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Partisan Group Identity and Belief in Human-Caused Climate Change

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Abstract

When individuals learn of the scientific consensus about human-caused climate change, do their opinions move in the direction of that consensus? Although a scientific consensus has existed for over a decade on this subject, the U.S. public is starkly divided along partisan group lines over whether human behavior is the dominant cause. We develop a framework that generates hypotheses about the impact of a scientific consensus statement (concerning climate change) on public opinion. We test our predictions with a survey experiment conducted on a nationally representative sample in the U.S. We find that the impact of this information is conditional on partisan group identity and individuals' knowledge levels. Low knowledge partisans shift their opinion toward the scientific consensus, while high knowledge partisans polarize. Further, when the consensus statement is "politicized," the aforementioned effect on low knowledge partisans disappears. The findings accentuate the highly contingent nature of climate change communication effects.

Keywords: Scientific Consensus, Politicization, Motivated Reasoning, Climate Change

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Can consensus scientific information about human-induced climate change move public opinion? This question is more complex than it may appear at first glance. Scholars have documented that a near scientific consensus about human-caused climate change exists: a review of nearly 12,000 peer-reviewed scientific studies on climate change, from 1991-2011, finds that of articles taking a position, 97.1 percent endorse "the consensus position that humans are causing global warming" (Cook et al., 2013, p.1; 2016; International Panel on Climate Change, 2013; Rosenberg et al., 2010). Yet, only roughly half of the United States public believes that climate change is mostly human-induced, and there is a stark identity group division with Democrats substantially more likely to believe (Brown, 2016; Funk & Kennedy, 2016).

It may be that many citizens, particularly Republicans, do not know of the scientific consensus (see van der Linden et al., 2015). However, even when citizens learn of the scientific consensus, their opinions do not consistently shift. Kahan (2016) summarizes, "[t]here is a serious scholarly debate… about whether social marketing campaigns that feature the existence of scientific consensus (a staple of climate advocacy for over ten years) can be expected to promote constructive engagement with climate science…. The results of studies that examine the impact of 'consensus messaging' are mixed" (pp. 2–3; c.f., Cook & Lewandowsky, 2016; Deryugina & Shurchkov, 2016; van der Linden et al., 2015, 2016; van der Linden, 2016).

We use a survey experiment to test the impact of a consensus statement about human-caused climate change on beliefs. In so doing, we introduce two additional factors, which despite the aforementioned partisan group divide, have received scant attention in experimental studies of consensus communications. First, we investigate whether individuals' partisan group identities and political/scientific knowledge influence the impact of the consensus information. Second, we introduce competing communications; indeed, consensus statements about climate change

regularly have detractors who question the validity of the consensus. Such detractors often do this by politicizing the underlying science, claiming it is difficult to know what to believe. Furthermore, we introduce additional competition to see what happens when communicators then react and challenge the politicization communication (see Bolsen & Druckman, 2015). In short, we introduce a robust competitive rhetorical environment.

We find that the impact of consensus climate change information is conditional. First, the impact depends on levels of political and scientific knowledge. Regardless of partisanship, those low in knowledge are affected by exposure to a scientific consensus statement – that is, receiving such information leads them to believe more in human-caused climate change. However, while high knowledge Democrats also are influenced, high knowledge Republicans are not only immune but move marginally in the opposite direction of the consensus message. The takeaway is that partisan group differences matter, but how they matter depends on knowledge. Second, we find that communications emphasizing the politicization of climate change eliminates the aforementioned effects of the consensus information on low knowledge partisans (i.e., their opinions on human-caused climate change are no longer affected by the consensus information). However, it has no effect on Democrats with more knowledge; we present suggestive evidence that the non-effect in this case stems from such people being pre-treated and thus already knowing about politicization, and hence, re-exposure does little. Third, we find rhetorical effects to counter politicization largely fail, which contradicts some prior work (c.f., Bolsen & Druckman, 2015). In the end, our findings highlight how group, particularly political, identity conditions the impact of consensus climate change information; however, the precise impact of partisan group identity depends on one's knowledge levels and the competitive rhetorical environment.

Communicating Scientific Consensus

A consensus refers to near universal agreement within a field about basic knowledge (Shwed & Bearman, 2010). How a consensus emerges and just how much agreement is needed for a consensus to exist is less clear (Druckman, 2015). That said, even if most agree there is a scientific consensus on a topic, whether that perspective shapes public opinion is hotly debated. This is particularly the case when it comes to climate change, where, as stated, most agree that such a *scientific consensus – at least that it is occurring and mostly human-induced – exists*.[1]

The information deficit model suggests that communications meant to educate the public about a scientific consensus should generate uniform movement in the direction of that consensus. As mentioned, in the case of climate change, the evidence is mixed. For example, van der Linden et al. (2016) find "communicating the scientific consensus on human-caused climate change… has (positive) direct effects (across the political spectrum) on belief that climate change is happening, human-caused, and a serious threat that requires societal action" (p. 2) (also see Guess & Coppock, 2015; Lewandowsky et al., 2013; Myers et al., 2015; van der Linden et al., 2015). Yet, other work finds no lasting effects (Deryugina & Shurchkov, 2016) or a backfiring effect (Cook & Lewandowsky, 2016). The latter dynamic occurs when those who have prior opinions that question the role of human activity in affecting climate change react negatively to consensus statements and become even more doubtful (Kahan et al., 2011, 2012).

One possibility is that the effect of the consensus climate change information depends on an individual's partisan group identity and knowledge. A process by which these variables would condition the effect of such information is motivated reasoning. How does this work? One step is that individuals must know where they stand (i.e., have a position) on the issue. Knowing where to stand does not require extensive information as it can be based on cues from trusted others

(Lupia & McCubbins, 1998). In the case of climate change, those with clear positions likely obtain them from elite cues – where elite Republicans oppose the view that climate change is largely human-caused, while elite Democrats support it (Bolsen, Druckman, & Cook, 2015, p. 286).[2] Those who are knowledgeable will be more likely to receive these cues and adopt them for their positions (see Price & Zaller, 1992): knowledge serves as a proxy for exposure/being informed about elite positions, and thus informed citizens follow elite stances (Lenz, 2012). In short, knowledgeable Democrats believe in human-caused climate change while knowledgeable Republicans are more doubtful. Group identity differences matter, but only for those who know enough to recognize their "group's position."

With these positions in hand, individuals may engage in partisan motivated reasoning. That is, they process information in ways that cohere with their positions as dictated by their partisan groups (Bolsen, Druckman, & Cook, 2014b; Lavine et al., 2012; Leeper & Slothuus, 2015). If the information is consistent with one's prior belief – as we suggest would be the case for high knowledge Democrats receiving information supporting human-caused climate change – then they accept it and update their opinion in the direction of the consensus position. If the information is counter to one's prior belief, as we suggest is true for high knowledge Republicans, then they dismiss it and may engage in counter-arguments, leading them to update their opinion in a direction counter to the scientific consensus (e.g., Hart & Nisbet, 2012; Kahan, 2015; Taber & Lodge, 2006).[3] We thus predict that, relative to those not receiving a scientific consensus statement that climate change is primarily due to human activities, knowledgeable Democrats who receive such information will increase their belief in human-caused climate change, all else constant (hypothesis 1a). Alternatively, relative to those not receiving a scientific consensus statement that climate change is primarily due to human activities, knowledgeable

Republicans who receive such information will counter-argue it and decrease their belief in human-caused climate change, all else constant (hypothesis 1b).[4]

In contrast, low knowledge partisans may not know their party's "correct" position and are less likely to engage in motivated reasoning (Taber & Lodge, 2006). Consequently, relative to those who receive no information, low knowledge Democrats and Republicans who receive consensus information will increase their beliefs that climate change is primarily due to human activities, all else constant (hypothesis 2). This follows the information deficit model; moreover, some suggestive evidence for hypothesis 2 comes from Deryugina and Shurchkov (2016) who find a greater, albeit not statistically significantly greater, impact of consensus information on low knowledge individuals. Here group differences, among low knowledge individuals, do not matter. The first two hypotheses accentuate how group identity conditions the impact of scientific consensus statements about climate change on individuals' opinions – and how this also depends on individual level knowledge.

What happens when competitive rhetoric is introduced that challenges a consensus statement?[5] A common type of counter-message strategy is to politicize the underlying science; that is, when an actor exploits "the inevitable uncertainties about aspects of science to cast doubt on the science overall… thereby magnifying doubts in the public mind" (Steketee, 2010, p. 2; also see Jasanoff, 1987; Oreskes & Conway, 2010; Pielke, 2007).[6] To cite an example – in response to the release of the *Climate Change Impacts in the United States* report that stated a scientific consensus exists that global climate change stems "primarily" from human activities, Florida Senator Marco Rubio stated, "The climate is always changing. The question is, is manmade activity what's contributing most to it? I've seen reasonable debate on that principle" (Davenport, 2014, A15).

The consequence of politicization is that it introduces "uncertainty regarding whether one can trust science-based arguments" (Bolsen et al., 2014a, p. 5). This uncertainty leads people to reject new evidence (because they are uncertain whether it is trustworthy) and consequentially it eliminates the impact of scientific consensus statements (see Dietz, 2013, Mullainathan, 2007). Two recent studies, exploring three distinct technologies with implications for the energy supply (nuclear energy, fracking, and carbon nanotubes), show that reminding people that a scientific consensus statement may be politicized eliminates the impact of that information (Bolsen et al., 2014a, Bolsen & Druckman, 2015). We predict, then, that exposure to a politicization message will eliminate any effect of a scientific consensus statement, all else constant (hypothesis 3). In essence, by eradicating the impact of the consensus information, individuals exposed to a politicization message end up expressing an opinion that resembles individuals who received no consensus message, or may even update their opinion in a direction counter to the scientific consensus position (e.g., Bolsen, Druckman, & Cook 2014a). Importantly, in light of hypotheses 1a, 1b, and 2, hypothesis 3 is *only* relevant to partisans with low knowledge, as well as and high knowledge Democrats, since only those individuals are expected to be positively affected by consensus climate change information in the first place. High knowledge Republicans are not expected to be influenced (or may be negatively influenced) by consensus information, and thus there is no positive effect for the politicization to counteract (i.e., we continue to expect a decreased belief in human-induced climate change for high knowledge Republicans – that is, they will continue to counter-argue the consensus information that happens to be politicized).[7] Thus, the conditional impact of partisan group identity also manifests in how one reacts to politicized communications.

A further wrinkle to the competitive communication environment is that advocates can attempt to pre-empt or question politicization claims. This can be done by offering a "warning" *before* substantial politicization occurs: telling individuals that any politicization claim is specious, should be ignored/dismissed, and that a consensus clearly exists. This can "inoculate" individuals from later politicized messages (e.g., Compton & Pfau, 2005).[8] Bolsen and Druckman (2015) find that, in the case of fracking and carbon nanotubes, warnings do indeed successfully vitiate the impact of politicization claims. We thus predict that, relative to those who receive no information, those who receive a scientific consensus statement that is politicized but also receive a warning will increase their belief that climate change is primarily due to human activities, all else constant (hypothesis 4). In other words, their opinion will resemble those who receive a scientific consensus statement only (a la hypotheses 1a, 1b). This hypothesis again is only relevant to low knowledge partisans, and high knowledge Democrats, who are affected by a scientific consensus statement in the first place. High knowledge Republicans are expected to dismiss such warnings just as they dismiss later consensus information and continue to move against the consensus information.

Finally, one might issue a message to dismiss politicization *after* the issue has been politicized – this would be called a "correction." This approach comes too late to inoculate individuals, and in fact, since politicization has taken place, individuals may dismiss the correction based on their initially formed belief about politicization. Bolsen and Druckman (2015), in the aforementioned study, find that corrections are marginally effective in one case (carbon nanotubes) but not the other (fracking). We thus have no clear predictions regarding the impact of providing a correction in this context. In Table 1, we summarize our predictions, all stated relative to the no information control group.

[Table 1 About Here]

Experimental Design and Procedure

We tested our hypotheses, concerning beliefs about human-caused climate change, with an experiment embedded in a nationally representative survey in the United States (implemented over the Internet) with a total of 1,329 participants.[9] Data were collected during July 2014. We randomly assigned participants to one of five conditions: a control condition, a consensus information condition, a politicization condition, a warning/politicization condition, and a politicization/correction condition.

Respondents in the control condition were simply asked our main outcome measure: "To what extent do you think climate change is *human-induced* as opposed to a result of Earth's natural changes?," with answers provided on a 7-point fully labeled scale, running from "entirely Earth's natural changes" to "entirely human-induced."[10]

Those assigned to the consensus information condition read the following statement, prior to being asked the main outcome variable:

> We are now going to ask your opinion about *human-induced* climate change. Climate change refers to a long-term change in the Earth's climate due to an increase in the average atmospheric temperature. A recent report, *Climate Change Impacts in the United States,* produced by 300 expert scientists and reviewed by the National Academy of Sciences as well as agencies with representatives from oil companies, puts much of the uncertainty to rest by stating that climate change "is primarily due to human activities."

It is worth noting that our consensus stimuli differs from that used in several prior studies (e.g., Cook & Lewandowsky, 2016; Deryugina & Shurchkov, 2016; van der Linden et al., 2016), which instead focus on telling respondents that a high percentage of scientists agree human-induced climate change is occurring. The treatment we employ may be stronger given that it cites a recent report that included hundreds of expert scientists, references an ostensibly credible source (i.e., the National Academy of Sciences), and mentions the inclusion of representatives

from oil companies. Comparing our consensus information condition to the control, among differently knowledgeable partisans, will allow us to test Hypotheses 1a, 1b, and 2.

Those assigned to the politicization condition read the same information as the consensus condition. However, between the introduction (mentioning being asked about climate change and the definition) and the consensus information, the following passage appeared:

> As you have likely heard, the role that humans' actions play in driving climate change has been a point of debate. Politics nearly always color scientific work with advocates selectively using evidence (e.g., that supports their policy positions). This leads some to say there is too much uncertainty over the role that humans play in this process – *politics make it difficult to assess* whether climate change reflects human activities or the Earth's natural changes. This may be true even for a recent report. That report…

This is analogous to the stimulus that past work shows can undermine the impact of scientific consensus statements (Bolsen, Druckman, & Cook, 2014a; Bolsen & Druckman, 2015) and resembles the aforementioned Rubio quote with regard to the report mentioned in the stimulus. We use this condition to test hypothesis 3 by seeing if responses for low knowledge partisans and high knowledge Democrats resemble similar individuals' responses in the control condition.

The final two conditions – a warning condition and a correction condition – also mimic past work (Bolsen & Druckman, 2015) that shows how warnings and corrections can vitiate the impact of the politicization prime. Each condition added a statement, either earlier in the survey for a warning (*prior to* the politicization and consensus information) or later in the survey for a correction (*after* the politicization and consensus information). The statement read:

> Some say that it is difficult to assess the role of human actions in climate change since people only point to evidence that supports their positions (e.g., their policy positions). Yet, despite what some claim, there is virtually no uncertainty when it comes to the assessment of *human-induced* climate change; a recent comprehensive report, endorsed by a wide range of individuals and organizations, makes clear that a consensus of scientists believes that human activities play a fundamental role.

The warning condition allows for a test of hypothesis 4, by comparing responses in it to responses among similar individuals in the no information control condition.

The survey also included items to measure partisan group identity and knowledge. We measured party identification with a standard fully labeled 7-point question, with higher values moving toward "strong Republican" (i.e., the labels are: strong Democrat, weak Democrat, lean Democrat, Independent, lead Republican, weak Republican, strong Republican). We measured knowledge by counting the number of correct answers to 11 factual questions about politics, science, and energy. We opted to include this mix of general and domain specific questions because it will identify individuals who are not only more likely to pay attention to their party's positions in general, but also specifically climate change positions (e.g., knowledge about science and energy) (see Andrews et al., 2016). We included two other measures of note. First, we measured confidence in science by asking "Would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in the Scientific Community?," on a fully labeled 3-point scale from "hardly any" to "a great deal." Second, we measured opposition or support for a set of three climate change polices (whether government should decrease or increase investments in ways to reduce impacts from climate change, the importance of planning for ways to reduce climate change's impacts, and opposition or support for laws aimed to cut emissions of greenhouse gases); from this, we created a scale (alpha = .91) such that higher scores lead to more support for climate change policy action. Finally, we included other demographic and political measures; question wording for these measures appear in the Supplementary Appendix, as does a demographic profile of our sample (see Table A1).

Results

Our hypotheses are contingent on an individual's partisanship and knowledge. We distinguish Democrats and Republicans based on our partisanship measure, treating leaners (see scale described above) as partisans (see Druckman et al., 2013; Levendusky, 2010).[11] For our analyses, we exclude pure Independents, although we present results for these individuals in the Supplementary Appendix (see Tables A10-A12). For knowledge, we created a low and high knowledge group by taking a median split on our 11-point (politics, science, and energy) knowledge scale (for discussion of median splits, see Iacobucci et al., 2015a,b).[12]

With these operationalizations, we then created four groups to explore our predictions (coded "1" if an individuals is part of that group and "0" otherwise): low knowledge Democrats (N = 213), low knowledge Republicans (N = 173), high knowledge Republicans (N = 264), and high knowledge Democrats (N = 286). While we do not predict differences between low knowledge Republic and Democrats (see Table 1), we separate them to ensure we do not miss unexpected partisan differences. In the Supplementary Appendix, we provide analyses with control variables (see Tables A2-A4). We also use one-tailed tests of significance, given we have directional predictions for each group and each condition (Blalock, 1979).[13]

In Table 2, we report the results from five separate ordinary least square (OLS) regressions that estimate the impact of each experimental condition, relative to the control group, on partisans' opinions about human-caused climate change.[14] We do this first for all partisans in the sample (i.e., excluding pure Independents) and then for four distinct partisan subgroups to test our hypotheses about the conditioning effect of partisanship, knowledge, and rhetorical competition.

[Table 2 About Here]

We find only one marginally significant treatment effect among all partisans in the sample (see the first column of results in Table 2): those in the politicization condition decrease their belief in human-induced climate change, relative to the control group ($p < .10$). Otherwise, we find no effects of consensus information moving public opinion, and then not surprisingly, no effect for the warning or correction (i.e., since the information itself did not move opinion, a warning or correction had nothing to resuscitate). This not only differs from some of the aforementioned work that shows general consensus statements affect climate change beliefs (e.g., van der Linden et al., 2015, 2016) but also contradicts Bolsen and Druckman's (2015) study of fracking and carbon nanotubes. In this sense, it is a failed replication, although one that is perhaps sensible given the salience and partisan divisions on climate change. Indeed, it was for these reasons that we hypothesized partisanship and knowledge would moderate the effects.

The next two columns are for low knowledge Democrats and Republicans, respectively. Both show strong support for hypothesis 2 – for these individuals, receiving the consensus climate change statement caused them to increase their belief in human-caused climate change ($p < .05$). The data also show strong support for hypothesis 3 – the effect of the consensus climate change statement on low knowledge partisans disappears in the presence of a politicization statement. For low knowledge Democrats, the information effect simply disappears and these individuals look the same as low knowledge Democrats in the control condition (the insignificant coefficient means the consensus information when accompanied by the politicization prime has no effect or, in other words, the politicization renders it ineffectual). Low knowledge Republicans significantly decrease their belief in human-caused climate change in the presence of a politicization statement relative to the control group ($p < .10$). Politicization thus eliminates the impact of a consensus climate change statement on low knowledge partisans.[15]

We find no support for hypotheses 4 among low knowledge partisans: the warning is unsuccessful in counter-acting the politicization prime (i.e., those receiving the warning continued to discount the consensus information when presented alongside politicization, and their opinions do not differ from the control group). We additionally find that a correction has no counter-active effect among low knowledge Democrats or Republicans. In sum, the opinions of low knowledge individuals, for either party, can be moved by consensus climate change information, but these effects are easy to eliminate with politicization statements and it is not clear how one could counter-act that effect and restore faith in the consensus information.

Turning to the high knowledge Democrats, column 4, we see support for hypothesis 1a – the consensus information moves opinion in the direction of the consensus ($p < .05$). Interestingly, however, we do not have support for the politicization hypothesis among this group (hypothesis 3). High knowledge Democrats are not impacted by the politicization message, and the consensus information continues to have an effect ($p < .01$) (i.e., the significant and positive coefficient means the consensus information, even when accompanied by the politicization prime, still moves opinions). This means hypothesis 4 is not relevant for high knowledge Democrats given the point is for the warning to counter-act politicization, which has no effect. We do find that knowledgeable Democrats in the warning condition continue to increase their belief in human-caused climate change ($p < .05$). We find no effect, however, in the correction condition, which is curious – why would the politicization prime combined with a correction suddenly negate the impact of the scientific consensus statement among this group?

Finally, when it comes to high knowledge Republicans (column 5), we find support for hypothesis 1b, with these respondents demonstrating a marginally significant *decline* in their belief in human-induced climate change in the presence of a scientific consensus statement ($p <$

.10). We see similar declines for high knowledge Republicans in all other conditions, albeit not at a statistically significant level for those in the warning condition. High knowledge Republicans seem to know where they "should stand" and engage in counter-argument when they receive contrary consensus information supporting human-caused climate change – hence a backfiring effect as reported by Cook and Lewandowsky (2016).

Overall, our results provide support for our hypotheses, with two important exceptions. First, the politicization condition has no effect on high knowledge Democrats (i.e., it does not eliminate the impact of a consensus climate change statement), thereby failing to support part of hypothesis 3. We suspect this is the case because these individuals were pre-treated with politicized information; that is, prior to participating in the survey, they already were well aware that climate change is highly politicized and had already adjusted their beliefs accordingly. Consequently, receiving yet another statement about politicization had no effect (see Druckman & Leeper, 2012; Gaines, Kuklinski, & Quirk, 2007). Some evidence along these lines comes from analyses of responses to the following question asked post-treatment measuring perceived politicization: "To what extent do you think political considerations affect the nature of the information that the public receives about *human-induced* climate change?," on a 7-point fully labeled scale ranging from "not at all" to "always." We find that compared low knowledge Democrats, high knowledge Democrats have a substantially higher mean score (5.62 (1.07; 285) versus 4.83 (1.51; 209); $t_{492} = 6.84$; $p < .01$ for a two-tailed test). Even more telling is that when we regress the politicization variable on experimental conditions, we find the politicization experimental condition is just marginally significant for high knowledge Democrats ($p < .10$ for a one-tailed test) whereas it is large and significant for low knowledge Democrats ($p < .05$).

These findings are consistent with the possibility of high knowledge Democrats being pre-treated and thus not affected by the politicization prime. [16]

Second, we also find, in contrast to Bolsen and Druckman (2015), the warning (and correction) failed to resuscitate the impact of (politicized) consensus information among low knowledge partisans, in violation of hypothesis 4. We have no evidence on why this occurred, although we suspect that the politicization message is simply stronger (i.e., more compelling) than the warning or correction (see Chong & Druckman, 2007). This would also be consistent with the well-documented, powerful effect of negative information overpowering positive information (see Baumeister et al., 2001). In sum, our results show that a scientific consensus statement can shift opinions among certain partisan groups (low knowledge Democrats and Republicans and high knowledge Democrats) while at the same time backfiring among others (high knowledge Republicans). Even so, a politicization message can eliminate the effect, and warnings/corrections fail to counteract it. Clearly, how individuals react to consensus messages in this domain is highly contingent on partisan group identity and knowledge.

Downstream Effects

We also measured, as mentioned, confidence in the scientific community and support for policy actions. While we do not have clear theoretical predictions, it would be sensible that the impact of the treatments match those found on beliefs in human-induced climate change. Those who are moved by the consensus statement also are likely to increase confidence in science given they are learning of a new or continuing consensus. In contrast, those who come to believe less in human-caused climate change will lose confidence since they will view the statement as disingenuous. We present the results in Table 3, with an analogous set of regressions to those used to study belief in human-induced climate change. We find virtually identical results to our

analyses of human-caused climate change with two notable exceptions. First, the politicization prime does not cause low knowledge Republicans to decrease their confidence in science. Second, the correction does not have a significant negative impact for high knowledge Republicans. This is consistent with Cook and Lewandowsky (2016) who find that "[c]onsensus information activated further distrust of scientists among Americans with high free-market support" (p. 172) (which we assume correlate highly with Republicans). We take these results as implying that climate change is inherently linked to confidence in the scientific community and thus information about climate change has potential downstream effects on confidence.[17]

[Tables 3 and 4 About Here]

Finally, we included three policy support items, which, as mentioned, we scaled to create a "support for policy action" on climate change variable. We present results in Table 4, and as is clear, there is virtually no effect of our treatments for any sub-groups. This is similar to Deryugina and Shurchkov's (2016) finding that "beliefs about the necessity of making policy decisions...were not affected [by] concrete information about scientists' views" (p. 1). We see these null results as particularly important insofar as they accentuate the need to distinguish beliefs about climate change from support for climate change policies – while those two variables clearly correlate, interventions aimed to affect one may not influence the other (also see Campbell & Kay, 2014). As Hennes et al. (2016) state, "simply providing the public with scientific evidence may be insufficient to inspire action to mitigate climate change" (p. 1). That said, if we include belief in human-induced climate change in each regression, it is always highly significant (see Supplementary Appendix Tables A5-A6).[18] Thus, efforts to generate greater consensus about human-caused climate change may indirectly boost support for policy action over time.[19]

Conclusion

We find the impact of a scientific consensus statement about human-caused climate change depends on individual and contextual features. The most salient political group identity – partisanship – matters, but only for those with high levels of knowledge. For low knowledge respondents, from both parties, consensus information moves them in a positive direction; however, that movement is quite easily tempered by politicizing the information. Moreover, attempts to counter-act politicization do not work, in contrast to what was found on other issues and technologies (c.f., Bolsen & Druckman, 2015). For high knowledge respondents, group identity matters, as consensus information affected Democrats who also were immune to politicization; however, high knowledge Republicans moved against consensus information. We find these same dynamics when it comes to general confidence in the scientific community, although we find no direct effect of the information on policy beliefs.

While our findings cohere with some prior work (e.g., Cook & Lewandowsky, 2016), they differ from others – particular insofar as other work has reported uniform effects of consensus information across partisans (e.g., van der Linden et al., 2015, 2016). These differences may reflect the timing of the studies or perhaps the fact that we used distinct stimuli that were more detailed than past studies (see Cook & Lewandowsky, 2016). This would suggest that the precise way that consensus messages are conveyed also matters.

We see at least three take-away points from our results. First, at the most basic level, our results provide insight into the nature of group identity and its impact in the domain of climate change opinions. Political science work often privileges the impact of group, particularly partisan, identity over substantive information, at the extreme; for example, Cohen (2003) reports "… the power of group influence in persuasion and people's blindness to it…[leads to]

attitudes toward a social policy [dependent] almost exclusively upon the stated position of one's political party" (p. 808, although see Bullock, 2011). While this is sometimes true, we find, in the domain of climate change, the impact of group identity versus substantive information is conditional. Specifically, not everyone who identifies with a partisan group knows "what position to take" and thus those low in such knowledge, perhaps ironically, are open to substantive information even when ostensibly contradicting an identity position (i.e., low knowledge Republicans) (also see Lenz, 2012). Knowledge conditions partisan group identity's impact. That said, we also find that substantive (consensus) information can be easily undermined via politicization but even then it seems as if people end up with middling opinions rather than some partisan driven view (also see Kahan, 2015). On the flip side, those high in knowledge demonstrate a dramatic partisan group identity effect, resulting in substantial partisan polarization. Schuldt and his colleagues (2011, 2015) also find a conditioning effect of partisan group identity on climate change communications, although they focus on wording changes (global warming versus climate change) as opposed to consensus messages. They also do not report a moderating effect resulting from differences in the sophistication of individuals within partisan groups (e.g., Schuldt et al., 2011, p. 122). This is interesting because, taken with our results, it suggests that partisan groups differ but how this plays out depends on the precise types of messages being studied. Second, there is no "magic bullet" such that, at least on relatively salient and polarized issues like human-caused climate change, communicating scientific consensus information will necessarily have uniform effects on citizens. This means scholars must explore, across issues and over time, how different subpopulations react to scientific consensus information. That said, these findings are far from definitive when it comes to science communication more generally, and especially in this ever-changing domain of climate change.

Third, the rhetorical environment matters; most prior research that explores how communicating scientific consensus shapes opinions focuses on providing information about what most climate scientists believe in the absence of any competitive rhetoric. The reality is that scientific consensus is often politicized and there will always be actors who attempt to contest such claims. This information affects individuals in distinct ways and must be accounted for in studies of scientific communication effects. Fourth, scholars should not confound beliefs about climate change with support for policy action. The latter involves complex individual calculations about beliefs, values, and personal interests. Future work is needed to identify when such factors moderate different communication approaches.

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Table 1: Predictions Relative to Receiving No Information

	Consensus Information	**Politicization**	**Warning**	**Correction**
Low Knowledge Democrats and Republicans	Increase Belief (that climate change is primarily human-caused (hypothesis 2)	No Effect (*cancels consensus effect*) (hypothesis 3)	Increase Belief (hypothesis 4)	?
High Knowledge Democrats	Increase Belief (hypothesis 1a)	No Effect (*cancels consensus effect*) (hypothesis 3)	Increase Belief (hypothesis 4)	?
High Knowledge Republicans	Decrease Belief (hypothesis 1b)	Decrease Belief	Decrease Belief	Decrease Belief

Table 2. Belief in Human-Caused Climate Change

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.171	0.474**	0.517**	0.349**	-0.347*
	(0.147)	(0.238)	(0.289)	(0.178)	(0.261)
Politicization	-0.223*	-0.151	-0.381*	0.481***	-0.315*
	(0.145)	(0.233)	(0.273)	(0.188)	(0.249)
Warning	-0.0636	-0.215	-0.350	0.402**	-0.151
	(0.146)	(0.240)	(0.280)	(0.177)	(0.256)
Correction	-0.134	-0.197	-0.299	0.208	-0.400*
	(0.150)	(0.233)	(0.284)	(0.182)	(0.279)
Constant	4.582***	4.651***	4.138***	5.356***	3.800***
	(0.105)	(0.166)	(0.204)	(0.127)	(0.192)
Observations	924	210	159	286	261
R-squared	0.009	0.052	0.086	0.030	0.012

*Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients. *** p<0.01, ** p<0.05, * p<0.105, one-tailed.*

Table 3. Confidence in Science

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.0602	0.239**	0.344**	0.161**	-0.325***
	(0.0674)	(0.129)	(0.154)	(0.0896)	(0.133)
Politicization	-0.102*	-0.127	-0.110	0.179**	-0.186*
	(0.0663)	(0.126)	(0.144)	(0.0949)	(0.127)
Warning	0.0198	0.0220	-0.0167	0.150**	-0.0678
	(0.0668)	(0.129)	(0.147)	(0.0893)	(0.131)
Correction	0.0566	0.0864	0.0879	0.0965	-0.0274
	(0.0687)	(0.126)	(0.149)	(0.0920)	(0.144)
Constant	2.326***	2.286***	2.138***	2.576***	2.156***
	(0.0482)	(0.0898)	(0.107)	(0.0639)	(0.0980)
Observations	917	208	156	286	260
R-squared	0.009	0.042	0.066	0.017	0.032

*Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients. *** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table 4. Support for Policy Action

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.0159	0.0125	0.0288	0.0230	0.0195
	(0.0281)	(0.0422)	(0.0555)	(0.0293)	(0.0589)
Politicization	0.00830	0.0181	0.118**	0.0351	0.0179
	(0.0276)	(0.0412)	(0.0528)	(0.0311)	(0.0557)
Warning	-0.0211	0.0188	-0.0536	0.00161	-0.0157
	(0.0278)	(0.0428)	(0.0538)	(0.0292)	(0.0575)
Correction	-2.31e-05	0.00804	-0.0147	-0.0231	0.0140
	(0.0287)	(0.0415)	(0.0550)	(0.0301)	(0.0635)
Constant	0.666***	0.718***	0.554***	0.840***	0.473***
	(0.0201)	(0.0298)	(0.0396)	(0.0208)	(0.0429)
Observations	907	205	156	282	257
R-squared	0.002	0.001	0.079	0.015	0.002

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Notes

[1] Others have studied the impact of communicating consensus on different scientific topics (e.g., Bolsen, Druckman, & Cook, 2014a, Bolsen & Druckman, 2015). Climate change may be unique unto itself insofar as it receives an unrivaled amount of governmental, media, and scholarly attention.

[2] We focus on partisanship rather than ideology because we base our argument on one knowing where the elites of his or her *party* stand on an issue.

[3] When people are motivated to form "accurate" opinions, they tend to process information more objectively and not engage in such partisan motivated reasoning (i.e., so as to confirm prior beliefs or identities). While we imagine there are some people who are so motivated (e.g., individuals whose local environment is clearly affected by climate change; Scannell & Gifford, 2013), we assume that, on average, people lack such motivation (see Kahan, 2015).

[4] Individual level knowledge not only heightens the likelihood that individuals are aware of the party position but it also increases the *extent* of motivated reasoning (Bolsen, Druckman, & Cook, 2015; Kahan et al., 2012; Taber & Lodge, 2006). Further evidence about the knowledge by partisanship interaction comes from observational data showing at low levels of knowledge, Democrats and Republicans hold, on average, nearly identical opinions, but as knowledge increases, partisans polarize in a way consistent with hypotheses 1a and 1b (Bolsen et al., 2015; Kahan, 2015).

[5] Kahan (2015) explains there are "many more things going on in the world, including counter-messaging, than are going on in a '97% consensus' messaging experiment" (p. 17).

[6] The consequence is that "even when virtually all relevant observers have ultimately concluded that the accumulated evidence *could* be taken as sufficient to issue a solid scientific conclusion…

arguments [continue] that the findings [are] not definitive" (Freudenburg et al., 2008, p. 28; italics in original).

[7] It might lead to even more backfiring as it provides explicit counter-arguments.

[8] Moreover, it could induce people to develop an opinion that politicization claims are not credible and thus they reject them later due to motivated reasoning (to protect their belief of non-credibility).

[9] We hired the firm *ResearchNow* to conduct the survey. They collected the data from a non-probability-based but representative (on all key census demographics) sample of the United States. When it comes to experimental research, such a sample is sufficient to ensure generalizable causal inferences (Druckman & Kam, 2011).

[10] Prior to this question, all respondents were asked, "Climate change refers to a long-term change in Earth's climate due to an increase in the average atmospheric temperature. What do you think? Do you think that climate change is happening?," with answers on a 7-point fully labeled scale. Anyone who answered "definitely is NOT happening," had their survey terminated as it would have been nonsensical to ask such respondents about the causes of something they believe is not happening. This led to the exclusion of a total of 31 respondents.

[11] We do not use the full 7-point party scale, as our predictions are not contingent on the strength of partisanship *per se* – only the party to which they belong. Note that 19 respondents did not answer the partisanship question and thus are excluded from our analyses.

[12] This also follows prior work such as Kinder and Sanders (1990), Krosnick and Brannon (1993), Nelson et al. (1997), Druckman and Nelson (2003), and Deryugina and Shurchkov (2016). In a below note, at the end of the results section (and in the Supplementary Appendix), we present and discuss the results of using an alternative split point for low and high knowledge.

[13] Respondents were asked, as a manipulation check, whether "most scientists are divided on the statement that human activities are causing climate change?" (coded "1" if there is a perception of scientific consensus, "0" otherwise). Table A13 in the Supplementary Appendix reports the results from a logistic regression of each experimental condition on perception of scientific consensus. We find that exposure to scientific consensus information about human-caused climate change significantly increases perceptions that a consensus exists for all partisans, and for each key subgroup with the exception of highly knowledgeable Democrats (who we assume may have already perceived a consensus prior to exposure).

[14] The Ns in Table 2 are slightly distinct from what we report in the main text due to the exclusion of the aforementioned 31 respondents who stated a belief that climate change was definitely not happening, the exclusion of the aforementioned respondents who did not answer the partisanship question, and to non-response on our dependent variables.

[15] The substantive movement due to assignment to different conditions is easily interpretable as it roughly reflects the size of the coefficients (e.g., for low knowledge Democrats, the consensus information increases their belief in human-caused climate change, on average, by .47 on a 7-point scale).

[16] We included an analogous question that asked about the politicization of science in general. We find, in our entire sample, a correlation of .81. This is striking insofar as Bolsen and Druckman (2015) report low correlations with a general measure and specific politicization measures on fracking and carbon nanotubes. This highlights the extent to which climate change dominates debates about science and politics.

[17] For partisans, the basic correlation between belief in human-caused climate change and confidence in science is .42 ($p < .01$).

[18] For partisans, the basic correlation between belief in human-caused climate change and the policy measure is .62 ($p < .01$).

[19] For our knowledge median split, we coded those who answered fewer than 7 questions correctly as low knowledge (a total of 45% of the sample) and those who answered greater than 6 questions as high knowledge (a total of 55% of the sample) (see Supplementary Appendix Table A1). This matches the same median if we look just among Democrats where the relevant percentages are 43% and 57%. It is not, however, the same median for Republicans as the relevant percentages are 40% and 60%. For Republicans, a split at less than/more than 8 correct answers generates percentages of 55% and 45%. In the Supplementary Appendix (Tables A7-A9), we re-run all analyses using a split at 8 instead of 7. We find largely similar results for Democrats, with the main exception being a significant positive movement for the correction condition (on human-caused climate change and confidence in science) among high knowledge Democrats. For low knowledge Republicans, we no longer find a significant effect for the scientific consensus condition, in violation of hypothesis 2 (we find the same lack of significance on confidence in science as well as a negative significant coefficient for the politicization condition). This suggests that the positive effect is very concentrated among particularly low knowledge Republicans. We also find a significant negative effect for the other conditions for human-caused climate change beliefs. For high knowledge Republicans, we no longer see a significant negative coefficient for the politicization condition, but it was just barley significant in Table 2. We also no longer see significant negative coefficient on politicization for confidence in science.

Appendix

Table A1. Sample Demographics

Variable	Question / Distribution
Gender	Are you male (46.42) or female (53.58%)
Ethnicity	Which of the following do you consider to be your primary racial or ethnic group? White (1) = 82.34%; African American (2) = 4.25%; Asian American (3) = 6.52%; Hispanic (4) = 3.71%; Native American (5) = 2.12%; Other (6) = 1.06%
Age	What is your age? under 18 (1) = 3.56%; 18-24 (2) = 13.93%; 25-34 (3) = 26.65%; 35-50 (4) = 32.70%; 51-65 (5) = 23.09%; over 65 (6) = 0.08%
Education	What is the highest level of education you have completed? less than high school (1) = 0.68%; high school graduate (2) = 7.20%; some college = 29.70%; 4 year college degree (4) = 35.15%; advanced degree (5) = 27.27%.
Income	What is your estimate of your family's annual household income (before taxes)? < $30,000 (1) = 13.07%; $30,000 – $69,999 (2) = 31.50%; $70,000 – $99,999 (3) = 23.62%; $100,000 - $200,000 (4) = 25.69%; > 200,000 (5) = 6.12%
Party Identification	Generally speaking, which of the options on the scale below best describes your party identification? strong Democrat (1) = 16.41%; weak Democrat (2) = 8.63%; lean Democrat (3) = 13.05%; Independent (4) = 28.55%; lean Republican (5) = 12.29%; weak Republican (6) = 8.40%; strong Republican (7) = 12.67%
Distrust in Science	Do you think that science enables us to overcome almost any problem, or that science creates unintended consequences and replaces older problems with new ones? definitely overcomes problems (1) = 6.36%; 2 = 19.77%; 3 = 18.79%; not sure (4) = 28.48%; 5 = 17.73%; 6 = 6.52%; definitely creates new problems (7) = 2.35%
Econ. Over Envir.	In general, what do you think is more important: protecting the environment, even at the risk of curbing economic growth, OR maintaining a prosperous economy, even if the environment suffers to some extent?" definitely protect the environment (1) = 17.73%; (2) = 16.14%; (3) = 10.38%; (4) = 37.42%; (5) = 8.56%; (6) = 6.52%; definitely maintain a prosperous economy (7) = 3.26%
Knowledge	Know which party is more conservative in the U.S. (76% correct; 24% incorrect) Know majority required to over-ride a Presidential veto (61% correct; 39% incorrect) Know which party has majority in U.S. House (62% correct; 38% incorrect) Know whose responsibility it is to declare law unconstitutional (80% correct; 20% incorrect) Know current U.S. Sec. of State (67% correct; 33% incorrect) Know whether most of the oil imported to the US comes from the Middle East (41% correct; 59% incorrect) Know whether there is currently a ban on drilling for oil and gas off the Atlantic Coast and in the eastern Gulf of Mexico (26% correct; 74% incorrect) Know what country is the world's largest exporter of crude oil (40% correct; 60% incorrect) Know which of the following is not a renewable energy source (62% correct; 38% incorrect) Is it true or false that lasers work by focusing sound waves? (51% correct; 49% incorrect) Which travels faster: light or sound? (84% correct; 16% incorrect) *Overall:* 0 correct = 2.03%; 1 correct = 1.96%; 2 correct = 4.06%; 3 correct = 6.55%; 4 correct = 6.02%; 5 correct = 11.59%; 6 correct = 12.79%; 7 correct = 14.15%; 8 correct = 15.73%; 9 correct = 14.67%; 10 correct = 7.98%; 11 correct = 2.48%

Table A2. Belief in Human-Caused Climate Change with Control Variables

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republican
Cons. Info.	0.0761	0.407**	0.497**	0.305**	-0.527**
	(0.134)	(0.235)	(0.292)	(0.177)	(0.256)
Politicization	-0.257**	-0.213	-0.465**	0.420**	-0.471**
	(0.131)	(0.231)	(0.271)	(0.184)	(0.243)
Warning	0.0137	-0.266	-0.227	0.413***	-0.262
	(0.132)	(0.241)	(0.285)	(0.174)	(0.249)
Correction	-0.0897	-0.175	-0.202	0.171	-0.309
	(0.136)	(0.234)	(0.290)	(0.181)	(0.273)
Age	0.0610*	0.0669	0.000244	0.0405	-0.0109
	(0.0415)	(0.0735)	(0.0843)	(0.0598)	(0.0787)
Female	0.276***	0.00277	0.489***	0.166*	0.0237
	(0.0889)	(0.176)	(0.197)	(0.120)	(0.171)
Income	-0.0257	-0.0152	0.0102	0.00966	0.0576
	(0.0393)	(0.0721)	(0.0885)	(0.0526)	(0.0746)
Minority	0.136	-0.198	0.570**	-0.153	-0.181
	(0.113)	(0.167)	(0.291)	(0.152)	(0.312)
Education	0.171***	0.127*	0.0700	0.167***	-0.0673
	(0.0492)	(0.0914)	(0.112)	(0.0674)	(0.0965)
Distrust Sci.	-0.0738***	-0.0623	-0.0604	0.0164	-0.0233
	(0.0304)	(0.0593)	(0.0696)	(0.0396)	(0.0555)
Econ./Envir.	-0.353***	-0.161***	-0.136**	-0.115***	-0.304***
	(0.0271)	(0.0542)	(0.0677)	(0.0420)	(0.0526)
Constant	4.751***	4.821***	3.673***	4.508***	5.330***
	(0.350)	(0.662)	(0.686)	(0.470)	(0.700)
Observations	903	209	152	283	253
R-squared	0.215	0.125	0.161	0.101	0.140

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficien
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A3. Confidence in Science with Control Variables

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.0182	0.181*	0.355**	0.153**	-0.354***
	(0.0632)	(0.122)	(0.159)	(0.0878)	(0.133)
Politicization	-0.120**	-0.160*	-0.141	0.178**	-0.237**
	(0.0614)	(0.119)	(0.145)	(0.0915)	(0.127)
Warning	0.0379	-0.0525	0.0979	0.184**	-0.118
	(0.0617)	(0.125)	(0.151)	(0.0862)	(0.130)
Correction	0.0567	0.0987	0.203*	0.0991	-0.0483
	(0.0639)	(0.122)	(0.154)	(0.0898)	(0.144)
Age	-0.00600	0.0198	-0.00873	-0.00400	-0.0827**
	(0.0197)	(0.0386)	(0.0458)	(0.0297)	(0.0415)
Female	0.0307	0.0285	0.0396	-0.0337	-0.0325
	(0.0419)	(0.0912)	(0.106)	(0.0593)	(0.0894)
Income	-0.0190	-0.0691**	-0.0467	0.0242	0.0278
	(0.0184)	(0.0370)	(0.0474)	(0.0261)	(0.0389)
Minority	-0.0446	-0.202***	-0.0699	-0.0811	0.0246
	(0.0531)	(0.0862)	(0.155)	(0.0755)	(0.163)
Education	0.0398**	0.0558	0.100**	0.00572	-0.0520
	(0.0231)	(0.0472)	(0.0598)	(0.0334)	(0.0504)
Distrust Sci.	-0.0963***	-0.102***	-0.106***	-0.0578***	-0.0856***
	(0.0143)	(0.0307)	(0.0376)	(0.0196)	(0.0291)
Econ./Envir.	-0.123***	-0.0815***	-0.0943***	-0.0737***	-0.0787***
	(0.0127)	(0.0280)	(0.0362)	(0.0208)	(0.0274)
Constant	2.968***	2.869***	2.602***	2.924***	3.316***
	(0.166)	(0.350)	(0.372)	(0.233)	(0.365)
Observations	896	207	149	283	252
R-squared	0.175	0.189	0.166	0.114	0.125

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A4. Support for Policy Action with Control Variables

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.00709	0.00700	0.0230	0.0288	-0.0429
	(0.0217)	(0.0356)	(0.0543)	(0.0250)	(0.0472)
Politicization	-0.00116	0.0158	0.0748*	0.0241	-0.0264
	(0.0211)	(0.0351)	(0.0508)	(0.0260)	(0.0445)
Warning	-0.00302	-0.0126	0.00288	0.0131	-0.0373
	(0.0212)	(0.0369)	(0.0528)	(0.0245)	(0.0456)
Correction	0.0199	0.00452	-0.0105	-0.00192	0.0468
	(0.0220)	(0.0359)	(0.0540)	(0.0255)	(0.0508)
Age	-0.00171	0.0110	0.00223	0.00556	-0.0336**
	(0.00672)	(0.0111)	(0.0158)	(0.00848)	(0.0148)
Female	0.0404***	0.0244	0.0254	-0.00465	0.0139
	(0.0143)	(0.0265)	(0.0365)	(0.0169)	(0.0320)
Income	-0.0131**	-0.0229**	0.0184	-0.000379	-0.00994
	(0.00632)	(0.0109)	(0.0163)	(0.00740)	(0.0137)
Minority	0.0472***	0.0359*	-0.00323	-0.0285*	-0.00193
	(0.0183)	(0.0255)	(0.0532)	(0.0215)	(0.0572)
Education	0.0188***	0.0326***	-0.00817	0.0128*	-0.0138
	(0.00793)	(0.0137)	(0.0205)	(0.00952)	(0.0177)
Distrust Sci.	-0.0162***	-0.0239***	-0.0175*	0.00336	-0.0153*
	(0.00490)	(0.00888)	(0.0130)	(0.00559)	(0.0103)
Econ./Envir.	-0.104***	-0.0660***	-0.0661***	-0.0608***	-0.120***
	(0.00437)	(0.00818)	(0.0126)	(0.00593)	(0.00972)
Constant	0.966***	0.869***	0.786***	0.915***	1.247***
	(0.0564)	(0.0997)	(0.126)	(0.0661)	(0.130)
Observations	886	204	149	279	249
R-squared	0.441	0.323	0.253	0.325	0.426

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A5. Support for Policy Action with Belief in Human-Caused Climate Change as Independent Variable

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Hum.-Caus.	0.118***	0.0630***	0.0757***	0.0536***	0.129***
	(0.00491)	(0.0114)	(0.0143)	(0.00934)	(0.0115)
Cons. Info.	-0.00537	-0.0127	-0.0154	0.00459	0.0620*
	(0.0219)	(0.0397)	(0.0518)	(0.0280)	(0.0483)
Politicization	0.0358*	0.0322	0.140***	0.00948	0.0585*
	(0.0215)	(0.0386)	(0.0488)	(0.0298)	(0.0457)
Warning	-0.0127	0.0363	-0.0321	-0.0206	0.00372
	(0.0217)	(0.0401)	(0.0497)	(0.0279)	(0.0470)
Correction	0.0159	0.0259	0.000812	-0.0328	0.0628
	(0.0224)	(0.0389)	(0.0508)	(0.0286)	(0.0521)
Constant	0.122***	0.420***	0.245***	0.553***	-0.0168
	(0.0275)	(0.0608)	(0.0687)	(0.0538)	(0.0560)
Observations	907	205	156	282	257
R-squared	0.394	0.133	0.224	0.120	0.335

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A6. Support for Policy Action with Belief in Human-Caused Climate Change as Independent Variable and Control Variables

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Hum.-Caus.	0.0798***	0.0442***	0.0650***	0.0400***	0.0882***
	(0.00466)	(0.0102)	(0.0147)	(0.00821)	(0.0103)
Cons. Info.	-0.000652	-0.00851	-0.0142	0.0166	0.00219
	(0.0188)	(0.0343)	(0.0516)	(0.0241)	(0.0417)
Politicization	0.0200	0.0279	0.0983**	0.00728	0.0152
	(0.0183)	(0.0337)	(0.0479)	(0.0252)	(0.0393)
Warning	-0.00345	0.00164	0.0137	-0.00376	-0.0144
	(0.0184)	(0.0355)	(0.0496)	(0.0238)	(0.0401)
Correction	0.0265*	0.0150	-0.00258	-0.00794	0.0714*
	(0.0190)	(0.0344)	(0.0507)	(0.0245)	(0.0446)
Age	-0.00738*	0.00789	0.00276	0.00377	-0.0329***
	(0.00582)	(0.0107)	(0.0148)	(0.00815)	(0.0129)
Female	0.0171*	0.0255	-0.00475	-0.0110	0.00977
	(0.0125)	(0.0254)	(0.0349)	(0.0162)	(0.0281)
Income	-0.0110**	-0.0222**	0.0178	-0.000709	-0.0154*
	(0.00547)	(0.0104)	(0.0153)	(0.00711)	(0.0121)
Minority	0.0362***	0.0450**	-0.0404	-0.0228	0.0153
	(0.0159)	(0.0245)	(0.0506)	(0.0207)	(0.0502)
Education	0.00572	0.0276**	-0.0129	0.00615	-0.00816
	(0.00691)	(0.0132)	(0.0193)	(0.00924)	(0.0155)
Distrust Sci.	-0.0101***	-0.0210***	-0.0120	0.00277	-0.0133*
	(0.00426)	(0.00852)	(0.0123)	(0.00536)	(0.00903)
Econ./Envir.	-0.0762***	-0.0592***	-0.0587***	-0.0564***	-0.0936***
	(0.00412)	(0.00799)	(0.0119)	(0.00577)	(0.00906)
Constant	0.589***	0.650***	0.547***	0.735***	0.784***
	(0.0536)	(0.108)	(0.130)	(0.0734)	(0.126)
Observations	886	204	149	279	249
R-squared	0.581	0.384	0.347	0.380	0.561

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A7. Belief in Human-Caused Climate Change with Alternative Knowledge Group Coding (see note 18 in paper)

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.171	0.422**	0.118	0.450***	-0.458*
	(0.147)	(0.217)	(0.249)	(0.202)	(0.299)
Politicization	-0.223*	-0.164	-0.638***	0.747***	-0.0770
	(0.145)	(0.217)	(0.247)	(0.213)	(0.269)
Warning	-0.0636	-0.0582	-0.365*	0.585***	-0.128
	(0.146)	(0.216)	(0.252)	(0.203)	(0.280)
Correction	-0.134	-0.250	-0.323*	0.434**	-0.605**
	(0.150)	(0.217)	(0.254)	(0.204)	(0.318)
Constant	4.582***	4.906***	4.278***	5.224***	3.605***
	(0.105)	(0.157)	(0.188)	(0.138)	(0.205)
Observations	924	286	224	210	196
R-squared	0.009	0.041	0.058	0.066	0.029

*Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients. *** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A8. Confidence in Science with Alternative Knowledge Group Coding (see note 18 in paper)

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.0602	0.219**	0.147	0.190**	-0.461***
	(0.0674)	(0.110)	(0.130)	(0.105)	(0.156)
Politicization	-0.102*	-0.0915	-0.263**	0.241**	-0.0601
	(0.0663)	(0.110)	(0.128)	(0.111)	(0.140)
Warning	0.0198	0.0730	-0.0700	0.184**	-0.0335
	(0.0668)	(0.110)	(0.130)	(0.106)	(0.146)
Correction	0.0566	0.0189	-0.0362	0.201**	0.0692
	(0.0687)	(0.110)	(0.132)	(0.106)	(0.166)
Constant	2.326***	2.385***	2.222***	2.531***	2.079***
	(0.0482)	(0.0799)	(0.0973)	(0.0717)	(0.107)
Observations	917	284	220	210	196
R-squared	0.009	0.032	0.053	0.030	0.066

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A9. Support for Policy Action with Alternative Knowledge Group Coding (see note 18 in paper)

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.0159	0.0123	-0.0251	0.0457	0.0441
	(0.0281)	(0.0356)	(0.0521)	(0.0343)	(0.0695)
Politicization	0.00830	0.0199	0.0190	0.0461*	0.0796*
	(0.0276)	(0.0356)	(0.0519)	(0.0364)	(0.0616)
Warning	-0.0211	0.0265	-0.0805*	0.00472	0.0108
	(0.0278)	(0.0357)	(0.0526)	(0.0343)	(0.0642)
Correction	-2.31e-05	0.00117	-0.0367	-0.0170	0.0229
	(0.0287)	(0.0357)	(0.0539)	(0.0348)	(0.0729)
Constant	0.666***	0.744***	0.584***	0.838***	0.430***
	(0.0201)	(0.0261)	(0.0396)	(0.0233)	(0.0470)
Observations	907	280	219	207	194
R-squared	0.002	0.003	0.022	0.023	0.011

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A10. Belief in Human-Caused Climate Change among Independents

	(1) All Independents	(2) Low Knowledge Independents	(3) High Knowledge Independents
Cons. Info.	0.210	0.471**	-0.140
	(0.208)	(0.286)	(0.306)
Politicization	0.0576	-0.0119	0.128
	(0.205)	(0.290)	(0.290)
Warning	-0.188	-0.358*	0.113
	(0.211)	(0.280)	(0.332)
Correction	-0.118	0.186	-0.402*
	(0.196)	(0.282)	(0.271)
Constant	4.575***	4.583***	4.569***
	(0.136)	(0.203)	(0.182)
Observations	363	187	176
R-squared	0.011	0.050	0.024

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.105, one-tailed.*

Table A11. Confidence in Science among Independents

	(1) All Independents	(2) Low Knowledge Independents	(3) High Knowledge Independents
Cons. Info.	0.206**	0.314**	0.0987
	(0.0993)	(0.143)	(0.139)
Politicization	0.0725	-0.0235	0.191*
	(0.0984)	(0.146)	(0.132)
Warning	0.0229	-0.0462	0.206*
	(0.101)	(0.141)	(0.151)
Correction	-0.0336	-0.0462	-0.00840
	(0.0935)	(0.141)	(0.123)
Constant	2.256***	2.200***	2.294***
	(0.0651)	(0.103)	(0.0827)
Observations	360	184	176
R-squared	0.018	0.051	0.023

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A12. Support for Policy among Independents

	(1) All Independents	(2) Low Knowledge Independents	(3) High Knowledge Independents
Cons. Info.	0.00998	0.0123	0.0253
	(0.0420)	(0.0496)	(0.0696)
Politicization	0.0145	0.0414	-0.00257
	(0.0411)	(0.0499)	(0.0653)
Warning	0.000260	0.00596	0.0218
	(0.0422)	(0.0483)	(0.0746)
Correction	0.000397	0.0553	-0.0420
	(0.0392)	(0.0486)	(0.0609)
Constant	0.619***	0.591***	0.637***
	(0.0274)	(0.0356)	(0.0409)
Observations	354	179	175
R-squared	0.001	0.011	0.007

Note: The coefficients are from an OLS regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*

Table A13. Belief that Scientists Mostly Agree on Human-Induced Climate Change

	(1) All Partisans	(2) Low Knowledge Democrats	(3) Low Knowledge Republicans	(4) High Knowledge Democrats	(5) High Knowledge Republicans
Cons. Info.	0.772***	1.165**	1.353***	0.502	0.784**
	(0.221)	(0.522)	(0.572)	(0.432)	(0.415)
Politicization	0.100	-0.386	0.922**	1.270**	-0.181
	(0.208)	(0.436)	(0.548)	(0.553)	(0.394)
Warning	0.235	-0.334	0.312	0.422	0.632*
	(0.211)	(0.449)	(0.576)	(0.424)	(0.404)
Correction	0.0988	-0.339	0.547	0.170	0.365
	(0.216)	(0.438)	(0.574)	(0.422)	(0.440)
Constant	0.114	0.386	-1.145***	0.904***	-0.314
	(0.151)	(0.314)	(0.434)	(0.287)	(0.302)
Observations	919	208	158	286	259

Note: The coefficients are from a logit regression. Standard errors listed in parentheses below the coefficients.
**** p<0.01, ** p<0.05, * p<0.1, one-tailed.*