The roles of information deficits and identity threat in the prevalence of misperceptions

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Abstract

Why do so many Americans hold misperceptions? We examine two factors that may contribute to the prevalence of these false or unsupported beliefs. First, many people have not been exposed to clear factual information. If so, presenting correct information in a more compelling format should reduce misperceptions. In some cases, however, people may instead reject accurate information because it threatens their worldview or self-concept – a mechanism that can be revealed by affirming individuals' self-worth, which could make them more willing to acknowledge uncomfortable facts. In three experiments, we find that providing information in graphical form reduces misperceptions relative to both a control condition and to equivalent textual information. However, we also find that self-affirmation may help to decrease misperceptions even if no other information is provided. These results suggest that misperceptions are not simply the result of a lack of information and that some people could offer correct answers if they were less psychologically threatening.

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Why do people so often fail to learn relevant facts about politics or update the inaccurate factual beliefs that they hold? Surveys show that the American public holds many incorrect or factually unsupported beliefs about politics. From myths about "death panels" to skewed beliefs about the state of the economy, misperceptions can distort public debate and warp the process by which people form and update their preferences, ultimately causing them to not only support different policies but vote for different candidates (Althaus 1998, Gilens 2001, Bartels 2002, Kull et. al 2003/2004, Nyhan and Reifler 2012). Given these perverse consequences, determining why so many Americans are misinformed is a vital task for social science.

In this article, we consider two hypotheses about the prevalence of misperceptions. First, in many cases, people may seek to form accurate beliefs (Kunda 1990) but the prevalence of political misperceptions reflects an information deficit – a common problem due to widespread lack of interest in or knowledge of politics (Delli Carpini 2005). Specifically, people may have failed to encounter accurate information about the issues in question or encountered it in formats that easily allow for counter-argument (e.g., Nyhan and Reifler 2010). Under this view, the way in which information is delivered could substantially reduce misperceptions.

Exposure to accurate information may not be enough, however; people's mindsets when they think about their factual beliefs are also likely to contribute to misperceptions about controversial issues. Directionally motivated reasoning – biases in information processing that occur when one wants to reach a specific conclusion – appears to be the default way in which people process (political) information (e.g., Lord, Ross, and Lepper 1979; Kunda 1990; Redlawsk 2002; Taber and Lodge 2006). Misperceptions often fit comfortably in people's worldviews in this sense by seeming to confirm people's prior beliefs (Kahan 2015).

On high-profile issues, many of the misinformed are likely to have already encountered and rejected correct information that was discomforting to their self-concept or worldview – especially among those who already follow politics (Steele 1988). Could some people potentially accept unwelcome facts in a different frame of mind? For instance, accuracy motivations can supplant directional motivations under certain conditions (Bolsen and Druckman 2015; Bolsen, Druckman, and Cook 2014). From this perspective, buttressing people's self-worth could potentially reveal that they can acknowledge uncomfortable facts without any new information. Such a finding would suggest that the threatening nature of unwelcome information contributes to people denying facts that they might accept in a different mindset. When people have sufficient feelings of self-worth, otherwise discomforting facts may no longer be so threatening.

These explanations have broad implications for how we understand the causes of inaccurate factual beliefs as well as approaches to reducing them. To the extent that misperceptions are rooted mainly in failures of information delivery, presenting corrective messages in convenient and accessible formats should reduce misperceptions. Such a finding would indicate that people are not sufficiently exposed to persuasive and accurate factual information and suggest the need for changes in the approaches used to try to correct misperceptions. By contrast, if misperceptions are more rooted in self-identity, people with inaccurate beliefs are likely to be resistant to acknowledging threatening information, suggesting that mitigating identity threat could be more useful. (As we discuss in the conclusion, these explanations are not mutually exclusive.)

We test both approaches in three experiments concerning issues for which some citizens may be unwilling to acknowledge factual information that contradicts their preexisting beliefs. In each study, we independently randomize whether participants receive information in a graphical format and whether they receive a self-affirmation treatment, a procedure that allows us to measure

the otherwise unobserved counterfactual of how people might react if they were buttressed against the potential identity threat posed by politically uncomfortable facts.

We find that delivering corrective information in graphical form successfully decreases reported misperceptions in all three studies. In Study 3, we additionally show that a graph reduces misperceptions more than equivalent text. We also find partial evidence that self-affirmation can reduce false responses to factual questions among respondents who might find an accurate answer to be threatening (e.g., supporters of withdrawal from Iraq asked about the success of the surge). These findings provide some indication that some misinformed individuals may already be at least tacitly aware of the correct information but uncomfortable acknowledging it. If so, misperceptions are not just an information problem; the threatening nature of certain facts may also inhibit people from acknowledging the true state of the evidence on controversial issues.

Theoretical approach

One of the simplest explanations for the prevalence of misperceptions is that factual information has not been encountered and encoded by members of the public. As Delli Carpini (2005) notes, "the average American is poorly informed but not uninformed." Similarly, previous work examining the link between factual beliefs and policy opinions (e.g., Bartels 1996, Althaus 1998, and Gilens 2001) has asked how preferences might change if people were more fully informed. Previous experiments have shown that accurate information can change people's policy preferences (Kuklinski et al. 2000, Gilens 2001, Howell and West 2009, Sides 2016), which suggests that the facts in question had not been sufficiently considered and that respondents' opinions may have been based on inaccurate information. These findings are consistent with an information deficits account, though they do not test for changes in factual beliefs.

One challenge for remedying information deficits is that even respondents who are exposed to facts may not successfully process them and/or update their beliefs due to limits on their attention, motivation, or capacity to understand complex political information (e.g., Zaller 1992, Lupia and McCubbins 1998). To test the effects of providing information on misperceptions, we therefore rely primarily on graphs, which we expect to reduce misinformation more effectively than text (we test this claim directly in Study 3). Graphs have several desirable properties. First, they convey a significant amount of information or data in a clear way that is less complex and difficult to interpret than most information provided to the public about politics. Second, graphs are especially helpful in conveying information about trends or changes in quantities over time (e.g., Meyer, Shamo, and Gopher 1999), which are frequently the subject of misperceptions (e.g., economic changes under a president). Third, graphs may reduce the salience of partisan or ideological cues that are often present in the "he said," "she said" style of mainstream news (Cunningham 2003).

Another factor that may contribute to the prevalence of misperceptions is the psychological mindset with which people consider the factual claims about controversial issues. People tend to evaluate information with a directional bias toward their existing beliefs, interpreting ambiguous or mixed information as consistent with those views and resisting or rejecting counter-attitudinal information (Lord, Ross, and Lepper 1979, Edwards and Smith 1996, Munro and Ditto 1997, Taber and Lodge 2006). This bias extends to factual beliefs – corrective information often fails to reduce misperceptions among resistant groups and sometimes strengthens them (Nyhan and Reifler 2010).

Why do individuals so often engage in motivated resistance to politically uncomfortable facts? Steele (1988) offers one potentially important psychological explanation for this phenomenon. According to his account, individuals are motivated to protect their general self-integrity from threat,

including unwelcome information that calls their beliefs and attitudes into question.[1] As such, they tend to reject such information or interpret it in a favorable manner. In this view, individuals who encounter threatening information are motivated to restore their feelings of self-worth; resolving dissonance is one way to accomplish this goal. Steele finds in experiments that individuals who affirmed personally important values and thereby felt secure in their self-worth did not engage in dissonance reduction, suggesting that their need to do so had been eliminated. Likewise, Cohen et al. (2000) find that self-affirmation reduces motivated reasoning about controversial political issues (see also Sherman, Nelson, and Steele 2000).

Self-affirmation is a novel approach in political science that allows us to test a potentially important explanation for the prevalence of motivated reasoning about politics, including misperceptions. Acknowledging the inaccuracy of misperceptions on controversial issues may be especially likely to stimulate self-integrity threat and spur motivated reasoning. Rejection of uncomfortable facts is a form of defensive processing that protects one's self-identity; when one's self-integrity is affirmed in some other domain, people may be less likely to respond defensively.[2]

If this account is correct, then motivated reasoning about facts may often be driven less by the dissonance between one's political views and the evidence in question than by the implications of that evidence for one's self-worth or integrity.[3] For instance, the persistence of the belief that President Obama was not born in the U.S. cannot at this point plausibly be attributed to a lack of

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[1] The concept of self-worth or self-integrity, which is central to self-affirmation theory, is theoretically and empirically distinct from self-esteem (see, e.g., Cohen et al. 2004). We focus instead on Steele's theory of the motive to protecting feelings of one's self-worth (1988).

[2] People's feelings of self-worth may be increased both by the affirmation itself and by the change it induces in the importance of the threatened aspect of the self (Critcher and Dunning 2015).

[3] Our psychological focus on the effects of self-affirmation complements Bullock et al. (2015) and Prior et al. (2015), who find that polarization in factual beliefs decreases when respondents are instead provided financial incentives for correct answers. (However, only one of four studies reported in the two articles finds greater belief accuracy as a result of incentives.)

information. It seems more likely that conceding the validity of Obama's account of his birth would require accepting the president's legitimacy, which would be threatening to so-called "birthers." We therefore hypothesize that it is threatening for people to concede the validity of potentially uncomfortable facts about controversial political issues, which hinders them from expressing belief in those facts even if they are at least tacitly aware of the validity of the claims in question. We test this prediction by comparing levels of misperceptions among untreated respondents who may be uncomfortable providing the correct answer with misperceptions among comparable respondents whose self-worth is affirmed. By buttressing respondents against the threatening implications of the question to their self-concept or worldview, they may be able to reflect more thoughtfully and provide more accurate answers *even in the absence of new information*.

Before proceeding, it is important to note that the effect of self-affirmation can be contingent on personal or situational relevance (Sherman and Cohen 2002, 2006; Cohen and Sherman 2014). If an issue is not personally relevant, disconfirming information may pose little threat to one's self-integrity. By contrast, challenging information about an important issue may be more threatening (Correll et al. 2004). We find evidence of such an effect in Study 2 below.

Expectations

We expect that presenting accurate information in graphical form will reduce misperceptions versus both a control condition (in each study below) and when directly compared to equivalent text (Study 3). To better identify contexts where the presentation of factual information can alter stated beliefs, our treatments are necessarily strong. To accomplish this, we test the effects of presenting graphical information about changes in quantities over time visually rather than in words. Our initial focus on visual presentation was motivated jointly by the limits of available survey time in Study 1 (a lengthy

textual treatment would not have been possible) and previous research finding limited or negative effects of textual corrections (e.g., Nyhan and Reifler 2010).

In addition, we expect that self-affirmation will reduce misperceptions among participants not assigned to receive corrective information who are motivated to hold incorrect beliefs on a given issue. Buttressing people's self-worth should lower the psychic cost of accepting uncomfortable facts. Finally, while our expectation is that self-affirmation should affect people's ability to recall and report uncomfortable facts in the absence of new information, self-affirmation could also change how respondents respond to graphical information (or vice versa). Previous studies suggest that self-affirmation should reduce biased processing of information, for instance, but they typically do not test a full factorial design in which self-affirmation is crossed with an information treatment. Consequently, we do not have strong priors on how our treatments will interact, especially for groups who are especially likely to be misinformed.[4]

We test these expectations in three studies of salient factual disputes about controversial political issues: the success of the troop surge in Iraq at reducing insurgent attacks (Study 1), the state of the economy under President Obama (Study 2), and evidence of climate change (Study 3).

Study 1: The troop surge in Iraq

After the 2006 elections, the Bush administration adopted a new Iraq war strategy known as "the surge" that included a substantial increase in U.S. troops and changes in counterinsurgency tactics. Civilian fatalities and insurgent attacks against coalition forces declined dramatically afterward (O'Hanlon and Campbell 2009). It is not clear how much the public knew about conditions in Iraq

[4] Self-affirmation could increase receptivity to counter-attitudinal messages, but graphical corrections may be sufficiently unambiguous that affirmation does not affect processing. Indeed, challenging people's beliefs directly could undo self-affirmation's effects.

after the surge began. Perceptions of the success of the surge and war effort more generally did improve somewhat by fall 2008 (the period when the study was conducted), but remained relatively low. For instance, according to ABC/*Washington Post* polls, perceptions the US was "making significant progress toward restoring civil order in Iraq" increased from 32% in May/June 2007 to 52% in September 2008. However, these totals mask wide variance by party. In February 2008, Gallup found that 70% of Republicans thought the surge was making the situation in Iraq better, but only 21% of Democrats agreed. Meanwhile, 31% of Democrats said the surge was making the situation *worse*. These differences could be the result of respondents applying differing standards to available evidence (Gaines et al. 2007), but given the pervasiveness of motivated reasoning, it seems likely that many partisans were selectively interpreting the evidence.

Study 1: Design, measures, and sample

Why were some respondents misinformed about improvements in the situation in Iraq after the surge? To find out, we exposed respondents to a self-affirmation treatment that bolsters their perceptions of self-worth and thereby reduces the potentially threatening nature of uncomfortable facts. We also tested the effect of providing unambiguous information about the change in attacks after the surge. We expected this treatment would increase the accuracy of the public's beliefs.

Study 1 was a 2x2 between-subjects survey experiment. One manipulation randomly assigned respondents to an affirmation condition in which they were asked to recall an experience in which they felt good about themselves (*Affirmation*) or a control condition. The other manipulation assigned respondents to view a graph showing the decline in insurgent attacks in Iraq after the troop surge began (*Graph*) or to a control condition with no additional information. As noted above, this design differs from psychology studies of self-affirmation and motivated reasoning, which typically

exposes all subjects to a given piece of information. In this study, however, we vary both *Graph* and *Affirmation*, allowing us to estimate their independent and joint effects.

Our affirmation manipulation (adapted from Cohen et al. 2000) asked respondents in the treatment group to select the value that is most important to them from a list and then to write about a time in which it was "especially important to you and made you feel good about yourself."[5] In the control condition, respondents instead reported what they had to eat or drink in the previous 48 hours. Our second experimental treatment is a graph showing the decline in attacks against U.S. and coalition forces in Iraq.[6] The control group was given a summary of the surge but no information about its effects. (Stimulus materials are in the Online Appendix.)

Our outcome of interest is factual beliefs about changes in attacks after the surge. After the manipulations, respondents were asked how the number of attacks changed on a five-point scale from "decreased substantially" to "increased substantially" (see Online Appendix for wording). As in each of our studies, responses were coded so that lower values indicate more accurate beliefs (attacks decreased) and higher values indicate greater misperceptions (attacks increased).

Study 1 was part of a pre-election module on the 2008 Cooperative Congressional Election Survey, a multi-investigator project administered by YouGov/Polimetrix in October 2008. The dataset consists of an Internet sample of 1,000 people constructed from more than 50,000 opt-in respondents to approximate a random probability sample (Rivers N.d.). The sample closely resembles those obtained using traditional methods (see appendix for demographics).

Study 1: Results

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[5] Writing about important values is common in self-affirmation studies (McQueen and Klein 2006).
[6] The outcome measures in our studies are designed to test how well respondents understood information in the graphs. No additional measures are available of how they were interpreted.

Rather than estimate a complicated set of interactions that are difficult to interpret, Table 1 presents separate models within three subgroups: respondents who said they oppose withdrawing from Iraq in a pre-treatment question (analyzed in column 1), those who were not sure (column 2), and those who support withdrawal (column 3), which simplifies the presentation of our results. While previous research has found that the effectiveness of corrections may vary depending on respondent ideology, partisanship, or issue attitudes (e.g., Nyhan and Reifler 2010), our primary focus here is not to test whether the effect of the graphical correction or self-affirmation treatments vary across attitudinal subgroups, but instead to examine whether our treatments significantly affect beliefs among these groups, especially those for whom corrective information would be counter-attitudinal (i.e., those who support withdrawal). Nonetheless, interactive models are provided in the Online Appendix for each study and we are careful to clarify below when differences in subgroup effects are not statistically significant (Gelman and Stern 2006).

Each model is estimated as an ordered probit given the ordered nature of our dependent variable. We also use survey weights to maximize the representativeness of the estimates.[7] Finally, we include indicators for black respondents, women, college graduates, Republicans (with leaners), independents, and those who view the war as "extremely important" to increase the precision of our estimates. However, the key results in each study are substantively identical when models are estimated without weights or controls or with outcome scales of increased, stayed the same, or decreased (available upon request).

[7] We find no evidence of significant imbalance on covariates in balance tests conducted on the weighted data (results available upon request).

Table 1: Misperceptions about post-surge change in insurgent attacks in Iraq

	Oppose withdrawal	Not sure	Support withdrawal
Affirmation	-0.31	-0.17	-0.41*
	(0.25)	(0.34)	(0.17)
Graph	-0.41	-0.67*	-0.63**
	(0.28)	(0.32)	(0.16)
Affirmation x graph	0.45	0.25	0.57*
	(0.40)	(0.53)	(0.28)
Black	0.66	-0.32	0.17
	(0.52)	(0.48)	(0.28)
Female	0.47*	0.46	0.22
	(0.20)	(0.33)	(0.15)
College graduate	-0.44	-0.49	-0.41**
	(0.24)	(0.41)	(0.13)
GOP (with leaners)	-0.62*	0.19	-0.11
	(0.24)	(0.29)	(0.27)
Independent	-0.18	0.31	0.47*
	(0.34)	(0.35)	(0.21)
Iraq extremely important	-0.15	-0.19	-0.24
	(0.23)	(0.34)	(0.15)
(Cutpoint 1)	0.26	-0.29	-0.85
	(0.31)	(0.38)	(0.19)
(Cutpoint 2)	0.84	0.31	-0.08
	(0.29)	(0.39)	(0.18)
(Cutpoint 3)	1.06	0.97	0.40
	(0.31)	(0.39)	(0.18)
(Cutpoint 4)	1.41	1.60	0.88
	(0.27)	(0.41)	(0.18)
N	399	121	467

* $p < .05$, ** $p < .01$. Ordered probit models estimated using survey weights.

Inspection of Table 1 reveals an encouraging result – the coefficient for *Graph*, which represents its marginal effect among respondents who did not receive *Affirmation*, indicates that graphical information alone reduces misperceptions about the change in insurgent attacks (as indicated by the negative coefficients). The effect is significant for withdrawal supporters, who are

most likely to reject positive news ($p < .01$), as well as those who are not sure about withdrawal ($p < .05$). The effect of *Graph* for withdrawal opponents is also negative but not significant ($p < .15$).[8]

Our results for the affirmation treatment are also intriguing. The coefficient for *Affirmation*, which represents its marginal effect among respondents who did not receive *Graph*, indicates that being affirmed decreases misperceptions among those who support withdrawing from Iraq ($p < .05$) – the subgroup that would otherwise experience the greatest discomfort from answering the question correctly (though we cannot directly reject the null of no difference in effects between withdrawal supporters and other groups).[9]

However, there is an offsetting interaction between *Affirmation* and *Graph* ($p < .05$), which suggests that the marginal effect of *Affirmation* varies depending on whether respondents received the *Graph* or not. The marginal effect of *Affirmation* – which was negative and significant among withdrawal supporters who did not receive any other information – is not significant for withdrawal supporters who also received *Graph* (this finding is discussed further below).[10] No other subgroup is significantly affected, though we cannot reject the null of no difference between groups.[11]

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[8] This finding is likely the result of a floor effect. We also cannot directly reject the null of no difference in *Graph* effects between withdrawal opponents and other groups (see Online Appendix).

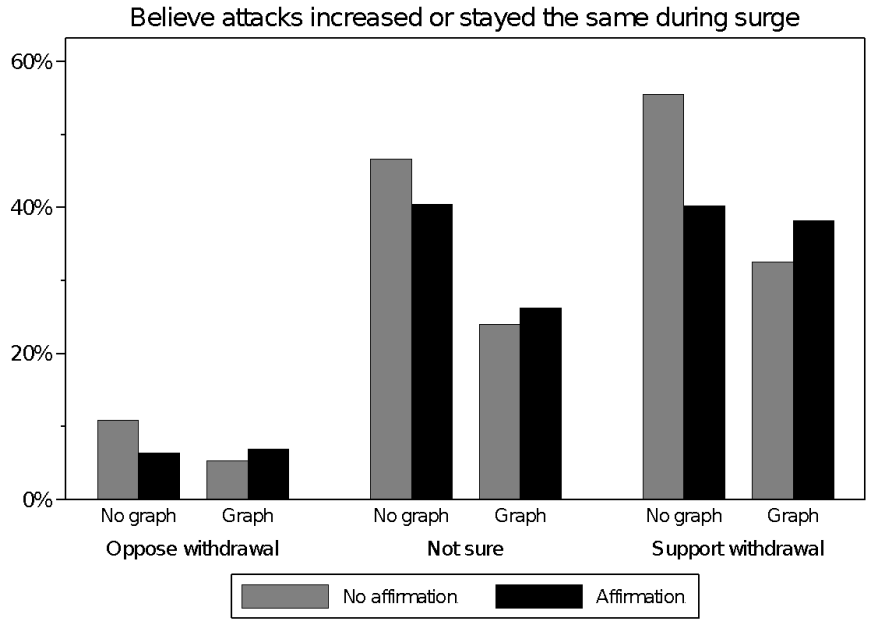
[9] Correll et al. (2004) suggests the effects of self-affirmation may be largest for personally important issues. In this case, we find issue importance does not moderate the effect of *Affirmation* (results available upon request), which may be the result of focusing on the highly salient issue of Iraq.

[10] The *Affirmation* x *Graph* interaction can be interpreted as either how the marginal effect of *Affirmation* varies by *Graph* or the converse. We focus on the former in the text but provide marginal effects for *Graph* among affirmed respondents in key subgroups in footnotes. In this case, the marginal effect was not significant among withdrawal supporters who received *Affirmation*.

[11] One concern in self-affirmation studies is that the results could be driven by an improvement in mood. Only a few studies have found support for this claim (McQueen and Klein 2006: 299). Likewise, we find no evidence *Affirmation* improved mood in any study (available upon request).

These results are best understood using predicted probabilities, which we calculate for respondents' beliefs that insurgent attacks increased or stayed the same after the surge rather than decreased. Figure 1 presents a bar graph disaggregating respondents by position and condition.[12]

Figure 1



Predicted probabilities from the ordered probit models in Table 1 estimated using survey weights.

As expected, only a few withdrawal opponents say insurgent attacks increased or stayed the same; treatment effects in this subgroup were small. By contrast, the effect of *Graph* is dramatic among those respondents who are not sure about withdrawal from Iraq. The results are most striking, however, for withdrawal supporters. We see a large effect of *Affirmation* among those who did not receive *Graph* – the predicted probability of believing attacks increased or stayed the same during the surge drops from 56% to 40%. This decline of 16 percentage points is approximately two-thirds of the reduction in misperceptions observed among withdrawal supporters who received *Graph* but not

[12] The predicted values we present average over the other covariates in the sample.

Affirmation (33% of this group believed attacks increased or stayed the same versus 56% of controls). However, *Affirmation* has no significant effect on misperceptions among withdrawal supporters who received *Graph* (38% said attacks increased or stayed the same among those who received both *Affirmation* and *Graph* versus 33% of those respondents who received only *Graph*).[13]

Study 1: Discussion

These results help us understand the prevalence of false beliefs about the surge in Iraq. *Graph* reduced misperceptions for unaffirmed respondents regardless of their position on the war, suggesting that many people were uninformed about its success. Others, however, may have found it threatening to concede this point. In this way, *Affirmation* may have helped reduced misperceptions, including among respondents who would otherwise be *least* likely to accept the facts (withdrawal supporters). However, the effects of *Affirmation* are limited. We cannot reject the null hypothesis of no difference in effects between withdrawal supporters and opponents. We also observe no additional marginal effect among respondents who also received *Graph*. When the correction is obvious and salient as with *Graph*, it is difficult to counter-argue, which seems to reduce misperceptions even among unaffirmed participants and thereby limit the effects of *Affirmation*.

Nevertheless, Study 1 has limitations. The group motivated to hold a misperception was largely Democrats (70% including leaners). However, Nyhan and Reifler (2010) found the most intense reaction to corrective information among conservatives. It would be desirable to establish that the beneficial effects of *Affirmation* and *Graph* hold for a conservative or Republican misperception. Between designing and fielding the study, an elite consensus emerged that the counterinsurgency strategy was a success. As a result, leading Democrats had largely stopped

[13] As noted above, however, we again cannot reject the null hypothesis of no difference in self-affirmation effects between withdrawal supporters and opponents (see Online Appendix).

debating the wisdom of the surge, which may have reduced counter-arguing among war opponents. Also, the economic crisis had supplanted foreign affairs as the dominant campaign issue at the time of the study (October 2008), which may have reduced the incentive for motivated reasoning.

Finally, it is worth noting that the results we present here are conservative estimates of the effects of our experimental treatments. Subjects may have failed to closely examine *Graph*, reducing its effects. Similarly, some subjects did not write the *Affirmation* essay as directed (21% wrote nothing, 43% wrote less than 80 characters), though presumably most at least briefly considered the prompt. In this sense, our estimates are intent to treat effects rather than average treatment effects on the treated.[14] As a result of this noncompliance, the effect sizes we report are necessarily smaller in magnitude than what we would observe if compliance were perfect.

Study 2: Job change under President Obama

To address the concerns described above, we designed a second experiment that focused on beliefs about the state of the economy during a period of intense partisan debate over the merits of President Obama's economic policies. In addition, the change in party control of the presidency in 2009 allows us to reverse the partisan dynamic from Study 1.

We selected this issue because the economy was most salient issue in national politics at the time. During the period in which Study 2 was conducted (February 2011), the economy dominated polls as the most important problem facing the country. We specifically focused on beliefs about job growth (or losses) since these measures, which are reported monthly, are an easily understood indicator of the direction of the economy. We expected to see widespread divergence in beliefs

[14] This logic also applies to Studies 2 and 3. All models we report are conservative estimates of intent to treat effects, not estimates of the average treatment effect on the treated (ATT).

about changes in the number of jobs under Obama since the state of the economy is a factual issue that lends itself to biased processing, especially during recoveries (Bartels 2002, Stanig 2013).

In this case, we expect factual beliefs to diverge based on respondents' prior attitudes about Obama's economic policies. Those who approve of his job performance on economic matters should be more likely to say that jobs are increasing, whereas those who do not approve of Obama should be less likely to agree. This expectation of divergence in factual perceptions of the economy is supported by a November 2010 WorldPublicOpinion.org poll which found 72% of Republicans believed that the economy is getting worse compared with only 36% of Democrats. Similarly, a recent survey experiment found large differences in perceptions of changes in the state of the economy depending on whether President Obama's name was mentioned (Edwards-Levy 2016).

Study 2: Design, measures, and sample

Our 2x2 design closely mirrors Study 1. Respondents are randomly assigned to a self-affirmation condition (*Affirmation)* or to a control condition and separately randomly assigned to receive a graph of job growth (*Graph*) or to a control condition. The self-affirmation treatment and the corresponding control condition in this study are virtually identical to Study 1 except for the inclusion of several more choices of values in the self-affirmation exercise. The graph treatment necessarily differs from Study 1, however. In this case, we showed participants a graph showing how payroll jobs increased from 129.3 million in January 2010 to 130.3 million in January 2011.

To measure perceptions of recent job change, we used a measure adapted from American National Election Study (ANES) questions on economic trends (Bartels 2002) asking if the number of people with jobs in the country has gone up, stayed about the same, or gone down since January 2010. Using branching followups, we constructed a five-point Likert scale ranging from "Gone

down a lot" to "Gone down a lot." As in each study, responses were coded so that higher values represent greater misperceptions (i.e., greater belief that jobs had gone down).[15] We also captured response time information for answers to the outcome question above (measured in seconds).[16]

This study was conducted using Qualtrics with participants from Mechanical Turk, which is increasingly used in experimental research and has been validated by scholars across the social sciences (e.g., Berinsky, Huber, and Lenz 2012). (See appendix for the demographics of the sample.)

Study 2: Results

We again disaggregate our sample based on their policy views and present interactive models in the Online Appendix. In this case, we measure attitudes using a pre-treatment question about approval of President Obama's job performance on the economy and split the sample into those who approve, disapprove, and those who neither approve nor disapprove. The results of that analysis did not reveal the expected effect for self-affirmation among respondents who disapproved of Obama's handling of the economy (available upon request). As an exploratory step, we therefore also disaggregated the data by whether respondents selected job creation and economic growth as the most important issue facing the country or not (47% did so) following Correll et al. (2004), who find self-affirmation effects were concentrated among those for whom the issue is most important.

We found that this measure moderates the effects of *Affirmation* among disapprovers (see Online Appendix). Table 2 therefore presents results from ordered probit models of beliefs about

[15] We believe this increase in jobs can appropriately be described as an increase (see, e.g., Eddlemon 2011). The appropriate branching answer is more subjective (unlike Studies 1 and 3, where the expert consensus is stronger). To address this concern, we therefore note that these results are robust to using a three-point outcome variable of "gone up," "stayed about the same," or "gone down" (available upon request) and that Figure 2 presents the predicted probability of respondents saying the number of jobs went down or stayed the same.

[16] Equivalent response time information is not available from Study 1 or Study 3.

job change within subgroups defined by respondents' approval of Obama on the economy and whether they said it was the most important issue.[17] We find that *Graph* has a strong corrective effect for each subgroup among respondents who did not receive *Affirmation* ($p < .01$).[18] In contrast, *Affirmation* significantly reduces misperceptions among people who did not receive *Graph* only when their prior attitude is in conflict with the factual outcome in question – those who disapprove of Obama on the economy and view the economy as the most important issue ($p < .05$). However, this effect is again offset by a marginally significant interaction term in the opposite direction ($p < .10$). As a result, *Affirmation* has no significant marginal effect for those who receive *Graph*.[19]

[17] In these models and those reported in Study 3 below, we include heteroskedasticity-robust standard errors, which could not be used in Study 1 due to the survey weights from CCES.
[18] The marginal effect of *Graph* remains negative and statistically significant ($p < .05$) among respondents who received *Affirmation* across each model.
[19] These differences are statistically significant (see Online Appendix).

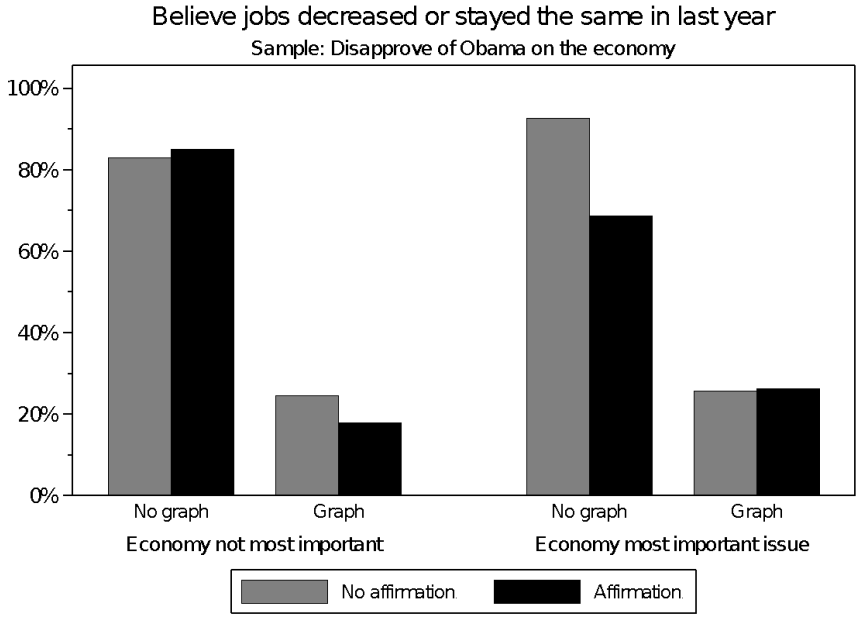
Table 2: Misperceptions about job change under Obama (Jan. 2010-Jan. 2011)

	Approve		Neither		Disapprove	
	Not MIP	MIP	Not MIP	MIP	Not MIP	MIP
Affirmation	-0.39	0.51	0.41	0.61	0.09	-1.04*
	(0.35)	(0.49)	(0.46)	(0.34)	(0.27)	(0.42)
Graph	-1.71**	-1.52**	-0.83*	-1.85**	-1.69**	-2.27**
	(0.43)	(0.38)	(0.36)	(0.38)	(0.31)	(0.51)
Affirmation x graph	0.94	-0.07	-0.61	-1.29*	-0.34	1.06
	(0.51)	(0.58)	(0.72)	(0.57)	(0.42)	(0.58)
Black	0.48	0.24	0.92	-0.46	2.90**	-0.14
	(0.35)	(0.38)	(0.69)	(0.81)	(1.09)	(0.65)
Female	0.24	0.33	0.52	-0.14	0.02	0.39
	(0.29)	(0.30)	(0.30)	(0.25)	(0.21)	(0.26)
College graduate	-0.62	-0.17	0.63*	-0.51*	-0.16	-0.63*
	(0.33)	(0.30)	(0.31)	(0.26)	(0.21)	(0.26)
GOP (with leaners)			0.25	-0.17	0.26	-0.57*
			(0.36)	(0.28)	(0.36)	(0.26)
Independent	0.97	0.91	0.47	0.43	0.42	-0.43
	(0.65)	(0.47)	(0.40)	(0.32)	(0.41)	(0.61)
(Cutpoint 1)	-0.59	-2.38	-3.08	-0.89	-1.27	0.14
	(0.45)	(0.46)	(0.46)	(0.39)	(0.42)	(0.39)
(Cutpoint 2)	0.39	-1.29	-1.94	-0.32	-0.63	1.00
	(0.46)	(0.36)	(0.41)	(0.35)	(0.43)	(0.42)
(Cutpoint 3)	2.21	-0.47	-0.82	0.83	0.77	2.12
	(0.51)	(0.38)	(0.41)	(0.34)	(0.40)	(0.49)
(Cutpoint 4)		1.49	0.89	3.41	2.74	3.72
		(0.44)	(0.43)	(0.52)	(0.44)	(0.58)
Log-likelihood	-66.80	-72.80	-65.51	-88.26	-120.74	-82.02
N	66	72	59	90	113	71

* $p < .05$, ** $p < .01$. Ordered probit models with robust standard errors in parentheses.

To illustrate the results above, we calculate predicted probabilities that respondents will incorrectly state the number of jobs decreased or stayed the same for the four experimental conditions averaging over the other covariates. To simplify presentation, we focus on those who disapprove of Obama on the economy – the group of greatest theoretical and substantive interest.

Figure 2



Predicted probabilities from the ordered probit models in Table 2.

As Figure 2 shows, *Affirmation* substantially reduced misperceptions among Obama disapprovers for whom the economy is most important. Among respondents who did not receive *Graph*, the predicted likelihood of saying jobs went down or stayed the same since January 2010 declines from 93% among those who were not affirmed to 69% among those who were. The effect of *Affirmation* among those who instead received *Graph* was negligible. By this measure, *Affirmation* closes approximately one-third of the gap in misperceptions between the no-affirmation, no-graph baseline and those respondents who received *Graph*.

We have suggested that *Affirmation* works by reducing the identity threat posed by attitude-inconsistent facts by buttressing people's self-worth, allowing them to more thoughtfully or carefully consider the evidence. The availability of response time data for the dependent variable in this study allows us to provide evidence to support this mechanism. The results above indicate the *Affirmation* reduced misperceptions among respondents who disapproved of Obama on the economy and saw it

as the most important issue facing the country, but not those who thought another issue was more important. The response time data is consistent with this finding. Members of the disapproving/most important subgroup who were affirmed spent 5.1 additional seconds on their response ($t = 2.01$, $p<.06$) – an increase of more than one standard deviation. No equivalent effect was seen for those who disapproved on the economy but saw another issue as more important.

Study 2: Discussion

These results support the findings of Study 1, which suggest that people face significant information deficits that can be reduced by graphical corrective information. Our results also address a key limitation of the previous study – at the time of the experiment, the economy was the dominant political issue and the subject of extensive elite conflict. Additionally, this decrease in misperceptions is found even among those respondents who disapprove of Obama on economic matters, which is encouraging given past research showing resistance to counter-attitudinal information.

We also find results similar to Study 1 for the effect of *Affirmation* alone, which suggests that misperceptions are fueled in part by the threatening nature of accurate information. *Affirmation* again reduces misperceptions among those who are most likely to be threatened by the correct answer. In this case, however, its effects are limited to those who say the economy is the most important issue – an effect that is consistent with theory and previous research. We also show that *Affirmation* caused respondents to take longer to answer, suggesting they considered it more thoughtfully.

Study 3: Global temperature change

We conducted one additional experiment to address several remaining questions. Studies 1 and 2 found that graphical information significantly reduced misperceptions relative to a control condition,

but do not directly compare the effects of alternate modes in presenting the same information.[20] In this study, we test the effects of graphical and textual presentations of temperature data on beliefs about climate change and global warming – another issue with high levels of partisan polarization (McCright and Dunlap 2011) and strong evidence of motivated reasoning (Hart and Nisbet 2012).

This approach also allows us to address several possible concerns about our previous studies. First, both studies asked about factual beliefs on questions where the accurate answer could be seen as good news, which might be affectively congruent with self-affirmation or facilitate acceptance of corrective information. The study below tests whether these effects hold when increased accuracy instead requires greater acceptance of bad news (increased global temperatures). In addition, the effectiveness of the graphical corrections in Studies 1 and 2 might have been the result of respondents' willingness to accept information from the government. In this study, the information source is identical in the correction conditions, allowing us to hold source fixed when comparing graphical and textual treatments.

Study 3: Design, measures, and sample

Our approach closely mirrors Studies 1 and 2 but adds a textual information condition. We use a 2x3 design in which participants are independently randomly assigned to either a self-affirmation condition (*Affirmation*) or a non-affirmation control in one manipulation and assigned to a graphical information condition (a graph of change in global average temperature – *Graph*), a textual information condition (a paragraph describing the temperature change – *Text*), or a control

[20] Previously, we relied on a comparison between the effectiveness of graphical corrections in Studies 1 and 2 and results reported in previous studies using textual corrections. This study directly tests graphs versus textual information with the same sample, issue, outcome question, etc.

condition (neither graph nor text). Our design therefore directly tests the hypothesis that graphs reduce misperceptions more effectively than equivalent text.

The self-affirmation treatment and the corresponding control condition in this study are identical to the one used in Study 2. Our graph treatment is adapted from a line graph in a NASA press release (http://www.giss.nasa.gov/research/news/20110113) showing the difference in average global temperature relative to a baseline period from 1940 to 2010 from four climate data sources. The textual treatment describing the data was adapted from language in the release.

In this study, we measure respondents' perceptions of global temperature change as well as their more general beliefs about global warming, a more politically salient topic where people might be more prone to motivated reasoning. The first outcome measure, *Temperature change*, is similar to the measure used in Study 2. It asks if average global surface temperatures have gone up, stayed about the same, or gone down in the last thirty years. Using branching follow-ups, we construct a five-point Likert scale ranging from "Gone down a lot" to "Gone up a lot" where higher values indicate greater misperceptions (temperatures decreased significantly). Our second dependent variable, *Global warming*, comes from a CNN survey question that asks respondents whether they believe global warming is a theory that has not yet been proven, a proven fact caused mostly by natural changes that have nothing to do with emissions from cars and industrial facilities, or a proven fact mostly caused by emissions from cars and industrial facilities. We ask this question before and after the experimental manipulations (the pre-treatment question is a control variable in analyses below). Both variables are coded so that higher values represent more misinformed views.

We consider both dependent variables to be measures of misperceptions. The first, *Temperature change*, measures whether respondents accurately perceive the observed pattern of changes in average global surface temperatures. Likewise, while *Global warming* is worded more

broadly, the belief that global warming is either unproven or caused by natural factors is contradicted by an overwhelming scientific consensus and is thus defined as a misperception under our framework as well (e.g., Anderegg et al. 2010). However, because the stimuli in *Graph* and *Text* only concern temperature change, we define the relevant misperception for *Global warming* in the predicted effects plot below as believing it is "a theory that has not yet been proven" (which sets aside respondent beliefs about the role of humans in causing climate change).

The study was conducted in July-August 2011 using an online convenience sample from Qualtrics.com's respondent panel. We limited this sample to respondents who previously self-identified as Republicans, the group that is most likely to hold inaccurate beliefs about global warming (McCright and Dunlap 2011). We also excluded respondents who failed to pass a pre-treatment attention filter designed to make sure that subjects were carefully reading survey questions (see the appendix for discussion of sample demographics).

Study 3: Results

As before, we examine results within different subgroups, which in this case are groups within our sample of self-identified Republicans, and present interactive models in the Online Appendix. One important contextual difference from previous studies is that Studies 1 and 2 focused on so-called "easy" issues (Carmines and Stimson 1980) that can be understood at a gut level with limited additional contextual information (the war in Iraq and the US economy). As such, we split respondents in those studies by their position on the relevant issue or performance measure – withdrawal from Iraq and approval of President Obama's performance on the economy, respectively. In the case of climate change, however, we find no evidence that the effects of self-affirmation vary by a pre-treatment measure of preferences toward regulation of greenhouse gas

emissions (results available upon request).[21] In this case, however, the issue is "hard" in that the issue involves contextual nuance, technical knowledge, and subtle differences among the possible complex policy responses. Because of clear cues from party elites on the issue of global warming, we therefore instead tested whether strong Republicans are more likely to be threatened by information showing rising global temperatures – a fact that contradicts claims from many party elites questioning whether climate change is real (e.g., Samuelson 2010). In this analysis, we therefore instead split the sample based on how strongly the respondents identify with the GOP. The set of control variables is nearly identical to Study 1.[22]

Table 3 presents results of our ordered probit models of *Temperature change* and *Global warming*. As above, we estimate separate models to facilitate interpretation. In this case, we split the sample by identification as strong Republicans (all are GOP identifiers). *Graph* alone is effective – it reduces misperceptions about temperature change for both groups ($p < .01$; columns 1 and 2) and also makes Republicans who don't identify strongly with their party more likely to acknowledge global warming as real and man-made ($p < .01$; column 3), though beliefs about global warming among strong Republicans are unaffected (column 4).[23] By comparison, *Text* does not significantly change respondents' beliefs about global temperature change or global warming. When we directly compare marginal effects, we find that *Graph* alone is more effective at reducing misperceptions about temperature change than *Text* alone for both groups of Republicans ($p < .01$) but we observe no measurable difference in effects on more general beliefs about global warming for either group.[24]

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[21]The fact that the policy preferences on the issue do not moderate the effects of our text information treatment could also reflect the fact that this sample consists only of Republicans (unlike previous studies).
[22] We exclude an indicator for black respondents (only two are in the sample).
[23] However, we cannot reject the null of no difference in effects versus non-strong identifiers either.
[24] These results do not appear to be driven by differences in how respondents processed *Text* or *Graph* – a post-treatment check of recall of a primary data source (NASA) found few significant differences between treatments and no difference in reading time (results available upon request).

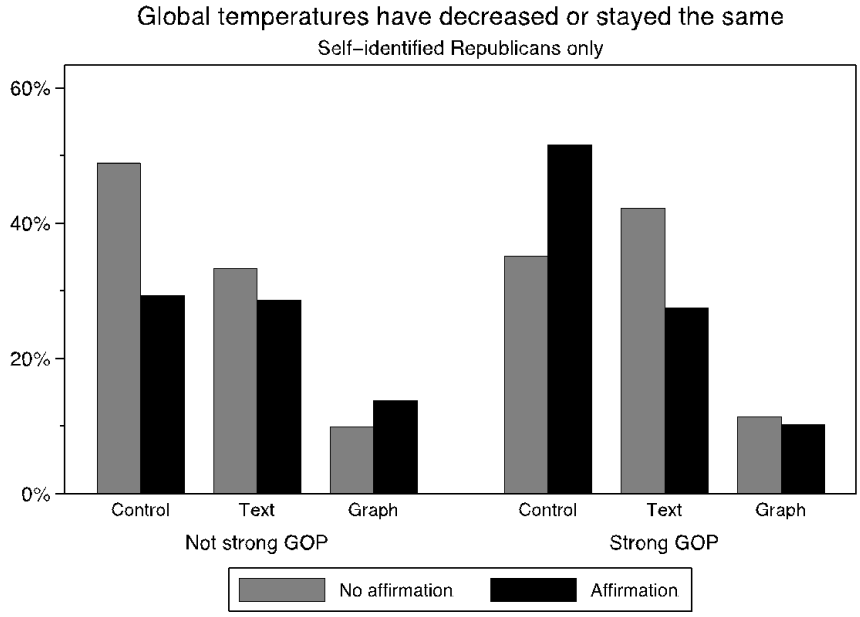
Table 3: Misperceptions about temperature change and its causes

	Temperature change		Global warming/causes	
	Not strong GOP	Strong GOP	Not strong GOP	Strong GOP
Affirmation	-0.52	0.44	-0.52	0.29
	(0.30)	(0.31)	(0.29)	(0.30)
Graph	-1.27**	-0.85**	-0.62*	-0.07
	(0.30)	(0.32)	(0.27)	(0.29)
Text	-0.41	0.19	-0.41	0.20
	(0.24)	(0.29)	(0.27)	(0.33)
Affirmation x graph	0.72	-0.51	0.85*	-0.68
	(0.42)	(0.44)	(0.41)	(0.42)
Affirmation x text	0.39	-0.86*	0.45	-0.59
	(0.39)	(0.41)	(0.45)	(0.45)
Female	-0.05	-0.47**	-0.05	0.08
	(0.16)	(0.16)	(0.18)	(0.18)
College graduate	-0.21	0.24	-0.04	0.04
	(0.16)	(0.17)	(0.19)	(0.19)
Extremely imp. issue	-0.27	-0.52	-0.44	-0.78*
	(0.45)	(0.40)	(0.34)	(0.33)
(Cutpoint 1)	-1.66	-1.33	-0.90	-0.83
	(0.26)	(0.29)	(0.22)	(0.26)
(Cutpoint 2)	-0.10	0.21	-0.46	-0.01
	(0.23)	(0.28)	(0.22)	(0.26)
(Cutpoint 3)	1.56	1.71		
	(0.26)	(0.31)		
	-185.80	-175.61	-182.83	-173.13
N	184	173	185	173

* $p < .05$, ** $p < .01$. Ordered probit models with robust standard errors in parentheses. See appendix for details on question wording and the coding of the dependent variables.

In addition, *Affirmation* somewhat reduces misperceptions for both groups of Republicans, but in different ways. Contrary to expectations, *Affirmation* somewhat decreases the likelihood that non-strong Republicans who did not receive *Graph* or *Text* will reject the scientific consensus on *Global warming* (p<.10), but as in Study 1, the *Affirmation x graph* interaction is in the opposite direction and marginally significant for non-strong Republicans (p<.06). By contrast, while the effect of *Affirmation*

Figure 3



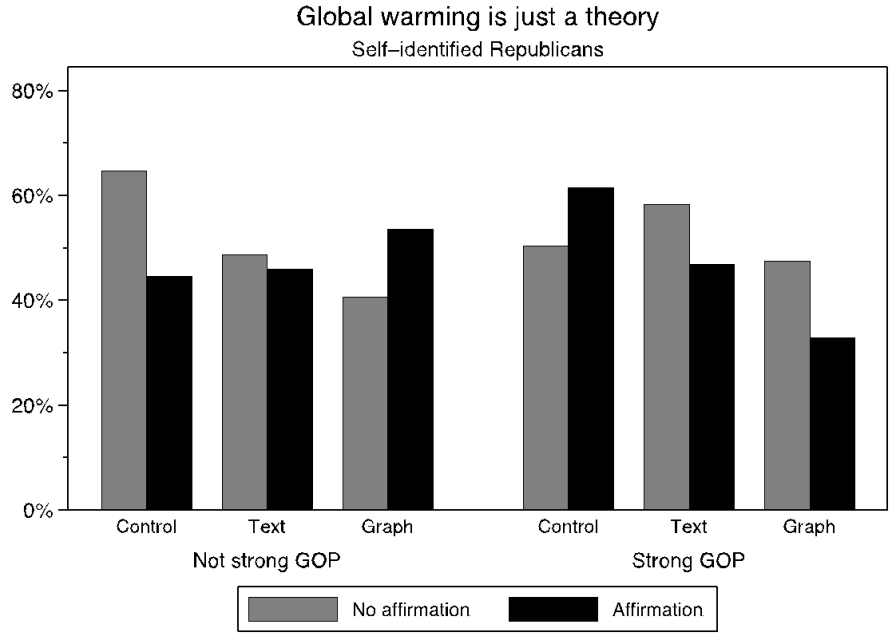
Predicted probabilities from the ordered probit models in Table 3.

alone is not significant for strong Republicans, it has a suggestive effect when combined with *Graph*. The effect of *Graph* on global warming beliefs is significant when respondents are affirmed ($p<.01$) but not otherwise ($p<.84$), a difference that is nearly statistically significant ($p<.11$).[25]

Figure 3 presents predicted probabilities that respondents will say temperatures have decreased or stayed the same (averaging over other covariates). Misperceptions are lower with *Graph* than with either *Text* or a control for both strong Republicans (35% for controls, 12% in *Graph*) and other Republicans (49% for controls, 10% in *Graph*). We also observe a decrease in misperceptions for affirmation among Republicans who don't identify strongly with their party (49% to 29%).

[25] The marginal effect of *Graph* is negative and significant among affirmed respondents for both groups on *Temperature change* and for strong Republicans on *Global warming*. The marginal effect of *Text* on *Temperature change* is only negative and significant for affirmed strong Republicans.

Figure 4



Predicted probabilities from the ordered probit models in Table 3.

Since our stimuli only directly address temperature change (and not the role of humans), we calculate predicted probability of belief that "Global warming is just a theory" in Figure 4. Among those who are not strong Republicans, the predicted probability of this belief declines from 65% among controls to 45% among those who were affirmed and 41% among those who received *Graph*.

In addition, for strong Republicans, agreement declines from 50% among unaffirmed controls and 48% with *Graph* alone to 33% among those who received *Graph* and were affirmed.

Study 3: Discussion

The results of Study 3 are consistent with the findings of Studies 1 and 2 in suggesting that some people suffer from information deficits but that others may also be threatened by accurate information. When we directly compare the effectiveness of *Graph* and *Text* at reducing information

deficits, we find that a graphical correction decreases misperceptions about temperature change more than an equivalent text correction, which is consistent with the observed contrast between Studies 1 and 2 (in which *Graph* was effective at reducing misperceptions) and previous studies that found corrective text about controversial issues to often be ineffective (e.g., Nyhan and Reifler 2010). We also some additional suggestive evidence that *Affirmation* can help reduce misperceptions among Republicans who do not identify strongly with their party (on global temperature change). Unlike in Studies 1 and 2, however, *Affirmation* also seems to improve respondents' receptivity to corrective information among strong Republicans; the marginal effect of the *Graph* treatment significantly reduces misperceptions only among those respondents who were affirmed.

Our interpretation of these results is that *Affirmation* can make it easier to cope with dissonant information that one has already encountered about controversial misperceptions, relaxing people's need to reject facts that could otherwise be threatening. We also find some evidence that *Affirmation* increases receptivity to new information (*Graph*) that might otherwise be resisted.

Conclusion

Why are political misperceptions – which can distort individual policy preferences and undermine the factual basis of democratic debate – so prevalent? We evaluate two factors that may contribute to the persistence of false and unsupported political beliefs. One explanation is that many people may not have been exposed to accurate information in a convincing format. In addition, however, the threatening nature of corrections itself may also cause people to reject counter-attitudinal information. Results from three experiments provide significant support for the first hypothesis and partial support for the second. We show that providing participants with graphical information

significantly decreases false and unsupported factual beliefs, but that affirming respondents' self-worth can in some cases reduce misperceptions for those who are most likely to be misinformed.

These results have important implications for research in political behavior and psychology. First, these findings suggest that misperceptions are not simply the result of information deficits. The provision of correct information did not eliminate false or unsupported beliefs; non-trivial proportions of respondents continued to hold false beliefs after receiving our graphs. This finding suggests that psychological factors also appear to play an important role in misperceptions.

However, these results also suggest that the information deficits we observe can be reduced. In particular, delivering factual information in graphical form appears to be more effective than text at reducing misperceptions. This finding suggests that the format in which information is presented matters; equivalent corrections—like the graph and text treatments in Study 3—may produce different levels of change in factual beliefs. While not every misperception can be represented graphically, journalists and others should consider using graphs when conveying information about changes or trends. Future research should investigate how consistent this finding is across different types of graphs, issues, and populations and in contexts that could stimulate motivated reasoning such as news reports featuring partisan cues and references to controversial figures.

Third, our results suggest that some people may already implicitly know the facts or are capable of making more accurate inferences if they are buttressed against identity threats. We found partial evidence that self-affirmation reduced misperceptions among motivated subgroups even when presented without corrective information. However, little evidence is observed that self-affirmation makes people more open-minded when they receive corrective information. It may the

case our graph treatments were simply strong enough to overcome motivated reasoning.[26] Further research is needed on the relationship between identity threat and motivated reasoning in politics.

Of course, all research projects have their limitations, and ours is no different. As with any study of misperceptions, we are constrained by the set of false or unsupported beliefs that were salient at the time of our research and the set of studies we conducted. While we are confident our conclusions generalize, some aspects of the misperceptions, stimuli used, or time period could be idiosyncratic. Second, it would be desirable to conduct additional studies on nationally representative samples. Third, while we find that graphs substantially reduce misperceptions, our studies were not designed to examine *why* they are so effective. Are all graphs effective, or only those that examine changes in quantities across time? More fundamentally, future research is needed to investigate whether the processing of graphical and textual corrections differs in terms of cognitive effort, directional motivations, etc. Fourth, we analyzed directional reasoning in subgroups we expected to be motivated to hold a particular belief, but scholars might instead manipulate respondent motivations directly. Fifth, future research should examine the durability of the treatment effects we observe, which our studies were not designed to examine. Sixth, future studies should investigate further why our results differ from the psychology literature on self-affirmation, which typically does not explore the effects of affirmation on factual beliefs and on respondents who do not receive new information. Finally, our results do not directly identify the point at which counterattitudinal information overrides directionally motivated reasoning or the role of affect in this process (e.g., Redlawsk et. al 2010). We encourage future research to address all of these questions.

Still, these results provide some reason for optimism. Though providing information does not automatically lead people to update their factual beliefs, people can change what they believe

[26] The observed interaction between affirmation and the textual correction among Strong Republicans in Study 3 lends additional credence to this possibility.

under certain circumstances even about controversial issues. It is our hope that future research will continue to explore the specifics of what types of information lead to belief change and the effects of context and mindset on how it is processed.

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Online appendix

Study 1

Affirmation treatment

[Part 1]

In this portion of the study, we would like to ask you some questions about your ideas, your beliefs, and your life. When you respond to these questions, please bear in mind that there are no right or wrong answers.

Below is a list of characteristics and values, some of which may be important to you, some of which may be unimportant. Looking at this list, please circle the characteristic or value that is MOST important to you.

1. Being smart or getting good grades
2. Creativity
3. Relationships with friends or family
4. Social skills
5. Business skills

[Part 2]

In a few sentences, please describe a personal experience in which [value choice from previous question] was especially important to you and made you feel good about yourself. Focus on your thoughts and feelings, and don't worry about spelling, grammar, or how well written it is.

Affirmation control

Please list everything you have had to eat or drink in the last 48 hours. Do not worry about those things you find yourself unable to remember.

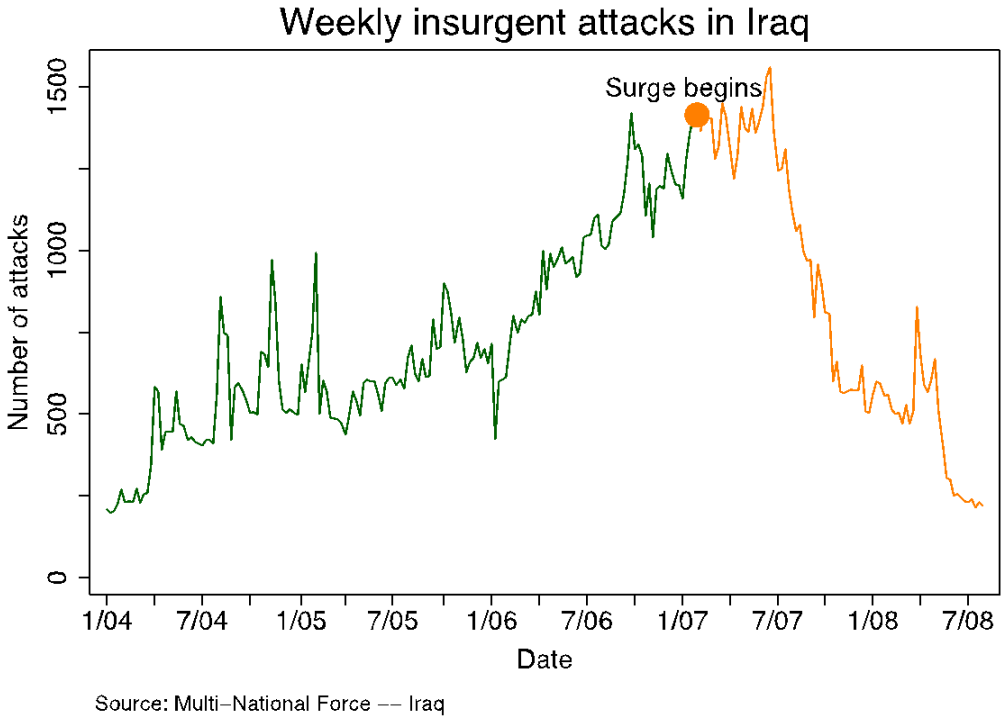
Graph treatment

[All respondents]

Now we would like to turn to a different topic. As you may know, starting in early 2007, the US sent an additional 30,000 troops to Iraq. Many people refer to this increase in the number of US troops in Iraq as "the surge" or "the troop surge."

[Treatment group only]

Below is a graph showing the number of insurgent attacks against US and coalition forces in Iraq per week since January 2004. Please take a moment to study it before proceeding.



Dependent variable

From what you know about the US involvement in Iraq, what has happened to the number of insurgent attacks in Iraq since the recent increase in troop levels ("the surge") began?

- Attacks have decreased substantially [1]
- Attacks have decreased slightly [2]
- Attacks have stayed the same [3]
- Attacks have increased slightly [4]
- Attacks have increased substantially [5]

Study 2

Affirmation treatment

[Part 1]

In this portion of the study, we would like to ask you some questions about your ideas, your beliefs, and your life. When you respond to these questions, please bear in mind that there are no right or wrong answers. Your answers will be kept confidential and not published in any form.

Below is a list of characteristics and values, some of which may be important to you, some of which may be unimportant. Looking at this list, please select the characteristic or value that is MOST important to you.

- Athletic ability
- Being good at art
- Being smart or getting good grades
- Creativity
- Living in the moment
- Musical ability/appreciation
- Relationships with friends or family
- Sense of humor
- Social skills
- Physical attractiveness
- Business skills
- Romantic values

[Part 2]

Please take a few minutes to describe a personal experience in which [value choice from previous question] was especially important to you and made you feel good about yourself. Focus on your thoughts and feelings, and don't worry about spelling, grammar, or how well written it is. Your answers will be kept confidential and not published in any form.

NOTE: The survey will allow you to move to the next page after a reasonable amount of time has elapsed. Please take all the time you need to answer the question thoroughly.

Affirmation control

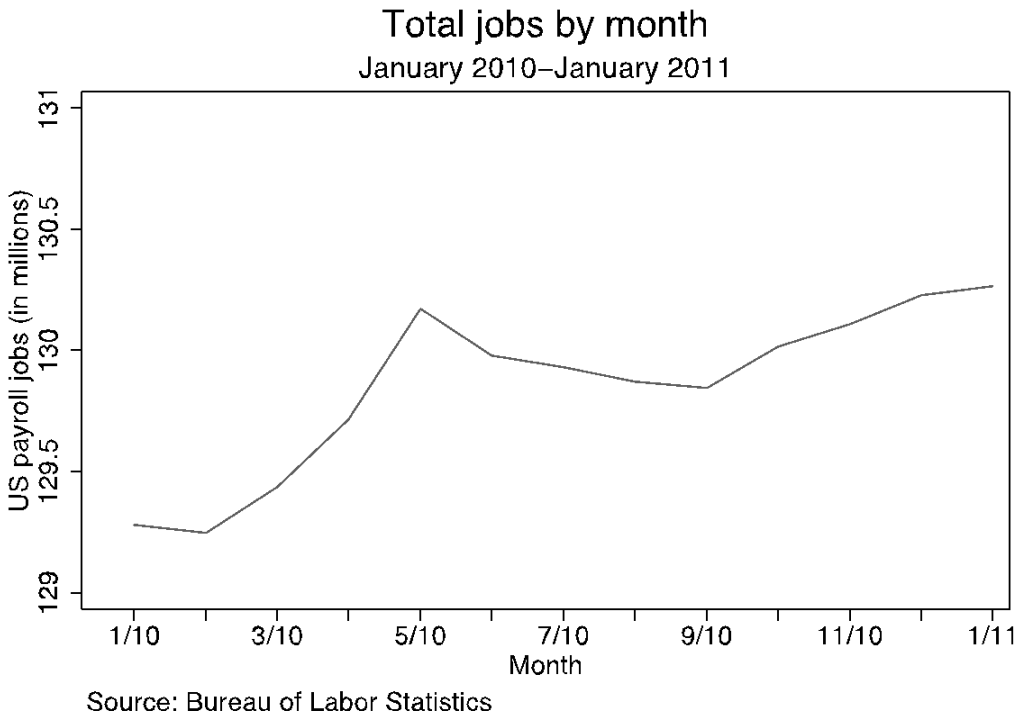
Please take a few minutes to list everything you've had to eat or drink in the last 24 hours. Don't worry about spelling, grammar, or how well written it is. Your answers will be kept confidential and not published in any form.

NOTE: The survey will allow you to move to the next page after a reasonable amount of time has elapsed. Please take all the time you need to answer the question thoroughly.

Graph treatment

Now we would like to turn to a different topic.

Below is a graph showing the total number of jobs in the United States from January 2010 to January 2011. Please take a moment to study it before proceeding.



NOTE: The survey will allow you to move to the next page after a reasonable amount of time has elapsed. Please take all the time you need to study the graph below.

Graph control

Now we would like to turn to a different topic.

Dependent variable

Would you say that, compared to January 2010, the number of people with jobs in the country has gone up, stayed about the same, or gone down?
-Gone up
-Stayed about the same [3]
-Gone down

[branching]
Compared to January 2010, has the number of people with jobs in the country gone up a lot or only somewhat?
-Gone up a lot [1]
-Gone up somewhat [2]

Compared to January 2010, has the number of people with jobs in the country gone down a lot or only somewhat?
-Gone down a lot [4]

-Gone down somewhat [5]

Study 3

Attention filter

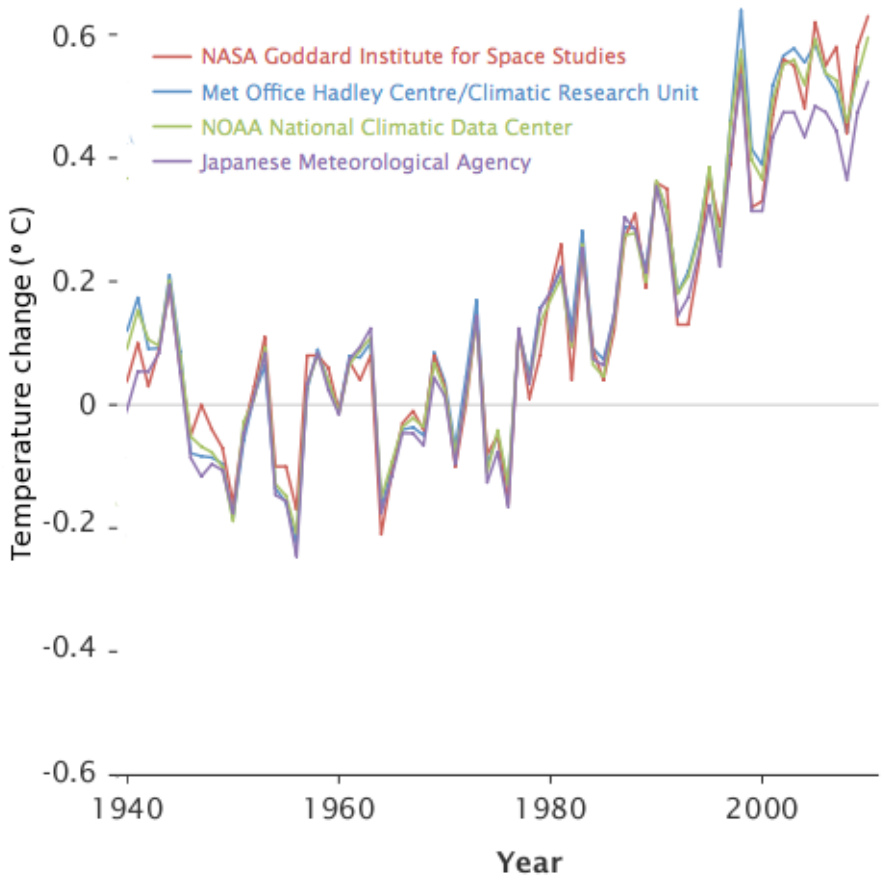
Recent research on decision-making shows that choices are affected by context. Differences in how people feel, their previous knowledge and experience, and their environment can affect choices. To help us understand how people make decisions, we are interested in information about you. Specifically, we are interested in whether you actually take the time to read the directions; if not, some results may not tell us very much about decision making in the real world. To show that you have read the instructions, please ignore the question below about your favorite color and check pink and green as your answers. Again, please answer the question as we have instructed rather than choosing your favorite color. Thank you very much.

Please indicate your favorite color.
-Red
-Pink
-Orange
-Brown
-Yellow
-Green
-Blue
-Purple
-None of the above

Graph treatment

Now we would like to turn to a different topic.

Below is a graph showing changes in average global surface temperatures since 1940. Please take a moment to study it before proceeding. (Note: A change of 1 degree Celsius = 1.8 degrees Fahrenheit.)



Text treatment

Now we would like to turn to a different topic.

Below is information about changes in average global surface temperatures since 1940. Please take a moment to study it before proceeding. (Note: A change of 1 degree Celsius = 1.8 degrees Fahrenheit.)

Groups of scientists from several major institutions — NASA's Goddard Institute for Space Studies, the National Oceanic and Atmospheric Administration's National Climatic Data Center, the Japanese Meteorological Agency and the Met Office Hadley Centre in the United Kingdom — tally data collected by temperature monitoring stations spread around the world. All four records show peaks and valleys that vary in virtual sync with each other. They each show an increase in average global surface temperatures of approximately 0.5 degrees Celsius over the last three decades. Data from each source also indicate that the last decade is the warmest since 1940.

Graph/text control group

Now we would like to turn to a different topic.

Dependent variables

Would you say that average global surface temperatures have gone up, stayed about the same, or gone down in the last thirty years?
-Gone up
-Stayed about the same [3]
-Gone down

[branching]
Have average global surface temperatures gone up a lot or only somewhat in the last thirty years?
-Gone up a lot [1]
-Gone up somewhat [2]

Have average global surface temperatures gone down a lot or only somewhat in the last thirty years?
-Gone down a lot [4]
-Gone down somewhat [5]

Which of the following statements comes closest to your view of global warming?
-Global warming is a proven fact and is mostly caused by emissions from cars and industrial facilities such as power plants and factories. [1]
-Global warming is a proven fact caused mostly by natural changes that have nothing to do with emissions from cars and industrial facilities. [2]
-Global warming is a theory that has not yet been proven. [3]

Sample composition

CCES (Study 1)

Overall, the sample is representative of the American population and matches known benchmarks well. Respondents are 48% male and 52% female. 72% are white, 12% are black, and 8% are Hispanic. 32% are age 18-34, 37% are 35-54, and 32% are 55 or older. Finally, 43% have a high school degree or less, 32% have some college or a two-year degree, and 25% have a four-year college degree or more.

In terms of party identification, our respondents are 37% Democrats, 27% independents (including leaners and identifiers of other parties), 27% Republicans, and 8% not sure, which almost perfectly matches the partisan distribution from telephone polls conducted in October 2008. To obtain the relevant estimates for how our party estimates match the party distribution of public polling (36% Democrat, 30% independent, and 26% Republican), go to http://elections.huffingtonpost.com/pollster/party-identification, include only live phone polls with non-partisan sponsors, and set the date range to October 1 to October 31, 2008.

CCES respondents may be somewhat more sophisticated or politically active than those in a probability sample, but such discrepancies should not threaten the internal validity of our experimental results.

Mechanical Turk (Study 2)

In line with previous research about Mechanical Turk, our sample is younger and more liberal than the national population, but more diverse than standard student-based convenience samples. In our sample, 41% of respondents were 18-29, 43% were 30-49, and 16% were 50 and over. 56% were female, 4% were black, and 5% Hispanic. 10% had a high school degree or less, 33% had some college, and 58% had a college degree or greater. 53% identified as Democrats (with leaners), 30% as Republicans (with leaners), and 16% as independents.

Qualtrics (Study 3)

This study restricted was restricted to self-identified Republicans in an online convenience sample obtained from Qualtrics. As an initial check on data quality, we asked the standard ANES party identification questions. The data match the screening almost perfectly. Only five respondents (1%) self-identify as Democrats or Democratic leaners, while 2% identify as pure independents. The remaining 97% identify as Republicans – 48% as strong Republicans, 43% as weak Republicans, and 5% as Republican-leaning independents. The sample is less racially diverse (95% white) than Study 2, which was not pre-screened on party identification. However, we still see diversity in other demographics. For instance, the sample is slightly more female (51%) than male (49%) and more diverse by age than respondents in Study 2.

Summary statistics

	Control	Affirmation	Graph	Text	Aff. x graph	Aff. x text	Total
Change in insurgent attacks							
Mean (weighted)	2.27	2.06	1.79		2.05		2.04
SE of mean (weighted)	0.12	0.13	0.08		0.16		0.07
N (unweighted)	251	219	270		260		1000
Job change under Obama							
Mean	2.88	2.88	4.03		3.98		3.47
SE of the mean	0.10	0.09	0.06		0.09		0.05
N	119	105	140		108		472
Temperature change							
Mean	2.38	2.34	1.71	2.27	1.76	2.13	2.10
SE of the mean	0.10	0.10	0.08	0.07	0.09	0.09	0.04
N	64	50	55	67	68	55	359
Global warming/causes							
Mean	2.39	2.26	2.13	2.27	2.10	2.18	2.22
SE of the mean	0.10	0.12	0.11	0.11	0.11	0.12	0.05
N	64	50	55	67	68	55	359

Interaction models

Study 1: Misperceptions about post-surge change in insurgent attacks in Iraq

	Coefficient (SE)
Affirmation	-0.31
	(0.28)
Graph	-0.44
	(0.30)
Not sure on Iraq withdrawal	0.91**
	(0.29)
Support Iraq withdrawal	1.26**
	(0.23)
Affirmation x not sure on withdrawal	-0.02
	(0.45)
Affirmation x withdrawal support	-0.07
	(0.32)
Graph x not sure on withdrawal	-0.23
	(0.44)
Graph x withdrawal support	-0.17
	(0.33)
Affirmation x graph	0.44
	(0.43)
Affirmation x graph x not sure on withdrawal	-0.03
	(0.70)
Affirmation x graph x support withdrawal	0.11
	(0.52)
Black	0.10
	(0.23)
Female	0.32**
	(0.11)
College graduate	-0.43**
	(0.12)
GOP (with leaners)	-0.12
	(0.16)
Independent	0.39*
	(0.16)
Iraq extremely important	-0.23*
	(0.12)
(Cutpoint 1)	0.50
	(0.24)
(Cutpoint 2)	1.19
	(0.24)
(Cutpoint 3)	1.66
	(0.24)
(Cutpoint 4)	2.15
	(0.24)
N	987

* $p < .05$, ** $p < .01$. Ordered probit models estimated using survey weights (as such, the log-likelihoods are not available); linearized standard errors in parentheses.

Study 2: Misperceptions about job change under Obama (Jan. 2010-Jan. 2011)

	Graph=0	Graph=1
Affirmation	0.48	-0.56
	(0.42)	(0.38)
Economy most important issue	0.50	0.27
	(0.41)	(0.38)
Neither approve nor disapprove of Obama on economy	0.38	-0.40
	(0.40)	(0.39)
Disapprove of Obama on economy	-0.23	-0.83*
	(0.41)	(0.37)
Affirmation x most important issue	-1.05	0.17
	(0.58)	(0.53)
Affirmation x neither approve nor disapprove	-0.81	0.88
	(0.60)	(0.59)
Affirmation x disapprove	-0.64	0.86
	(0.52)	(0.47)
Neither approve nor disapprove x most important	0.38	-0.25
	(0.40)	(0.52)
Disapprove x most important	-1.36**	-0.13
	(0.53)	(0.49)
Affirmation x neither x most important	0.77	-0.02
	(0.78)	(0.79)
Affirmation x disapprove x most important	2.25**	-0.59
	(0.75)	(0.72)
Black	0.12	-0.88*
	(0.37)	(0.42)
Female	-0.33*	-0.12
	(0.15)	(0.15)
College graduate	0.45**	0.01
	(0.15)	(0.15)
GOP (with leaners)	-0.25	0.07
	(0.22)	(0.21)
Independent	-0.32	-0.68**
	(0.23)	(0.22)
(Cutpoint 1)	-1.53	-2.65
	(0.36)	(0.35)
(Cutpoint 2)	-0.75	-2.59
	(0.36)	(0.35)
(Cutpoint 3)	-0.42	-1.65
	(0.35)	(0.32)
(Cutpoint 4)	2.17	0.26
	(0.40)	(0.31)
N	224	247

* $p < .05$, ** $p < .01$. Ordered probit models with robust standard errors in parentheses.

Study 3: Misperceptions about temperature change and its causes

	Temperature change	Global warming/causes
Affirmation	-0.51	-0.55
	(0.29)	(0.31)
Graph	-1.22**	-0.64*
	(0.29)	(0.29)
Text	-0.36	-0.44
	(0.24)	(0.28)
Strong Republican	-0.28	-0.24
	(0.31)	(0.28)
Affirmation x graph	0.74	0.93*
	(0.42)	(0.43)
Affirmation x text	0.38	0.49
	(0.39)	(0.47)
Affirmation x strong Republican	0.98*	0.81
	(0.43)	(0.42)
Graph x strong Republican	0.32	0.57
	(0.43)	(0.40)
Text x strong Republican	0.46	0.63
	(0.38)	(0.42)
Affirmation x graph x strong Republican	-1.27*	-1.56*
	(0.62)	(0.58)
Affirmation x text x strong Republican	-1.20*	-1.02
	(0.57)	(0.63)
Female	-0.25*	0.00
	(0.12)	(0.13)
College graduate	0.01	-0.01
	(0.12)	(0.13)
Extremely important issue	-0.38	-0.60*
	(0.31)	(0.24)
(Cutpoint 1)	-1.60	-1.01
	(0.23)	(0.21)
(Cutpoint 2)	-0.08	-0.38
	(0.21)	(0.21)
(Cutpoint 3)	1.47	
	(0.24)	
N	356	357

* $p < .05$, ** $p < .01$. Ordered probit models with robust standard errors in parentheses.