-4.283656	1.032462
norelig	-.9726167	.9042137	-1.08	0.282	-2.744843	.7996096
female	-.2534098	.2429435	-1.04	0.297	-.7295703	.2227506
income	-.0555952	.1198069	-0.46	0.643	-.2904124	.179222
minority	.1867776	.3797835	0.49	0.623	-.5575843	.9311395
govtrust	-.4435475	.2181739	-2.03	0.042	-.8711605	-.0159346
govbigint	.3069112	.295756	1.04	0.299	-.27276	.8865823
ideology	-.0919104	.1347499	-0.68	0.495	-.3560154	.1721946
pid	.0902254	.2012532	0.45	0.654	-.3042237	.4846744
equaltoomuch	.0073362	.0701247	0.10	0.917	-.1301056	.1447781
govout	.0216389	.0767759	0.28	0.778	-.1288391	.1721168
moralfound	.1115934	.1040907	1.07	0.284	-.0924207	.3156075
trustclimsci	.0366802	.0737187	0.50	0.619	-.1078059	.1811663
needcog	-.1517329	.1560309	-0.97	0.331	-.457548	.1540821
_cons	.7562252	1.775572	0.43	0.670	-2.723832	4.236282
2						
intpolitics	.2977486	.1610994	1.85	0.065	-.0180004	.6134977
partipolitics	-.0518534	.0991528	-0.52	0.601	-.2461893	.1424825
talkpolitics	-.0037962	.0638895	-0.06	0.953	-.1290174	.121425
poliknow	-.1831445	.1117339	-1.64	0.101	-.4021389	.0358499
age	-.1934107	.1184312	-1.63	0.102	-.4255315	.0387101
educat	-.0287501	.1353787	-0.21	0.832	-.2940873	.2365872
protestant	-.2334534	.7876616	-0.30	0.767	-1.777242	1.310335
catholic	-.6669826	.818905	-0.81	0.415	-2.272007	.9380417
jewish	-.6232727	1.004865	-0.62	0.535	-2.592771	1.346226
norelig	-.9029987	.8378492	-1.08	0.281	-2.545153	.7391556
female	-.1106363	.2509036	-0.44	0.659	-.6023982	.3811257
income	-.0918075	.1234887	-0.74	0.457	-.3338409	.1502259
minority	-.4606862	.4439092	-1.04	0.299	-1.330732	.4093599
govtrust	-.1688406	.2216428	-0.76	0.446	-.6032525	.2655712
govbigint	.2625811	.2988154	0.88	0.380	-.3230863	.8482485
ideology	-.1349709	.1359619	-0.99	0.321	-.4014513	.1315095

pid	.0653928	.205448	0.32	0.750	-.3372779	.4680634
equaltoomuch	-.0239443	.0709465	-0.34	0.736	-.1629968	.1151083
govout	.1348552	.0804334	1.58	0.094	-.0227814	.2925117
moralfound	.185718	.1072928	1.73	0.083	-.024572	.396008
trustclimsci	-.0041933	.0756181	-0.06	0.956	-.152402	.1440153
needcog	-.2857089	.1580695	-1.81	0.071	-.5955195	.0241016
_cons	.8797303	1.786263	0.49	0.522	-2.621282	4.380742

3						
intpolitics	.3962056	.159957	2.48	0.013	.0826956	.7097155
partipolitics	.0636853	.0946123	0.67	0.501	-.1217514	.2491219
talkpolitics	-.1330765	.0636484	-2.09	0.037	-.2578251	-.0083279
poliknow	.0757818	.1148217	0.66	0.509	-.1492646	.3008282
age	-.0494178	.1184689	-0.42	0.677	-.2816127	.182777
educat	-.1687005	.1344985	-1.25	0.210	-.4323128	.0949118
protestant	.5479761	.9358527	0.59	0.558	-1.286281	2.382233
catholic	.0595695	.9597959	0.06	0.951	-1.821596	1.940735
jewish	.3346495	1.103782	0.30	0.762	-1.828723	2.498022
norelig	-.3741305	.9871812	-0.38	0.705	-2.30897	1.560709
female	-.2259408	.2461682	-0.92	0.359	-.7084217	.25654
income	-.0091076	.121392	-0.08	0.940	-.2470315	.2288163
minority	.3916273	.3734668	1.05	0.294	-.3403541	1.123609
govtrust	.031283	.2223447	0.14	0.888	-.4045047	.4670706
govbigint	.39782	.2998961	1.33	0.185	-.1899656	.9856056
ideology	-.2189668	.1349895	-1.62	0.105	-.4835413	.0456077
pid	.3629429	.2123378	1.71	0.087	-.0532316	.7791173
equaltoomuch	-.0918973	.0698519	-1.32	0.188	-.2288046	.04501
govout	.1344696	.0804018	1.67	0.094	-.023135	.2920342
moralfound	.1084154	.1045172	1.04	0.300	-.0964345	.3132653
trustclimsci	-.028595	.0750765	-0.38	0.703	-.1757422	.1185522
needcog	-.3600782	.156173	-2.31	0.021	-.6661718	-.0539847
_cons	-2.278487	1.892845	-1.20	0.229	-5.988396	1.431421

4	(base outcome)					

5						
intpolitics	-.1215251	.1613006	-0.75	0.451	-.4376685	.1946182
partipolitics	.1283335	.0952718	1.35	0.178	-.0583958	.3150627
talkpolitics	-.0292826	.0669221	-0.44	0.662	-.1604475	.1018823
poliknow	-.0624534	.1124517	-0.56	0.579	-.2828548	.1579479
age	-.1249071	.1194188	-1.05	0.296	-.3589637	.1091496
educat	.0050564	.1351898	0.04	0.970	-.2599108	.2700236
protestant	.5903651	.9363275	0.63	0.528	-1.244803	2.425533
catholic	.1149906	.9600496	0.12	0.905	-1.756672	1.996653
jewish	-.5716198	1.231208	-0.46	0.642	-2.984744	1.841504
norelig	-.1543204	.9835193	-0.16	0.875	-2.081983	1.773342
female	-.6428021	.2514088	-2.56	0.011	-1.135554	-.1500498
income	.0697911	.122306	0.57	0.568	-.1699244	.3095065
minority	.2210667	.3748089	0.59	0.555	-.5135453	.9556787
govtrust	.3003538	.217112	1.38	0.167	-.125178	.7258856
govbigint	.5453002	.2996779	1.82	0.069	-.0420578	1.132658
ideology	-.0357927	.1366799	-0.26	0.793	-.3036804	.232095
pid	-.1372251	.2006363	-0.68	0.494	-.530465	.2560149
equaltoomuch	.0285516	.0717759	0.40	0.691	-.1121267	.1692298
govout	.0008228	.0783683	0.01	0.992	-.1527762	.1544219
moralfound	.2511948	.1113129	2.26	0.024	.0330256	.469364
trustclimsci	.0212662	.075667	0.28	0.779	-.1270385	.1695709
needcog	-.2108671	.1616209	-1.30	0.192	-.5276382	.105904

_cons	-.7525197	1.823057	-0.41	0.680	-4.325646	2.820607
<hr/>						
6						
intpolitics	.1571326	.154992	1.01	0.311	-.1466461	.4609114
partipolitics	-.1270682	.0991746	-1.28	0.200	-.3214468	.0673104
talkpolitics	-.001208	.062177	-0.02	0.984	-.1230726	.1206567
poliknow	.0005232	.1100251	0.00	0.996	-.2151221	.2161685
age	-.2189413	.1139412	-1.92	0.055	-.4422619	.0043794
educat	-.1154475	.1304853	-0.88	0.376	-.371194	.1402989
protestant	-.2935011	.7314543	-0.40	0.688	-1.727125	1.140123
catholic	-.7139656	.7598032	-0.94	0.347	-2.203152	.7752213
jewish	-.7769893	.9346023	-0.83	0.406	-2.608776	1.054798
norelig	-1.50509	.7967779	-1.89	0.059	-3.066746	.0565658
female	-.463096	.240734	-1.92	0.054	-.9349261	.008734
income	-.0413096	.118505	-0.35	0.727	-.2735751	.190956
minority	.014472	.3836657	0.04	0.970	-.737499	.7664431
govtrust	-.1994926	.2150197	-0.93	0.354	-.6209235	.2219384
govbigint	.2895557	.2892812	1.00	0.317	-.277425	.8565364
ideology	-.254369	.1322567	-1.92	0.054	-.5135874	.0048493
pid	-.0950516	.1930128	-0.49	0.622	-.4733497	.2832466
equaltoomuch	-.0753378	.0675864	-1.11	0.265	-.2078048	.0571291
govout	.0902297	.0761528	1.18	0.236	-.0590271	.2394865
moralfound	.1271024	.1027344	1.24	0.216	-.0742533	.328458
trustclimsci	-.0122902	.0728468	-0.17	0.866	-.1550674	.130487
needcog	.0490891	.1577332	0.31	0.756	-.2600624	.3582405
_cons	2.875522	1.690095	1.70	0.089	-.4370037	6.188048
<hr/>						
7						
intpolitics	.1009392	.1608382	0.63	0.530	-.2142978	.4161762
partipolitics	.1281089	.092924	1.38	0.168	-.0540188	.3102367
talkpolitics	-.0058764	.0642382	-0.09	0.927	-.1317809	.1200281
poliknow	-.0861995	.1115597	-0.77	0.440	-.3048525	.1324534
age	-.0809734	.1192029	-0.68	0.497	-.3146068	.15266
educat	-.0500652	.1343779	-0.37	0.709	-.313441	.2133106
protestant	-.2374264	.7876946	-0.30	0.763	-1.781279	1.306427
catholic	-.3065831	.8101524	-0.38	0.705	-1.894453	1.281286
jewish	-1.373025	1.120609	-1.23	0.220	-3.569379	.8233285
norelig	-.5622354	.8280592	-0.68	0.497	-2.185202	1.060731
female	-.0518145	.2499868	-0.21	0.836	-.5417796	.4381507
income	.021132	.1206547	0.18	0.861	-.2153469	.2576109
minority	.4029535	.3655578	1.10	0.270	-.3135266	1.119434
govtrust	-.0640453	.2169125	-0.30	0.768	-.489186	.3610953
govbigint	.0929913	.2901191	0.32	0.749	-.4756318	.6616143
ideology	-.1406716	.1345614	-1.05	0.296	-.404407	.1230638
pid	-.063035	.1985485	-0.32	0.751	-.4521828	.3261129
equaltoomuch	-.0428196	.0711715	-0.60	0.547	-.1823133	.0966741
govout	.1412055	.0815526	1.73	0.083	-.0186346	.3010457
moralfound	.0609366	.1034111	0.59	0.556	-.1417454	.2636187
trustclimsci	-.0719433	.0757023	-0.95	0.342	-.2203171	.0764304
needcog	-.2154706	.1588399	-1.36	0.175	-.5267912	.0958499
_cons	1.686844	1.727332	0.98	0.329	-1.698664	5.072352

8							
	intpolitics	-.0239336	.164669	-0.15	0.884	-.346679	.2988117
	partipolitics	.1878059	.0960507	1.96	0.051	-.0004499	.3760618
	talkpolitics	-.0459623	.0687285	-0.67	0.504	-.1806678	.0887432
	poliknow	.1022275	.1154499	0.89	0.376	-.1240501	.328505
	age	-.1044392	.1224267	-0.85	0.394	-.3443911	.1355127
	educat	-.1096995	.139147	-0.79	0.430	-.3824226	.1630235
	protestant	.0745257	.8433401	0.09	0.930	-1.578391	1.727442
	catholic	-.2798768	.8705518	-0.32	0.748	-1.985323	1.426569
	jewish	-.8263317	1.160723	-0.71	0.477	-3.101308	1.448644
	norelig	-.2064593	.8796395	-0.23	0.814	-1.930521	1.517602
	female	-.1452374	.2566312	-0.57	0.571	-.6482252	.3577504
	income	.0593091	.1247633	0.48	0.535	-.1852224	.3038406
	minority	.3343098	.3844566	0.87	0.385	-.4192112	1.087831
	govtrust	-.1764572	.2244238	-0.79	0.432	-.6163198	.2634055
	govbigint	.5093336	.3117178	1.63	0.102	-.1016221	1.120289
	ideology	-.2561242	.1366147	-1.87	0.061	-.523884	.0116356
	pid	.1874389	.2071504	0.90	0.366	-.2185685	.5934462
	equaltoomuch	-.0014424	.0739636	-0.02	0.984	-.1464084	.1435236
	govout	-.0039663	.0805772	-0.05	0.961	-.1618946	.153962
	moralfound	-.0091447	.1059388	-0.09	0.931	-.2167809	.1984916
	trustclimsci	.0975548	.0775379	1.26	0.208	-.0544067	.2495363
	needcog	-.2109503	.1654601	-1.27	0.202	-.5352462	.1133456
	_cons	.2044373	1.819247	0.11	0.911	-3.361221	3.770095
9							
	intpolitics	-.0498616	.1550435	-0.32	0.748	-.3537413	.2540182
	partipolitics	.1256578	.0919606	1.37	0.172	-.0545817	.3058972
	talkpolitics	-.0319569	.0634071	-0.50	0.614	-.1562325	.0923188
	poliknow	.000321	.108026	0.00	0.998	-.2114061	.2120481
	age	-.0555486	.1164079	-0.48	0.633	-.2837039	.1726066
	educat	-.0814218	.131101	-0.62	0.535	-.3383751	.1755314
	protestant	-.4133125	.7556192	-0.55	0.584	-1.894299	1.067674
	catholic	-.4348178	.7781004	-0.56	0.576	-1.959867	1.090231
	jewish	-.9442019	1.020257	-0.93	0.355	-2.94387	1.055466
	norelig	-.8705905	.8029438	-1.08	0.278	-2.444332	.7031504
	female	.1024228	.2438919	0.42	0.575	-.3755966	.5804422
	income	.0383444	.1182758	0.32	0.746	-.1934718	.2701607
	minority	.2131069	.3706635	0.57	0.565	-.5133801	.9395939
	govtrust	.0188948	.2114113	0.09	0.929	-.3954638	.4332534
	govbigint	.4149604	.2871028	1.45	0.148	-.1477507	.9776716
	ideology	-.2275737	.1294519	-1.76	0.079	-.4812947	.0261473
	pid	.5078242	.208048	2.44	0.015	.1000576	.9155909
	equaltoomuch	.0673889	.0700093	0.96	0.336	-.0698269	.2046047
	govout	.025438	.0762201	0.33	0.739	-.1239506	.1748266
	moralfound	.1132726	.1035118	1.09	0.274	-.0896069	.3161521
	trustclimsci	.0716123	.0731532	0.98	0.328	-.0717653	.21499
	needcog	-.1289123	.1549843	-0.83	0.406	-.4326759	.1748512
	_cons	-2.838333	1.770982	-1.60	0.109	-6.309394	.6327277

10						
intpolitics	-.010007	.1540224	-0.06	0.948	-.3118854	.2918714
partipolitics	.0627629	.0932765	0.67	0.501	-.1200557	.2455815
talkpolitics	-.0573101	.0634413	-0.90	0.366	-.1816529	.0670326
poliknow	.0810707	.1105623	0.73	0.463	-.1356274	.2977687
age	-.1309847	.1144816	-1.14	0.253	-.3553645	.093395
educat	.0450663	.130032	0.35	0.729	-.2097918	.2999244
protestant	-.3507662	.7545782	-0.46	0.642	-1.829712	1.12818
catholic	-.8127345	.7828324	-1.04	0.299	-2.347058	.7215888
jewish	-.7416721	.9530039	-0.78	0.436	-2.609526	1.126181
norelig	-.7954784	.7977734	-1.00	0.319	-2.359086	.7681287
female	-.5095216	.2411537	-2.11	0.035	-.9821741	-.0368691
income	.0977131	.1174745	0.83	0.406	-.1325327	.3279589
minority	-.6007488	.4295682	-1.40	0.162	-1.442687	.2411894
govtrust	-.0527515	.2113898	-0.25	0.803	-.4670679	.3615649
govbigint	.0982038	.2805256	0.35	0.726	-.4516162	.6480239
ideology	-.1711575	.131488	-1.30	0.193	-.4288693	.0865543
pid	.306632	.2019869	1.52	0.129	-.0892551	.7025191
equaltoomuch	-.0651609	.0677865	-0.96	0.336	-.1980201	.0676982
govout	.008396	.0748848	0.11	0.911	-.1383755	.1551675
moralfound	.1387883	.1027083	1.35	0.177	-.0625163	.3400928
trustclimsci	.0549841	.0727762	0.76	0.450	-.0876546	.1976229
needcog	-.1179402	.1566442	-0.75	0.451	-.4249573	.1890769
_cons	-.5240965	1.730738	-0.30	0.762	-3.916281	2.868088

11						
intpolitics	.0603202	.168385	0.36	0.720	-.2697083	.3903488
partipolitics	.1069461	.1009205	1.06	0.289	-.0908545	.3047467
talkpolitics	-.111711	.0696194	-1.60	0.109	-.2481625	.0247406
poliknow	-.0028902	.1190749	-0.02	0.981	-.2362727	.2304922
age	-.1365107	.1238797	-1.10	0.270	-.3793104	.1062891
educat	.0816368	.1429377	0.57	0.568	-.1985159	.3617896
protestant	.1993672	.9359503	0.21	0.831	-1.635062	2.033796
catholic	.1607258	.9582355	0.17	0.867	-1.717381	2.038833
jewish	-1.301448	1.418279	-0.92	0.359	-4.081224	1.478329
norelig	.0897389	.9692919	0.09	0.926	-1.810038	1.989516
female	-.3990215	.2624562	-1.52	0.128	-.9134262	.1153833
income	-.2411563	.1323857	-1.82	0.069	-.5006375	.018305
minority	.1536163	.4008512	0.38	0.702	-.6320376	.9392701
govtrust	-.251838	.230827	-1.09	0.275	-.7042505	.2005745
govbigint	-.1451089	.3032354	-0.48	0.632	-.7394393	.4492215
ideology	.0407127	.1460679	0.28	0.780	-.2455752	.3270006
pid	-.0857335	.2141272	-0.40	0.689	-.5054152	.3339482
equaltoomuch	.0267721	.0755957	0.35	0.723	-.1213927	.174937
govout	.1138146	.085269	1.33	0.182	-.0533096	.2809388
moralfound	.2535393	.1162253	2.18	0.029	.025742	.4813367
trustclimsci	.038828	.0791602	0.49	0.624	-.1163232	.1939792
needcog	-.1343577	.1680899	-0.80	0.424	-.4638079	.1950925
_cons	-.0731458	1.880849	-0.04	0.969	-3.759543	3.613251

12						
intpolitics	.0326473	.1572291	0.21	0.836	-.2755162	.3408107
partipolitics	.034015	.0947705	0.36	0.720	-.1517319	.2197618
talkpolitics	-.009486	.0632051	-0.15	0.881	-.1333657	.1143937
poliknow	.0637243	.1131205	0.56	0.573	-.1579878	.2854364
age	-.1285163	.1161067	-1.11	0.268	-.3560813	.0990486
educat	-.0805163	.132952	-0.61	0.545	-.3410974	.1800649
protestant	-.1940192	.7545476	-0.26	0.797	-1.672905	1.284867
catholic	-.8233053	.7879794	-1.04	0.296	-2.367717	.7211058
jewish	-2.226568	1.306057	-1.70	0.088	-4.786392	.3332559
norelig	-1.068533	.8061927	-1.33	0.185	-2.648641	.5115761
female	-.5042398	.245242	-2.06	0.040	-.9849052	-.0235743
income	-.1113307	.1214883	-0.92	0.359	-.3494435	.126782
minority	.0919995	.3849882	0.24	0.811	-.6625636	.8465625
govtrust	-.3101927	.2161943	-1.43	0.151	-.7339258	.1135403
govbigint	-.0795397	.2857303	-0.28	0.781	-.6395607	.4804814
ideology	-.0663675	.1357426	-0.49	0.625	-.3324181	.1996831
pid	-.0229634	.1996085	-0.12	0.908	-.4141889	.3682622
equaltoomuch	.0357453	.0712747	0.50	0.616	-.1039505	.175441
govout	.0524366	.0779762	0.67	0.501	-.1003939	.205267
moralfound	.0545265	.1024186	0.53	0.594	-.1462103	.2552633
trustclimsci	.0382875	.073851	0.52	0.604	-.1064579	.1830328
needcog	.0039952	.159302	0.03	0.980	-.308231	.3162215
_cons	1.744433	1.714292	1.02	0.309	-1.615518	5.104384

13						
intpolitics	.0629852	.1590836	0.40	0.692	-.248813	.3747834
partipolitics	.1371172	.093109	1.47	0.141	-.045373	.3196075
talkpolitics	-.0626213	.064905	-0.96	0.335	-.1898327	.0645901
poliknow	-.0119749	.1116916	-0.11	0.915	-.2308863	.2069365
age	-.3510427	.1154581	-3.04	0.002	-.5773364	-.124749
educat	.0671757	.1329019	0.51	0.613	-.1933072	.3276586
protestant	1.285622	1.170337	1.10	0.272	-1.008196	3.579441
catholic	.9087485	1.188589	0.76	0.445	-1.420842	3.238339
jewish	.4776647	1.356699	0.35	0.725	-2.181417	3.136746
norelig	.9704507	1.196806	0.81	0.417	-1.375247	3.316148
female	-.1490714	.24645	-0.60	0.545	-.6321044	.3339617
income	.0397659	.1188428	0.33	0.738	-.1931618	.2726936
minority	.2256134	.3690805	0.61	0.541	-.4977711	.9489978
govtrust	-.0935734	.2162945	-0.43	0.665	-.5175028	.330356
govbigint	.4873421	.2975599	1.64	0.101	-.0958645	1.070549
ideology	.0555424	.1377081	0.40	0.687	-.2143605	.3254453
pid	-.2107706	.1958367	-1.08	0.282	-.5946035	.1730624
equaltoomuch	-.0486129	.0696913	-0.70	0.485	-.1852053	.0879795
govout	.0323276	.0770712	0.42	0.675	-.1187292	.1833844
moralfound	.1874845	.1064251	1.76	0.078	-.0211048	.3960739
trustclimsci	-.0660497	.0750847	-0.88	0.379	-.213213	.0811137
needcog	-.1589637	.1590196	-1.00	0.317	-.4706364	.152709
_cons	.0473869	1.927344	0.02	0.980	-3.730139	3.824912

Appendix VI: Regression Tables with Controls

VARIABLES	(1) Message Evaluation	(2) Belief About Climate Consensus
No Motivation x Information Message		4.007 (2.970)
No Motivation x Values Message	1.193*** (0.149)	3.206 (2.937)
No Motivation x Group Norms Message	0.671*** (0.146)	5.201* (2.877)
Values Threat x Information Message	0.035 (0.151)	1.638 (2.997)
Values Threat x Values Message	1.042*** (0.146)	3.449 (2.875)
Values Threat x Group Norms Message	0.696*** (0.150)	3.685 (2.980)
Group Conformity x Information Message	-0.063 (0.155)	2.202 (3.077)
Group Conformity x Values Message	0.782*** (0.146)	0.230 (2.891)
Group Conformity x Group Norms Message	0.421*** (0.146)	2.916 (2.886)
Accuracy Motivation x Information Message	0.066 (0.158)	7.513** (3.129)
Accuracy Motivation x Values Message	0.750*** (0.148)	4.852* (2.926)
Accuracy Motivation x Group Norms Message	0.592*** (0.149)	4.174 (2.940)
Trust in Climate Science	0.476*** (0.019)	3.720*** (0.372)
Conservative Moral Foundations	0.092*** (0.028)	1.289** (0.534)
Political Ideology	-0.030 (0.032)	-1.558** (0.615)
Hierarchical	-0.013 (0.019)	-0.306 (0.363)
Individualism	-0.060*** (0.021)	-0.232 (0.404)
Political Knowledge	-0.031 (0.028)	3.754*** (0.549)
Race	-0.027 (0.099)	-4.295** (1.915)
Education	-0.048 (0.035)	-0.481 (0.678)
Age	0.039 (0.030)	-1.621*** (0.587)
Religion	0.066 (0.078)	0.569 (1.511)
Sex	0.123* (0.064)	0.040 (1.242)
Income	0.013 (0.032)	1.533** (0.620)
Constant	1.809***	41.781***

	(0.305)	(5.961)
Observations	1,804	1,952
R-squared	0.372	0.096

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(1)

(2)

(3)

VARIABLES	Climate Change Beliefs	Climate Change Behaviors	Climate Change Policy Attitudes
No Motivation x Information Message	0.118 (0.110)	-0.066 (0.096)	-0.052 (0.128)
No Motivation x Values Message	0.198* (0.109)	0.060 (0.095)	-0.119 (0.126)
No Motivation x Group Norms Message	0.356*** (0.106)	0.193** (0.093)	0.143 (0.124)
Values Threat x Information Message	0.075 (0.111)	0.086 (0.097)	0.043 (0.129)
Values Threat x Values Message	0.373*** (0.107)	0.196** (0.093)	0.111 (0.124)
Values Threat x Group Norms Message	0.498*** (0.110)	0.255*** (0.096)	0.066 (0.128)
Group Conformity x Information Message	0.046 (0.114)	-0.035 (0.099)	0.056 (0.132)
Group Conformity x Values Message	0.065 (0.107)	0.050 (0.093)	0.004 (0.124)
Group Conformity x Group Norms Message	0.304*** (0.107)	0.163* (0.093)	-0.067 (0.124)
Accuracy Motivation x Information Message	0.326*** (0.116)	0.194* (0.101)	0.102 (0.135)
Accuracy Motivation x Values Message	0.120 (0.109)	0.018 (0.095)	-0.067 (0.126)
Accuracy Motivation x Group Norms Message	0.144 (0.109)	0.083 (0.095)	-0.049 (0.126)
Trust in Climate Science	0.526*** (0.014)	0.252*** (0.012)	0.480*** (0.016)
Conservative Moral Foundations	0.109*** (0.020)	0.115*** (0.017)	0.211*** (0.023)
Political Ideology	-0.094*** (0.023)	-0.045** (0.020)	-0.091*** (0.026)
Hierarchical	-0.014 (0.013)	-0.031*** (0.012)	-0.007 (0.016)
Individualism	-0.026* (0.015)	-0.005 (0.013)	-0.067*** (0.017)
Political Knowledge	0.005 (0.020)	0.006 (0.018)	-0.065*** (0.024)
Race	0.023 (0.071)	0.098 (0.062)	-0.033 (0.082)
Education	0.008 (0.025)	0.050** (0.022)	-0.029 (0.029)
Age	0.048** (0.022)	0.036* (0.019)	0.032 (0.025)
Religion	0.073 (0.056)	0.011 (0.049)	0.035 (0.065)
Sex	0.135*** (0.046)	0.087** (0.040)	0.222*** (0.053)
Income	0.001 (0.023)	0.059*** (0.020)	0.072*** (0.027)
Constant	2.095*** (0.220)	1.791*** (0.192)	2.209*** (0.256)
Observations	1,963	1,963	1,962
R-squared	0.519	0.275	0.446

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1