

Blank slates or closed minds?

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

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Abstract

Why do so many Americans hold misperceptions? One possibility is that they have not been exposed to clear factual information. If so, then presenting correct information in a compelling format should reduce these false or unsupported beliefs. Alternatively, people may have rejected accurate information because it threatened their worldview or self-concept – a mechanism that can be revealed by affirming individuals' self-worth, which might buttress them psychologically and make them more willing to acknowledge uncomfortable facts they would otherwise deny. We find support for both explanations across three experiments. Our results indicate that providing accurate information in graphical form reduces misperceptions. However, self-affirmation also substantially 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 that many people could offer correct answers if they were less psychologically threatening.

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Numerous 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 democratic consequences, determining why so many Americans are misinformed is a vital task for social science. In this paper, we therefore focus on factual beliefs rather than opinions – specifically, understanding the mechanisms by which people (fail to) learn relevant facts about politics or update inaccurate beliefs that they hold. We examine two potential explanations for the prevalence of misinformation. Both are complementary to 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 explanation we consider is that the prevalence of political misperceptions reflects an information deficit resulting from the public’s lack of interest in or knowledge of the political system (Delli Carpini and Keeter 1996). Many people may have failed to encounter accurate information about these issues or have only been exposed to that information in formats that easily allow for counter-argument (e.g., Nyhan and Reifler 2010). Under this view, delivering accurate information in a more persuasive format could substantially reduce misperceptions.

Alternatively, however, the principal cause of misperceptions may not be exposure to accurate information but people’s mindset when they think about

controversial issues. Many of the misinformed are likely to have already encountered and rejected correct information about these issues that was discomforting to their self-concept or worldview – especially among those people who already follow politics (Steele 1988). However, some of these individuals could potentially accept unwelcome facts (or make more accurate guesses) in a different frame of mind. In this scenario, buttressing people’s self-worth could reveal that they are willing to admit uncomfortable facts they would otherwise deny even *without any new information*. More importantly, such a finding would suggest that the threat posed by unwelcome information contributes to people denying facts under normal circumstances that they might accept in a more open or less defensive mindset.

These competing explanations have broad implications for how we understand the causes of inaccurate factual beliefs as well as the best approaches to reducing them. If misperceptions are rooted mainly in failures of information delivery, then presenting corrective messages in convenient and accessible formats should be effective at reducing 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 journalists, educators, and other groups. By contrast, however, if misperceptions are rooted in self-identity, then people with inaccurate beliefs are likely to be resistant to acknowledging potentially threatening information. In that case, approaches that help to mitigate the identity threat posed by unwelcome information might prove more useful. (We discuss these issues and the implications of our empirical results further in the conclusion.)

We test both approaches¹ in three experiments concerning issues where some citizens may be unwilling to acknowledge factual information that contradicts their preexisting beliefs about insurgent attacks in Iraq after the US troop surge (Study 1), job growth in the US from January 2010 to January 2011 (Study 2), and global temperature change over the past thirty years (Study 3). In each study, we independently randomize whether participants receive information in a compelling graphical format and whether they receive a self-affirmation treatment, a procedure adapted from social psychology 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 or uncomfortable facts.² Study 3 also directly compares the effects of graphical information with equivalent textual 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. The self-affirmation treatment also substantially reduces false or unsupported responses to factual questions among respondents who might find providing 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

¹ We have elected to structure our article as a test of theories about the effects of information deficits and motivated reasoning on misperception belief, though our findings also contribute to the literature on the factors that exacerbate or inhibit motivated reasoning more generally (see, e.g., Bolsen et al. 2014, Druckman et al. 2012).

² The value of this manipulation is that it lets us test an important explanation for defensive responses to counter-attitudinal information that is otherwise difficult to evaluate (as we explain further below). We discuss the practical applicability of our self-affirmation results further in the conclusion.

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 counter-attitudinal facts appears to inhibit people from acknowledging the true state of the evidence on controversial issues.

Theoretical approach

The simplest explanation for the prevalence of misperceptions is that factual information has not been encountered and encoded by members of the public, who are typically politically inattentive at best (e.g., Delli Carpini and Keeter 1996). Results from several studies indicate that providing accurate information can change people's policy preferences (Kuklinski et al. 2000 [study 2], Bullock 2007, Gilens 2001, Howell and West 2009, Sides N.d.), suggesting that the facts in question were novel or had not been sufficiently considered before and that respondents' previous opinions may have been based on inaccurate information.

One problem 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 reducing knowledge deficits on misperceptions, we therefore rely primarily on graphs, which we hypothesize should reduce misinformation more effectively than text (a proposition we test directly in Study 3). As a means of communicating information, graphs have several desirable properties. First, they can convey a significant amount of information or data in a compact form, which is a key concern given the cognitive and linguistic complexity of most information

that is provided to the public about controversial issues. 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., the change in an economic indicator under a given president).³ Third, the use of 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; Fritz, Keefer, and Nyhan 2004).

Another explanation for the prevalence of misperceptions is not a lack of information, but the psychological mindset with which people consider the validity of these claims. The prevalence of motivated reasoning about politics is by now well-established. Numerous studies have found that people tend to evaluate information with a directional bias toward their previous beliefs (e.g., Lord, Ross, and Lepper 1979, Edwards and Smith 1996, Munro and Ditto 1997, Taber and Lodge 2006; for reviews of the psychology literature, see Kunda 1990 and Molden and Higgins 2005). In particular, 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 misperceptions⁴ among resistant groups and sometimes actually strengthens them (Nyhan and Reifler 2010; for a review of the literature on misinformation, see Nyhan and Reifler 2012).

³ Prior (2014) considers visual measures of political knowledge, but does not provide his respondents with corrective information in visual form.

⁴ 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 (insurgent attacks in Iraq, payroll jobs in the US, and average global temperatures). As a result, the misperceptions in question can be directly disproven.

Why do individuals so often engage in motivated resistance to politically uncomfortable facts? Steele (1988) offers a theoretical framework that can help us understand this phenomenon. According to his account, individuals are motivated to protect their general self-integrity from threat, including unwelcome information that calls into question their beliefs and attitudes. 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.⁵ 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 the process of self-affirmation reduces motivated reasoning about several controversial political issues (see also Sherman, Nelson, and Steele 2000). Studies also show that self-affirmation can make people more receptive to health risk information (Harris and Epton 2009, Howell and Shepperd 2012).

If this account is correct, then motivated reasoning about facts is not driven by the dissonance between one's political views and the evidence in question, but by the implications of that evidence for one's self-worth or integrity. For instance, most Americans have presumably been exposed to the overwhelming evidence that President Obama was born in the United States. At this point, the persistence of that claim cannot plausibly be attributed to a lack of information. We suggest instead that conceding the

⁵ For a more detailed discussion of self-esteem maintenance mechanisms, see Tesser (2000).

validity of this evidence would constitute acceptance of the president’s legitimacy and thereby be psychologically threatening to so-called “birthers.”

Along these lines, we hypothesize that it is threatening for people to concede the validity of politically uncomfortable facts, 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 can 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 thoughtfully⁶ and provide more accurate answers *even in the absence of new information*.⁷

Before proceeding, it is important to note that the success of self-affirmation can be contingent on personal or situational relevance (for reviews of the literature, see Sherman and Cohen 2002, 2006 and Cohen and Sherman 2014). If an issue is not personally important, disconfirming information about it may pose little threat to one’s perception of self-integrity. By contrast, challenging information about an especially important or relevant issue may be more threatening and likely to provoke defensive processing. Correll et al. (2004) find a debiasing effect of self-affirmation on information

⁶ We verify this mechanism directly in Study 2, which allows us to measure response times for the misperception question (see below for details).

⁷ An alternate approach is employed by Bullock et al. (2013) and Prior, Sood, and Khanna (N.d.), who find that providing monetary incentives reduces partisan polarization in factual beliefs – a different outcome measure than we study. Like ours, these studies suggest that respondents may know more than their answers suggest. However, Bullock et al. find no main effect of incentives on respondent accuracy (Appendix C). These studies also often use difficult factual questions with numeric answers (e.g., the percentage of TARP loans that were repaid), which means that the treatment effects they obtain may reflect changes in guessing strategies rather than the revelation of previously undisclosed knowledge.

processing about a tuition increase only among individuals who viewed the issue as important. 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 inconvenient facts for those who are otherwise unwilling to acknowledge them. 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. Previous studies in psychology suggest that self-affirmation should reduce biased processing of information, 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 the interaction between the two treatments. In this context, self-affirmation could increase receptivity to counter-attitudinal information about political issues, but presenting information graphically may be sufficiently unambiguous that affirmation does not affect how respondents process it.

We test these expectations in three studies below. Each study concerns a salient factual dispute related to a controversial political issue. We tested beliefs about three different topics to ensure that our results generalize as much as possible: 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 war strategy known as “the surge” that included a substantial increase in the number of US troops in Iraq and changes in counterinsurgency tactics (see, e.g, Ricks 2009). Civilian fatalities and insurgent attacks against coalition forces declined dramatically following the surge (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 they remained relatively low given the magnitude of the decline in violence. For instance, ABC News/*Washington Post* polls found that the number of Americans who thought 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 along partisan lines. A February 2008 Gallup poll found that 70% of Republicans thought the surge was making the situation in Iraq better, but only 21% of Democrats and 37% of independents agreed (Jones 2008). Meanwhile, 31% of Democrats (along with 21% of independents and 6% of Republicans) said the surge was making the situation *worse*. These differences could be the result of respondents applying

differing standards to available evidence,⁸ 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 on the ground 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 beginning of the surge. We expected that this treatment would increase the accuracy of the public's factual beliefs about the surge.⁹

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 randomly assigned respondents to view a graph showing the substantial decline in the number of insurgent attacks in Iraq since the troop surge began (*Graph*) or to a control condition in which respondents did not receive any additional information. As noted above, this design differs from the psychology literature

⁸ Gaines et al. (2007) found that a college student sample had relatively accurate perceptions of US casualties in Iraq and whether weapons of mass destruction had been found there, but differed widely in their interpretations of these facts.

⁹ As an anonymous reviewer suggested, it is possible that many people may not think they know how attacks have changed after the surge and are therefore less likely to be threatened by corrective information than on other, more salient misperceptions. Given how controversial the Iraq war was during the Bush presidency, however, we still expect very significant motivated reasoning among respondents (as indeed we find). Moreover, if this logic is correct, finding an effect of the self-affirmation treatment would be less likely, but we find one nonetheless (see results below).

on 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, which was 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 that value was “especially important to you and made you feel good about yourself.”¹⁰ 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 of attacks against US and coalition forces in Iraq between January 2004 and August 2008 illustrating the dramatic decrease in attacks after the surge began. The control group was given a summary of the surge but no information about its effects. (All study materials and question wording are provided in the online appendix.)

Study 1: Dependent variable

We focus on this measure of factual belief about changes in attacks after the surge:

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?

¹⁰ Asking participants to write essays about important values is a common design in self-affirmation studies (the design was used in 19 of 69 articles surveyed by McQueen and Klein 2006).

Respondents answered on a five-point Likert scale ranging from “decreased substantially” to “increased substantially.” As in all of the studies in this article, the dependent variable was coded so that lower values indicate more accurate beliefs (attacks decreased), while 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. It was constructed from a large pool of more than 50,000 opt-in respondents using a technique called sample matching that seeks to approximate a random probability sample (Rivers N.d.). Given concerns about the validity of opt-in Internet samples (e.g., Baker et al. 2010, Pasek and Krosnick 2010, Yeager et al. 2011), we do not claim that our results are perfectly nationally representative,¹¹ but the sample composition closely resembles those obtained using traditional methods.¹² For instance, 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 2008.¹³

¹¹ CCES respondents may still be somewhat more sophisticated or likely to participate in politics than respondents contacted via a random probability sample, but such discrepancies should not threaten the internal validity of our results since we randomize exposure to the treatments of interest.

¹² 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.

¹³ To obtain the relevant estimates (37% Democrat, 29% independent, and 27% Republican), go to http://www.huffingtonpost.com/2009/04/30/party-id_n_725948.html, exclude Internet and automated

Study 1: Results

Rather than estimate a complicated set of interactions that are difficult to interpret, we estimate separate ordered probit models for respondents who said they oppose withdrawing from Iraq in a pre-treatment question (column 1), those who said they were not sure (column 2), and those who support withdrawal (column 3), which simplifies the presentation of our results.¹⁴ To increase the precision of our estimates, we include indicators for black respondents, women, college graduates, Republicans (including leaners), independents, and those who view the war as an “extremely important” issue. Each model is estimated using survey weights to maximize the representativeness of the estimates and include linearized standard errors.¹⁵

[Table 1]

We observe an encouraging result – *Graph* reduces misperceptions about the change in insurgent attacks relative to controls (as indicated by the negative 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 ($p < .15$).¹⁶

phone polls (under Tools: Filter), and set the date range to October 1, 2008 to October 31, 2008 (under Tools: Date Range). These estimates are derived from a loess regression on partisan ID estimates obtained in polls conducted in the date range selected.

¹⁴ We provide summary statistics (mean, standard error of the mean, and sample size by condition and overall) for the dependent variable used in this study as well as those from Studies 2 and 3 in the appendix.

¹⁵ 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).

¹⁶ 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.

Our results for the affirmation treatment are intriguing. Specifically, it 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.¹⁷ However, there is an offsetting interaction between *Affirmation* and *Graph* ($p < .05$). As a result, the marginal effect of *Affirmation* is not significant among withdrawal supporters who receive *Graph* (this finding is discussed further below). No other subgroup is significantly affected.¹⁸

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 their position toward withdrawal and experimental condition.¹⁹

[Figure 1]

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 who not sure about withdrawal from Iraq. The results are most striking, however, for withdrawal supporters. We see a large effect

¹⁷ Previous research by Correll et al. (2004) suggests that self-affirmation may have the largest effects among those for whom an issue is extremely important. In this case, we found that high issue importance does not moderate the effect of *Affirmation* (results available upon request), which may be the result of our focus on the Iraq war, which was highly salient and relevant politically.

¹⁸ One concern in self-affirmation studies is that the results could be the spurious result of an improvement in mood relative to control conditions. Only a few studies have found support for this claim (McQueen and Klein 2006: 299), but we check for it in this and subsequent studies and find no evidence that *Affirmation* improved mood. We thus do not discuss the issue further (results available upon request).

¹⁹ The predicted values we present average over the distribution of the other covariates in the sample. In other words, they represent the average of the predicted probabilities of the outcome within the data used in each study, not the predicted probability for a hypothetical individual with specific characteristics.

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 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 success of the surge in Iraq. Many Americans were presumably uninformed about the facts. *Graph* therefore significantly reduced misperceptions for respondents regardless of their position toward withdrawal from Iraq. Others, however, may have found it threatening to concede the surge's success. By buttressing people's self-worth against this identity threat, *Affirmation* reduced misperceptions significantly among a group of respondents who would otherwise be *least* likely to accept such a claim (supporters of withdrawal). However, *Affirmation* has no additional marginal effect among respondents who receive *Graph* – a result we attribute to the clarity of the visual presentation of the data. When the factual correction is obvious and salient in this way, it is difficult for respondents to counter-argue, which reduces misperceptions even among unaffirmed participants and thereby limits the possible effects of *Affirmation*.

Nevertheless, Study 1 has several limitations. First, it focuses on an issue where the group motivated to hold a misperception was dominated by Democrats (70% including leaners). However, Nyhan and Reifler (2010) found the most intense reaction to corrective information among conservatives. It would therefore be desirable to establish that the positive effects of *Affirmation* and *Graph* hold for a group with more conservatives and Republicans. Second, though our study was designed at a time when the success of the Iraq surge was still a matter of partisan debate, an elite consensus emerged by the time the survey was fielded that the counterinsurgency strategy was a success. As a result, leading Democrats had largely stopped debating the wisdom of the surge by October 2008, which may have reduced counter-arguing among war opponents. Finally, at the time the survey was conducted, the economic crisis had supplanted Iraq and foreign affairs as the dominant campaign issue, which again may have reduced the incentive for motivated reasoning.

It is also important to note that the results we present here are conservative estimates of the effects of our experimental treatments due to non-compliance. Subjects may have failed to closely examine *Graph*, reducing its effects. Similarly, in the *Affirmation* condition, some subjects did not write the essay as directed (21% did not write anything, 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.²⁰

²⁰ 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). Instrumental variables estimates of the ATT for *Affirmation* in each study are larger in magnitude (available upon request)

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 has been the most salient issue in national politics since fall 2008. Barack Obama's victory can be attributed in large part to the economy (Scotto et al. 2009), which is the dominant factor in presidential elections (e.g., Hibbs 2008). The state of the economy also appeared to contribute to the GOP's near-landslide victory in the 2010 elections – a conclusion buttressed by previous studies showing the economy plays a key role in midterm elections (e.g., Jacobson 2008, Hibbs N.d.). During the period in which Study 2 was conducted (February 2011), the economy continued to dominate 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 the job he is doing 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

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 the number of nonfarm payroll jobs reported each month by the Bureau of Labor Statistics increased from 129.3 million in January 2010 to 130.3 million in January 2011. (Stimuli are provided in the appendix.)

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):

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?

Respondents who answered that jobs had gone up or down were asked branching followups about whether they had gone down (or up) “somewhat” or “a lot.” We constructed a five-point Likert scale from these responses 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).²¹

Study 2: Sample

This study was conducted using Qualtrics online survey software with participants from Amazon’s Mechanical Turk website, which is increasingly used in experimental research. Recent studies by economists (Horton, Rand, and Zeckhauser 2011), psychologists (Buhrmester et al. 2011), and political scientists (Berinsky, Huber, and Lenz 2012) have validated the use of Mechanical Turk by replicating previously published findings using participants recruited on the site.²² All three papers note that participants from Mechanical Turk are more diverse than typical undergraduate convenience samples. In our case, 41% 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

²¹ Equivalent response time information is not available from Study 1 or Study 3.

²² We are also reassured by the fact that the results from this study are generally consistent with those in Studies 1 and 3, which do not use Turk participants. There is thus no indication that the particular characteristics of Turkers are driving our results.

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.

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 divide each subgroup by issue importance in the table below.

Table 2 presents the results of our ordered probit models of beliefs about job change since January 2010 disaggregated by approval of Obama on the economy and whether the economy was the most important issue.²³

[Table 2]

²³ In these models and in those reported in Study 3 below, we include heteroskedasticity-robust standard errors, which could not be used in Study 1 due to the need to account for the survey weights from CCES.

We find that *Graph* has a strong misperception-reducing effect for each subgroup ($p < .01$), while *Affirmation* significantly reduces misperceptions 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 ($p < .05$). However, this effect is again offset for respondents in the graph condition as indicated by a marginally significant interaction term in the opposite direction ($p < .10$). As a result, *Affirmation* has no significant effect for respondents who receive *Graph*.²⁴

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.²⁵ Predicted probabilities are presented in Figure 2.

[Figure 2]

As the figure shows, *Affirmation* substantially reduced misperceptions among 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

²⁴ Interestingly, *Affirmation* may also have changed how respondents who are neutral toward Obama on the economy and view it as the most important issue reacted to the graph. The self-affirmation treatment causes a marginally significant *increase* in misperceptions among this group ($p < .10$), but respondents who received *Affirmation* and *Graph* report lower misperceptions than those who receive the graph alone ($p < .05$). Among the subgroups considered in this article, these are the only respondents who were significantly more likely to accept the information in *Graph* if affirmed (the result predicted by Cohen et al. 2000).

²⁵ Predicted probabilities for respondents who are neutral or approve of Obama on the economy are available upon request.

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 (26% said jobs decreased in each case). 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, 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.²⁶ 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

²⁶ The mean of the response time distribution is 8.98 seconds and the standard deviation is 4.89 seconds.

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*, 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 using response time data that *Affirmation* caused respondents in this group to take longer to answer the dependent variable, suggesting they were considering it in a more careful or 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. 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 (e.g., McCright and Dunlap 2011) and strong evidence of motivated reasoning (e.g., Hart and Nisbet 2012).

This approach also allows us to address several possible concerns about our previous studies. First, both studies presented information that could be seen as good news; will affirmation have the same effects when the corrective information is *worse* than expected (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 source of the global temperature information is identical in the two correction conditions, allowing us to hold source fixed when comparing graphical and textual treatments. Finally, the previous studies used between-subjects designs that compared post-treatment beliefs among participants. In this study, we assessed beliefs in misperceptions about global warming before and after treatment, allowing us to control for respondents' pre-existing views.

Study 3: Hypotheses and design

Our approach closely mirrors that of Studies 1 and 2, but adds a textual information condition. Specifically, 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 showing change in global average temperature – *Graph*), a textual information condition (a paragraph describing change in global average temperature – *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 (and virtually identical to those in Study 1). Our graph treatment is adapted from a line graph in a NASA press release showing the difference in average global temperature (relative to a baseline period) from 1940 to 2010 from four climate data sources.²⁷ The textual treatment describing the data was adapted from language in the press release. (Stimuli are presented in the online appendix.)

Study 3: Dependent variables

In this study, we measure respondents' specific perceptions of global temperature change and their more general beliefs about global warming – a departure from the single outcome measures used in Studies 1 and 2. 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 the narrower topic of global temperatures. (Research by Gaines et al. [2007] suggests that people might interpret disconfirming information in an attitude-consistent manner rather than updating their beliefs.) Second, we sought to estimate the direct effect of the self-affirmation treatment on general global warming beliefs rather than just temperatures (a narrower topic where respondent mindsets might matter less).

The first outcome measure, *Temperature change*, is constructed using a similar approach to Study 2:

²⁷The press release is available at <http://www.giss.nasa.gov/research/news/20110113/>.

Would you say that average global surface temperatures have gone up, stayed about the same, or gone down in the last thirty years?

Respondents who answer that global temperatures had “gone up” or “gone down” were asked branching followups about whether the temperature had gone down (or up) “somewhat” or “a lot.” We constructed a five-point Likert scale from these responses ranging from “Gone down a lot” to “Gone up a lot” where higher values indicate greater misperceptions since temperatures increased significantly during this period.

Our second dependent variable, *Global warming*, comes from a question used in CNN/Opinion Research Corporation (ORC) surveys that asks respondents to choose which of three statements is closest to their view on global warming:

- Global warming is a theory that has not yet been proven.
- Global warming is a proven fact caused mostly by natural changes that have nothing to do with emissions from cars and industrial facilities.
- Global warming is a proven fact and is mostly caused by emissions from cars and industrial facilities such as power plants and factories.

We ask this question before and after the experimental treatments. (We include the pre-treatment question as a control variable in analyses below.) Both variables are coded so that higher values represent more misinformed views.

We consider both of these 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 (the question is available in the online appendix).

As a check on data quality, we asked the standard ANES party identification questions. Five respondents (about 1%) self-identify as Democrats or Democratic leaners, while approximately 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. Not surprisingly, a sample of self-identified Republicans is less racially diverse than the sample used in Study 2 (which was not pre-screened on party) – nearly the entire sample (95%) is white. 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.

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.²⁸ We therefore instead use party affiliation as the relevant variable, dividing self-identified strong Republicans from other respondents. Our assumption is that strong Republicans are more likely to be threatened by information showing rising global temperatures, which contradicts statements by an increasing number of 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. We include indicator variables for women, college graduates, and those who think the issue is extremely important plus a control variable for respondents’ pre-treatment beliefs about global warming. However, we exclude an indicator for black respondents since there are only two in the sample.

²⁸ 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).

Table 3 presents results of our ordered probit models of *Temperature change* and *Global warming* divided by whether respondents are strong Republicans.

[Table 3]

As in the previous two studies, *Graph* 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* 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* is significantly more effective at reducing misperceptions about climate change and global warming than *Text* in three of the four models ($p < .01$; columns 1, 2, and 4).²⁹

In addition, *Affirmation* reduces misperceptions among those most likely to be threatened by the fact in question. Looking again at Table 3, we see that *Affirmation* decreases the likelihood that strong Republicans 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 increase receptivity to corrective information. Instead, as in Study 1, the *Affirmation x graph* interaction is in the

²⁹ These results do not appear to be driven by systematic 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 the treatments. Moreover, we observe no significant difference in the length of time respondents spent considering each treatment (results available upon request).

opposite direction and marginally significant for strong Republicans on *Global warming* ($p < .10$), indicating that the misperception-reducing effects of *Affirmation* were eliminated among respondents exposed to the graph.

To illustrate these results, we again calculate 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.

[Figure 3]

Predicted misperceptions about global temperatures are much lower among 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 recipients of *Graph*). By contrast, *Text* and *Affirmation* are ineffective.

Since our stimuli only directly address temperature change (and not the role of humans in causing it), we restrict our attention to the predicted probabilities that respondents will agree that “Global warming is just a theory” in Figure 4.

[Figure 4]

Among those who are not strong Republicans (the group we believe is most strongly motivated to reject counter-attitudinal information on the issue), none of the treatments

significantly reduces belief that global warming is just a theory. However, for strong Republicans, agreement declines from 57% among unaffirmed respondents in the control group to 39% among those who received *Graph*. (By contrast, *Text* only reduced predicted belief to 53% among unaffirmed strong GOP identifiers.) Finally, *Affirmation* reduced misperceptions among strong Republicans, 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*.

Study 3: Discussion

The results of Study 3 generally affirm 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 misperception in question (in this case, strong Republicans). However, as in Studies 1 and 2, *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 increase receptivity to new information because our treatments (especially *Graph*) appear to overcome counter-argument among 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 possible theories. One plausible explanation is that people have simply not been exposed to accurate information in a convincing format. Alternatively, the threatening nature of corrective information itself may cause people to reject information that contradicts their preexisting views. Results from three experiments provide support for both explanations. 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 respondents 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. More specifically, our results show 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,³⁰ these results suggest that journalists covering stories about changes or trends where misperceptions are likely should consider

³⁰ It is an open question whether graphics and visual information could be effective for non-quantitative issues where misperceptions are common more generally (see, e.g., Travis 2010).

using graphs in their stories. 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 such as news reports that are more likely to include partisan cues and references to controversial figures that could stimulate motivated reasoning (Bolsen et al. 2014; see, e.g., the stimulus materials in Nyhan and Reifler 2010).³¹

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. Even after receiving compelling graphical information, non-trivial proportions of respondents continued to hold false beliefs. This finding suggests that information deficits are not the only cause of misperceptions; psychological factors also appear to play an important role.

In particular, we found that the self-affirmation treatment (but not corrective information) resulted in decreased misperceptions among motivated subgroups. 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.

Future research should investigate how our results relate to the psychology literature on self-affirmation, which typically does not explore the effects of affirmation

³¹ In our studies, we isolated the corrective information of interest and provided it directly to participants so that we could most precisely identify its effects.

on factual beliefs or on respondents who do not receive new information, and to further specify the conditions under which issue importance moderates the effects of affirmation. These findings also have important practical and normative implications. Self-affirmation is seemingly not a scalable intervention in politics,³² but it offers insights into the psychology of misperceptions that could be applied in practice – for instance, by testing whether corrective information from identity-congruent sources is more persuasive (Nyhan and Reifler 2013).

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 in the political environment at the time of our research. While we are confident that our conclusions generalize, it is possible that some aspects of the misperceptions or time period that we consider are idiosyncratic or unusual. Second, it would be desirable to conduct further studies on nationally representative samples (like Study 1) rather than convenience samples (like Studies 2 and 3), though we have no reason to believe that our results are sensitive to the samples used. Finally, while we find that graphs are effective in general (and specifically more effective than text in Study 3), our studies were not designed to examine *why* graphs are so effective. Future research should explore this question further.

In the end, these results underscore the challenges faced by those who hope to reduce misperceptions among the public. The idealized democratic citizen is largely a fiction. Ironically, it is the importance of politics to (some) people's self-concept that

³² While journalists or politicians might try to flatter their audiences, it seems difficult for a third party to affirm people's self-worth. Indeed, it may be more likely that politicians who wish to maintain a misperception may seek to increase the issue's perceived importance in order to inoculate their supporters against corrective information they might encounter. (See Cohen and Sherman 2014 for examples of recent applications in education and health, however.)

makes it so hard to let go of misperceptions. Instead, we find that individuals can become *better* informed about politics when it is less important to them. 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.

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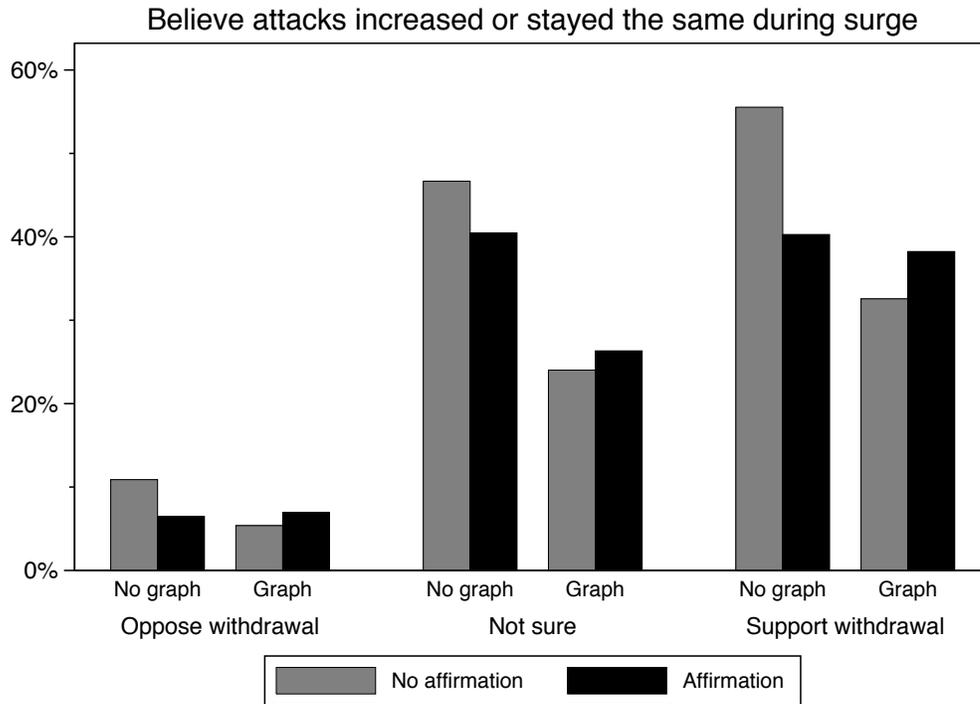
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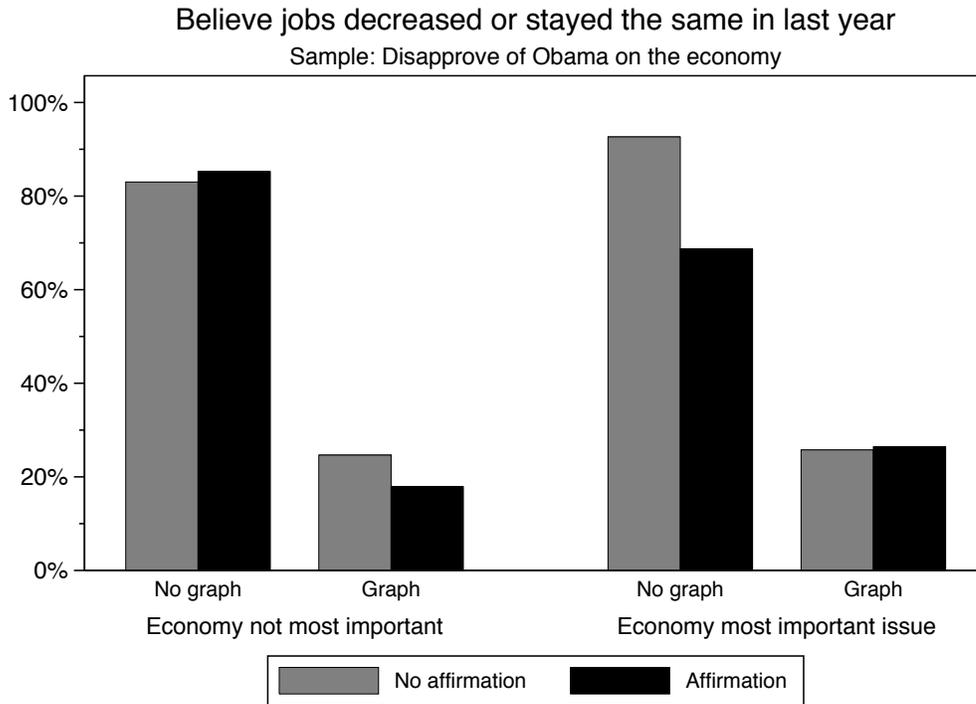
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Figure 1



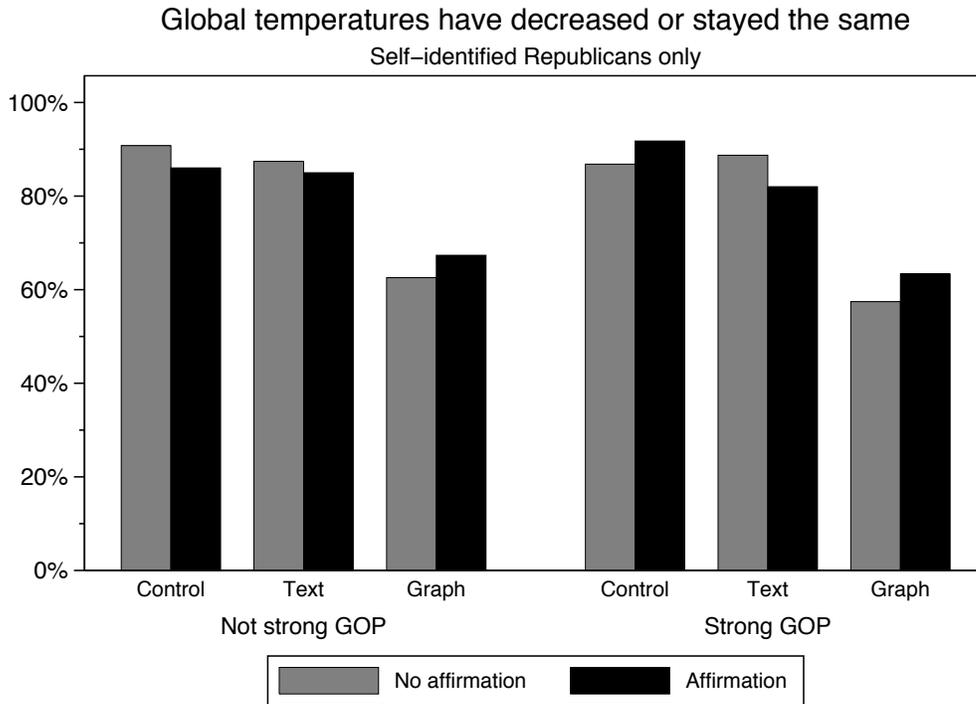
Predicted probabilities from the ordered probit models in Table 1 estimated using survey weights. The figure presents the estimated probability that a respondent would answer “Attacks have stayed the same,” “Attacks have increased slightly,” or “Attacks have increased substantially” to the question “From 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?” Experimental materials are provided in the Supplementary Information.

Figure 2



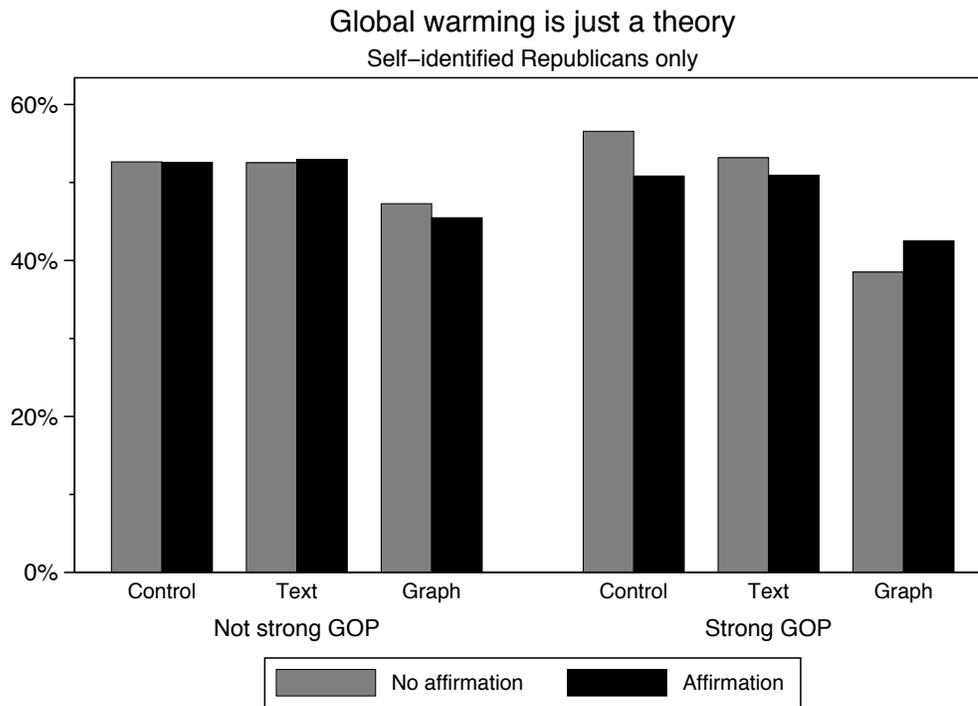
Predicted probabilities from the ordered probit models in Table 2. The figure presents the estimated probability that a respondent who disapproves of President Obama’s performance on the economy would answer “Gone down” or “Stayed about the same” to the question “Would you say that, compared to January 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.

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.

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.

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.

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 (0.35)	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.

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 (0.32)	-0.01 (0.32)	-1.31* (0.66)
Graph	-1.17** (0.31)	-1.11** (0.32)	-0.33 (0.31)	-2.31** (0.62)
Text	-0.21 (0.27)	0.11 (0.30)	-0.01 (0.33)	-0.87* (0.43)
Affirmation x graph	0.43 (0.43)	-0.14 (0.45)	-0.10 (0.50)	1.55 (0.81)
Affirmation x text	0.16 (0.43)	-0.68 (0.44)	0.03 (0.53)	0.89 (0.72)
Female	-0.01 (0.17)	-0.54** (0.18)	0.15 (0.21)	0.39 (0.28)
College graduate	-0.15 (0.18)	0.22 (0.18)	0.20 (0.21)	0.06 (0.28)
Extremely important issue	-0.00 (0.10)	-0.14 (0.09)	-0.12 (0.13)	-0.09 (0.13)
Prior misperception	0.61** (0.11)	0.58** (0.12)	0.61** (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.

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.

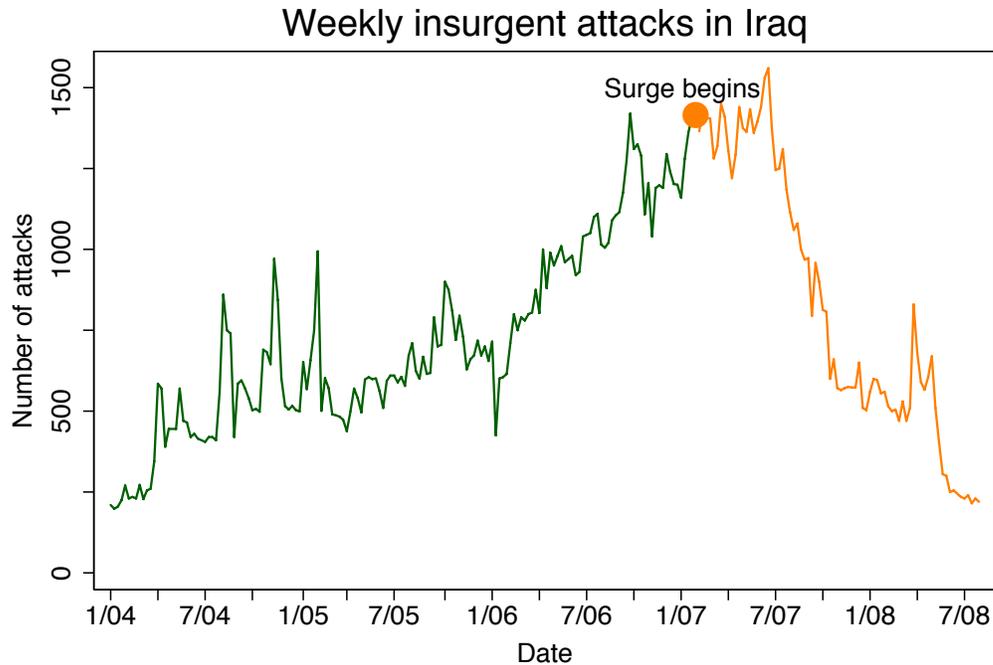
Graph treatment

[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.



Source: Multi-National Force -- Iraq

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.

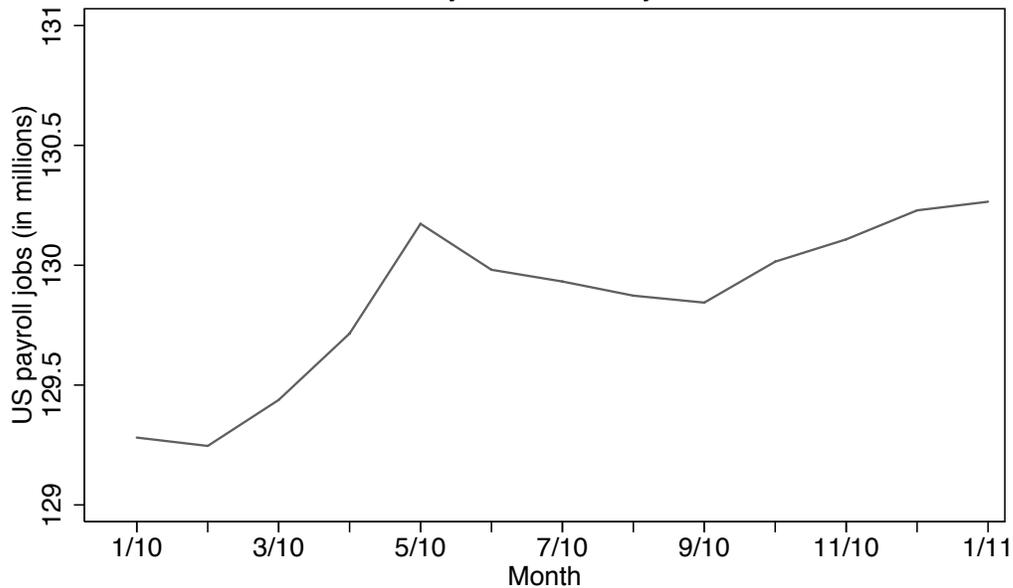
NOTE: The survey will allow you to move to the next page after a reasonable amount of time has elapsed. Please take all the time you need to answer the question thoroughly.

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.

Total jobs by month January 2010–January 2011



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.

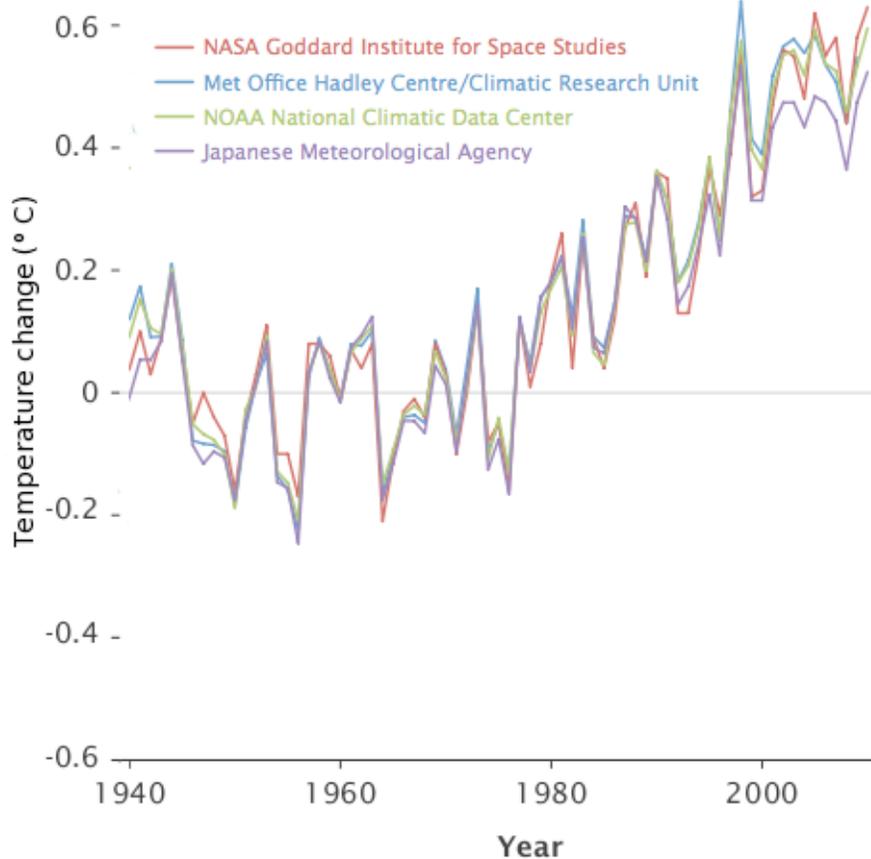
Please indicate your favorite color.

- 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]

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