

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

Brendan Nyhan  
Dartmouth College  
nyhan@dartmouth.edu

Jason Reifler  
University of Exeter  
J.Reifler@exeter.ac.uk

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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. We find support for both hypotheses. Our results indicate that providing information in graphical form reduces misperceptions. However, self-affirmation also decreases misperceptions among those most likely to hold them even if no other information is provided. Misperceptions are thus not simply the result of a lack of information - our results suggest many people could offer correct answers if they were less psychologically threatening.

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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, undermine trust in political leaders, and warp the process by which people form and update policy preferences (Bartels 2002, Nyhan 2010, Nyhan and Reifler 2012).

Given these perverse consequences, determining why so many Americans are misinformed is a vital task for social science. To do so, we focus on factual beliefs rather than opinions to learn why which people (fail to) learn relevant facts about politics or update inaccurate beliefs that they hold. We examine two factors that may contribute to the prevalence of misinformation. Both explanations complement the standard account of motivated reasoning, which finds that people are biased in favor of pro-attitudinal claims and against claims that contradict their predispositions (e.g., Lord, Ross, and Lepper 1979; Edwards and Smith 1996; Taber and Lodge 2006).

The first hypothesis we consider is that the prevalence of political misperceptions reflects an information deficit resulting from the public’s lack of interest in or knowledge about politics (Delli Carpini 2005). People may have failed to encounter accurate information about these issues or encountered it in formats that easily allow for counter-argument (e.g., Nyhan and Reifler 2010). Under this view, delivering information in a more persuasive format 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. Many of the misinformed are likely to have already encountered and rejected correct information about these issues that was discomfiting to their self-concept or worldview – especially among those who already follow politics (Steele 1988). However, some could potentially accept unwelcome facts in a different frame of mind. From this perspective, buttressing people’s self-worth could 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.

These explanations have potentially 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, when misperceptions seem 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 where 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 unwelcome information.

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 textual information. Self-affirmation also substantially reduces false or unsupported responses to factual questions among respondents who might find an accurate answer to be threatening (e.g., supporters of withdrawal from Iraq being asked about the success of the surge). Despite providing no new information, the magnitude of the estimated effect is one-third to two-thirds as large as our graph treatments and larger than the text treatment in Study 3. These findings suggest that many misinformed individuals may already be at least tacitly aware of the correct information but uncomfortable acknowledging it. In this sense, misperceptions are not just an information problem; the threatening nature of certain facts appears to 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, Bullock 2007, Gilens 2001, Howell and West 2009, Sides N.d.), 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 hypothesize should reduce misinformation more effectively than text (which we test directly in Study 3). Graphs have several desirable properties. First, they convey a significant amount of information or data in a clear way, reducing the cognitive and linguistic complexity of most information provided to the public about politics. Second, graphs may be particularly 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., changes in the economy 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 that dominates mainstream news (Cunningham 2003).

Another factor that may contribute to the prevalence of misperceptions is the psychological mindset with which people consider the validity of these claims. Numerous studies have found that people tend to

evaluate information with a directional bias toward their previous beliefs (Lord, Ross, and Lepper 1979, Edwards and Smith 1996, Munro and Ditto 1997, Taber and Lodge 2006). People tend to interpret ambiguous or mixed information in line with their preexisting views and to resist or reject counter-attitudinal information. This bias extends to factual beliefs – corrective information often fails to reduce misperceptions<sup>1</sup> 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. As such, they tend to reject such information or interpret it in a favorable manner. In this view, individuals who encounter dissonant information that is threatening are motivated to restore their feelings of self-worth; resolving dissonance is one way they can accomplish this goal. Steele supports this claim with experiments showing 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 several controversial political issues (see also Sherman, Nelson, and Steele 2000).

Self-affirmation is a novel approach in political science that allows us to test one 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 thereby spur motivated reasoning. Rejection of uncomfortable facts is a form of

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<sup>1</sup> Following Nyhan and Reifler (2010), we define misperceptions as beliefs that are unsupported by clear evidence and expert opinion – a definition that includes both false *and* unsubstantiated beliefs about the world. In this article, however, we focus primarily on empirical dependent variables that can be directly measured. As a result, the misperceptions in question can be directly disproven.

defensive processing that serves to protect one's self-identity; when self-identity is buttressed, people may be less likely to respond defensively.

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. 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 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 hypothesis 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 and likely to provoke defensive processing (Correll et al. 2004). We find evidence of such an effect in Study 2 below.

### *Expectations*

First, we expect that presenting accurate information in graphical form will reduce misperceptions. 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.<sup>2</sup>

We test these expectations in three studies of salient factual disputes related to a controversial political issue: 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 entirely clear how much the public knew about conditions in Iraq after the surge began. Perceptions of the success of the surge and war effort more generally did improve somewhat by fall 2008 (the period in which the study was conducted), but remained relatively low given the magnitude of the decline in violence. 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

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<sup>2</sup> Self-affirmation could increase receptivity to counter-attitudinal messages, but graphical corrections may be sufficiently unambiguous that affirmation does not affect respondent processing. Indeed, challenging people with corrections could undo self-affirmation's effects among those most at risk of misperceptions.

(Jones 2008). 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 based on their party affiliation or opinions about the war.

### *Study 1: Hypotheses and design*

Why were some respondents misinformed about improvements in the situation in Iraq following the US troop 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 insurgent attacks since the surge began. 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 substantial decline in insurgent attacks in Iraq since 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.

### *Study 1: Experimental treatments*

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.”<sup>3</sup> In the control condition, respondents

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<sup>3</sup> Writing about important values is a common self-affirmation manipulation (McQueen and Klein 2006).



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. The control group was given a summary of the surge but no information about its effects. (Stimulus materials are in the Online Appendix.)

### *Study 1: Dependent variable*

We focus on a measure of factual belief about changes in attacks after the surge, which asked how the number of insurgent attacks changed since the surge began (see Online Appendix for exact wording). Respondents answered on a five-point Likert scale from “decreased substantially” to “increased substantially.” As in all of our studies, it was coded so that lower values indicate more accurate beliefs (attacks decreased) and higher values indicate greater misperceptions (attacks increased).

### *Study 1: Sample*

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 using a technique called sample matching that seeks 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*

Rather than estimate a complicated set of interactions that are difficult to interpret, we estimate separate ordered probit models for our ordinal dependent variable 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. To increase the precision of our estimates, we include indicators for black respondents, women, college

graduates, Republicans (with leaners), independents, and those who view the war as “extremely important.”<sup>4</sup>

Each model is estimated using survey weights to maximize the representativeness of the estimates. We observe 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 relative to controls (as indicated by the negative

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

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

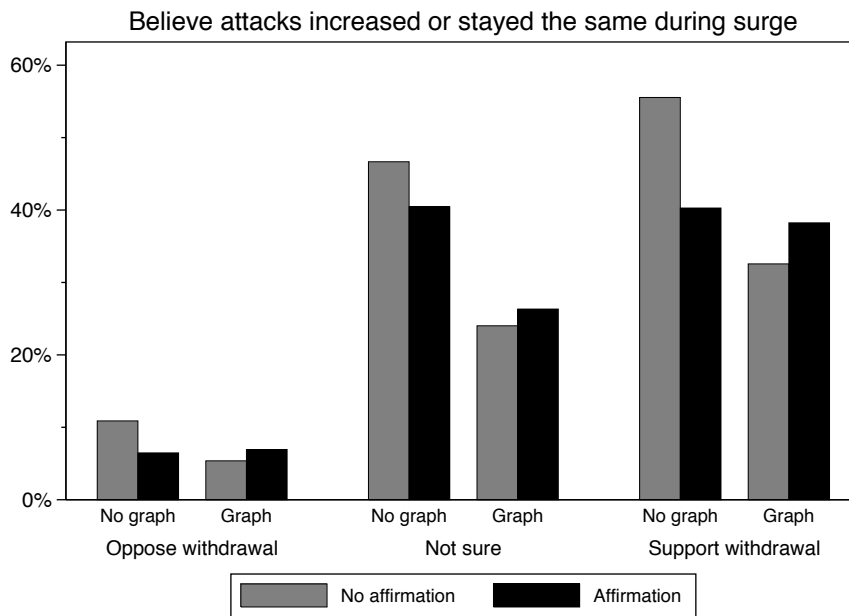
\* $p < .05$ , \*\* $p < .01$ . Ordered probit models estimated using survey weights (as such, the log-likelihoods are not available); linearized standard errors in parentheses. Ordered probit cutpoints omitted but available upon request. See appendix for details on question wording and the coding of the dependent variable.

<sup>4</sup> Our key results in this study and the ones below are substantively identical when the models are estimated without weights or demographic control variables, in more complex interactive models, or when the five-point outcome measures of perceived change are collapsed to three-point outcome measures with the values of increased, stayed the same, or decreased (all results available upon request).

coefficients). The effect is statistically 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 ( $p < .15$ ).<sup>5</sup>

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 about the change in insurgent attacks among those who support withdrawing from Iraq ( $p < .05$ ) – the subgroup that would otherwise experience the greatest discomfort from answering the question correctly.<sup>6</sup> However, there is an offsetting interaction between *Affirmation* and *Graph* ( $p < .05$ ), which

**Figure 1**



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

<sup>5</sup> This finding is likely the result of a floor effect – 79% of withdrawal opponents in the control condition (no *Graph* or *Affirmation*) said insurgent attacks had decreased substantially.

<sup>6</sup> Correll et al. (2004) suggests self-affirmation may have the largest effects when an issue is personally important. 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.

suggests that the marginal effect of *Affirmation* varies depending on whether respondents subsequently received the *Graph* treatment or not. Specifically, our results indicate that 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).<sup>7</sup> No other subgroup is significantly affected.<sup>8</sup>

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 withdrawal position and experimental condition.<sup>9</sup> As predicted, only a small proportion of 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 *Affirmation* (33% of this group believed attacks increased or stayed the same versus 56% of controls). However, *Affirmation* has no significant effect

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<sup>7</sup> The *Affirmation* x *Graph* interaction can be interpreted as either how the marginal effect of *Affirmation* varies by whether respondents also received *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, *Graph*'s marginal effect was not significant among withdrawal supporters who received *Affirmation*.

<sup>8</sup> 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 that *Affirmation* improved mood in any of our studies (results available upon request).

<sup>9</sup> The predicted values we present average over the distribution of the other covariates in the sample.

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*).

### *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. By buttressing people's self-worth against this identity threat, *Affirmation* reduced misperceptions significantly among the respondents who would otherwise be *least* likely to accept the facts (withdrawal supporters). However, *Affirmation* has 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 reduces misperceptions even among unaffirmed participants and thereby limits the possible 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 debating the wisdom of the surge, which may have reduced counter-arguing among war opponents. Finally, by October 2008 the economic crisis had supplanted foreign affairs as the dominant campaign issue, which may have reduced the incentive for motivated reasoning.

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 they may

have thought about the prompt. Thus, our treatment effect estimates should be understood as estimates of intent to treat effects rather than average treatment effects on the treated.<sup>10</sup>

## **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 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 (Ramsay et al. 2010).

### *Study 2: Hypotheses and design*

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<sup>10</sup> 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).

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.

### *Study 2: Experimental treatments*

The self-affirmation treatment and the corresponding control condition (food and drink consumption) in this study are virtually identical to Study 1. The only difference of note is 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 line graph showing how nonfarm payroll jobs reported monthly by the Bureau of Labor Statistics increased from 129.3 million in January 2010 to 130.3 million in January 2011.

### *Study 2: Dependent variable*

To measure perceptions of recent job change, we used a dependent variable 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 of our studies, responses were coded so that higher values represent greater misperceptions (i.e., greater belief that jobs had gone down rather than up). We also captured response time information for answers to the dependent variable question listed above (measured in seconds).<sup>11</sup>

### *Study 2: Sample*

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 (Berinsky, Huber, and

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<sup>11</sup> Equivalent response time information is not available from Study 1 or Study 3.

Lenz 2012; Buhrmester et al. 2011; Horton, Rand, and Zeckhauser 2011). (See the appendix for a discussion of the demographics of the sample.)

### *Study 2: Results*

We again disaggregate our sample based on their views of the policy in question. 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. We also disaggregate by whether respondents selected job creation and economic growth as the most important issue facing the country or not (47% did so). As noted above, Correll et al. (2004) find that the effects of self-affirmation were concentrated among those for whom the issue is most important. In this case, three-way interaction models demonstrate that issue importance moderates the effects of *Affirmation* among those who disapprove of Obama on the economy (results available upon request).

To simplify presentation, we again report separate models in Table 2, which presents the results of ordered probit models of beliefs about job change among subgroups defined by respondents' approval of Obama on the economy and whether they said it was the most important issue.<sup>12</sup> We find that *Graph* has a strong misperception-reducing effect for each subgroup among respondents who did not receive *Affirmation* ( $p < .01$ ).<sup>13</sup> In contrast, *Affirmation* significantly reduces misperceptions among people who did not receive *Graph* only for those respondents whose 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 ( $p < .05$ ).

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<sup>12</sup> 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.

<sup>13</sup> The marginal effect of *Graph* remains negative and statistically significant ( $p < .05$ ) among respondents who received *Affirmation* across each model.



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 respondents who receive Graph.<sup>14</sup>

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

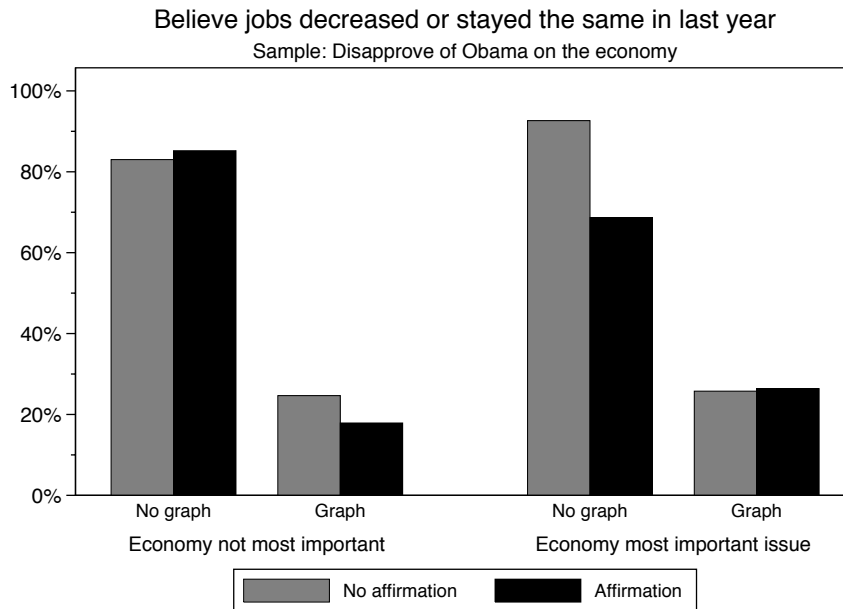
	<u>Approve</u>		<u>Neither</u>		<u>Disapprove</u>	
	Not MIP	MIP	Not MIP	MIP	Not MIP	MIP
Affirmation	-0.39 (0.35)	0.51 (0.49)	0.41 (0.46)	0.61 (0.34)	0.09 (0.27)	-1.04* (0.42)
Graph	-1.71** (0.43)	-1.52** (0.38)	-0.83* (0.36)	-1.85** (0.38)	-1.69** (0.31)	-2.27** (0.51)
Affirmation x graph	0.94 (0.51)	-0.07 (0.58)	-0.61 (0.72)	-1.29* (0.57)	-0.34 (0.42)	1.06 (0.58)
Black	0.48 (0.35)	0.24 (0.38)	0.92 (0.69)	-0.46 (0.81)	2.90** (1.09)	-0.14 (0.65)
Female	0.24 (0.29)	0.33 (0.30)	0.52 (0.30)	-0.14 (0.25)	0.02 (0.21)	0.39 (0.26)
College graduate	-0.62 (0.33)	-0.17 (0.30)	0.63* (0.31)	-0.51* (0.26)	-0.16 (0.21)	-0.63* (0.26)
GOP (with leaners)			0.25 (0.36)	-0.17 (0.28)	0.26 (0.36)	-0.57* (0.26)
Independent	0.97 (0.65)	0.91 (0.47)	0.47 (0.40)	0.43 (0.32)	0.42 (0.41)	-0.43 (0.61)
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. “Approve,” “Neither” and “Disapprove” refer to respondents who approve of Obama’s handling of the economy, those who neither approve nor disapprove, and those who disapprove, respectively. “Not MIP” and “MIP” refer to those who did not select the economy as the most important issue and those that did so, respectively. Ordered probit cutpoints omitted but available upon request. See appendix for details on question wording and the coding of the dependent variable.

<sup>14</sup> Interestingly, *Affirmation* causes a marginally significant *increase* in misperceptions among respondents who are neutral toward Obama on the economy and view it as the most important issue ( $p < .10$ ), but respondents who received *Affirmation* and *Graph* report lower misperceptions than those who receive the graph alone ( $p < .05$ ). Among the subgroups we consider, this is the only one that is significantly more likely to accept the information in *Graph* if affirmed (the result predicted by Cohen et al. 2000).

To illustrate the results above, we calculate predicted probabilities for the four experimental conditions by averaging over the other covariates for subgroups. The predicted probability we report is the proportion of respondents who incorrectly state that jobs decreased or stayed the same since January 2010. To simplify presentation, we limit the graph to those who disapprove of Obama on the economy – the group of greatest theoretical and substantive interest. Predicted probabilities are presented in Figure 2. As the figure 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. By contrast, the effect of *Affirmation* among those who 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*.

**Figure 2**



Predicted probabilities from the ordered probit models in Table 2. The figure presents the estimated probability that a respondent who disapproves of President Obama’s performance on the economy would answer “Gone down” or “Stayed about the same” to the question “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?” Experimental materials are provided in the Supplementary Information.

We have suggested that *Affirmation* works by reducing the identity threat posed by attitude-inconsistent facts. By buttressing people's self-worth, it may help people overcome their instinctive reactions to a question and 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 considerable 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 (Correll et al. 2004). We also show that *Affirmation* caused respondents to take longer to answer, suggesting they were considering it in a more thoughtful manner.

### 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 they do not allow us to directly compare the effects of alternate modes in presenting the same information.<sup>15</sup> 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). Second, 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. Finally, unlike Studies 1 and 2, we assess misperception belief before and after treatment, allowing us to control directly for respondents' pre-existing views.

#### *Study 3: Hypotheses and design*

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

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<sup>15</sup> Previously, we relied on a comparison between the effectiveness of graphical corrections in Studies 1 and 2 and the null or backfire results reported in previous studies using textual corrections. This study directly tests graphs versus textual information with the same sample, issue, outcome question, etc.

temperature change – *Text*), or a control condition (neither graph nor text). Our design therefore directly tests the hypothesis that graphs reduce misperceptions more effectively than equivalent text.

### *Study 3: Experimental treatments*

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.

### *Study 3: Dependent variables*

In this study, we measure respondents' perceptions of global temperature change and their more general beliefs about global warming. We made this choice for two reasons. First, we wanted to determine whether respondents would update their beliefs about the broader issue of climate change in addition to global temperatures. Second, we sought to estimate the effect of the self-affirmation treatment on general global warming beliefs rather than just temperatures (a narrower topic where mindset might matter less).

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 increased significantly).

Our second dependent variable, *Global warming*, comes from a CNN/Opinion Research Corporation (ORC) 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).

### *Study 3: Sample*

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 in the previous studies, we split our respondents by their pre-existing views before running ordered probit models. We make one important change, however. Studies 1 and 2 focused on so-called “easy” issues (Carmines and Stimson 1980) where subjects were likely to have well-formed opinions about the issues at stake (the war in Iraq and the performance of the US economy). As such, we split respondents in those studies by their position on withdrawal from Iraq and approval of President Obama’s performance on the economy, respectively. In the case of climate change, however, the issue is “hard” and respondents’ policy

attitudes appear to not be well-formed.<sup>16</sup> We therefore instead use party affiliation as the relevant variable, dividing self-identified strong Republicans from those do not identify as strong Republicans. Our assumption is that strong Republicans are more likely to be threatened by information showing rising global temperatures, which contradicts statements by many GOP elites in recent years questioning whether climate change is real (e.g., Samuelson 2010). The set of control variables is nearly identical to Study 1.<sup>17</sup>

Table 3 presents results of our ordered probit models of *Temperature change* and *Global warming*. As above, we estimate separate models to facilitate interpretation rather than presenting complex interactive models. In this case, we split the sample by identification as strong Republicans (all are GOP identifiers). *Graph* alone is effective – it reduces misperceptions about global temperature change for both groups ( $p < .01$ ; columns 1 and 2) and makes strong Republicans more likely to acknowledge that global warming is real and man-made ( $p < .01$ ; column 4), though it has no effect on beliefs about global warming among other Republicans (column 3). By comparison, *Text* alone does not significantly change respondents’ beliefs about global temperature change and is only significant in reducing misperceptions about global warming among strong Republicans (column 4). When we directly compare marginal effects, we find that *Graph* alone is significantly more effective at reducing misperceptions about climate change and global warming than *Text* alone in three of the four models ( $p < .01$ ; columns 1, 2, and 4).<sup>18</sup>

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<sup>16</sup> Specifically, a pre-treatment measure of preferences toward regulation of greenhouse gas emissions did not moderate the effects of the *Graph* or *Text* treatments (results available upon request).

<sup>17</sup> In this case, we control for pre-treatment beliefs about global warming but exclude an indicator for black respondents (only two are in the sample).

<sup>18</sup> 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 we observe no significant difference in time spent reading (results available upon request).

**Table 3: Misperceptions about temperature change and its causes**

	<u>Temperature change</u>		<u>Global warming/causes</u>	
	Not strong GOP	Strong GOP	Not strong GOP	Strong GOP
Affirmation	-0.28 (0.29)	0.32 (0.30)	-0.01 (0.32)	-1.31* (0.66)
Graph	-1.17** (0.31)	-1.11** (0.30)	-0.33 (0.31)	-2.31** (0.62)
Text	-0.21 (0.26)	0.11 (0.29)	-0.01 (0.33)	-0.87* (0.43)
Affirmation x graph	0.43 (0.44)	-0.14 (0.45)	-0.10 (0.50)	1.55 (0.81)
Affirmation x text	0.16 (0.40)	-0.68 (0.42)	0.03 (0.53)	0.89 (0.72)
Female	-0.01 (0.16)	-0.54** (0.17)	0.15 (0.21)	0.39 (0.28)
College graduate	-0.15 (0.17)	0.22 (0.18)	0.20 (0.21)	0.06 (0.28)
Extremely important issue	-0.00 (0.11)	-0.14 (0.11)	-0.12 (0.13)	-0.09 (0.13)
Prior misperception	0.61** (0.12)	0.58** (0.12)	1.61** (0.18)	4.06** (0.48)
Log-likelihood	-165.15	-160.25	-98.75	-43.88
N	181	172	181	172

\* $p < .05$ , \*\* $p < .01$ . Ordered probit models with robust standard errors in parentheses. Ordered probit cutpoints are omitted but available upon request. See appendix for details on question wording and the coding of the dependent variables.

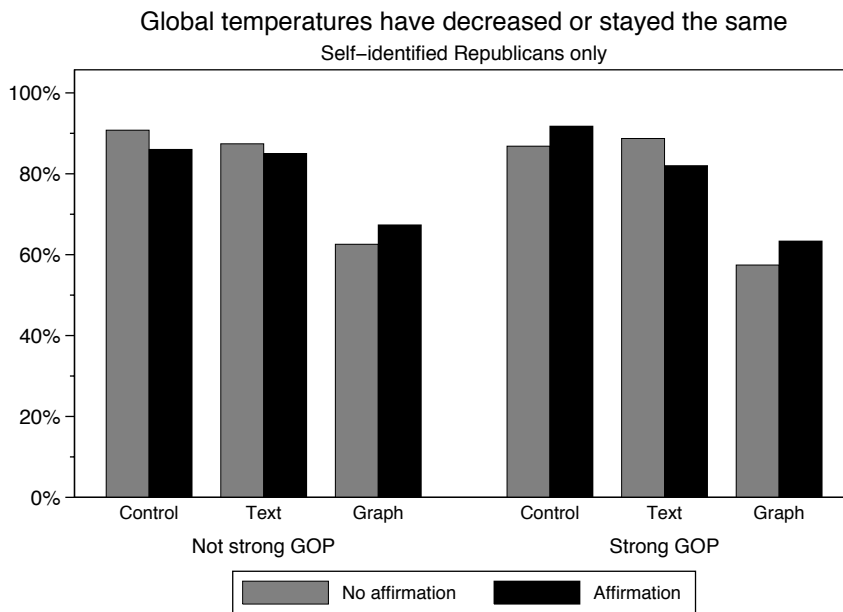
In addition, *Affirmation* reduces misperceptions among those most likely to be threatened by the fact in question. Table 3 shows that *Affirmation* decreases the likelihood that strong Republicans who did not receive *Graph* or *Text* will reject the scientific consensus that global warming is real and man-made. This effect is consistent with what we saw in Studies 1 and 2. However, we again find that *Affirmation* does not significantly increase receptivity to corrective information. Instead, as in Study 1, the *Affirmation*  $\times$  *graph* interaction is in the



opposite direction and marginally significant for strong Republicans on *Global warming* ( $p < .10$ ). The effect of Affirmation on those in this group who were exposed to the graph was not significant.<sup>19</sup>

We again present predicted probabilities for the different experimental conditions averaging over the other covariates by experimental subgroup. Figure 3 reports the predicted probability that respondents will say that global temperatures have decreased or stayed the same over the past thirty years. Predicted misperceptions about temperatures are much lower for those who received *Graph* than among those who received either *Text* or a control. This relationship holds both among both strong Republicans (the unaffirmed decline from 87% among controls to 57% in *Graph*) and other respondents (91% among unaffirmed controls, 63% among unaffirmed in *Graph*). By contrast, *Text* and *Affirmation* are ineffective.

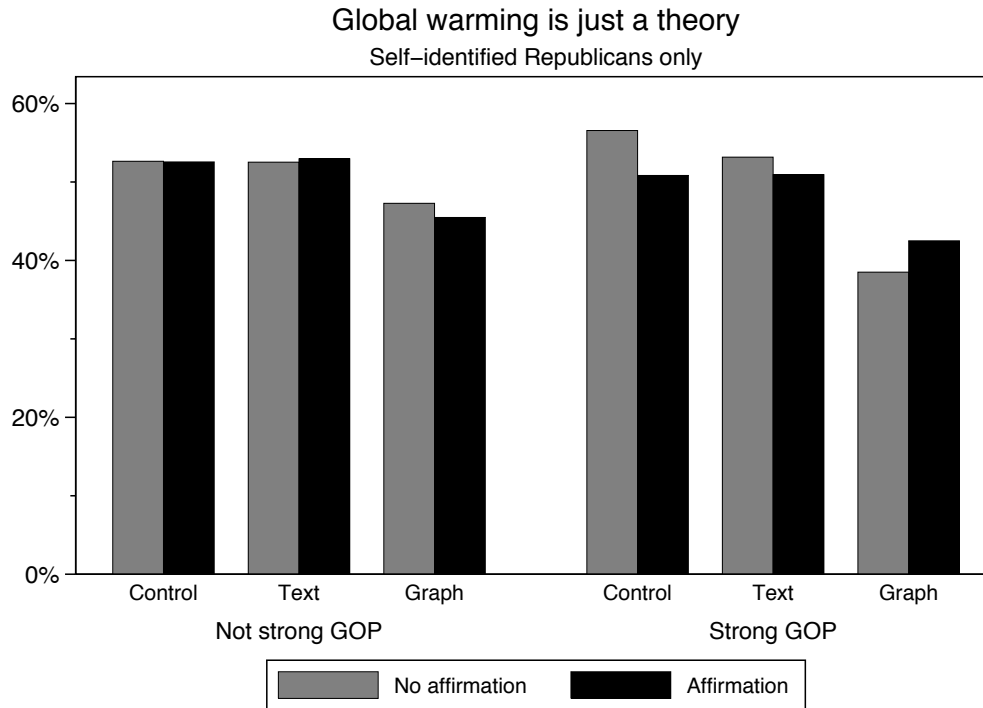
**Figure 3**



Predicted probabilities from the ordered probit models in Table 3. The figure presents the estimated probability that a Republican respondent would answer “Gone down” or “Stayed about the same” to the question “Would you say that average global surface temperatures have gone up, stayed about the same, or gone down in the last thirty years?” Experimental materials are provided in the Supplementary Information.

<sup>19</sup> The marginal effect of *Graph* is negative and significant among affirmed respondents for both groups on *Temperature change* but not *Global warming*. The marginal effect of *Text* is negative and marginally significant for strong Republicans who were affirmed ( $p < .10$ ) but otherwise insignificant.

Figure 4



Predicted probabilities from the ordered probit models in Table 3. The figure presents the estimated probability that a Republican respondent would answer “Global warming is a theory that has not yet been proven” to the question “Which of the following statements comes closest to your view of global warming?” Experimental materials are provided in the Supplementary Information.

Since our stimuli only directly address temperature change (and not the role of humans), we restrict our attention to predicted probability of belief that “Global warming is just a theory” in Figure 4. Among those who are not strong Republicans, none of the treatments significantly reduces belief that global warming is just a theory. However, for strong Republicans (the group we believe is most strongly motivated to reject counter-attitudinal information on the issue), agreement declines from 57% among unaffirmed respondents in the control group to 39% among those who received *Graph* alone. (By contrast, *Text* only reduced predicted belief to 53% among unaffirmed strong GOP identifiers.) Finally, *Affirmation* reduced misperceptions among strong Republicans who did not receive *Graph*, decreasing the predicted probability of stating that global warming is just a theory from 57% to 51% among those who did not receive *Graph* or *Text*. This six percentage point decline is approximately one-third of the estimated decline in belief for strong

Republicans who were exposed to *Graph* alone. (No equivalent reduction was observed among affirmed Republicans who also received *Graph* or *Text*, however.)

### *Study 3: Discussion*

The results of Study 3 generally confirm the findings of Studies 1 and 2, suggesting that some people suffer from information deficits but that others are 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 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 find additional evidence that *Affirmation* can reduce misperceptions among a group that is otherwise likely to resist acknowledging the facts in question (in this case, strong Republicans). As in Studies 1 and 2, however, *Affirmation* does not increase respondents' receptivity to corrective information.

Our interpretation of these results is that the primary effect of *Affirmation* in the domain of salient factual misperceptions is to make it easier to cope with dissonant information that one has already encountered. This explanation sheds light on why *Affirmation* works among the subgroups most likely to cling to false beliefs – it relaxes their need to reject facts that could otherwise be threatening. In contrast, *Affirmation* does not seem to increase receptivity to new information because our correction treatments (especially *Graph*) appear to overcome any counter-argument by unaffirmed participants.

## **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. First, many people may not have been exposed to accurate information in a convincing format. In addition, however, the threatening nature of corrective information

itself may also cause people to reject information that contradicts their preexisting views. Results from three experiments provide support for both hypotheses. We show that providing participants with graphical information significantly decreases false and unsupported factual beliefs, but that affirming respondents' self-worth can also reduce misperceptions among those who are most likely to be misinformed.

These results suggest that many citizens have significant information deficits that can be reduced by delivering factual information in a more compelling form. Our results suggest that delivering factual information in graphical form appears to be more effective than text at reducing misperceptions. 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. In addition, we should test whether graphical corrections are effective in contexts that could stimulate motivated reasoning such as news reports that include partisan cues and references to controversial figures.

While these results are encouraging, our experimental findings also suggest that misperceptions are not simply the result of information deficits. First, the provision of correct information did not eliminate misperceptions. Non-trivial proportions of respondents continued to hold false beliefs after receiving our graphs. This finding suggests that information deficits are not the only cause of misperceptions; psychological factors also appear to play an important role.

We found that self-affirmation resulted in decreased misperceptions among motivated subgroups when presented without corrective information. People may already implicitly know the facts or be capable of making more accurate inferences about the correct answer if they are buttressed against identity threats in this way. Otherwise, however, people often resist acknowledging uncomfortable facts. What the self-affirmation procedure allows us to see is how threatening it is to concede difficult truths and reject pleasing falsehoods under normal circumstances – a key psychological process in misperception belief. Further research is needed on the extent to which identity threat contributes to motivated reasoning about politics more generally.

In addition, future studies should investigate how our results relate to 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. In particular, it is worth investigating further why self-affirmation did not increase acceptance of corrective information that was provided directly to participants (as prior research might seem to suggest), though as noted above, our stimuli were more unambiguous and the issues used were more controversial than most past studies.

These findings also have important practical and normative implications that are worth considering. Self-affirmation is seemingly not a scalable intervention, but it offers insights that could be applied in practice – for instance, by testing if information from identity-congruent sources is more persuasive.

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. While we are confident our conclusions generalize, some aspects of the misperceptions 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. Future research should explore this question further. 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. Finally, future research should examine the durability of the treatment effects we observe, which our studies were not designed to examine.

Scholars should also consider a broader array of possible explanations for misperceptions. In this article, we tested two possible factors that we think are especially likely to contribute to their prevalence: information deficits and identity threat. However, researchers should test other possibilities, helping us to build a more comprehensive scholarly understanding of who holds misperceptions, why people hold them, and why some false or unsupported beliefs spread widely and resist correction.

In the end, these results underscore the challenges faced by those who hope to reduce misperceptions. People who care enough about politics to become well-informed often find it threatening to

admit that they are misinformed or that their side is making false claims about controversial issues and political figures, which we demonstrate by affirming people's identities in a non-political domain. Still, all hope is not lost. Unlike previous research, we find that reducing misperceptions is possible even among groups that are most likely to hold false or unsupported beliefs. Given sufficiently unambiguous graphical information, people are more likely to acknowledge the facts.

## Works cited

- Anderegg, William R. L., James W. Prall, Jacob Harold, and Stephen H. Schneider. 2010. "Expert credibility in climate change." *Proceedings of the National Academy of Sciences* 107(27):12107-12109.
- Bartels, Larry. 2002. "Beyond the Running Tally: Partisan Bias in Political Perceptions." *Political Behavior* 24(2):117-150.
- Berinsky, Adam J., Gregory A. Huber, and Gabriel S. Lenz. 2012. "Evaluating online labor markets for experimental research: Amazon.com's Mechanical Turk." *Political Analysis* 20(3): 351-368.
- Binder, David A. 1983. "On the variances of asymptotically normal estimators from complex surveys." *International Statistical Review* 51(3): 279-292.
- Buhrmester, Michael, Tracy Kwang, and Samuel D. Gosling. 2011. "Amazon's Mechanical Turk: A New Source of Inexpensive, Yet High-Quality Data?" *Perspectives on Psychological Science* 6(1):3-5.
- Bullock, John. 2007. "Experiments on partisanship and public opinion: Party cues, false beliefs, and Bayesian updating." Ph.D. dissertation, Stanford University.
- Carmines, Edward G. and James A. Stimson. 1980. "The Two Faces of Issue Voting." *American Political Science Review* 74(1): 78-91.
- Cohen, Geoffrey L., Joshua Aronson, and Claude M. Steele. 2000. "When beliefs yield to evidence: Reducing biased evaluation by affirming the self." *Personality and Social Psychology Bulletin* 26:1151-1164.
- Cohen, Geoffrey L. and Sherman, David K. 2014. "The psychology of change: Self-affirmation and social psychological intervention." *Annual Review of Psychology* 65: 333-371.
- Correll, Joshua, Stephen J. Spencer, and Mark P. Zanna. 2004. "An affirmed self and an open mind: Self-affirmation and sensitivity to argument strength." *Journal of Experimental Social Psychology* 40:350-356.
- Cunningham, Brent. 2003. "Re-thinking objectivity." *Columbia Journalism Review*, July/August 2003, 24-32.

- Delli Carpini, M. X. (2005). An overview of the state of citizens' knowledge about politics. In M. S. McKinney, L. L. Kaid, D. G. Bystrom, & D. B. Carlin (Eds.), *Communicating politics: Engaging the public in democratic life* (pp. 27-40). New York: Peter Lang. Accessed March 23, 2015.
- Edwards, Kari, and Edward E. Smith. 1996. "A Disconfirmation Bias in the Evaluation of Arguments." *Journal of Personality and Social Psychology*, 71(1): 5-24.
- Gaines, Brian J., James H. Kuklinski, Paul J. Quirk, Buddy Peyton and Jay Verkuilen (2007). "Interpreting Iraq: Partisanship and the Meaning of Facts." *Journal of Politics* 69(4): 957-974.
- Gerber, Alan S., Gregory A. Huber, David Doherty, Conor M. Dowling (2012). "Disagreement and the avoidance of political discussion: Aggregate relationships and differences across personality traits." *American Journal of Political Science* 56(4): 849-874.
- Gilens, Martin. 2001. "Political Ignorance and Collective Policy Preferences." *American Political Science Review* 95(2):379-396.
- Hart, P. Sol and Erik C. Nisbet. 2012. "Boomerang Effects in Science Communication: How Motivated Reasoning and Identity Cues Amplify Opinion Polarization About Climate Mitigation Policies." *Communication Research* 39(6), 701-723.
- Horton, John, David Rand, and Richard J. Zeckhauser. 2011. "The Online Laboratory: Conducting Experiments in a Real Labor Market." *Experimental Economics* 14(3): 399-425.
- Howell, William G. and Martin R. West (2009). "Educating the Public." *Education Next* 9(3): 41-47.
- Jones, Jeffrey M. 2008. "Iraq War Attitudes Politically Polarized." Gallup.com. April 8, 2008. <<http://www.gallup.com/poll/106309/iraq-war-attitudes-politically-polarized.aspx>> Accessed August 28, 2009.
- Kuklinski, James H., Paul J. Quirk, Jennifer Jerit, David Schweider, and Robert F. Rich. 2000. "Misinformation and the Currency of Democratic Citizenship." *The Journal of Politics* 62(3):790-816.



- Lord, Charles G., Lee Ross, and Mark R. Lepper. 1979. "Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence." *Journal of Personality and Social Psychology*, 37(11): 2098-2109.
- Lupia, Arthur and Mathew D. McCubbins. 1998. *The democratic dilemma: Can citizens learn what they need to know?* Cambridge: Cambridge University Press.
- McCright, Aaron M. and Riley E. Dunlap. 2011. "Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001-2010." *Sociological Quarterly* 52(2): 155-194.
- McQueen, Amy and William M.P. Klein. 2006. "Experimental Manipulations of Self-Affirmation: A Systematic Review." *Self and Identity*, 5: 289-354.
- Meyer, Joachim, Marcia Kuskin Shamo, and Daniel Gopher. 1999. "Information Structure and the Relative Efficacy of Tables and Graphs." *Human Factors: The Journal of the Human Factors and Ergonomics Society* 41: 570-587.
- Munro, Geoffrey D. and Peter H. Ditto. 1997. "Biased Assimilation, Attitude Polarization, and Affect in Reactions to Stereotype-Relevant Scientific Information." *Personality and Social Psychology Bulletin* 23(6): 636-653.
- Nyhan, Brendan. 2010. "Why the 'Death Panel' Myth Wouldn't Die: Misinformation in the Health Care Reform Debate." *The Forum* 8(1).
- Nyhan, Brendan and Jason Reifler. 2010. "When Corrections Fail: The persistence of political misperceptions." *Political Behavior* 32(2):303-330.
- O'Hanlon, Michael and Jason Campbell. 2009. "Iraq Index: Tracking Variables of Reconstruction & Security in Post-Saddam Iraq." Brookings Institution. July 16, 2009. Accessed August 29, 2009.  
<<http://www.brookings.edu/saban/~media/Files/Centers/Saban/Iraq%20Index/index.pdf> >

- Ramsay, Clay, Steven Kull, Evan Lewis, and Stefan Subias. 2010. "Misinformation and the 2010 Midterm." WorldPublicOpinion.org. December 10, 2010. Accessed March 24, 2011.  
<[http://www.worldpublicopinion.org/pipa/pdf/dec10/Misinformation\\_Dec10\\_rpt.pdf](http://www.worldpublicopinion.org/pipa/pdf/dec10/Misinformation_Dec10_rpt.pdf)>
- Rivers, Douglas. N.d. "Sample Matching: Representative Sampling from Internet Panels." YouGov/Polimetrix.  
<<http://www.polimetrix.com/documents/YGPolimetrixSampleMatching.pdf> > Accessed August 28, 2009.
- Samuelson, Darren. 2010. "GOP candidates knock global warming." *Politico*, August 18, 2010. Accessed August 24, 2011. <<http://www.politico.com/news/stories/0810/41192.html>>
- Sherman, David K., L.D. Nelson, Claude M. Steele. 2000. "Do messages about health risks threaten the self? Increasing the acceptance of threatening health messages via self-affirmation." *Personality and Social Psychology Bulletin*, 26, 1046-1058.
- Sherman, David K. and Geoffrey L. Cohen. 2002. "Accepting threatening information: Self-affirmation and the reduction of defensive biases." *Current Directions in Psychological Science*, 11, 119-123.
- Sherman, David K. and Geoffrey L. Cohen. 2006. "The psychology of self-defense: Self-affirmation theory," in Mark P. Zanna (ed.) *Advances in Experimental Social Psychology* 38: 183-242. San Diego, CA: Academic Press.
- Sides, John and Jack Citrin. 2007. "How Large the Huddled Masses? The Causes and Consequences of Public Misperceptions about Immigrant Populations." Paper presented at the 2007 annual meeting of the Midwest Political Science Association, Chicago, IL.
- Sides, John. N.d. "Stories, Science, and Public Opinion about the Estate Tax." Unpublished manuscript.
- Skinner, Chris J. 1989. "Introduction to Part A." In *Analysis of Complex Surveys*, C. J. Skinner, D. Holt, T. M. F. Smith, eds. John Wiley & Sons.

- Stanig, Piero. 2013. "Political Polarization in Retrospective Economic Evaluations Durings Recessions and Recoveries." *Electoral Studies* 32(4): 729-745.
- Steele, Claude M. 1988. "The psychology of self-affirmation: Sustaining the integrity of the self" in Leonard Berkowitz (ed.), *Advances in experimental social psychology* 21: 261-302. New York: Academic Press.
- Taber, Charles S. and Milton Lodge. 2006. "Motivated Skepticism in the Evaluation of Political Beliefs." *American Journal of Political Science* 50(3): 755-769.
- Zaller, John R. 1992. *The Nature and Origins of Mass Opinion*. Cambridge: Cambridge University Press.

## 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.

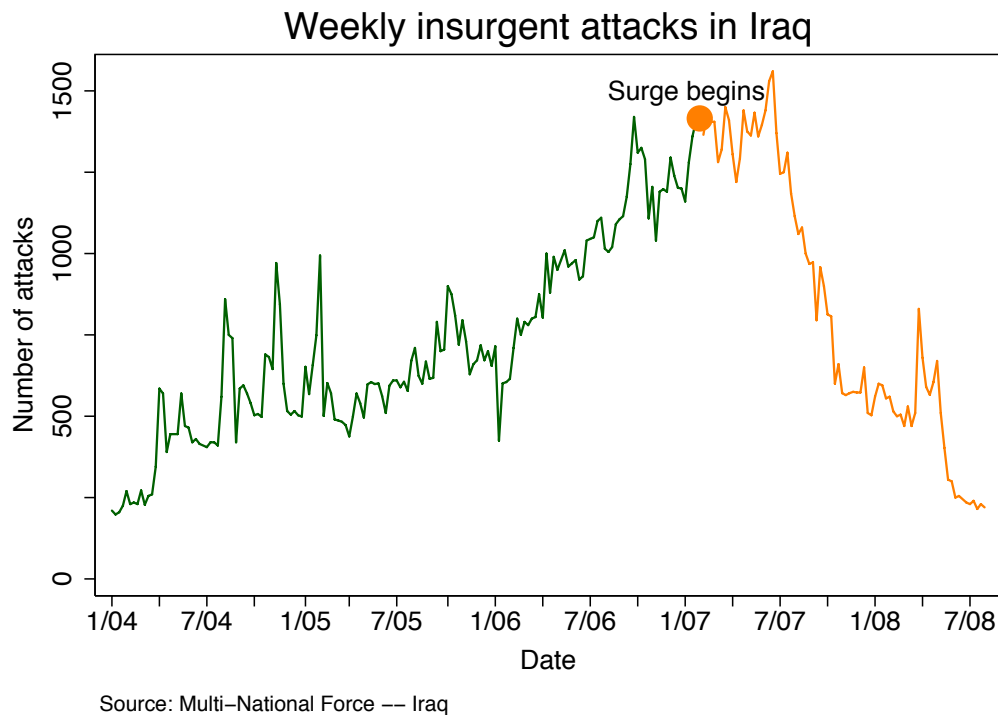
#### *Graph treatment*

##### [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*

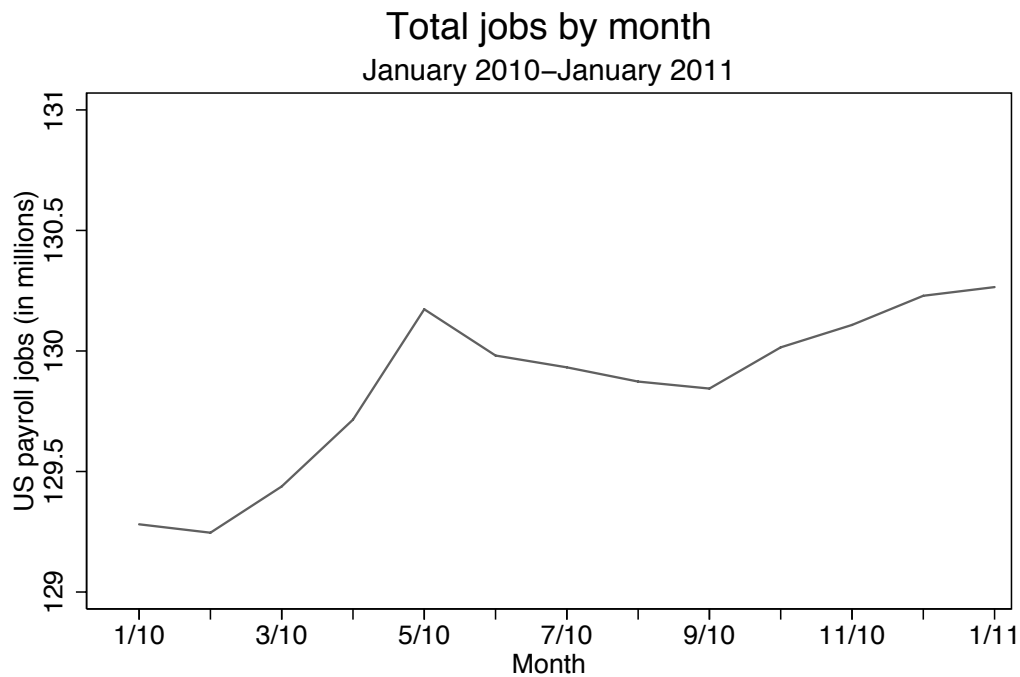
Please take a few minutes to list everything you've had to eat or drink in the last 24 hours. Don't worry about spelling, grammar, or how well written it is. Your answers will be kept confidential and not published in any form.

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.



Source: Bureau of Labor Statistics

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.

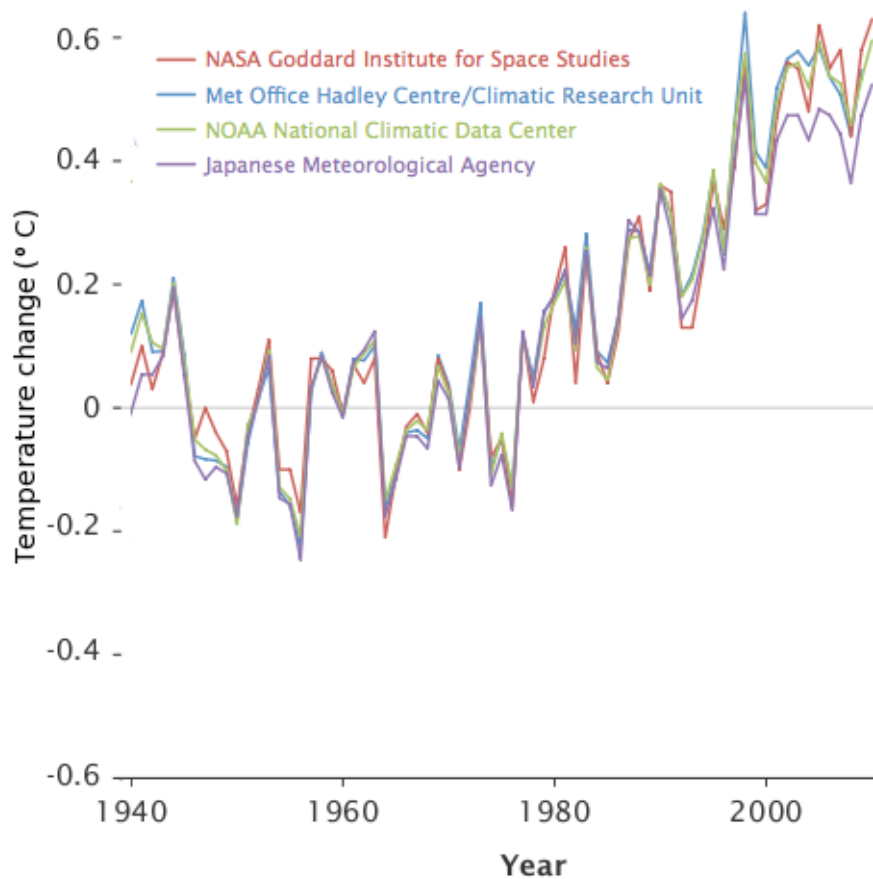
- Red
- Pink
- Orange
- Brown
- Yellow
- Green
- Blue
- Purple
- None of the above

*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. 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
<u>Change in insurgent attacks</u>							
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
<u>Job change under Obama</u>							
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
<u>Temperature change</u>							
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
<u>Global warming/causes</u>							
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