

Boomerangs versus Javelins: How Polarization Constrains Communication on Climate Change

Jack Zhou

Nicholas School of the Environment, Duke University, Durham, USA

ABSTRACT


Political communicators work under the assumption that information provision, such as framing, may influence audiences and elicit some desired attitudinal or behavioral shift. However, some political issues, such as climate change, have become polarized along party lines, with partisans seemingly impervious to disconfirming information. On these highly polarized issues, can framing sway partisans to moderate their positions, or are partisans so motivated in their issue stances that framing fails? Using a variety of vignettes, and Republican climate change skepticism as a case, this article reports an experiment of how partisans respond to counter-attitudinal framing on a sharply polarized issue. Results indicate that Republicans are resistant to frames that encourage support of governmental action or personal engagement against climate change. There is strong evidence of motivated skepticism, given widespread backfire (or 'boomerang') effects and decreased attitudinal ambivalence following exposure to framing, suggesting that issue polarization may severely constrain attempts at communication.

KEYWORDS Polarization; motivated reasoning; backfire; framing; identity; climate change

Introduction

Over the past two decades, political polarization has erupted in American politics, most visibly at the elite and media levels (for reviews, see Fiorina and Abrams 2008, Prior 2013). While it is still unclear to what extent polarization among political elites has translated into partisan schisms at the public level more generally, environmental issues – particularly climate change – have seen sharp increases in politicization and polarization. For instance, the scientific community has reached 97% consensus that global warming is occurring and largely from human activity (Cook *et al.* 2013). However, the American public is much less homogenous, with a 2015 poll conducted by the Pew Research Center revealing stark partisan and ideological differences between Democrats and Republicans on the issue. These include a 39 percentage-point gap in the belief that dealing with global

CONTACT Jack Zhou  jack.zhou@duke.edu

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warming should be a top priority for the Federal government (Pew Research Center 2015).

With widespread partisan antagonism surrounding the issue (see McCright and Dunlap 2011), climate change is an excellent case to examine how an increasingly hostile environment for political information on an issue affects how communicators interact with public opinion. The extensive literature on political framing across a wide range of topic areas suggests that, given strong messages and credible sources for those messages, communicators are able to influence public opinion, attitudes, and behavior (Chong and Druckman 2007).

However, the theory of motivated reasoning offers a different perspective – that individuals with strong personal convictions on certain issues may preferentially filter information on that issue, and even reject outright information that does not comport with their prior beliefs (Taber and Lodge 2006). Given that issue polarization is a process dependent on strong political opinions and attitudes, motivated reasoning may be potentiated in issue contexts facing fierce polarization, especially when that polarization falls along identity-based lines such as partisanship (Druckman *et al.* 2013).

This study contributes to the extant literatures on public opinion, political communication, and environmental politics by exploring the limits of framing effects in light of political issue polarization and offering a cognitive mechanism to understand better how communication works in these contentious situations. I report the results of a March 2014 survey experiment that examines how political communication and framing effects are constrained by political polarization. Using climate change skepticism among Republicans as a case, I observe that Republican respondents are not receptive to frames supportive of action against climate change. This result suggests that while framing is powerful, polarization can produce stressful conditions in an issue's information environment that amplify the effects of motivated reasoning and limits the impacts of framing. Here, the presence of motivated skepticism is observed through how Republican respondents reject pro-climate action framing, becoming more skeptical on several attitudinal and cognitive measures after exposure to framing. Given the increasing prominence (and polarization) of environmental issues in American and global politics, my research indicates that navigating environmental politics may be considerably more complicated than simply finding 'the right message.'

Theory

Framing effects

The literature on political communication has extensively covered the use of framing to influence public opinion on political issues. Framing – or,

more specifically, emphasis framing – refers to how messages that strategically emphasize certain facets of an issue and ignore others may influence individual and public perception of that issue (Chong and Druckman 2007). Previously, scholars have noted how framing can affect public opinion across many issue areas, including free speech (Nelson *et al.* 1997), government welfare (Druckman 2001), capital punishment (Dardis *et al.* 2008), and military intervention (Berinsky and Kinder 2006). Frames are therefore a potentially powerful mechanism for driving public opinion, and have been adopted as such by policy-oriented scholars and activists.

Framing effects may be generally grouped into two different types: message effects and source effects. Message effects pertain to the content of the framing – what elements of an issue are emphasized, de-emphasized, or made most accessible for the message receiver's consumption (Chong and Druckman 2007). For instance, research has shown that partisans are generally more receptive to messages referencing issues owned by the party they personally identify with than opposition-owned messages (Cohen 2003, Sides 2006). Source effects, meanwhile, relate to perceptions of the deliverer of the frame, with source credibility linked to perceived knowledgeability, trustworthiness, and whether the messenger shares similar perspectives or characteristics as the intended audience (Lupia and McCubbins 1998, Druckman and Lupia 2000, Cohen 2003).

Motivated reasoning

However, insights from political psychology suggest that framing of polarized issues may be more difficult than simply crafting the right messages. While framing effects can be powerful, models of political cognition focusing mainly on information provision – as in many framing studies – ignore how individuals process that political information. Using the terminology of Druckman (2001), frames in thought are just as important to consider as frames in communication. For issues seen as controversial or where there is an abundance of conflicting information, as in climate change (see Crow and Boykoff 2014), individuals tend to process political cues from framing selectively (Zaller 1992, Krosnick *et al.* 2006, Malka *et al.* 2009). Consequently, individuals may pass over information seen as challenging or incompatible with their political preferences, and become even more confident of those preferences regardless of substantive grounding (Druckman *et al.* 2013).

The theory of directional motivated reasoning states that individuals with strong prior attitudes and beliefs may be goal-oriented to seek out and process information supporting those beliefs preferentially. In addition, these motivated individuals are apt to ignore or reject disconfirming information (Kunda 1990, Kuklinski and Hurley 1994, Taber and Lodge 2006,

Lodge and Taber 2013). Motivated reasoners filter information to fit some desired stance rather than have information influence position. Because motivated reasoners prefer not to change their minds about their strongly held beliefs, they approach potentially dissonant information in a fundamentally different way than confirmatory information. As a result, motivated reasoners behave contrary to traditional expectations of political behavior, particularly in how they process stimuli such as political frames.

Cognitive motivation may arise from any aspect of social identity, such as party identification (Bartels 2002, Slothuus and de Vreese 2010), political ideology (Jost *et al.* 2003), or race (Kuklinski and Hurley 1994). These motivations are not transitory but become aspects of an individual's personal identity and frequently reflect that individual's social and political identity (Huddy 2001). Once set, motivations are remarkably persistent, even in the face of corrective information (Nyhan and Reifler 2010). Motivated reasoning is closely associated with an increase in personal interest in politics (Lodge and Taber 2000, Taber and Lodge 2006). Motivated reasoning is also negatively associated with attitudinal ambivalence, or the certainty and stability of attitudes (Lavine *et al.* 2012, Lodge and Taber 2000). Individuals with greater political interest better understand the political landscape, can more readily discern and process appropriate cues, and have greater knowledge with which to refute undesirable information. Individuals with lower attitudinal ambivalence (i.e., greater certainty of their attitudes) are more susceptible to engaging in motivated reasoning, and the cognitive process of counter-arguing dissonant information reduces their ambivalence even further (Lodge and Taber 2000).

Motivated skepticism

In considering how polarized political issues may interact with motivated reasoning at the individual level to constrain issue framing, it is important to consider that when motivated reasoners are exposed to information that clashes with their identity, they engage in a motivated skepticism wherein they mentally counter-argue against any stimuli that could depolarize their beliefs (Edwards and Smith 1996, Taber and Lodge 2006). Disconfirmation bias may further polarize motivated reasoners if the process makes them more certain of the validity of their established prior beliefs (Ditto and Lopez 1992, Taber and Lodge 2006). For instance, Taber and Lodge (2006) find that individuals with strong prior attitudes on gun control and affirmative action strengthen in attitude polarization following exposure to information incongruent with their prior attitudes, and that greater political sophistication further intensifies this effect. This is referred to as a 'backfire' or 'boomerang' effect (Byrne and Hart 2009).

Theoretical expectations

Given these considerations, I expect motivated reasoners in a polarized context not simply to be unreceptive to political frames they disagree with, but to counter-argue and perhaps react to those frames actively with even more negative beliefs. Theoretically, the interaction of motivated reasoning with issue polarization is key here. Absent motivated reasoning, framing effects should still hold, despite the level of issue polarization, with the ‘worst’ effect being unreceptivity to frames. The boomerang effect, where framing backfires and intensifies prior views, should only appear when motivated skepticism is so strong that it triggers particularly fierce counter-arguing.

Climate change offers an excellent issue arena to test how the interaction of issue polarization and motivated reasoning affects political communication. This is both because the issue is conveniently polarized along political party lines and because boomerang effects have been observed in some previous studies of American public opinion on climate change. For example, Hart and Nisbet (2012) find evidence of a boomerang effect in assessing partisan differences in support of governmental climate-mitigation policy when mediated by respondent social identification with the proposed victims of warming impacts. However, Hart and Nisbet only ask for support of governmental action, which may be endogenous with their partisanship measure, given that Republicans generally disdain governmental regulation so a reduction in regulatory support may be a function of their general anti-regulatory attitudes and unrelated to climate change. Further, they test explicitly non-political messages. In a consumer context, Gromet *et al.* (2013) demonstrate that conservatives are less likely to choose expensive compact fluorescent light bulbs when they are marked with a small ‘Protect the Environment’ sticker than when they are unmarked, but do not offer a cognitive mechanism for this result. Though not focusing on partisanship, Kahan *et al.* (2010, 2012) investigate cultural polarization and observe similarly that attitudes on climate change are much more dependent on personal identity and values than on scientific literacy.

Given that climate change attitudes appear to be sharply split along party lines, with Republicans seemingly highly skeptical of climate change as a political issue necessitating action (see Buell 2003, McCright and Dunlap 2011), this group is appropriate for a study on how motivated reasoning may constrain framing effects. Furthermore, Jost *et al.* (2003) show that a right-wing political ideology lends itself to motivated reasoning and resistance to change in particular. Framing (or reframing) climate change is seen by both activists and scholars as a key component in influencing public opinion and overcoming the political deadlock surrounding climate change (e.g. Nisbet 2009, Lakoff 2010, McElwee 2014). If framing effects are still effective in this information environment, I expect that exposure to

pro-climate change action framing should increase Republican support for environmental policies (Hypothesis 1a). Further, given that partisans are predisposed to favor information with cues consonant to their own political identities, the most effective frames may be those that reference Republican-owned issues such as national security (Hypothesis 1b), or are delivered by a Republican source (Hypothesis 1c).

Alternatively, if Republicans are motivated by their partisan identities to oppose action on climate change (either governmental or personal), then I should find very different effects. In particular, I expect to see signs of motivated skepticism among Republican respondents to framing in the form of backfire – the subjects moving their opinions against the direction of the frame. In this case, a boomerang effect would be a Republican, post-exposure, growing in opposition to governmental action against climate change or becoming less likely to take commensurate personal action (Hypothesis 2a). Because the boomerang effect relies on an individual identifying and reacting against cues hostile to their identity, I expect that Republicans will counter-argue most harshly against frames attributed to a Democratic source and using Democrat-owned messages (Hypothesis 2b).

The mechanism of motivated reasoning can be confirmed via complementary measures such as decreased attitudinal ambivalence post-framing (Hypothesis 2c) and a positive correlation between backfire strength and political interest, a proxy for level of motivated reasoning (Hypothesis 2d). These Hypothesis 2 statements stand in opposition to those in Hypothesis 1.

Research design

Data

The data come from a nationally diverse sample of registered American Republicans and Republican-leaning Independents recruited by Survey Sampling International, a large professional sampling firm. Data were collected using the web-based surveying platform Qualtrics from February 28, 2014, to March 6, 2014. Following data-set cleaning, the sample included 476 respondents.¹ This sample was split across nine conditions, which provided a mean group size of 53 respondents per experimental group. The respondent age structure was sampled to be representative of American Republicans, with the median age of the sample being roughly 50 years of age. The sample was 50.7% male and 87.6% white. Balance between experimental groups on these profile variables was tested using one-way analysis of variance (ANOVA), with no group sample significantly skewed. The respondents excluded due to data-set cleaning were tested for

systematic differences from the remaining sample and breaking of randomization; no significant effects were found.

Design

A multifactorial 2 × 4 (source × message) survey experiment (*n* = 476) was used to assess Republican reactions to message framings of climate change and attributed information sources. I evaluated nine conditions – eight treatments and one control. Participants were randomly assigned to a condition at the outset of the survey. The nine experimental conditions are presented in Table 1.

Each condition exposed participants to a paragraph-long vignette embedded with message and source cues. For each treatment vignette, participants were primed to consider the issue of climate change, introduced to a fictional political elite (identified as a former US congressman), and exposed to a series of arguments attributed to this elite wherein he calls for greater US government action against climate change. The message component included an issue linkage between climate change and another political issue, an example of projected threats from unabated climate change consistent with the issue linkage, a quote attributed to the elite, and a call to action. In an attempt to make these vignettes as realistic as possible, all statements used were originally made by a prominent political figure and are correctly attributed during the participant debriefing.² All messages featured ‘loss frames’ (framing climate change as a reduction from the *status quo*; see Kahneman and Tversky 1979, Cobb and Kuklinski 1997) consistent with popular activist framings of climate change (Nisbet *et al.* 2013). Borrowing from Taber and Lodge (2006), I controlled for alternative explanations of cognitive bias such as those substituting argument length or complexity for argument strength by constructing each vignette in the same five-sentence format and using similar levels of complexity for each.

The control vignette included a neutral statement that simply prompted the respondent to consider the issue of climate change as a current political issue. The use of a neutral priming vignette in the control condition

Table 1. Experimental farming conditions.

		Message condition			
		Economic	National Security	Moral Justice	Natural Disaster
Control (no source, no message)					
Source condition	Democrat Republican	<i>Econ × Democrat</i> <i>Econ × Republican</i>	<i>NS × Democrat</i> <i>NS × Republican</i>	<i>MJ × Democrat</i> <i>MJ × Republican</i>	<i>ND × Democrat</i> <i>ND × Republican</i>

Italicized cells contain the eight framing conditions, which are factorial combinations of two source conditions and four message conditions. The non-italicized cell represents the control condition, which presented the issue of climate change without source or message.

presents a harder test than not providing a vignette. Assuming that Republicans are nominally motivated against climate change, treatment effects should be smaller with this priming design than no prime; if I still find significant treatment effects, those effects should likely have greater external validity.

These source and message cues are intended to trigger in-group/out-group responses in Republican participants. For source cues, the vignette labels the fictional former congressman as either a Democrat or Republican. For message cues, I pretested four framings of climate change that are already prevalent in American politics: two tied to Democratic Party-owned issues and two referencing Republican-owned issues. On the Democratic (out-party) side, I tested messages linking climate change to *Moral Justice* and *Natural Disaster* concerns. The *Moral Justice* condition specifically invokes the themes of intergenerational equity and sustainability – the notion that future generations should not inherit a degraded environment – and the *Natural Disaster* condition references extreme weather events such as Hurricane Sandy in 2012. Republican conditions linked climate change to *Economic* harm – that currently favorable policies for fossil fuel companies interfere with the free market – and *National Security* threats, which invoke the specter of decreasing geopolitical stability due to resource stresses from warming.

The vignettes were pretested using Amazon Mechanical Turk to ensure that they load onto the appropriate partisan connotations, i.e., the *Economic* and *National Security* messages are categorized as Republican and the *Moral Justice* and *Natural Disaster* framings as Democratic. The vignettes were also tested for argument strength (see Chong and Druckman's, 2007, discussion of strong and weak arguments), which was measured on a one-way scale of argument effectiveness. Pretest respondents rated all four types of issue vignettes 'somewhat effective' or better.

Variables

The main dependent variable is an additive index of questions assessing respondent attitudes toward governmental action against climate change. This approach builds on Hart and Nisbet (2012), but focuses on respondent policy attitudes and excludes perceptions of the legitimacy of climate science. The index was formed from respondent agreement with the following battery of questions: 'We should immediately increase government regulation on industries and businesses that produce a great deal of the greenhouse emissions linked to climate change'; 'We should immediately increase taxes on industries and businesses that produce a great deal of the greenhouse emissions linked to climate change'; and 'Action through the government is the best way to deal with a big issue like climate change.'

Each statement was measured on a two-sided Likert-type scale with seven points, ranging from ‘strongly agree’ to ‘strongly disagree.’ The index thus ranges from 0 (‘highly opposed to governmental action against climate change’) to 18 (‘highly supportive’). These three statements had a Cronbach’s alpha of 0.9, indicating excellent internal consistency.

The second dependent variable is a measure of likelihood to take personal action against climate change, such as ‘joining an environmental organization, signing a petition, changing your consumption patterns, or changing your life habits.’ This alternative measure of message effectiveness improves on Hart and Nisbet (2012) by assessing whether Republican respondents may simply be more inclined to engage in personal action against climate change than to support governmental action (see Maibach *et al.* 2013). This item was measured on a five-point scale, ranging from ‘not likely at all’ to ‘extremely likely.’

I include an index of attitudinal ambivalence as a cognitive gauge of attitude strength. I follow Holbrook and Krosnick’s (2005) meta-attitudinal measure of ambivalence, which includes three questions: ‘People’s thoughts and feelings about an issue can be all one-sided or very mixed. How mixed are your thoughts and feelings about climate change?’; ‘How much conflict do you feel about your opinions about climate change?’; and ‘People can be very decisive or very indecisive in their thoughts and feelings about an issue. How indecisive are your thoughts and feelings about climate change?’ These items are measured on one-way five-point scales. The index ranges from 0 (‘no ambivalence’) to 12 (‘extremely high ambivalence’). The Cronbach’s alpha for this index was 0.79.

Last, I include a five-point measure of political interest as a way of measuring motivated reasoning given that individuals with high political interest are most prone to engaging in politically motivated reasoning (Lodge and Taber 2000, Taber and Lodge 2006). I then constructed a dummy variable for ‘high political interest.’ Responses of ‘extremely interested’ or ‘very interested’ are coded as 1, and lower levels of political interest are coded as 0. While interest in politics was measured post treatment in this study, levels of political interest do not vary significantly between respondents in the control and treated conditions ($p = 0.68$); exposure to experimental treatment does not seem to have affected political interest, and the measure appears valid.

Analysis

The logic of the experimental design is that participants in treatment cells (such as *Economic* frame \times *Democratic* source) are compared to those in the control cell. The difference in effects on the dependent variable between each experimental condition and the control condition provides the causal

treatment effect of that framing condition (Morgan and Winship 2007). For this study, if the difference is positive, then the framing was effective. If zero, the treatment was ineffective. If negative, the treatment was ineffective and potentially triggered a boomerang effect.

Causal effects between experimental conditions and control were checked using ordinary least squares linear regression of the dependent variables of study, such as support for or opposition to governmental action on climate change. For independent variables, I use dummy variables for each *message* \times *source* condition. In these models, the constant term represents the results of the control group. Consequently, the coefficients from regression represent the differences between respondents allocated to treatment conditions and those in the control group.

I estimate three sets of models. The first model estimates the effect of treatment on Republican climate change attitudes, comparing each treatment condition against the control group. This is meant to gauge the framing effect of each framing condition and to check whether certain types of argumentation (i.e., in-group vs. out-group messages, in-group vs. out-group sources) are more effective than other messages are. These split-out models estimate the effect of each treatment condition on support or opposition for governmental action, likelihood to take personal action, and attitudinal ambivalence on climate change. For the second set of models, I collapse all treatment groups together to test the effect of exposure to framing on Republican subjects. I again estimate three individual models, one for each dependent variable. I then estimate regressions stratifying on level of personal interest in politics to test for the effects of motivated reasoning on attitudes regarding climate change.

Results

In my first set of models, which separates the effect of each treatment compared to the control, I find little evidence for the framing-effect hypotheses. As presented in Table 2, none of the framing conditions significantly increased Republican support for governmental action on climate change, increased personal likelihood to act against warming, or increased attitudinal ambivalence on the issue.

Rather, all framing conditions resulted in negative coefficients for all three dependent variables, meaning that every attempt at framing elicited boomerang effects. Republican respondents increased in their opposition to proposed governmental action against climate change after being exposed to framing, with three conditions eliciting statistically significant backfires: *Republican* \times *National Security* ($p < 0.05$), *Democrat* \times *National Security* ($p < 0.05$), and *Democrat* \times *Moral Justice* ($p < 0.05$). A post-estimation Wald test confirms that these three treatment conditions are statistically

Table 2. Effects of treatment by framing condition.

Condition	Source	Governmental action		Personal action		Attitudinal ambivalence	
		All	High interest	All	High interest	All	High interest
<i>Message Economic</i>	Republican	-1.785 (1.003)	-4.104* (1.659)	-0.338 (0.209)	-0.965** (0.36)	-0.241 (0.477)	-0.778 (0.823)
	Democrat	-0.792 (0.988)	-1.976 (1.551)	-0.057 (0.206)	-0.54 (0.337)	-0.481 (0.47)	-0.494 (0.765)
<i>National Security</i>	Republican	-2.46* (1.014)	-3.929* (1.551)	-0.38 (0.213)	-1.063*** (0.337)	-1.064* (0.48)	-1.349 (0.756)
	Democrat	-2.326* (0.984)	-4.881*** (1.551)	-0.266 (0.205)	-1.206*** (0.337)	-0.901† (0.468)	-1.873* (0.756)
<i>Moral Justice</i>	Republican	-0.221 (0.979)	-0.867 (1.569)	-0.108 (0.203)	-0.444 (0.337)	-0.695 (0.462)	-1.254 (0.756)
	Democrat	-2.377* (0.988)	-4.99*** (1.633)	-0.113 (0.206)	-0.66 (0.355)	-1.404*** (0.47)	-1.327 (0.796)
<i>Natural Disaster</i>	Republican	-0.489 (0.993)	-2.292 (1.659)	-0.185 (0.207)	-0.965** (0.36)	-0.654 (0.47)	-0.757 (0.809)
	Democrat	-0.497 (0.971)	-2.949 (1.519)	-0.166 (0.146)	-0.647* (0.33)	-0.485 (0.46)	-1.053 (0.741)
Constant		8.585 (0.699)	8.167 (0.816)	2.358 (0.146)	2.778 (0.177)	3.731 (0.332)	3.444 (0.404)
n =		475	475	475	475	471	471

Framing conditions shown in left-hand column. Constant represents intercept for control group. Unstandardized regression coefficients shown on top. Standard errors are shown below in parentheses. Bottom-three models collapse all treatment groups against control. Governmental action is measured on a two-way scale ranging from 0 ('strongly opposed') to 18 ('strongly support'); 9 is neutral. Likelihood to take personal action is measured from 1 ('not at all likely') to 5 ('extremely likely'). Attitudinal ambivalence is measured on a one-way scale ranging from 0 ('not at all ambivalent') to 12 ('extremely ambivalent').

*** $p < 0.005$; ** $p < 0.01$; * $p < 0.05$; † $p = 0.055$.

different ($p < 0.005$) from the other five. Republican likelihood to engage in personal action against warming also decreased following exposure to treatment, though no single condition was statistically significant. Exposure to framing decreased respondent attitudinal ambivalence in all conditions, meaning that Republicans felt more assured of their opposition to climate change action after being asked to consider the issue. Attitudinal ambivalence was significantly decreased for the conditions of *Republican* \times *National Security* ($p < 0.05$) and *Democrat* \times *Moral Justice* ($p < 0.005$). Among messages, the *National Security* frame seemed to provoke the greatest backfire. For instance, the coefficient for *National Security* in regards to support for governmental action ($b = -2.4$) is nearly twice as large as the next biggest backfire (*Moral Justice* at $b = -1.3$).

When stratifying my sample by interest in politics, I find that partisan respondents who are highly interested in politics – and thus more likely to engage in motivated reasoning – are even more skeptical of taking action against climate change post exposure. These results, also summarized in Table 2, suggest that disconfirmation bias on the issue of climate change strengthens with high political interest, further evidence for motivated reasoning effects, given that these highly interested partisans are the most likely to engage in such cognition. Here, the most significant backfire effects (for the *Democrat* \times *National Security* and *Democrat* \times *Moral Justice* conditions) produce approximately five points greater opposition to governmental action when compared with the control condition ($p < 0.01$ and $p < 0.01$, respectively). These boomerang effects are approximately three to five times the size of those for Republicans with low political interest.

While three framing conditions seem especially unpalatable to Republicans, neither they nor the other treatment conditions follow a clear pattern or easy logic. I find no statistical evidence for systematic effects from either type of message – whether an in-party issue-linkage frame or out-party frame – or type of source. Nor do I find clear evidence of expectancy violation effects, i.e., Republican respondents did not punish partisan sources delivering messages at odds with what would be expected (Rahn 1993, Nelson and Garst 2005). While I find some significant differences between several treatment groups compared with the control group, I observe no significant differences between treatment groups compared to each other.

Given these broad-spectrum boomerang effects, I reran these models with a simple binomial variable for whether respondents were treated (coded 1) or untreated (i.e., the control condition; coded 0). The effect of being exposed to framing on climate change on support for governmental climate change action was marginally significant ($p = 0.073$) and negative ($b = -1.34$) among all Republican respondents. As shown in Table 3, however, this effect balloons to 3.22 points greater opposition to governmental action against climate change ($p < 0.01$) among the highly politically

Table 3. Effects of framing treatment stratified by personal interest in politics.

Condition	Governmental action	Personal action	Attitudinal ambivalence
<i>High interest in politics</i>	-3.218** (1.21)	-0.803*** (0.261)	-1.132† (0.586)
<i>Low interest in politics</i>	-0.227 (0.873)	0.128 (0.188)	-0.494 (0.429)
<i>n =</i>	475	475	471

Values are unstandardized regression coefficients with standard errors in parentheses. Constant represents intercept of control group. Governmental action is measured on a two-way scale ranging from 0 ('strongly opposed') to 18 ('strongly support'); 9 is neutral. Likelihood to take personal action is measured from 1 ('not at all likely') to 5 ('extremely likely'). Attitudinal ambivalence is measured on a one-way scale ranging from 0 ('not at all ambivalent') to 12 ('extremely ambivalent').

*** $p < 0.005$; ** $p < 0.01$; * $p < 0.05$; † $p = 0.053$.

interested – those partisans most prone to motivated reasoning. This increase in skepticism is shown graphically in Figure 1. In terms of personal likelihood to act (see Figure 2), treated Republicans were marginally dissuaded in the aggregate ($b = -0.2$, $p = 0.201$). However, like attitudes on governmental action, politically interested partisans exhibited a significant larger backfire effect ($b = -0.8$, $p < 0.005$). Similarly, in Figure 3, ambivalence decreases among treated Republicans ($b = -0.74$, $p < 0.05$) and even further for treated Republicans with high personal interest in politics ($b = -1.13$, $p = 0.053$).

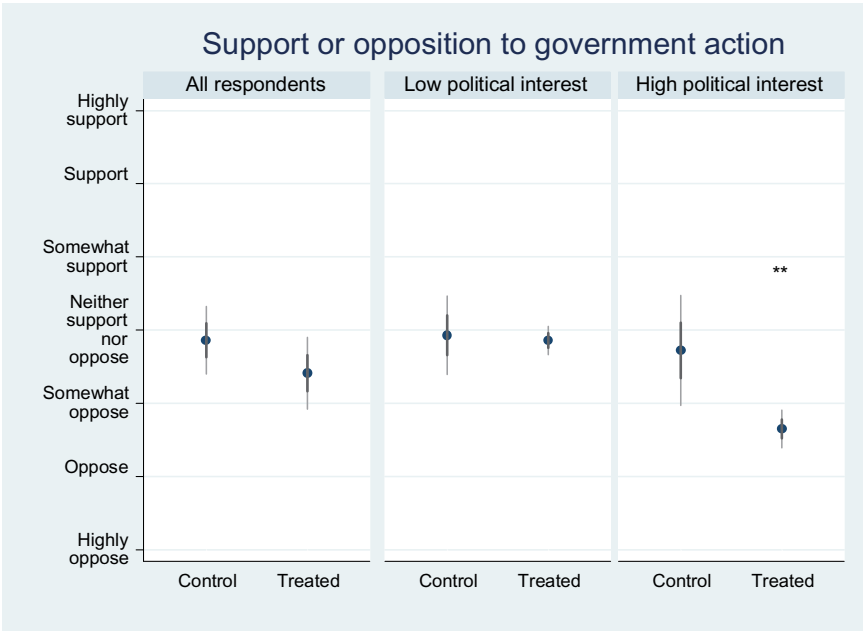


Figure 1. Support or opposition for governmental action among treated respondents. *Note.* Left side: effects among all respondents; center: effects among politically uninterested; right side: effects among politically interested. Darker lines indicate 68% confidence interval; lighter lines indicate 95% confidence interval.



Figure 2. Likelihood to take personal action among treated respondents.

Note. Left side: effects among all respondents; center: effects among politically uninterested; right side: effects among politically interested. Darker lines indicate 68% confidence interval; lighter lines indicate 95% confidence interval.

Further, these effect sizes dwarf those for Republicans with low expressed interest in politics, for whom exposure to framing was insignificantly different from the control. This suggests that polarization born of motivated reasoning is closely tied to political interest. Unlike Republican respondents with high interest in politics, partisans who are politically unsophisticated do not react with a strong disconfirmation bias after exposure to framing. To test that the interaction between being treated and having high political interest is meaningful for this analysis, I estimated a multivariate ANOVA (MANOVA) over all three dependent variables with the two-way interaction included. This test revealed an F -statistic of 2.92 for the interaction, which was significant at $p < 0.05$.

Discussion

These results suggest little support for the framing through polarization hypothesis (H1a), or the notion that Republican skepticism toward climate change may be mitigated by framing. Indeed, not only were Republican respondents unconvinced by the various messages and messengers, but

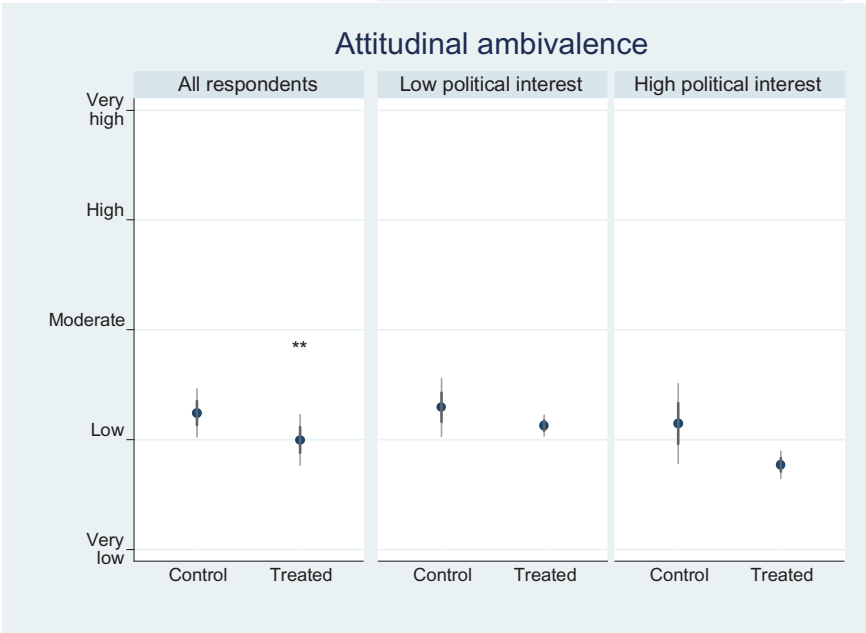


Figure 3. Attitudinal ambivalence among treated respondents.

Note. Left side: effects among all respondents; center: effects among politically uninterested; right side: effects among politically interested. Darker lines indicate 68% confidence interval; lighter lines indicate 95% confidence interval.

these subjects rejected the information to such a degree that they increased their opposition to both proposed governmental and personal climate change action. Respondents demonstrated little to no reaction to theoretically relevant factors of message and source, seemingly treating in-party and out-party cues with equal disdain. These results therefore present an interesting phenomenon: known framing effects are not observed when Republicans are asked to consider a polarized issue in a light at odds with their party line. These respondents just do not seem to be willing to believe the merits of such information.

Rather, I find that Republicans are strongly motivated to reject information in support of climate change action on multiple metrics of political behavior. When exposed to information advocating for increased attention on climate change, Republican respondents grew in their opposition for proposed governmental intervention. Similarly, these partisans became significantly less likely to engage in personal action. In essence, being told that climate change is a problem worth caring about – regardless of reason or source – increased Republican skepticism and decreased their support for action on the issue. These backfire effects are telltale signs of motivated counter-arguing stemming from disconfirmation bias.

As expected under the motivated reasoning hypothesis, exposure to political communication reduced partisan attitudinal ambivalence on matters of climate change. Exposure to framing therefore not only discouraged Republicans from supporting or engaging in action against climate change, but also made these partisans surer of their opposition to such action.

In addition, the observed pattern of skepticism increases with personal political interest, where Republican respondents with high levels of interest in politics become even more skeptical of climate change action than the less politically engaged. While most Republicans may not be this motivated, highly politically interested Republicans are not uncommon and represent 36.6% of the sample and roughly 34% of Republicans nationally (American National Election Studies 2013). Furthermore, even Republicans who report low interest in politics appeared unaffected by framing, showing little support for climate change action post exposure to framing. Given that these individuals are presumed to be unmotivated on the issue, frames contrary to their partisan identity fail without additional backfire. This suggests that for Republicans, climate skepticism is heavily tied to strength of partisan identity.

The point here is not the observation that partisans who are likely to engage in motivated reasoning do indeed engage in motivated reasoning. Instead, it is that issues such as climate change have become politicized and polarized enough to trigger these motivated responses, regardless of political communication strategy. Thus, the presence of these observed boomerang effects seriously hinders framing and the impact of counter-attitudinal information. Republicans have seemingly become so motivated to dismiss the issue of climate change that attempts to temper those predispositions result in a cognitive backlash. While these dissuasion effects are not necessarily large in an absolute sense, it is telling that the framing cues failed so completely and unambiguously. Given that this boomerang effect can also be observed for likelihood to take personal action against climate change, I find evidence that these negative motivations may be directed generally at the issue of climate change more than specifically toward governmental policy. After nearly two decades of intense politicization and polarization, climate change has become an unpalatable issue for Republicans to the point where framing effects are ineffective, and quite possibly counterproductive, when met by skeptical motivations.

These results are neither unprecedented nor wholly unexpected. Druckman *et al.* (2013), in their investigation of how growing elite polarization has affected citizen policy attitudes, find that polarization encourages party-based motivated reasoning, decreases the quality of partisan opinions (by substituting party endorsements for substance), and yet makes partisans feel more confident that their biased opinions are sound and well supported. In other words, elite polarization that engenders issue polarization creates a public that is more reliant on party identification than

on conscious, critical thinking for political attitude development. Furthermore, increased competition on these polarized issues cue partisans to toe their party line and invite further polarization as political identity overtakes actual issue considerations.

Consequently, this evidence of motivated reasoning may have some serious normative implications for American politics – and particularly climate change politics – moving forward. Given that climate change is a highly politicized and polarized issue in modern American politics, some commentators (e.g., Mann 2013) have characterized ongoing political discussions of the issue as ‘climate wars,’ or similarly strong language. Nevertheless, some framing and political communication researchers (e.g., Hart and Nisbet 2012, Kahan *et al.* 2012) have expressed optimism in the face of evidence of motivated reasoning on climate change, arguing that communication across partisan, ideological, and/or cultural lines still may be possible to engage with skeptics on the issue. However, such research sometimes seems to mischaracterize the state of American climate politics. This is not a static system where novel information stimuli may easily sway those holding skeptical attitudes. Rather, the past 20 years of intense politicization and polarization on the issue have created formidable inertia when it comes to public opinion on matters of climate change, as evidenced by the partisan motivations found in this study.

Such political communication may be difficult, if not untenable in polarized issue contexts. The worst-case scenario here may not simply be a lack of meaningful engagement across political lines. Rather, the lines may be so well drawn and partisans so entrenched on this issue that no amount or type of political stimulus is likely to sway Republicans to engage on climate change. Attempts to frame the issue to counter established motivations may additionally polarize partisans and make them even surer of their distaste for the issue. Furthermore, these boomerang effects may hold for other polarized issues beyond climate change.

Some researchers have identified possible inroads in communicating the issue despite polarization, suggesting that would-be communicators should use more targeted or nuanced rhetoric. For instance, Myers *et al.* (2012) report that individuals are more receptive to messages about climate change that use a public-health frame, though their respondents are not stratified by political party identification in the study, so it is unknown if there were differential effects between Democrats and Republicans. Using an Australian sample, Lewandowsky *et al.* (2012) find that information referencing scientific consensus is able to mitigate the effect of free-market ideology when it comes to climate change attitudes. Kahan (2010) stresses the importance of cultural values-based framing, which could affirm rather than attack skeptical values and possibly reduce the likelihood of motivated counter-arguing. For instance, Kahan (2010) suggests that for people with

individualistic values who distrust governmental intervention, messages that emphasize the potential for new enterprises such as geoengineering may cue positive support for individual resourcefulness.

Patt and Weber (2013) hypothesize that the public may be more amenable to discussions about specific policy instruments than about the issue of climate change itself, and that growing familiarity with policy instruments should reduce perceptions of climate change action as threatening. This tactic dovetails with Fernbach *et al.*'s (2013) finding that polarized attitudes are moderated when individuals are asked to explain how a policy they dislike works in detail; the authors theorize that this process exposes mistakes in understanding and gaps in knowledge.

While these approaches show potential, further exploration of how these prospective messages interact with partisan-motivated reasoning is needed. It remains to be seen whether these approaches can actually reach skeptics or merely preach to supporters. Perhaps more importantly, more framing studies are needed that take into account how motivated reasoning interacts with political competition – an inherent and powerful feature of the information environment surrounding polarized issues such as climate change. For the most part, framing research on climate change ignores the contentiousness and competition in political framing – positive framing effects that seem to circumvent existing partisan motivations may quickly vanish once opposing framers reassert and reactivate those motivations (Chong and Druckman 2007). Do observed framing effects persist after subsequent waves of skeptical reinforcement, particularly for commonplace and polarizing cues such as *An Inconvenient Truth* or ‘hoax’? These relationships are still not well understood. It is also likely that certain framings may make communication even more problematic, such as using ‘global warming’ rather than ‘climate change’ (Schuldt *et al.* 2011). Information provision on highly polarized issues such as climate change may simply be ineffective. Given that climate skepticism has taken hold in other nations such as Canada, Australia, and the United Kingdom (see Jacques *et al.* 2008), the disconfirmation bias and boomerang effects shown in this American sample may portend similar processes in other contexts if polarization is left unchecked.

Although my focus here on climate change is supported by one study, its implications for political communication should logically hold for other, similarly polarized issues. After all, the theorized mechanism at play concerns partisan identity – which is as easily triggered by cues on climate change as rhetoric about gun control or abortion. The theory may not hold for other contentious, high-profile issues that are not similarly polarized in the public, such as marijuana legalization or tort reform.

It may be useful to think of political issues as existing on a polarization spectrum and that an issue's place on this spectrum constrains the role of communication and information provision. For issues with low levels of

polarization, simple facts may be enough to sway undecided individuals. At moderate levels of polarization, factual information may not be enough, but framing may still be effective (e.g., Nelson *et al.*'s, 1997, experiment on framing public safety vs. free speech). However, at high levels of issues polarization – such as with climate change – communication through information provision may be untenable, as motivated skepticism effects such as cognitive boomerangs dominate. Here, identity trump information.

Given that motivated reasoning relies on personal identity defense, perhaps the key to overcoming seemingly continual issue polarization lies in targeting identity claims. As Kahan (2014) has recently noted, 'communicating valid science about climate change (or about the expert consensus of climate scientists) will not dispel public conflict; only dissolving the connection between positions on the issue and membership in competing cultural groups will.' However, because climate skepticism seems closely – if not inextricably – tied with partisan identity for Republican individuals, this appears a tall obstacle to hurdle. Nyhan and Reifler (2013, unpublished) find that affirming an individual's self-worth opens him or her up to politically uncomfortable information. In this vein, perhaps posing conciliatory statements that explicitly preserve partisan identity may loosen motivated self-defensiveness on the issue. Such proposals leave much to be explored in political communication research.

Conclusion

Climate change is an issue that has engendered great political polarization over the past 20 years at both elite and public levels, making it an ideal test case for how polarization affects political communication. In examining how Republican individuals process information about climate change, I find no evidence that framing effects combat party-aligned skeptical attitudes on the issue. Rather, the Republican participants in this experiment exhibited strong signs of motivated reasoning, rejecting attempts to have them consider the value of ameliorative action against climate change through framing. Respondents were also surer of their skeptical stances post exposure to framing. Tellingly, these effects doubled in strength for respondents who reported high levels of personal political interest, which supports the notion that observed attitude polarization is rooted in motivated reasoning.

Notes

1. In cleaning the data set, I removed all respondents reporting a political ideology of 'slightly liberal,' 'liberal,' or 'extremely liberal' for being outside the population of interest. I also dropped 13 subjects who responded incorrectly or unacceptably on at least two out of three data quality checks. These

included two attention checks adapted from Clifford and Jerritt (2015) and a respondent memory check of the manipulation given (if any). Finally, I removed respondents who completed the survey in less than 1.5 minutes (16 respondents) or more than 35 minutes (eight respondents).

2. Quotations taken from: Former Congressman Bob Inglis (Economic; Cohn 2013); Admiral Samuel J. Locklear III (National Security; Bender 2013); UN Secretary-General Ban Ki-moon (Moral Justice; Ki-moon 2013); Former New York City Mayor Michael Bloomberg (Natural Disaster; Hernandez 2012).

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Appendix

Framing vignettes and survey questions available at [https://mjackzhou.github.io/surveys/Zhou boomerangs 2014.pdf](https://mjackzhou.github.io/surveys/Zhou%20boomerangs%202014.pdf).