Ideological Framing: Key to Overcoming Motivated Reasoning on Climate Change

By: Kyra Larson

B.G.S. University of Kansas, 2020

Submitted to the graduate degree program in Political Science and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Master of Arts.

Chair: Dr. Kevin Mullinix

Dr. Donald Haider-Markel

Dr. Patrick Miller

Date Defended: 29 April 2022

The thesis committee for Kyra Larson certifies that this is the approved version of the following thesis:

Ideological Framing: Key to Overcoming Motivated Reasoning on Climate Change

Chair: Dr. Kevin Mullinix

Dr. Donald Haider-Markel

Dr. Patrick Miller

Date Approved: 29 April 2022

Abstract

Research has demonstrated that the presentation of scientific information about climate change strengthens Democrats' belief in the scientific consensus on this issue and increases their support for mitigation policy solutions. By contrast, this same information fails to increase support from Republicans and, sometimes, results in a backfire effect, where Republicans reject the scientific consensus and disapprove of these mitigation policies to a greater extent than if not exposed to this information. I argue that Republicans are motivated to reject this scientific information about climate change because the policy solutions are typically communicated in a manner inconsistent with their ideological values. I theorize that framing policy solutions using arguments that invoke conservative values will result in policy support from Republicans. I test this hypothesis and related expectations using a survey experiment in which respondents are randomly assigned to one of three strategically crafted messages that do and do not invoke conservative economic values. In doing so, I directly assess the distinct effects of economic information and environmental protection information on support for climate mitigation policy. The importance of these findings for public opinion, political communication, and the adoption of climate change policy solutions is discussed.

Table of Contents

Introduction

Climate change is a grave threat to life on Earth and requires immediate action to curb the amount of greenhouse gases in the atmosphere (IPCC, 2021). This 2021 IPPC report made clear that there is a consensus among the scientific community that climate change is real, human-caused, and that mitigation policy solutions are critical. Despite this scientific consensus, Democrats and Republicans have polarized over the issue of climate change (Egan & Mullin, 2017). Only 39% of Republicans think the government should act more on climate policy, compared to 90% of Democrats (Pew Research Center, 2019). Efforts to shift public opinion toward the scientific consensus have failed to move Republican attitudes (Ma et. al, 2019) Thus, addressing climate change is critical, but there is considerable Republican opposition to policies designed to attenuate the problem. Given this, it is important to identify strategies that effectively garner support for climate change mitigation policies.

To do so, it is imperative to first recognize the obstacles to attitude change. Motivated reasoning provides an explanation for Republicans' lack of support for mitigation strategies. Motivated reasoning suggests that people seek out information that confirms their prior attitudes (confirmation bias), counter-argue messages that challenge their existing beliefs (disconfirmation bias), and, as a result, only become more entrenched in their views when presented with new information (e.g., Taber & Lodge, 2006). In this context, it suggests Republicans who do not initially support climate policy will simply look for information that bolsters their position and counter-argue messages in support of climate policy. If presented with arguments on both side of the issue, they likely view arguments opposed to climate policy as stronger than those in support of mitigation policies (prior attitude effect). These biases in information processing are accentuated by partisanship when political leaders take different contrasting positions on these policies (i.e., partisan motivated reasoning; see Leeper and Slothuus 2014). A litany of research

tests political communication strategies to shift climate attitudes, but – due to biases and motivated reasoning – these efforts result in Republicans maintaining their opposition to climate mitigation policy or becoming more extreme in their opposition (Cook & Lewandowsky, 2016; Feldman & Hart, 2018; Kahan, 2016). Similarly, Republicans displayed backfire effects when exposed to information about climate science, environmental effects, or a variety of climate mitigation policy proposals. (Bayes et. al, 2020; Ma et. al, 2019). Clearly, a different strategy must be deployed to combat motivated reasoning, avoid backfire effects, and, ultimately, shift Republican attitudes.

I argue that part of the motivation underlying Republicans' rejections of climate solutions is an ideological objection to the specific solutions associated with climate change mitigation, not necessarily an objection to the science itself (McCright & Dunlap, 2011). Republican ideology is rooted in market-liberalism, characterized by small government and less regulation (Brulle & Jenkins, 2012), but climate mitigation policy typically involves government intervention and regulation of business. It should be no surprise that Republicans oppose these climate mitigation policies – even when, as some research suggests that most Republicans believe climate change exists (Egan & Mullin, 2017). It may be possible, however, to generate Republican support for climate mitigation policies by tapping into ideologically-consistent conservative values, like job creation and economic benefits.

I develop my theoretical argument about how to overcome Republicans' rejection climate change policy solutions around the "solution aversion model." This model is built on the notion that solutions associated with a problem can be aversive, or even threatening, to specific individuals and groups (Campbell & Kay, 2014). Climate change policy solutions often involve government intervention in the economy or regulation of the oil and gas industry. Republican

aversion to these solutions stems from their market-liberalism ideology (Brulle & Jenkins, 2012). Republicans believe in a free-market without safety nets or government regulation. The scientific consensus on climate change and the policy solutions resulting from it, create skepticism in Republicans whose economic ideological values are threatened by these proposals. Strategically communicating the climate change policy solutions as ideologically-consistent, may increase support for it (Campbell & Kay, 2014). If the policy solutions are presented as ideologically inconsistent, as done in prior research, it can prompt motivated reasoning and attitude reinforcement rather than attitude change (Taber & Lodge, 2006). Information about climate change is processed by Republicans through their partisan and ideological lenses, thus; presenting the scientific consensus or regulatory policy solutions can lead to backfire effects in Republicans (Zhou, 2016).

Uniting insights from the solution aversion model with framing research (e.g. Chong & Druckman, 2007), I argue that climate policy solutions can be strategically framed and communicated such that they overcome backfire effects and facilitate persuasion. For decades, framing research has demonstrated that particular presentations of issue information can shift the salience of various considerations and, at times, can alter policy preferences (Chong & Druckman, 2007). However, it is critical to identify "strong" frames that resonate with the target audience (Busby et. al, 2018; Chong & Druckman, 2007). I utilized the solution-aversion model to create frames that avoid conservative aversion to climate mitigation policy.

Prior research has found that Republicans exposed to messages like an environmental frame will have little effect or will prompt backfire effects. I think these findings can be explained by the solution aversion model; these are policy solutions that are inconsistent with conservative values. Yet, the model can inform the design of more effective frames that invoke

values that appeal to Republicans. More specifically, I argue that an economic frame that emphasizes job creation and energy costs will resonate with Republicans and will increase support for climate mitigation policies.

I test my hypotheses with a survey experiment focused on climate mitigation policy solutions. Respondents were randomly assigned to one of three conditions: no treatment (i.e., control), an environmental message invoking more liberal values, or an economic message designed to appeal to conservative values. Using this design, I test whether respondents' support for climate mitigation policy is affected by different ideological value frames. The study is implemented with a national sample of U.S. adults, but I focus much of my analysis on Republicans. In contrast to my expectations, I find little evidence that value-consistent frames garner Republican support for climate mitigation policy. However, while the observed movement in Republican attitudes was not statistically significant, the economic frame consistently moved Republican support for all climate mitigation policy in the hypothesized direction.

Republican skepticism about climate science and aversion to its policy solutions has prevented the adoption of substantial climate change policy (McCright & Dunlap, 2003). The planet is nearing irreversible levels of greenhouse gases in the atmosphere, making policy adoption necessary to address these impacts (IPCC, 2021). Therefore, it is critical to identify a mechanism that will successfully gain Republican support for climate policy solutions. My findings bring research closer to developing a successful strategy to shift Republican attitude toward climate mitigation policy support. I conclude with a discussion of how these findings advance motivated reasoning, the solution aversion model, and framing theory and inform our

understanding of political communication strategies that do and do not garner support for climate policy adoption.

Public Opinion on Climate Change

Multiple dynamics influence attitudes toward climate change and support for its mitigation policies in the United States, but perhaps the most well documented factor tied to this issue area is partisanship. There is a lack of unified support for climate policy adoption in the United States, in part, because Democrats and Republicans are polarized over the issue (Egan & Mullin, 2017). It is important to recognize that partisan polarization over climate change is partly shaped by the spread of misinformation about the validity of climate science (Bugden, 2022). Efforts to do so gained political traction in the 1990s through fossil fuel industry interest groups and conservative think tanks (Bolsen, Cook, and Druckman, 2015). Jenkins (2011) identifies that the fossil fuel industry, which substantially contributes to climate change, wanted to protect their interests, while conservative think tanks were prioritizing the economy over the environment. These groups allied with Republican leaders to deny the science of climate change. These misinformation campaigns influenced Republican voters to distrust climate scientists and diverge with Democrats on climate change attitudes (Jenkins, 2011).

Polls find that a majority of Democrats and Independents believe that climate change is real and human-caused (Pew Research Center, 2010). A narrow majority of Republicans believe climate change is real, but they do not believe that humans are responsible. One poll found that 45% of conservative Republicans believe humans have not caused climate change at all, compared to only 3% of liberal Democrats (Pew Research Center, 2021). Despite this, individuals with a broader understanding of the science of climate change and higher levels of general education are significantly more likely to believe in climate change and its human cause, regardless of partisanship (Bolsen, Cook, Druckman, 2015). Climate change public opinion is

heavily influenced by an uninformed and unaware public, but these trends have slightly decreased in recent years (Egan & Mullin, 2017). Some studies go so far as to argue that partisanship is the largest contributor to the gap among Americans on climate change (Bayes, Bolsen, & Druckman, 2020).

Motivated Reasoning

Experimental studies have attempted to shift Republicans' attitudes on climate change toward the scientific consensus, but have not been successful (Cook & Lewandoswky, 2016; Feldman & Hart, 2018; Hart & Nisbet, 2012). In fact, much of this research found evidence of backfire effects and motivated reasoning (Ma et. al, 2019; Zhou, 2016). Although people want to arrive at correct decisions (i.e., accuracy motivation), they are often driven by unconscious partisan (or directional) goals which distort information processing (Taber & Lodge, 2006). Motivated reasoning leads individuals to view arguments on their "side" as stronger, exert effort arguing against messages which challenge their views, and seek out information consistent with their prior attitudes. As a result, when people are exposed to information inconsistent with their prior attitudes, they are unlikely to be persuaded. Instead, they engage in attitude reinforcement. Republicans hold prior attitudes that are inconsistent with the scientific consensus, so they may display a disconfirmation bias if provided information about this consensus (Cook & Lewandowsky, 2016). In turn, Republicans reject this type of information and can, at times, simply reinforce and strengthen their prior attitudes. These effects of motivated reasoning are particularly pronounced when people feel manipulated or threatened into changing their opinions (Ma et. al, 2019).

Republicans' attitudes on climate change and the scientific consensus are likely connected to elite cues and rhetoric from political leaders. Elite cues aid the public in forming opinions on complex or debated issues, like climate change (Abeles et. al, 2019). The public

looks to news coverage of their political elites or a party-consistent news station to understand and form opinions about complex issues (Brulle, Carmichael, Jenkins, 2011). This information shifts their attitudes in the respective partisan direction, thus; leading Republicans to question the science of climate change. For example, the 2012 and 2016 platforms of the Republican party questioned the science of climate change. Republicans are motivated to be both accurate and confirm these partisan goals (Taber & Lodge, 2006). Partisan goals may override accuracy goals when elites are polarized over an issue (Druckman et. al, 2013). The gap between Republicans and Democrats on climate change has increasingly polarized since the late 1970s (Dunlap, Xiao, McCright, 2001). Therefore, per Republican political elites' information, rejecting the science of climate change and confirming prior attitudes meets these partisan goals (Druckman & McGrath, 2019; Taber & Lodge, 2006). Previous findings of Republicans rejection of climate science may stem from this motivation to maintain consistency with their party (Hart & Nisbet, 2012; McCright & Dunlap, 2011). Lack of support for environmental legislation by Republican members of Congress, illustrated by their voting record, is correlated with a decrease in belief and concern for climate change amongst Republicans in the mass public (Brulle, Carmichael, Jenkins, 2011). In the next section, I discuss the connection between these partisan attachments and the values underlying them as they pertain to climate mitigation policy attitudes.

Value-Based Rejection

Public opinion surveys reveal that even though they often oppose mitigation policies, most Republicans believe climate change is real, but not necessarily caused by humans (Egan & Mullin, 2017). Survey experiments demonstrate that exposure to information about the science of climate change does not prove useful in shifting Republicans' attitudes in support of climate mitigation policy (Bayes et. al 2020; Feldman & Hart, 2018; Ma et. al, 2019). I argue that it is

important to understand how Republicans' values do and do not connect to mitigation efforts in order to grasp their lack of support for these policies.

Specifically, it is critical to examine the values that influenced Republicans' position on climate change. Public opinion data reveals that Republicans do not believe that climate change is human-caused (Pew Research Center, 2010). If a problem results from human actions, then a solution must also restrict those actions. Thus, if Republicans believe that climate change is human-caused then human behavior must be restricted to mitigate the problem. Climate change policy proposals often involve government intervention, regulation of the free market, and substantial costs largely to business interests (Koba, 2013). These policies are inconsistent with Republican values of a limited government and laissez-faire economics (GOP, 2014). Support for climate mitigation policy is heavily influenced by an individual's prioritization of hierarchal versus communitarian values, and the former is commonly found among Republicans (Bolsen, Druckman, Cook, 2015). Republicans' hierarchal values are highly individualistic, independent, and self-sufficient. Coinciding with their value of limited government and laissez-faire economics, Republicans believe the market can resolve issues, such as climate change, without a safety net or government regulation. They endorse a form of market liberalism, where capitalism should be left unchecked with little to no government interference (Brulle, 2011).

The most common climate mitigation proposals fundamentally contradict essential ideological-values of most Republicans. Thus, Republicans' rejection of climate change's human cause and its mitigation proposals is a value-based rejection. This value-based rejection is illustrated by a litany of experimental studies on climate change attitudes. If exposed to proposals of government intervention for climate change mitigation, Republicans are not supportive (Zhou, 2016). As noted above, exposure to the science and impacts of climate change

result in similar rejections to mitigation policy (Cook & Lewandowsky, 2016). The content and presentation of climate mitigation proposals trigger the Republican backfire effects and motivated reasoning documented in the literature, because these proposals are not consistent with their values. Recent work has utilized consistent framing with some success, but these studies rely on cues and do not truly capture policy support (Dixon et. al, 2017; Luong et. al, 2019). For example, Dixon et.al do not have a measure for policy support, but do find value-consistent messages increase conservatives' belief in climate change and that it is caused by humans. Luong et al. utilize a broad measure of support for renewable energy, but do not examine support for specific mitigation policies. Furthermore, this policy support measure asks respondents if it should be "a focus of national energy policy", which taps into hypothetical support rather than support for a specific policy. I see utility in these initial efforts to overcome motivated reasoning by presenting policy proposals in a value-consistent manner. And, importantly, I think there are opportunities to move beyond prior scholarship and test the effects of value-consistent messaging strategies designed to increase Republicans' support for specific climate mitigation policy.

Solution Aversion Model

I argue that the solution aversion model is a guideline for how to overcome motivated reasoning and address Republicans' opposition to climate change mitigation policy. This model proposes that certain policy solutions are associated with policy mechanisms that are aversive to some individuals (Campbell & Kay, 2014). These policy solutions are aversive to some individuals, because they challenge their ideological values. This ideological incompatibility and aversion lead individuals to reject the existence of the problem and its solutions. Climate mitigation policy proposals largely include government regulation and intervention into the free market, which threaten Republican and conservative ideological values of limited government and a free market (Dunlap, Xiao, McCright, 2001). This ideological challenge makes

Republicans averse to climate mitigation policy (Hornsey, 2021). Furthermore, Republicans' skepticism of climate change's cause should be dependent upon how inconsistent its policy proposals are with their ideology (Campbell & Kay, 2014).

This model, in conjunction with insight from framing research, informs my theoretical expectations. In order to overcome motivated reasoning and foster persuasion, policy proposals must be framed in a manner consistent with Republicans' ideological values so as to avoid solution aversion. If proposals are consistent, motivated reasoning and backfire effects should not be observed (Hornsey, 2021, Luong et. al, 2019). The framing literature makes clear that variation in information presentation alters the considerations that are most salient to an individual at a given time and, in some cases, can shift their policy attitudes (Busby & Druckman, 2018; Chong & Druckman, 2007). The success of a frame depends on its "strength" as perceived by the target audience (Busby & Druckman, 2018; Chong & Druckman, 2007). A frame which discusses policy proposals that require greater government regulation and intervention – and invokes liberal values – is unlikely to be perceived as strong by Republicans. As such, Republicans have an aversion to this policy solution and are unlikely to support such a policy proposal. By telling us why Republicans oppose climate mitigation policies in situation like this, the solution-aversion model also suggests that framing these policies with value-consistent language will be more persuasive. In short, if you want to persuade, you need to frame policy proposals in a manner that appeals to the target audience's ideological values.

Hypotheses

Building upon prior research, individuals support of climate change science will depend upon their partisan affiliation (Bugden, 2022; Egan & Mullin, 2017). Due, in part to partisan motivated reasoning, Republicans reject climate science when exposed it to it, illustrating a backfire effect and attitude reinforcement (Bayes, Bolsen, Druckman, 2020). Republicans feel

this information is manipulating them to shift their attitude away from their prior attitudes and political values (Ma et. al, 2019). Thus, Republicans should not be persuaded by a frame that employs information about climate science.

Hypothesis 1 (H1): Republicans exposed to a scientific frame will have lower levels of support for climate mitigation policy than Republicans not exposed to this scientific frame (i.e., a backfire effect).

This rejection of this climate science stems from what acknowledgement of the problem would necessitate: action. The scientific consensus states that climate change is real and human-caused, so accepting this science would necessitate a policy solution. Support for these policy solutions can be determined by partisan ideology (Buttel & Flinn, 1976). Republicans oppose these policies, because they are inconsistent with their laissez-faire economics ideology. Therefore, exposure to climate policy that regulates the economy results in strong opposition from Republicans (Fisher, Waggle, Leifeld, 2013). For example, climate policy support erodes for Republicans when it transitions from vague commitments to regulation like taxation (Leiserowitz, 2006). If a climate policy is proposed in a manner consistent with conservative ideology, Republicans should be less likely to backfire or exhibit motivated reasoning. Instead, it should persuade.

Hypothesis 2 (H2): Republicans will be more supportive of climate mitigation policy when exposed to an economic frame compared to Republicans not exposed to this economic frame.

Taking **H1** and **H2** together, the order of Republican support for climate mitigation policies is the scientific frame (lowest support) then no frame (the control) and economic frame (highest support).

Although not my primary focus, I outline my expectations for how Democrats will respond to these messages as well. Aligning with prior research, Democrats should be more responsive to a frame with scientific information on climate change than Republicans (Bayes et. al, 2020; Cook & Lewandowsky, 2016; Ma et. al, 19). Polls consistently find high belief in climate change, its human cause, and support for climate mitigation policies among Democrats (Pew Research Center, 2021). Democrats do not experience the same solution aversion to these policies as Republicans do. Thus, they are not motivated to reject the science that necessitates such policy solutions.

Hypothesis 3 (H3): Democrats exposed to a scientific frame will have higher levels of support for climate mitigation policy than Democrats not exposed to this scientific frame.

Democrats do not experience the same solution aversion to climate mitigation policy as Republicans, because these policies are not inconsistent with their ideology (Brulle, 2011). An economic frame is tailored to emphasize Republican values, but isn't necessarily inconsistent with liberal ideology. The economic frame emphasizes economic benefits from these policies. Liberal ideology is not inconsistent with economic gains, so I do not expect Democrats to backfire when exposed to this information.

Hypothesis 4 (H4): Democrats will be more supportive of climate mitigation policy when exposed to an economic frame compared to Democrats not exposed to this economic frame.

I do not have expectations about the order of support for Democrats, because it is unclear how substantively large of an effect the economic frame will have on their policy support compared to scientific information. It is likely that Democrats have previously been exposed to this scientific information via their liberal news sources of Democratic elites. Previous research

has found that these pre-treatment effects could dampen the effect of such a frame (Druckman & Leeper, 2012). The economic frame was tailored to Republicans, but emphasizes economic benefits, which should garner bipartisan support. Prior research has not indicated whether Democrats are persuaded by such messages or if they are more persuasive then scientific information.

Research Design

To test these hypotheses, I implemented a three-condition survey experiment that randomly assigned people to receive one of two different climate change messages and measured their support for climate mitigation policy; a control group did not receive any climate change message. The treatment group messages (i.e., frames) were either scientific or economic in nature. Coinciding with previous work, these alternative frames tested the conditions that may or may not increase Republican support for climate mitigation policy (Bayes, Bolsen, Druckman; 2020, Campbell & Kay, 2014; Ma et. al, 2019, Zhou, 2016). This research design allowed me to test whether an economic framing of climate mitigation policy can garner support from Republicans, and, by contrast, whether a scientific frame generates backfire effects among Republicans. Furthermore, it determined whether Democrats are more supportive of climate mitigation policy when exposed to scientific or economic information. By randomly assigning respondents to these three different conditions, I isolated the effects of frames that invoke different values on support for climate change mitigation policies.

Sample and Stimuli

I implemented an online survey experiment, with a general population sample, in October of 2021 with *Lucid*[1]. As with other survey companies (e.g., Dynata, Qualtrics), Lucid has a non-probability-based pool of potential respondents. They draw a sample from this pool of

respondents such that it matches the distribution of demographics in the target population. In doing so, the sample demographics approximate those in the target population. The specific demographics are documented in Appendix A. Prior research has found that online samples yield estimates of treatment effects that are often statistically indistinguishable from estimates from probability-based sampling techniques (Bernisky, Huber, & Lenz, 2017; Krupnikov & Levine, 2014; Mullinix et. al, 2015), importantly, this occurs even when treatment effects are broken down by partisanship (Coppock, Leeper, and Mullinix 2018).

As noted above, survey respondents were randomly assigned to one of three conditions: control (no climate frame), scientific frame, or economic frame. Both frames focused on green technologies as a policy solution for climate change, but, consistent with my theoretical argument and framing research, emphasized different value-based considerations. After the treatments, respondents were asked about their support for climate mitigation policies. Because of random assignment, the only difference between conditions is the treatment. Any difference observed in the average support for climate change policies between experimental conditions is due to the treatments. After consent to participation in the survey, respondents answered a few demographic questions. Next, they were randomly assigned to one of the three conditions and received the relevant climate change frame (i.e., treatment) and subsequently answered questions capturing their support of mitigation policies (i.e. dependent variables). Finally, they answered additional demographic questions.

The experimental frames focus on green technologies and proposals for its adoption to mitigate climate change. Green technology was selected as a mitigation proposal for external validity, because it is outlined as a measure to combat climate change by scientists (IPCC, 2021). Respondents in the control condition receive no frame and move directly into the questions about

support for mitigation policies. Respondents in the experimental conditions receive information on green technologies, but it is described differently depending upon the condition (a scientific frame or an economic one).

The scientific frame begins by isolating the scientific consensus on the existence and cause of climate change. It goes on to briefly discuss the environmental concerns and then identifies that green technology has been proposed as a solution. It notes specific examples of this technology and how it mitigates climate change, so the public has a better understanding of what green technology is and what it does. This frame is scientific, because it notes the scientific consensus of scientists on climate change, which has resulted in staunch opposition from Republicans (Egan & Mullin, 2017). The consensus is paired with green technology, so comparisons can be made between frames. The consensus alone will be viewed as a threat to Republicans' beliefs and be rejected (Ma et. al, 2019). For decades, Democrats have largely been supportive of climate mitigation policy (Egan & Mullin, 2017). Prior research finds that exposure to scientific information about climate mitigation policy increases this support (Bayes et. al, 2020; Cook & Lewandowsky, 2016; Ma et. al, 19). The full scientific frame is as follows:

The Environmental Dangers of Climate Change:

"Scientists have come to a consensus that climate change is a human-caused public problem that must be addressed by policymakers. Climate change triggers rising temperatures and levels of carbon dioxide, which devastate ecosystems and biodiversity. Proposals to combat climate change include use of green technology, offshore wind farms, and carbon emission limits. The evidence and research is clear that these policies effectively reduce the carbon footprint of states, localities, and the country at large."

Like the scientific frame, the economic frame begins by citing a consensus that climate change is a human-caused problem that needs addressed, but, here, the consensus is among economists and business leaders. It continues to discuss the economic consequences of climate change and also identifies that green technology has been proposed as a solution. This frame concludes by discussing the potential economic benefits of various green technology proposals. This frame does not discuss the science of climate changes, but describes what the green technology does. Although it is green technology, backfire effects should not be triggered, because the scientific consensus nor its findings are discussed. These mitigation policy proposals and their economic benefits are consistent with Republican ideology, so should be received as such (Kahan, 2016). The full economic frame is as follows:

The Economic Dangers of Climate Change:

"Economists and business leaders have come to a consensus that climate change is a human-caused public problem that must be addressed by policymakers. Climate change triggers extreme weather and more frequent natural disasters, which devastate growth and productivity by threatening GDP, food production, and infrastructure. Proposals to combat climate change include use of green technology, offshore wind farms, and carbon emission limits. The evidence and research is clear that these polices have been found to create jobs, stabilize global energy prices, and reduce energy costs for individuals."

The expectations for support for climate mitigation policy for each condition (broken down by party) are shown in Table 1. The "+" and "–" indicate the hypothesized direction of the relationship relative to the control.

Table 1: Expected Change in Support for Mitigation Policies

Condition	Among Democrats	Among Republicans
Scientific Frame	+	-
Economic Frame	+	+

Note: expected change is relative to the no information control. The "+" indicates higher levels of support.

Measures

The dependent variables measure support for climate mitigation policies using four questions which were asked immediately after the presentation of the frames, or lack thereof for the control condition. The four dependent variables questions varied the type of mitigation policy and policy specificity to determine if the frame garnered general support for green technology or overall support for mitigation policies. Each question had a seven-point Likert scale from strongly agree to strongly disagree. They asked, separately, about support for the federal government immediately regulating carbon emissions, the federal government immediately incentivizing green technology, the government utilizing offshore wind farms for energy, and no action or change needed (reverse-coded). These questions allow me to test whether the economic frame was effective at overcoming Republican solution aversion by asking about policies that are inconsistent with Republicans values. Regulation of carbon emissions specifically mentions government regulation and green technology incentives coincide with government intervention in the economy, two actions Republicans traditionally oppose the federal government doing (Brulle, 2011). If Republicans show support despite these value inconsistencies, the frame successfully overcomes motivated reasoning and their solution aversion. Questions on offshore wind farm utilization and no action needed avoided policy that were traditionally inconsistent with Republican values to determine if some support for climate mitigation policy could be found. The first and last question were adapted from previous work, but the first was made vaguer (Hart & Nisbet, 2012). The original form of the question specifically cited regulating

carbon emission of industries and businesses, which is strongly inconsistent with Republican values. Thus, I adapted the question to be broad regulation of carbon emissions, so backfire effects from Republicans in support of business would be less likely. The second and third questions on green technology and offshore wind farms were created to move beyond prior work. Other research has successfully garnered Republican support for taking action on climate change, but not shifted attitudes to support specific policies that could be adopted (Hornsey, 2021; Luong et. al, 2019). I take the next step by adding these policy-specific questions to determine if value-consistent frames can garner Republican support for actionable policy, rather than broad support for change. I examine each dependent variable independently, but I also analyze an index based on the average of all the dependent variables.

I analyze the effects of the treatments (relative to the control group) on policy preferences using regression models. While I briefly discuss the average treatment effects, I focus my analysis on regression models with controls for age, gender, level of education, political knowledge, ideology, climate change concern, and factual knowledge about climate change. Although I implement a survey experiment in which my main independent variable (e.g., the frame) is randomly assigned, I must break the results down by partisanship to test my hypotheses. Research suggests that control variables should be included in survey experiments such as this where a moderating variable, partisanship in this case, is not randomly assigned (Kam & Trussler, 2016). Although it is also important that the included variables are sufficiently predictive of dependent variable as to offset the efficiency costs imposed (Kam & Trussler, 2016). Prior studies have found that the specific control variables I include affect attitudes towards climate change (Hart & Nisbet, 2012; Pew Research Center, 2014). Previous standard ANES measures for age, gender, education level, ideology, and partisanship were utilized.

Measures for climate change concern and factual knowledge about climate change were derived from preceding scholarship (Hart & Nisbet, 2012). This research determined that high levels of concern for climate change and factual knowledge about climate change results in more support for climate mitigation policy. Consequently, low levels of concern for climate change and factual knowledge about climate change results in less support for climate mitigation policy attitudes. Given the structure of the hypotheses, all tests and regressions are run separately for Republicans and Democrats[2].

Results and Analysis

The primary tests of my hypotheses are based on separate analyses for Republicans and Democrats. However, before presenting those results, I discuss a few initial analyses that were performed with respect to the full sample. The results for the average treatment effects of the economic and scientific frames on support for climate mitigation policy for the full sample are shown in Appendix Table 1. The control group is the baseline for comparison. The coefficients of both the economic and scientific frames for all dependent variables fail to reach statistical significance. The economic frame results in negative coefficients for all measures of policy preferences except support for offshore windfarms and no action needed. Note that no action needed is a lack of support for policy, so a reverse sign is expected with this variable. The variable was reverse coded when creating the support index. The scientific frame largely has negative coefficients for each dependent variable outside the combined support index. Null average effects for the full sample are unsurprising, because, I hypothesized that Republicans and Democrats would respond differently to each frame.

Next, I evaluated the influence of the various control variables for the full sample (controlling for experimental condition), which can be found in Table 3 of the Appendix. Being female has a statistically significant negative influence on support for offshore wind farms and

no action needed. Age has a statistically significant negative impact on their support for green technology and no action needed such that older individuals are less supportive of these policies. As anticipated, more concern for climate change and higher levels of climate change knowledge result in statistically significant increases in support for all climate policy measures and a decrease in agreement with no action needed. Higher levels of conservatism result in a statistically significant negative effect for all policy support indicators except no action needed[3]. This finding aligns with my theory that the aversion to climate policy is ideological in nature. Being a Republican only had a statistically significant negative impact on policy support for green technology and the support index. This result is unexpected, so I suspected a high variance inflation factor due to collinearity. Thus, I ran a model with all the controls excluding partisanship and then another excluding ideology. The results can be found in Table 5 and 6 in the Appendix. Ideology maintained its statistically significant effect for climate policy support except the no action needed measure. The magnitude of the negative ideology effect on the combined policy support index increased to .139. Being a Republican and Independent had a statistically significant negative effect on carbon regulation, green technology, and the combined support index. Being a Republican decreases support for the combined policy support index by .456 and .279 for Independents. Overall, the frames fail to have a significant effect on the policy support measures, but the economic frame resulted in more positive coefficients than the scientific frame. Partisanship plays a role in policy support, but ideology appears to have a more consistent effect. Most the coefficients for each frame are negative for all measures of the dependent variable and fail to reach statistical significance. These results are likely misleading, because results on a polarized issue like climate change need to be examined by partisanship. The demographics, specifically ideology, concern for climate change, and factual knowledge

about climate change are moving in the expected directions, which corresponds to prior research (Bayes, Bolsen, and Druckman, 2020; Hart & Nisbet, 2012). As the results from these initial tests generally align with prior research, I view the sample as an appropriate testing ground for my hypotheses, which necessitates analysis broken down by partisanship.

Analysis of Republicans

Turning to the populations of interest, I hypothesized that Republicans will be less supportive of climate policy when exposed to a scientific frame and more supportive when exposed to an economic frame. In Table 2, I present the results from regression models, with controls, that analyze treatment effects for Republicans[4]. The results in Table 2 reveal that neither frame resulted in a statistically significant effect on support for climate policy. The economic frame elicited positive coefficient for all measures except carbon regulation, thus; the frame moved in the hypothesized direction for three of the four measures (**H2**). The carbon regulation question specifically mentioned government regulation of the economy, so this solution may have made Republicans too averse to overcome (Brulle, 2011). The scientific frame had positive coefficients for all measures but carbon regulation and no action needed. The direction of these coefficients does not support **H1**. Climate concern again results in a statistically significant positive effect for all measures of policy support and a negative effect for no action needed. Climate knowledge results in statistically significant support for the combined index and a decrease in no action needed. For both frames, the coefficient for the final combined policy support index was positive, despite the negative coefficients from the carbon regulation measure. Altogether, the treatments fail to significantly increase support for climate mitigation policy, but the economic frame moves most measures in the hypothesized direction.

Table 2. OLS Regression (Republicans)

Experimental Condition	(1) Carbon Regulation	(2) Green Technology	(3) Windfarms	(4) No Action Needed	(5) Support Index
Economic Frame	-0.0378	0.392	0.218	0.0144	0.139
	(-0.14)	(1.50)	(0.77)	(0.04)	(0.76)
Scientific Frame	-0.157	0.224	0.145	-0.0559	0.0669
	(-0.57)	(0.87)	(0.49)	(-0.17)	(0.36)
Female	0.193	0.162	-0.146	-0.467	0.169
	(0.82)	(0.74)	(-0.58)	(-1.70)	(0.99)
Other	-0.634	-2.722***	-0.368	-1.829**	-0.473
	(-1.46)	(-6.68)	(-0.75)	(-2.99)	(-1.54)
Ideology	-0.0482	0.0115	0.0536	0.159	-0.0356
	(-0.71)	(0.19)	(0.72)	(1.41)	(-0.73)
Political Knowledge Index	-0.172	-0.132	-0.315*	-0.211	-0.102
	(-1.42)	(-1.11)	(-2.21)	(-1.26)	(-1.18)
Climate Concern Index	0.438***	0.472***	0.287***	-0.277***	0.369***
	(7.50)	(8.43)	(4.50)	(-3.79)	(9.34)
Climate Knowledge Index	0.199	0.0865	0.266	-0.378**	0.232**
	(1.60)	(0.70)	(1.97)	(-2.80)	(2.86)
Income	-0.0496	-0.0311	0.0312	0.0810	-0.0326
	(-1.37)	(-0.94)	(0.79)	(1.82)	(-1.35)
Education	0.0437	0.0692	0.110	0.0670	0.0389
	(0.45)	(0.86)	(1.10)	(0.62)	(0.57)
Age	-0.0150	-0.0207**	-0.00826	-0.0226*	-0.00535
	(-1.90)	(-2.98)	(-1.14)	(-2.57)	(-1.07)
Constant	3.170***	2.497***	2.704**	6.734***	2.409***
	(4.20)	(3.69)	(3.22)	(6.52)	(4.57)
Observations	181	181	181	181	181
R^2	0.497	0.534	0.310	0.318	0.578

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Analysis of Democrats

Next, I examine the results for Democrats. As with Republicans, analyses without control variables are presented in the Appendix (Table 5). I hypothesized that Democrats will be more supportive of climate policy when exposed to both frames compared to the control. The results in Table 3 show that neither frame resulted in a statistically significant effect on support for climate policy support (Models without control variables are provided in Appendix Table 5). The economic frame resulted in a positive coefficient for all measures except green technology, thus; the frame moved in the hypothesized direction (**H4**). The scientific frame had positive coefficients for all measures but green technology and windfarms. No action needed moved in a negative direction, which is consistent with support for climate policy. The direction of these coefficients provides mixed support for **H3**. It is highly plausible that these results stem from pretreatment and a ceiling effect - Democrats may have been previously exposed to this information. Prior surveys have documented Democrats widespread support for climate mitigation policy, so these measures may not be able to increase that support (Egan & Mullin, 2017). Climate concern and climate knowledge result in a statistically significant positive effect for most measures of the dependent variable. While ideology was statistically insignificant for Republicans, it had a statistically significant negative effect for all measures of support for Democrats besides no action needed. Both frames have a positive coefficient for the final combined policy support index, despite some negative coefficients on individual support measures. Altogether, the treatments fail to produce a statistically significant increase in support for climate mitigation policy, but the economic frame moves most measures in the hypothesized direction.

Table 3. OLS Regression (Democrats)

Experimental Condition	(1) Carbon Regulation	(2) Green Technology	(3) Wind Farms	(4) No Action Needed	(5) Support Index
Economic Frame	0.0979	-0.0222	0.230	0.0458	0.0649
	(0.48)	(-0.14)	(1.17)	(0.13)	(0.54)
Scientific Frame	0.188	-0.0368	-0.217	-0.107	0.0103
	(1.10)	(-0.23)	(-1.01)	(-0.34)	(0.09)
Female	-0.101	-0.243	-0.325	-0.459	-0.0523
	(-0.68)	(-1.83)	(-1.81)	(-1.60)	(-0.53)
Other	-1.519	-0.244	-1.421**	-0.991	-0.548
	(-1.87)	(-0.42)	(-3.20)	(-1.66)	(-1.08)
Ideology	-0.209***	-0.188***	-0.302***	-0.155	-0.136***
	(-3.39)	(-3.51)	(-4.72)	(-1.44)	(-3.72)
Political Knowledge Index	0.0210	0.108	0.146	-0.198	0.118*
	(0.21)	(1.20)	(1.26)	(-1.10)	(1.99)
Climate Concern Index	0.200*	0.157*	0.119	-0.287**	0.191***
	(2.42)	(2.26)	(1.65)	(-2.73)	(4.47)
Climate Knowledge Index	0.102	0.221*	0.106	-0.699***	0.282***
	(1.06)	(2.21)	(0.88)	(-4.45)	(4.93)
Income	0.0234	0.00460	0.0562*	0.0933	-0.00228
	(0.92)	(0.23)	(2.01)	(1.88)	(-0.15)
Education	-0.129*	-0.0841	-0.0135	-0.0872	-0.0349
	(-2.07)	(-1.56)	(-0.18)	(-0.84)	(-0.94)
Age	0.00786	-0.00344	0.000451	-0.0257**	0.00764**
	(1.92)	(-0.90)	(0.08)	(-3.10)	(2.81)
Constant	4.824***	5.200***	5.124***	9.215***	3.483***
	(7.70)	(10.18)	(7.33)	(8.66)	(10.14)
Observations	200	200	200	200	200
R^2	0.280	0.267	0.257	0.356	0.530

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Additional Analysis

Thus far, I have examined the effect of the treatments on Republican and Democratic support for climate policy. These models have failed to find statistically significant effects of the treatment. They did reveal that Republicans moved in the hypothesized direction and that partisanship and ideology have significant effects. Republicans overall may not have been persuaded by the frames, but is it possible that the treatments resonated with some Republicans more than others. It is possible that my economic frame which was designed to appeal to conservative values is most impactful for more extreme conservatives.

That is, perhaps it is the most ideologically conservative individuals who can be persuaded by these frames. The solution aversion model details that individuals are averse to policy that is ideologically inconsistent (Campbell and Kay, 2014). The economic frame was tailored to be ideologically-consistent with conservative ideology often found in Republicans. If the treatment was ineffective even for the Republicans, on average, it is plausible that it resonated with the most extreme conservatives. To test this possibility, I restrict my analysis to the most extreme conservatives; individuals for who identified themselves as extremely conservative on a seven-point ideology scale. This analysis is purely exploratory as I am statistically underpowered to draw strong inferences. I initially examined the average treatment effects for extreme conservatives (i.e., no controls); the results are in Table 6 of the Appendix. The economic frame resulted in a statistically significant positive effect on all measures of climate policy support, but no action needed ($p < 0.05$ for carbon regulation and windfarms, $p < 0.01$ for the support index, and $p < 0.001$ for green technology). The scientific frame did not produce any statistically significant effects, but all coefficients are positive, but no action needed.

I then examined the differences in means between treatments for each measure of the dependent variable and the combined index. Table 4 looks at these differences for *extreme conservatives*. For all measures of policy support, the mean of the economic frame is larger than both the environmental frame and control condition. For the carbon regulation and green technology measures, the economic frame's mean is more than one-point higher than the environmental frame. For the no action needed measure, the economic frame is smaller than the environmental frame and control condition, which is the expected direction. It is also important to note that on all measures of policy support the mean of the environmental frame is larger than the condition and smaller on the no action needed measure. This is in contrast to prior work that has found a backlash effect amongst Republicans when exposed to scientific information on climate change (Hart & Nisbet, 2012; Zhou, 2016). Table 5 explores these differences for *conservatives* (those selecting six on a seven-point ideology scale). Again, on all measures of the dependent variable the economic frame's mean is larger than the environmental frame, but not the control condition. The differences in means between the economic frame and environmental frame is much smaller for moderate conservatives than it was for extreme conservatives. The means of the control condition are larger than both the economic and environmental frames for all measures of policy support and smaller than the no action needed measure. Table 6 inspects these differences for people who label themselves *somewhat conservatives* (those selecting five on a seven-point ideology scale).

Next, I analyzed the attitudes of *extreme conservatives* in response to the treatments with OLS including controls in Table 7. The economic frame had a statistically significant positive effect for green technology ($p < .01$) and significant positive effect for the support index ($p < 0.10$). This finding provides some hope for the hypotheses. The solution aversion model

informed an economic frame that garnered some climate policy support for the most extreme conservatives. Specifically, the economic frame had the strongest positive effect on support for green technology. This measure was uniquely selected because it did not mention government regulation of the economy, but rather a government incentive to the economy. The carbon regulation measure went negative when the other dependent variables did not. This provides evidence that frames tailored to be ideologically consistent may not be able to overcome aversion to questions that are worded ideologically inconsistently, but can garner support for vaguely worded questions. The other measures of policy support move in a positive direction except no action needed. The scientific frame failed to reach statistical significance for all policy measures, but they all moved in a positive direction but carbon regulation. Climate concern and climate knowledge once again have a statistically significant positive effect on most policy support measures. In sum, ideologically-consistent measures may not be able to overcome partisan opposition, but can garner some support for climate policy from the most extreme conservatives. The economic frame's mean is only larger than the environmental frame for windfarms and the no action needed measure where a smaller mean is expected. The control condition's mean is larger than the economic and environmental frame for all measures of policy support and less than both frames for no action needed. The analysis of these means indicate that the measures may only resonate with the most extreme conservatives, but I am wary to draw firm conclusions due to a lack of statistical power.

Table 4. Means (Extreme Conservatives)

Experimental Condition	Control	Economic Frame	Environmental Frame
Carbon Regulation	3.688 (.604) N=16	5.467 (.515) N=15	4.231 (.622) N=13
Green Technology	3.313 (.568) N=16	5.8 (.38) N=15	4.385 (.615) N=13
Windfarms	4.188 (.542) N=16	5.87 (.401) N=15	5.385 (.538) N=13
No Action Needed	6 (.376) N=16	4.8 (.587) N=15	5.538 (.475) N=13
Support Index	3.297 (.447) N=16	5.083 (.351) N=15	4.115 (.413) N=13

Note: standard error of mean is in parentheses

Table 5. Means (Moderate Conservatives)

Experimental Condition	Control	Economic Frame	Environmental Frame
Carbon Regulation	5.364 (.576) N=11	3.913 (.435) N=23	3.857 (.468) N=28
Green Technology	4.455 (.679) N=11	3.87 (.438) N=23	3.857 (.439) N=28
Windfarms	4.636 (.717) N=11	4.391 (.396) N=23	3.929 (.378) N=28
No Action Needed	3.91 (.639) N=11	4.652 (.318) N=23	4.321 (.434) N=28
Support Index	4.636 (.543) N=11	3.88 (.307) N=23	3.83 (.362) N=28

Note: standard error of mean is in parentheses

Table 6. Means (Mild Conservatives)

Experimental Condition	Control	Economic Frame	Environmental Frame
Carbon Regulation	4.45 (.394) N=20	4.8 (.329) N=20	5.5 (.423) N=8
Green Technology	4.45 (.426) N=20	4.65 (.379) N=20	4.875 (.718) N=8
Windfarms	4.45 (.359) N=20	5.3 (.317) N=20	5.125 (.666) N=8
No Action Needed	3.65 (.35) N=20	3.6 (.432) N=20	3.5 (.802) N=8
Support Index	4.425 (.247) N=20	4.788 (.289) N=20	5 (.584) N=8

Note: standard error of mean is in parentheses

Table 7. OLS Regression (Extreme Conservatives)

Experimental Condition	(1) Carbon Regulation	(2) Green Technology	(3) Windfarms	(4) No Action Needed	(5) Support Index
Economic Frame	0.599	1.020**	0.422	-0.395	0.609
	(1.42)	(3.03)	(0.75)	(-0.64)	(1.95)
Scientific Frame	-0.332	0.214	0.452	0.0231	0.0778
	(-0.56)	(0.45)	(0.66)	(0.04)	(0.20)
Female	-0.113	0.245	0.787	-2.010*	0.732
	(-0.19)	(0.47)	(1.69)	(-2.67)	(1.89)
Political Knowledge Index	-0.231	-0.277	-0.314	-0.134	-0.172
	(-0.99)	(-1.39)	(-1.07)	(-0.42)	(-1.06)
Climate Concern Index	0.330**	0.343***	0.175	-0.205	0.263***
	(3.63)	(4.45)	(1.39)	(-1.85)	(4.13)
Climate Knowledge Index	0.624	0.520*	0.796*	-0.516	0.614**
	(2.01)	(2.54)	(2.60)	(-2.03)	(3.36)
Income	-0.215*	-0.163*	0.130	-0.0444	-0.0508
	(-2.17)	(-2.05)	(1.25)	(-0.39)	(-0.81)
Education	0.127	0.0831	-0.272	-0.0475	-0.00357
	(0.58)	(0.40)	(-0.88)	(-0.21)	(-0.02)
Age	-0.0447*	-0.0473**	-0.0169	-0.00882	-0.0250*
	(-2.42)	(-3.59)	(-0.87)	(-0.46)	(-2.15)
Independent	-0.218	-0.309	-0.749	-2.148	0.218
	(-0.19)	(-0.28)	(-0.59)	(-1.52)	(0.30)
Republican	-0.837	-0.220	0.197	-1.658*	0.199
	(-1.77)	(-0.44)	(0.27)	(-2.15)	(0.48)
Constant	5.686**	4.797**	3.375	11.33***	2.632*
	(3.38)	(3.25)	(1.60)	(5.53)	(2.28)
Observations	41	41	41	41	41
R^2	0.785	0.840	0.590	0.468	0.814

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Discussion and Conclusion

The purpose of this survey experiment was to discover new strategies to gain support for climate mitigation policy. Climate change poses a severe threat to all life on earth and has resulted in almost irreversible levels of greenhouse gases in the atmosphere (IPCC, 2021). Despite this danger, the United States has failed to pass comprehensive legislation to address climate change (Egan & Mullin, 2017). Literature in this policy domain has long documented that this policy inaction is a result of polarization over the issue of climate change amongst Democrats and Republicans (Egan & Mullin, 2017). Public opinion data finds that Democrats and Republicans both believe climate change is occurring, but Republicans differ from their partisan counterparts in their belief in its cause, its severity, and required policy solutions (Egan & Mullin, 2017). Research has attempted to garner Republican support for climate mitigation policy through a variety of methods, but has largely failed to do anything but reinforce people's prior attitudes (Bayes, Bolsen, & Druckman, 2020; Ma et. Al, 2019; Zhou, 2016). As greenhouse gas levels approach irreversible levels, it is critical that the United States, one of the largest contributors to climate change, adopt climate mitigation policy. This policy adoption cannot occur until strategies to gather Republican support are found. This study brings researchers closer to uncovering persuasive methods that can be successful in doing so.

Literature on motivated reasoning and the solution aversion model were utilized to craft a message on climate change policy that would be persuasive to Republicans: an economic frame. The effects of this political communication strategy were tested in a survey experiment in which respondents were randomly assigned to either a control condition, a traditional scientific frame on climate policy, or an economic frame. All respondents were subsequently asked four questions on various climate policy measures (i.e. dependent variables). Using regression models both with and without control variables, there were no statistically significant effects for either

the scientific or economic frame for policy preferences. It is critical to note that Republicans in the economic frame moved in the hypothesized direction for all measures of the dependent variable except the question concerning carbon regulation. Republicans in the scientific frame moved in the same direction for all measures of the dependent variable. I am hesitant to draw firm conclusions about the success – or lack thereof of the economic frame – because it is possible that the test is underpowered to detect the effect. Similarly, Democrats moved in the expected direction for all measures of the dependent variable except the green technology question. Democrats in the scientific frame moved in the same direction for all measures of the dependent variable besides the windfarms question.

It is important to note there was no evidence of a backlash effect from Republicans in response to the scientific frame. Some researchers have found that Republicans will display backfire effects when exposed to the scientific consensus that climate change is real and human-caused (Hart & Nisbet, 2012; Zhou, 2016). These authors argued that Republicans had statistically significant less support for climate policy when exposed to this scientific consensus. In contrast to these findings, I do not find that the scientific frame had a statistically significant negative effect on Republican support for climate policy. In fact, Republicans moved in a positive direction for all measures of the dependent variable besides no action needed (the expected direction) and the carbon regulation measure. The carbon regulation measure was also negative for the economic frame, so the wording of the question may have been too inconsistent with their ideology for any frame to overcome. These findings are in stark contrast to authors who argue that exposure to scientific information further polarizes Republicans on climate policy. It is possible that the prevalence of these backfire effects has been overstated in the extant literature. It certainly seems possible that some studies (like mine) document null treatment

effects rather than backfire effects, and these may receive little attention due to the "file-drawer problem" and publication biases (e.g., Franco, Malhotra, and Simonovitz, 2014).

As noted, I think it is possible that my treatments may have been under-powered. The economic frame moved both Democrats and Republicans in the expected direction for most measures of the dependent variable. This finding, in conjunction with theoretical insights from the solution aversion model, led me to further examine my data with ideological sub-groups such as extreme conservatives. However, these exploratory analyses were underpowered and only serve as a possibility for the phenomenon observed. An OLS regression of extreme conservatives with control variables found a statistically significant increase in support for green technology and the combined support index for those exposed to the economic frame. It is plausible that the economic frame resonated with the most extreme conservatives, but not Republicans. The solution aversion model, which informed the economic frame, argued that policy aversion results from policies inconsistent with one's ideology (Campbell & Kay, 2014). As most Republicans are conservative, the economic frame was crafted to be ideologically-consistent with conservatives. These findings provide hope that this frame can garner policy support, specifically with the most extreme conservatives. The full sample had very few extreme conservatives (N=44). Among Republicans in the study, there were far fewer extreme conservatives and most were moderates (N=46), so a larger sample may be able to find more robust effects.

These findings have implications for both the solution aversion model and motivated reasoning. As discussed, the solution aversion model argues that individuals are averse to policies that are inconsistent with their ideology (Campbell and Kay, 2014). This theory informed the creation of the economic frame, which may have resulted in some climate policy support amongst the most extreme conservatives. This theory has yet to be adopted by most of

the researchers examining climate policy support, but may be the path forward. Under this theory, I crafted an economic frame intended to be consistent with conservative ideology. There is suggestive evidence that the frame is more successful among the most extreme conservatives. This theory highlights that the aversion to climate policy may not be partisan in nature, but ideological. Thus, this theory can be utilized in future work to collect policy support from conservatives from both parties. Furthermore, this study tested the ability to overcome motivated reasoning on a polarized issue. The climate change debate has become increasingly contested and polarized in recent years (Egan & Mullin, 2017). Motivated reasoning tells us that individuals are motivated to confirm their prior beliefs and so Republicans and conservatives are not expected to support climate policy (Egan & Mullin, 2017; Taber & Lodge, 2006). The solution aversion model helped craft an economic frame that that may have the potential to resonate with Republicans and the most extreme conservatives. The ideological consistency of the economic frame may be able to overcome the motivation to reject it from both an ideological and partisan standpoint. Future research in motivated reasoning should account for the interactions between multiple motivations such as these.

These findings also have implications for future research on climate change policy, as well as climate advocacy. The findings of this study were largely null, but it is possible that the treatment effects are small and I am unable to detect them in this small sample. With only one exception, the economic frame moved all measures of climate policy support in a positive direction besides carbon regulation for Republicans. Some hope was found for the economic frame amongst extreme conservatives, but this finding lacks statistical power. This study finds some support that an economic frame may resonate with Republicans or extreme conservatives, so future work should build upon this. The solution aversion model should be utilized to create

frames consistent with Republicans and conservatives. The economic frame can be altered to strengthen its ideological consistency with these groups. Future work could develop several economic frames and pre-test them to determine the most effective. Another possibility is to carry out a study with multiple variations of an economic frame and compare their effectiveness relative to the control. One more avenue for strengthening the effect of the economic frames is to include endorsements. Republicans are motivated to reject climate policy to confirm their partisan goals (Taber & lodge, 2006). Republican elites, specifically in Congress, established the Republican opposition to such policies (Druckman & McGrath, 2019). If Republicans believe their political elites are endorsing these policies, it could increase support for them by reducing the partisan motivation to reject them. Subsequent studies could compare the use of endorsements to not utilizing them, endorsements from elites of different parties, or even endorsements from different elites or the same party.

The literature has failed to find a strategy that can generate Republican support for climate mitigation policy, so other avenues must be explored. In the meantime, climate advocates can utilize this study and the solution aversion model to inform their work. Much of climate advocacy focuses on the implications and dangers of climate change, but this often hinges on the science of climate change. The literature has documented that Republicans exhibit backlash to this information, but I find null effects. Regardless, scientific information and the risks of climate change are not compelling to Republicans. Climate advocates must develop build support for policy adoption and change. Their work should focus on messages and campaigns that resonate with their target audiences. Democrats and Republicans have different priorities and ideological values. Advocacy work must take this into consideration. Climate advocates should identify and emphasize the economic benefits of climate mitigation policy and the economic consequences of

climate change. This information is more consistent with the priorities of Republicans and conservatives, and it should be highlighted in appeals to these groups. It is critical that science and political communication scholars identify strategies that increase Republican support of climate mitigation policy. The threat of climate change is imminent and it cannot be resolved if the United States does not pass comprehensive mitigation policy. Amassing public support from climate policy is a key step towards influencing action at the elite and institutional level.

Appendix

Contents

Table 1. Sample Demographics:

Sample recruited by Lucid in October 2021

	Sample
Percent Female	51.95%
Mean Age	45.86
Median Education Category	Some college or technical school
Median Income Category	$40,000-$49,999
Percent Conservative	31.62%
Percent Liberal	32.24%

Dependent Variable

To what extent do you agree with the following statement: "carbon emissions should be regulated immediately by the government"?
- o   Strongly Agree
- o   Agree
- o   Weakly agree
- o   Neither agree or disagree
- o   Weakly disagree
- o   Disagree
- o   Strongly disagree

To what extent do you agree with the following statement: "green technology should be incentivized immediately by the government"?
- o   Strongly Agree
- o   Agree
- o   Weakly agree
- o   Neither agree or disagree
- o   Weakly disagree
- o   Disagree
- o   Strongly disagree

To what extent do you agree with the following statement: "offshore wind farms should be utilized for energy by the government"?
- o   Strongly Agree
- o   Agree
- o   Weakly agree
- o   Neither agree or disagree
- o   Weakly disagree
- o   Disagree
- o   Strongly disagree

Q41 To what extent do you agree with the following statement: "concerns about global climate change are unwarranted and no action is needed"?
- o   Strongly Agree
- o   Agree
- o   Weakly agree
- o   Neither agree or disagree
- o   Weakly disagree
- o   Disagree
- o   Strongly disagree

Average Treatment Effects

Table 2. Average Treatment Effects (Full Sample):

Experimental Condition	(1) Carbon Regulation	(2) Green Technology	(3) Windfarms	(4) No Action Needed	(5) Support Index
Economic Frame	-0.0859	-0.0491	0.0307	0.166	-0.0675
	(-0.45)	(-0.26)	(0.17)	(0.69)	(-0.46)
Scientific Frame	-0.0760	-0.145	-0.127	-0.390	0.0105
	(-0.39)	(-0.73)	(-0.66)	(-1.58)	(0.07)
Constant	5.380***	5.288***	5.301***	3.589***	5.095***
	(40.31)	(38.30)	(39.63)	(20.32)	(47.20)
Observations	487	487	487	487	487
R^2	0.000	0.001	0.002	0.011	0.001

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3. OLS Regression (Full Sample)

Experimental Condition	(1) Carbon Regulation	(2) Green Technology	(3) Windfarms	(4) No Action	(5) Support Index
Economic Frame	-0.0370	-0.00622	0.0465	0.145	-0.0355
	(-0.25)	(-0.04)	(0.30)	(0.67)	(-0.36)
Scientific Frame	-0.137	-0.151	-0.202	-0.284	-0.0513
	(-0.96)	(-1.04)	(-1.28)	(-1.37)	(-0.53)
Female	0.0207	-0.0994	-0.357**	-0.442*	0.00154
	(0.17)	(-0.83)	(-2.70)	(-2.41)	(0.02)
Other	-1.005*	-0.162	-0.653	-0.814	-0.251
	(-2.52)	(-0.30)	(-1.62)	(-1.12)	(-1.08)
Ideology	-0.147***	-0.0993*	-0.137**	0.0203	-0.101***
	(-3.36)	(-2.38)	(-2.82)	(0.29)	(-3.49)
Political Knowledge Index	-0.0867	0.00464	-0.0830	-0.177	0.00308
	(-1.19)	(0.06)	(-0.99)	(-1.61)	(0.06)
Climate Concern Index	0.357***	0.350***	0.244***	-0.257***	0.302***
	(8.57)	(8.78)	(5.37)	(-4.90)	(11.64)
Climate Knowledge Index	0.163*	0.184**	0.196*	-0.545***	0.272***
	(2.42)	(2.63)	(2.55)	(-6.11)	(6.16)
Income	-0.00708	-0.00242	0.0356	0.0573	-0.00781
	(-0.37)	(-0.13)	(1.71)	(1.83)	(-0.61)
Education	-0.0247	-0.0455	0.0367	-0.0000595	-0.00835
	(-0.50)	(-0.92)	(0.70)	(-0.00)	(-0.25)
Age	-0.00217	-0.00915**	-0.000263	-0.0236***	0.00301
	(-0.59)	(-2.63)	(-0.07)	(-4.43)	(1.24)
Independent	-0.255	-0.439*	-0.166	-0.148	-0.178
	(-1.53)	(-2.46)	(-0.91)	(-0.58)	(-1.58)
Republican	-0.263	-0.539**	-0.0389	0.285	-0.281**
	(-1.56)	(-3.25)	(-0.22)	(1.15)	(-2.65)
Constant	3.752***	3.858***	3.834***	7.800***	2.911***
	(8.48)	(8.84)	(7.91)	(12.01)	(10.05)
Observations	474	474	474	474	474
R^2	0.458	0.480	0.301	0.329	0.600

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

<h2 style="text-align:center"><u>Table 4. Average Treatment Effects (Republicans):</u></h2>

Experimental Condition	(1)	(2)	(3)	(4)	(5)
	Carbon Regulation	Green Technology	Windfarms	No Action Needed	Support Index
Economic Frame	0.0127	0.353	0.181	-0.222	0.192
	(0.04)	(0.97)	(0.54)	(-0.61)	(0.71)
Scientific Frame	-0.441	-0.112	-0.120	-0.00121	-0.168
	(-1.14)	(-0.30)	(-0.35)	(-0.00)	(-0.58)
Constant	4.704***	4.259***	4.759***	4.296***	4.356***
	(16.64)	(15.09)	(18.80)	(15.47)	(21.01)
Observations	182	182	182	182	182
R^2	0.012	0.011	0.005	0.003	0.010

t statistics in parentheses
$^{*} p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

The average effects of the economic and scientific frames (without control variables) on support for climate mitigation policy for Republicans are shown in Appendix Table 2 and for Democrats in Appendix Table 3. The average treatment effects of both frames for Republicans fails to reach statistical significance for each dependent variable. Nevertheless, each frame moves in the hypothesized direction for the various measures of climate policy support. The economic frame resulted in positive coefficients for the various policies and a negative coefficient for no action needed. The scientific frame resulted in negative coefficients for all the dependent variables. The average treatment effects of both frames for Democrats also fails to reach statistical significance for the climate policy support measures. It is intriguing that Democrats' responses to the frames largely mirrored that of Republicans. The economic frame resulted in positive coefficients for all the dependent variables, besides green technology. The scientific frame resulted in more negative coefficients than positive ones for the various policies, except green technology and the combined support index. Failure to detect treatment effects may

be a result of low power, amongst a number of other factors, so I am wary to make firm

conclusions. Taken together, these results fail to confirm my hypotheses, but identify that the

frames move policy support in the expected direction for Republicans.

Table 5. OLS Regression Excluding Partisanship:

Experimental Condition	(1) Carbon Regulation	(2) Green Technology	(3) Windfarms	(4) No Action Needed	(5) Support Index
Economic Frame	-0.0714	-0.0282	0.0437	0.140	-0.0490
	(-0.48)	(-0.20)	(0.29)	(0.65)	(-0.49)
Scientific Frame	-0.100	-0.147	-0.159	-0.341	-0.0163
	(-0.72)	(-1.03)	(-1.02)	(-1.67)	(-0.17)
Female	-0.000846	-0.115	-0.368**	-0.461*	-0.00556
	(-0.01)	(-0.94)	(-2.79)	(-2.56)	(-0.06)
Other	-0.936**	-0.181	-0.690*	-0.918	-0.222
	(-2.77)	(-0.36)	(-2.06)	(-1.48)	(-1.17)
Ideology	-0.195***	-0.170***	-0.143**	0.0494	-0.139***
	(-4.50)	(-4.08)	(-3.24)	(0.78)	(-5.07)
Political Knowledge	-0.0945	-0.0166	-0.115	-0.157	-0.0173
	(-1.30)	(-0.23)	(-1.38)	(-1.45)	(-0.35)
Climate Concern	0.363***	0.368***	0.250***	-0.274***	0.314***
	(9.31)	(9.63)	(5.81)	(-5.50)	(12.41)
Climate Knowledge	0.149*	0.186**	0.190*	-0.541***	0.267***
	(2.23)	(2.67)	(2.49)	(-6.19)	(6.01)
Income	-0.00675	-0.00803	0.0338	0.0677*	-0.0122
	(-0.36)	(-0.44)	(1.69)	(2.24)	(-0.98)
Education	-0.00872	-0.0211	0.0456	-0.0122	0.00700
	(-0.18)	(-0.43)	(0.88)	(-0.18)	(0.21)
Age	-0.00352	-0.00930**	-0.000239	-0.0224***	0.00233
	(-0.94)	(-2.65)	(-0.06)	(-4.25)	(0.95)
Constant	3.805***	3.717***	3.818***	7.775***	2.891***
	(8.62)	(8.58)	(8.15)	(12.58)	(10.14)
Observations	486	486	486	486	486
R^2	0.456	0.470	0.303	0.330	0.597

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6. OLS Regression Excluding Ideology:

Experimental Condition	(1) Carbon Regulation	(2) Green Technology	(3) Windfarms	(4) No Action Needed	(5) Support Index
Economic Frame	-0.0566	-0.0195	0.0281	0.148	-0.0489
	(-0.38)	(-0.14)	(0.18)	(0.68)	(-0.49)
Scientific Frame	-0.148	-0.158	-0.213	-0.283	-0.0591
	(-1.03)	(-1.09)	(-1.32)	(-1.36)	(-0.60)
Female	0.0205	-0.0995	-0.357**	-0.442*	0.00141
	(0.17)	(-0.82)	(-2.67)	(-2.42)	(0.02)
Political Knowledge	-0.0795	0.00951	-0.0762	-0.178	0.00804
	(-1.07)	(0.13)	(-0.91)	(-1.63)	(0.16)
Climate Concern	0.378***	0.364***	0.264***	-0.260***	0.316***
	(9.03)	(9.25)	(5.82)	(-5.14)	(11.92)
Knowledge Index	0.178*	0.194**	0.210**	-0.547***	0.282***
	(2.55)	(2.75)	(2.69)	(-6.14)	(6.28)
Income	-0.0114	-0.00533	0.0315	0.0579	-0.0108
	(-0.57)	(-0.29)	(1.50)	(1.86)	(-0.81)
Education	-0.00856	-0.0346	0.0518	-0.00229	0.00275
	(-0.17)	(-0.70)	(0.97)	(-0.03)	(0.08)
Age	-0.00323	-0.00987**	-0.00126	-0.0235***	0.00228
	(-0.89)	(-2.88)	(-0.32)	(-4.41)	(0.93)
Independent	-0.403*	-0.538**	-0.303	-0.128	-0.279*
	(-2.45)	(-3.06)	(-1.71)	(-0.51)	(-2.48)
Republican	-0.518**	-0.710***	-0.276	0.320	-0.456***
	(-3.16)	(-4.31)	(-1.68)	(1.40)	(-4.48)
Constant	3.137***	3.444***	3.261***	7.885***	2.489***
	(7.81)	(8.99)	(7.71)	(14.63)	(9.58)
Observations	474	474	474	474	474
R^2	0.445	0.474	0.289	0.329	0.590

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9. Average Treatment Effects (Democrats):

Experimental Condition	(1)	(2)	(3)	(4)	(5)
	Carbon Regulation	**Green Technology**	**Windfarms**	**No Action Needed**	**Support Index**
Economic Frame	0.0127	-0.0700	0.160	0.120	0.00583
	(0.04)	(-0.35)	(0.74)	(0.30)	(0.03)
Scientific Frame	-0.441	0.101	-0.0656	-0.501	0.216
	(-1.14)	(0.57)	(-0.26)	(-1.30)	(1.40)
Constant	4.704***	6.053***	5.773***	3.147***	5.657***
	(16.64)	(53.18)	(34.28)	(11.72)	(50.20)
Observations	182	200	200	200	200
R^2	0.012	0.004	0.005	0.013	0.011

t statistics in parentheses
[*] $p < 0.05$, [**] $p < 0.01$, [***] $p < 0.001$

Table 10. Average Treatment Effects (Extreme Conservatives)

t statistics in parentheses

Experimental Condition	(1)	(2)	(3)	(4)	(5)
	Carbon Regulation	**Green Technology**	**Windfarms**	**No Action Needed**	**Support Index**
Economic Frame	1.779*	2.487***	1.679*	-1.200	1.786**
	(2.24)	(3.63)	(2.49)	(-1.72)	(3.14)
Scientific Frame	0.543	1.072	1.197	-0.462	0.819
	(0.63)	(1.28)	(1.57)	(-0.76)	(1.35)
Constant	3.687***	3.312***	4.187***	6.000***	3.297***
	(6.09)	(5.81)	(7.71)	(15.89)	(7.36)
Observations	44	44	44	44	44
R^2	0.111	0.224	0.134	0.074	0.198

[*] $p < 0.05$, [**] $p < 0.01$, [***] $p < 0.001$

Reference

Abeles, A. T., Howe, L. C., Krosnick, J. A., & MacInnis, B. (2019). Perception of public opinion on global warming and the role of opinion deviance. *Journal of Environmental Psychology, 63*, 118–129.

Antonio, Robert J., and Robert J. Brulle. 2011. "THE UNBEARABLE LIGHTNESS OF POLITICS: Climate Change Denial and Political Polarization." Sociological Quarterly 52(2): 195–202.

Bayes, R., Bolsen, T., & Druckman, J.N. (2020). A Research Agenda for Climate Change Communication and Public Opinion: The Role of Scientific Consensus Messaging and Beyond. Retrieved November 13th, 2020 from https://www.tandfonline.com/doi/full/10.1080/17524032.2020.1805343.

Berinsky, A., Huber, G., & Lenz, G. (2012). Evaluating Online Labor Markets for Experimental Research: Amazon.com's Mechanical Turk. Political Analysis, 20(3), 351-368. doi:10.1093/pan/mpr057

Bolsen, T., Druckman, J. N., & Cook, F. L. (2015). Citizens', scientists', and policy advisors' beliefs about global warming. *The ANNALS of the American Academy of Political and Social Science*, *658*(1), 271–295.

Brulle, R., Carmichael, J., & Jenkins, J. (2012). Shifting public opinion on climate change: An empirical assessment of factors influencing concern over climate change in the U.S., 2002–2010. *Climatic Change, 114*(2), 169-188.

Bugden, D. Denial and distrust: explaining the partisan climate gap. Climatic Change 170, 34 (2022). https://doi.org/10.1007/s10584-022-03321-2

Busby, Ethan C., D.J. Flynn, and James N. Druckman. 2018. "Studying framing effects on political preferences: existing research and lingering questions." In P. D'Angelo (Ed.), Doing news framing analysis II. New York: Routledge.

Buttel, F. H., & Flinn, W. L. (1976). Environmental Politics: The Structuring of Partisan and Ideological Cleavages in Mass Environmental Attitudes. *The Sociological Quarterly, 17*(4), 477-490.

Campbell, T., & Kay, A. (2014). Solution aversion: On the relation between ideology and motivated disbelief. Journal of Personality and Social Psychology, 107, 809-824

Chong, Dennis and James N. Druckman. 2007. "Framing Public Opinion in Competitive Democracies." American Political Science Review 101(4): 637-655.

Cook, J., & Lewandowsky, S. (2016). Rational irrationality: Modeling climate change belief polarization using Bayesian networks. *Topics in Cognitive Science*, *8*(1), 160–179.

Coppock, A., Leeper, T. J., & Mullinix, K. J. (2018). Generalizability of heterogeneous treatment effect estimates across samples. *Proceedings of the National Academy of Sciences*, *115*(49), 12441–12446. https://doi.org/10.1073/pnas.1808083115

Dixon, G., Hmielowski, J., & Ma, Y. (2017). Improving climate change acceptance among U.S. conservatives through value-based message targeting. *Science Communication*, *39*(4), 520–534. https://doi.org/10.1177/1075547017715473

Druckman, J.N. and Leeper, T.J. (2012), Learning More from Political Communication   Experiments: Pretreatment and Its Effects. American Journal of Political Science, 56: 875-896. https://doi.org/10.1111/j.1540-5907.2012.00582.x

Druckman, J. N., & McGrath, M. C. (2019). The evidence for motivated reasoning in climate change preference formation. *Nature Climate Change*, *9*(2), 111-119

Druckman, James N., Erik Peterson, and Rune Slothuus. 2013. "How Elite Partisan Polarization Affects Public Opinion Formation." American Political Science Review 107(1): 57-79.

Dunlap, R., Xiao, C., & Mccright, A. (2001). Politics and Environment in America: Partisan and Ideological Cleavages in Public Support for Environmentalism. Environmental Politics, 10(4), 23-48.

Egan, P., & Mullin, M. (2017). Climate Change: US Public Opinion. *Annual Review of Political Science, 20*(1), 209-227.

Feldman, Lauren, and P. Sol Hart. "Climate change as a polarizing cue: Framing effects on public support for low-carbon energy policies." *Global Environmental Change* 51 (2018): 54-66.

Fisher, D., Leifeld, R., & Iwaki, P. (2013). Mapping the ideological networks of American climate politics. *Climatic Change, 116*(3-4), 523-545.

Franco, A., Malhotra, N., & Simonovits, G. (2014). Publication bias in the Social Sciences: Unlocking the file drawer. *Science*, *345*(6203), 1502–1505. https://doi.org/10.1126/science.1255484

GOP.com. (2014). Our party. Retrieved from http://www.gop.com/ourparty/

Funk, C., & Hefferon, M. (2021, July 12). *U.S. public views on climate and Energy*. Pew Research Center Science & Society. Retrieved February 4, 2022, from https://www.pewresearch.org/science/2019/11/25/u-s-public-views-on-climate-and-energy/

Hart PS, Nisbet EC. 2012. Boomerang effects in science communication: how motivated reasoning and identity cues amplify opinion polarization about climate mitigation policies. *Commun. Res.* 39:701–23.

Hornsey, M. J. (2021). The role of Worldviews in shaping how people appraise climate change. *Current Opinion in Behavioral Sciences*, *42*, 36–41. https://doi.org/10.1016/j.cobeha.2021.02.021

IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [MassonDelmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S.

Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

Jenkins, J. (2011). Democratic Politics and the Long March on Global Warming: Comments on McCright and Dunlap. *The Sociological Quarterly, 52*(2), 211-219.

Kahan, D. M. (2016). The 'gateway belief' illusion: Reanalyzing the results of a scientific-consensus messaging study. *Journal of Science Communication*, *16*(5), 1–20.

Kam, C. D., & Trussler, M. J. (2016). At the nexus of observational and experimental research: Theory, specification, and analysis of experiments with heterogeneous treatment effects. *Political Behavior*, *39*(4), 789–815. https://doi.org/10.1007/s11109-016-9379-z

Koba, M. (2013). Fighting climate change could come at a high price. CNBC Online: Economy. Retrieved from http://www.cnbc.com/id/100398076/Fighting_Climate_Change_Could_Come_at_a_High_Price

Krupnikov, Y., & Levine, A. (2014). Cross-Sample Comparisons and External Validity. Journal of Experimental Political Science, 1(1), 59-80. doi:10.1017/xps.2014.7

Leiserowitz, A. (2006). Climate Change Risk Perception and Policy Preferences: The Role of Affect, Imagery, and Values. *Climatic Change, 77*(1-2), 45-72.

Lodge, M., & Taber, C. S. (2013). The rationalizing voter. Cambridge, England: Cambridge University Press

Luong, K. T., Garrett, R. K., & Slater, M. D. (2019). Promoting persuasion with ideologically tailored science messages: A novel approach to research on emphasis framing. *Science Communication*, *41*(4), 488–515. https://doi.org/10.1177/1075547019862559

Ma, Y., Dixon, G., & Hmielowski, J. D. (2019). Psychological reactance from reading basic facts on climate change: The role of prior views and political identification. *Environmental Communication*, *13*(1), 71–86.

McCright, A., & Dunlap, R. (2003). Defeating Kyoto: The conservative movement's impact on U.S. climate change policy. Social Problems, 50, 348-373.

Mccright, A., & Dunlap, R. (2011). The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001-2010. *The Sociological Quarterly, 52*(2), 155-194.

Mullinix, Kevin J., Thomas J. Leeper, Jeremy Freese, and James N. Druckman. 2015. "The Generalizability of Survey Experiments." Journal of Experimental Political Science. 2(2): 109- 138.

Peer, E., Vosgerau, J., & Acquisti, A. (2013). Reputation as a sufficient condition for data quality on Amazon Mechanical Turk. Behavior Research Methods. Advance online publication. doi:10.3758/s13428-013- 0434-y

Pew Research Center. (2010). Wide partisan divide over global warming. Retrieved from
http://www.pewresearch.org/2010/10/27/wide-partisandivide-over-global-warming/

Pew Research Center. (2012). Deepening divide between Republicans and Democrats over
business regulation. Retrieved from http://www .pewresearch.org/daily-
number/deepening-divide-between-republicansand-democrats-over-business-regulation/

Taber, C. S., & Lodge, M. (2006). Motivated skepticism in the evaluation of political beliefs.
American Journal of Political Science, 50, 755–769. doi:10.1111/j.1540-
5907.2006.00214.x

Zhou, J. (2016). Boomerangs versus javelins: How polarization constrains communication on
climate change. *Environmental Politics*, *25*(5), 788-811.