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

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Abstract

Why do so many Americans hold misperceptions? We examine two factors that contribute to the prevalence of these beliefs. First, presenting correct information should reduce misperceptions, especially if provided in a clear and compelling format. We therefore test the effect of graphical information, which may be especially effective in facilitating belief updating about changes in quantities over time. In some cases, though, people may reject 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 test both mechanisms jointly. In three experiments, we find that providing information in graphical form reduces misperceptions. A third study shows that this effect is greater than for equivalent textual information. Our findings for self-affirmation are more equivocal. We find limited evidence that self-affirmation can help diminish misperceptions when no other information is provided, but it does not consistently increase willingness to accept corrective information as previous research in social psychology would suggest. These results suggest that misperceptions are caused by a lack of information as well as psychological threat, but that these factors may interact in ways that are not yet well understood.

Why do people so often fail to learn relevant facts about politics or update the inaccurate factual beliefs that they hold? Surveys show incorrect or factually unsupported beliefs about politics are widespread. From myths about "death panels" to skewed beliefs about the economy, misperceptions can distort public debate and warp people's preferences over policies and candidates (Althaus 1998, Gilens 2001, Bartels 2002, Kull et. al 2003/2004, Nyhan and Reifler 2012). Given these perverse consequences, determining why so many Americans are misinformed is a vital task for social science.

In this article, we consider two hypotheses about the prevalence of misperceptions and how they might interact. First, people may not have encountered accurate information about an issue or encountered it in formats that easily allow for counter-argument (e.g., Nyhan and Reifler 2010). Under this view, the format in which information is delivered could substantially affect misperceptions. Graphic presentation of data may be an especially potent form of communication when communicating structure or statistical relationships (Meyer et al. 1999). For example, line graphs (which our experiments use) convey how quantities of interest change over time whereas bar graphs are well suited to making comparisons across groups. When the presentation matches the structure in what Zacks and Tversky call "bar-line message correspondence" (1999: 1073), then communication should be particularly effective.

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

On high-profile issues, many of the misinformed are likely to have already encountered and rejected correct information that was discomforting to their self-concept or worldview (Steele 1988).

Could some people potentially accept unwelcome facts in a different frame of mind? For instance, accuracy motivations can supplant directional motivations under certain conditions (e.g., Bolsen and Druckman 2015). From this perspective, buttressing people's self-worth could potentially help them acknowledge uncomfortable facts without any new information. Such a finding would suggest that people deny facts they might otherwise accept because of the psychological threat that they pose.

These explanations have broad potential 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 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. By contrast, if misperceptions are more rooted in self-identity, people with inaccurate beliefs are likely to resist threatening information when they think about it or are presented with it, suggesting that identity threat is the key mechanism. (As we discuss below, these explanations are not mutually exclusive.)

We test both approaches and their interaction in three experiments concerning issues for which some citizens may be unwilling to acknowledge factual information that contradicts their preexisting beliefs. In each study, we independently randomize whether participants receive information in a graphical format and whether they receive a self-affirmation treatment, a procedure that allows us to measure the counterfactual of how people might react if they were buttressed against identity threat from politically uncomfortable facts.

We find that delivering corrective information in graphical form successfully decreases reported misperceptions relative to controls in all three studies. In Study 3, we additionally show that a graph reduces misperceptions more than equivalent text. We also find limited evidence that self-affirmation can reduce false responses to factual questions among respondents who might find an

accurate answer to be threatening relative to controls. These findings suggest that some misinformed individuals may already be at least tacitly aware of the correct information but uncomfortable acknowledging it. If so, misperceptions are not just an information problem; the threatening nature of certain facts may also inhibit people from acknowledging the true state of the evidence on controversial issues. However, we find little evidence that self-affirmation increases receptivity to corrective information. We discuss the implications of this finding, which contradicts past research in social psychology, further in the conclusion.

Theoretical approach

One of the simplest explanations for the prevalence of misperceptions is that factual information has not been encountered and encoded by many members of the public. One challenge for remedying information deficits is that even respondents who are exposed to facts may not successfully process them and/or update their beliefs due to limits on their attention, motivation, or capacity to understand complex political information (e.g., Zaller 1992, Lupia and McCubbins 1998). To test the effects of providing information on misperceptions, we therefore rely primarily on graphs, which we expect could reduce misinformation more effectively than text. The idea that graphical data would be compelling and persuasive is hardly new. Washburne (1927) claimed that, except for trying to remember specific values, graphs were better than tables in nearly all other instances. More recently and closer to political science, prominent voices have championed the use of graphs as a way to facilitate understanding of data and models (e.g., Gelman et al. 2002). Despite the intuitive appeal of these accounts, results from experimental studies are mixed (see Meyer et al 1999: 571 and Vessey 1991 for reviews). Given the contested nature of this literature in psychology and decision sciences, we explicitly test the effectiveness of graphs versus text in Study 3.

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One criticism of studies that do not find that graphs communicate information more effectively is that they often rely on random data, whereas social data often have structure. Our primary justification for the use of graphs comes from Meyer et al. (1999) and their argument that graphical data are likely to be effective because they communicate the inherent structure of change over time. The power of visual information to convey relationships like this is sometimes referred to as visual statistical learning (VSL). While the findings from psychology are well documented, the testing paradigm is typically very abstract (e.g., Fiser and Aislin 2002). Our studies therefore provide an important test case for the power of graphs about real topics rather than abstract studies in a lab.

Another factor that may contribute to the prevalence of misperceptions is the psychological mindset with which people consider factual questions about controversial issues (either when considering their own beliefs or processing new information). People tend to evaluate information with a directional bias toward their existing beliefs, interpreting ambiguous or mixed information as consistent with those views and resisting or rejecting counter-attitudinal information (e.g., Lord, Ross, and Lepper 1979, Kunda 1990, Taber and Lodge 2006).

Why do individuals so often engage in motivated resistance to politically uncomfortable facts? Steele (1988) offers a novel psychological explanation for this phenomenon. According to his account, individuals are motivated to protect their general self-integrity from threat, including unwelcome information that calls their beliefs and attitudes into question.[1] As such, they tend to reject such information or interpret it in a favorable manner. In this view, individuals who encounter threatening information are motivated to restore their feelings of self-worth; resolving dissonance is one way to accomplish this goal. Steele finds that individuals who affirmed personally important

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

values and thereby felt secure in their self-worth did not engage in dissonance reduction, suggesting that their need to do so had been eliminated. Likewise, Cohen et al. (2000) find that self-affirmation reduces motivated reasoning about controversial political issues.

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

If this account is correct, then motivated reasoning about facts may 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 myth that Barack Obama was not born in the U.S. cannot plausibly be attributed to a lack of information given how frequently it has been debunked. It seems more likely that conceding the validity of Obama's birth in the U.S. 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 acknowledge potentially uncomfortable facts about controversial issues, which hinders them from expressing belief in those facts. We test this hypothesis in two ways that are encoded in our experimental designs (described further below). First, we test whether self-affirmation makes people better able to acknowledge uncomfortable facts by comparing estimating its effect on reported misperceptions among respondents who may otherwise be uncomfortable providing the correct answer (the main effect of self-affirmation). Second, we test whether participants are more willing to accept corrective information they would otherwise resist or reject if affirmed (self-affirmation's interactive effect).

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Expectations

We expect that presenting accurate information in graphical form will reduce misperceptions versus both a control condition (in each study below) and when directly compared to equivalent text (Study 3). To accomplish this, we test the effects of presenting graphical information about changes in quantities over time visually rather than in words – a decision motivated by limits on available survey time in Study 1 (a lengthy textual treatment would not have been possible) and previous research finding limited or negative effects of textual corrections (e.g., Nyhan and Reifler 2010). In addition, we expect 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, we expect self-affirmation will change how respondents respond to corrective information. Previous studies suggest that self-affirmation should reduce biased processing of information, though they typically do not test a design in which self-affirmation is crossed with an information treatment.

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. It is not 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 when the study was conducted), but remained relatively low. For instance, according to ABC/*Washington Post* polls, perceptions the US was "making significant progress toward restoring civil order in Iraq" increased from 32% in May/June 2007 to 52% in September 2008. However,

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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; another 31% of Democrats actually said the surge was making the situation *worse*.

Study 1: Design, measures, and sample

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

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

Our affirmation manipulation (adapted from Cohen et al. 2000) asked respondents in the treatment group to select the value that is most important to them from a list and then to write about a time in which it was "especially important to you and made you feel good about yourself."[2] In the control condition, respondents instead reported what they had to eat or drink in the previous

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[2] Writing about important values is common in self-affirmation studies (McQueen and Klein 2006).

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.)

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

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

Study 1: Results

Table 1 presents interactive models that allow the effect of *Affirmation* and *Graph* to vary by respondents' support for withdrawing from Iraq. Specifically, we interact the treatments and their interaction with indicators for respondents who were not sure about withdrawing and those who support withdrawal (support for withdrawal is the omitted category). While previous research has found that the effectiveness of corrections may vary depending on respondent ideology, partisanship, or issue attitudes (e.g., Nyhan and Reifler 2010), our primary focus here is different; we examine whether our treatments significantly affect beliefs among these groups, especially those for

whom corrective information would be counter-attitudinal (i.e., withdrawal supporters). Separate

subgroup models are provided in the Online Appendix for each study to facilitate interpretation.

Each model is estimated as an ordered probit given the ordered dependent variable. We also

use survey weights to maximize the representativeness of the estimates.[3] Key results in each study

are substantively identical when models are estimated without weights or controls or with outcome

scales of increased/stayed the same/decreased (available upon request).

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[3] We find no evidence of significant imbalance on covariates in balance tests (results available upon request).

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

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

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

Results from Table 1 show that the marginal effect of *Graph* alone is negative 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 ($p < .15$), though we cannot directly reject the null of no difference in *Graph*

effects between withdrawal opponents and other groups (Gelman and Stern 2006). Finally, we find that the marginal effect of *Graph* is not significant among withdrawal supporters who received *Affirmation*, contradicting expectations from past research.[4]

We also find that being *Affirmed* alone decreases misperceptions among those who support withdrawing from Iraq ($p < .05$) – the subgroup that would otherwise experience the greatest discomfort from answering the question correctly (though we cannot directly reject the null of no difference in effects between withdrawal supporters and other groups). However, 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). No other subgroup is significantly affected, though we cannot reject the null of no difference between groups.[5]

These results are best understood using predicted probabilities, which we calculate for respondents' beliefs that insurgent attacks increased or stayed the same after the surge rather than decreased. Figure 1 presents a bar graph disaggregating respondents by position and condition.[6]

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[4] The *Affirmation* x *Graph* interaction can be interpreted as either how the marginal effect of *Affirmation* varies by *Graph* or the converse. We largely focus on the latter.

[5] One concern in self-affirmation studies is that the results could be driven by an improvement in mood. We find no evidence *Affirmation* improved mood in any study (available upon request).

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

Figure 1

Believe attacks increased or stayed the same during surge
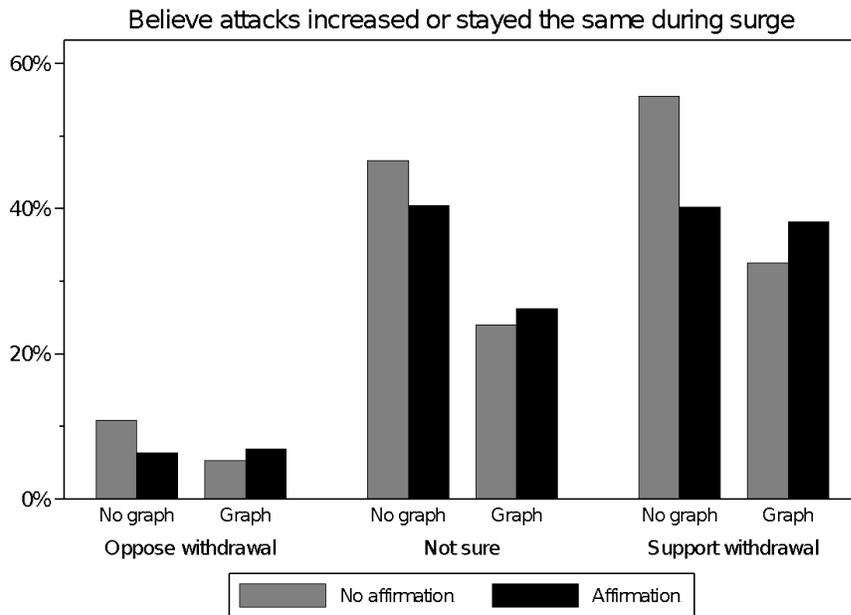
Predicted probabilities from the models in Appendix Table 2 estimated using survey weights.

As expected, only a few withdrawal opponents say insurgent attacks increased or stayed the same; treatment effects in this subgroup were small. By contrast, the effect of *Graph* is dramatic among those respondents who are not sure about withdrawal from Iraq. The results are most striking, however, for withdrawal supporters. We see a large effect of *Affirmation* among those who did not receive *Graph* – the predicted probability of believing attacks increased or stayed the same during the surge drops from 56% to 40%. This decline of 16 percentage points is approximately two-thirds of the reduction in misperceptions observed among withdrawal supporters who received *Graph* but not *Affirmation* (33% of this group believed attacks increased or stayed the same versus 56% of controls). As noted above, however, we again cannot reject the null hypothesis of no difference in self-affirmation effects between withdrawal supporters and opponents. In addition, *Affirmation* has no significant effect on misperceptions among withdrawal supporters who received *Graph* (38% said

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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. *Affirmation* may have helped reduce misperceptions, including among respondents who would otherwise be *least* likely to accept the facts (withdrawal supporters), among people who did not receive *Graph*. However, the effects of *Affirmation* are limited. We cannot reject the null hypothesis of no difference in effects between withdrawal supporters and opponents. It also did not increase the marginal effect of *Graph* as previous research would suggest.

Study 1 also has notable limitations. First, it would be desirable to establish that the beneficial effects of *Affirmation* and *Graph* hold for a conservative or Republican misperception. Also, the salience of the Iraq issue changed between the design and fielding of the study, which may have reduced the incentive for motivated reasoning. Elite Democrats came to accept that that the counterinsurgency strategy was a success and shifted the focus of their criticisms of the Bush administration to the economic crisis that was ongoing at the time of the study (October 2008).

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. At the time 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) because 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 because the state of the economy is a factual issue that lends itself to biased processing (Bartels 2002). This expectation of divergence in perceptions of the economy is supported by a November 2010 WorldPublicOpinion.org poll which found 72% of Republicans said that the economy is getting worse compared with only 36% of Democrats.

Study 2: Design, measures, and sample

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

Our outcome measure is 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 up a lot" to "Gone down a lot." As in

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each study, responses were coded so that higher values represent greater misperceptions (i.e., greater belief that jobs had gone down).[7] We also captured response time information for answers to the outcome question above (measured in seconds).[8] This study was conducted using Qualtrics with participants from Mechanical Turk.

Study 2: Results

We present interactive models in the main text and separate subgroup models in the Online Appendix.[9] In this case, we measure attitudes using a pre-treatment question about approval of President Obama's job performance on the economy and split the sample into those who approve, disapprove, and those who neither approve nor disapprove. The results of that analysis did not reveal the expected effect for self-affirmation among respondents who disapproved of Obama's handling of the economy (available upon request). As an exploratory step, we therefore also disaggregated the data by whether respondents selected job creation and economic growth as the most important issue facing the country or not (47% did so) following Correll et al. (2004), who find self-affirmation effects were concentrated among those for whom the issue is most important.

We found that this measure moderates the effects of *Affirmation* among disapprovers. Table 2 therefore presents results from ordered probit models of beliefs about job change within subgroups defined by respondents' approval of Obama on the economy and whether they said it

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[7] These results are robust to using a three-point outcome variable of "gone up," "stayed about the same," or "gone down" (available upon request). Figure 2 similarly presents the predicted probability of respondents saying the number of jobs went down or stayed the same.
[8] Equivalent response time information is not available from Study 1 or Study 3.
[9] Specifically, we estimate separate three-way interaction models for respondents exposed to *Graph* and those who were not. (Four-way interaction models do not facilitate exposition.)

was the most important issue.[10] We find that *Graph* has a strong corrective effect for each subgroup among respondents who did not receive *Affirmation* ($p < .01$). The marginal effect of *Graph* remains negative and significant ($p < .05$) among respondents who received *Affirmation* across each model but did not increase as prior research would suggest. In contrast, *Affirmation* significantly reduces misperceptions only when respondents' 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 ($p < .05$) – and they did not receive *Graph*.

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[10] 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.

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

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

*$p < .05$, ** $p < .01$. Ordered probit models with robust standard errors in parentheses. Cutpoints omitted but available upon request.

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

Figure 2

Believe jobs decreased or stayed the same in last year
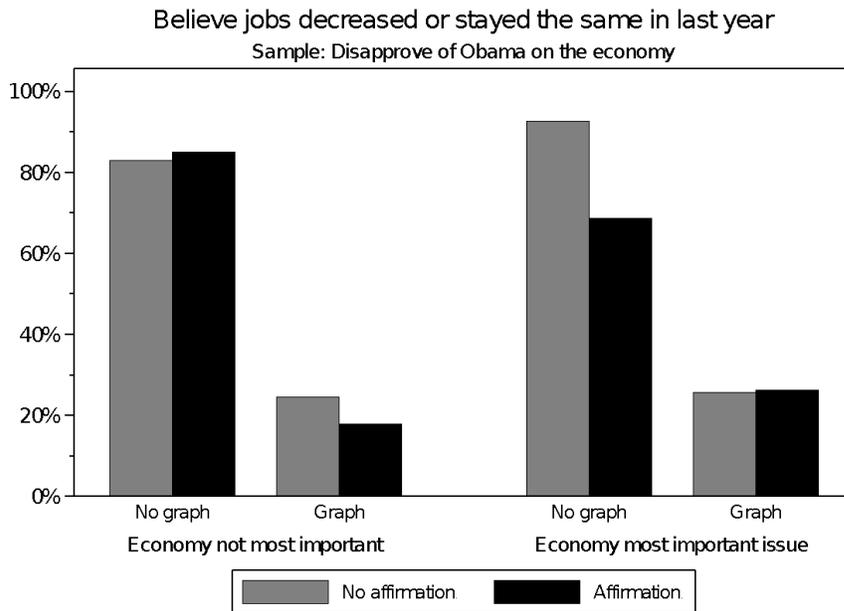
Predicted probabilities from the models in Appendix Table 3.

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

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

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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. This finding holds even among those respondents who disapprove of Obama on economic matters. Our results also address a key limitation of the previous study by focusing on an especially salient political issue.

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 exploratory result but one that is consistent with theory and previous research.

Study 3: Global temperature change

We conducted one additional experiment to address several remaining questions. Studies 1 and 2 found that graphical information significantly reduced misperceptions relative to a control condition, but do not directly compare the effects of alternate modes in presenting the same information.[11] In

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

this study, we test the effects of graphical and textual presentations of temperature data on beliefs about climate change and global warming – another issue with high levels of partisan polarization (McCright and Dunlap 2011) and strong evidence of motivated reasoning (Hart and Nisbet 2012).

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

Study 3: Design, measures, and sample

Our approach closely mirrors Studies 1 and 2 but adds a textual information condition. We use a 2x3 design in which participants are independently randomly assigned to either a self-affirmation condition (*Affirmation*) or a non-affirmation control in one manipulation and assigned to a graphical information condition (a graph of change in global average temperature – *Graph*), a textual information condition (a paragraph describing the temperature change – *Text*), or a control condition (neither graph nor text). Our design therefore directly tests the hypothesis that graphs reduce misperceptions more effectively than equivalent text.

The self-affirmation treatment and control conditions are identical to those in Study 2. Our graph treatment is adapted from a line graph in a NASA press release (http://www.giss.nasa.gov/research/news/20110113) showing the difference in average global

temperature relative to a baseline period from 1940 to 2010 from four climate data sources. The textual treatment describing the data was adapted from language in the release.

In this study, we measure respondents' perceptions of global temperature change as well as their more general beliefs about global warming, a more politically salient topic where people might be more prone to motivated reasoning. The first outcome measure, *Temperature change*, asks if average global surface temperatures have gone up, stayed about the same, or gone down in the last thirty years. Using branching follow-ups, we construct a five-point Likert scale ranging from "Gone down a lot" to "Gone up a lot" where higher values indicate greater misperceptions (temperatures decreased significantly). Our second dependent variable, *Global warming*, 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. *Temperature change* measures whether respondents accurately perceive the observed pattern of changes in average global surface temperatures *Global warming* measures broader beliefs about evidence for and causes of climate change that conflict with overwhelming scientific consensus. However, because the stimuli in *Graph* and *Text* only concern temperature change, we only define choosing "a theory that has not yet been proven" as a misperception (which sets aside respondent beliefs about the role of humans).

The study was conducted in July-August 2011 using an online convenience sample from Qualtrics.com's respondent panel. We limited this sample to respondents who previously self-identified as Republicans, the group that is most likely to hold inaccurate beliefs about global

warming (McCright and Dunlap 2011). We also excluded respondents who failed to pass a pre-treatment attention filter designed to make sure that subjects were carefully reading survey questions (see the appendix for discussion of sample demographics).

Study 3: Results

As before, we examine results within different subgroups, which in this case are groups within our sample of self-identified Republicans, and present interactive models in the Online Appendix. One important contextual difference from previous studies is that Studies 1 and 2 focused on so-called "easy" issues (Carmines and Stimson 1980). In this case, however, the issue is "hard" in that the issue involves contextual nuance, technical knowledge, and subtle differences between the possible policy responses. Because of clear cues from party elites on the issue of global warming, we therefore instead tested whether strong Republicans are more likely to be threatened by information showing rising global temperatures – a fact that contradicts claims from many party elites questioning whether climate change is real. We therefore instead split the sample based on how strongly the respondents identify with the GOP. Control variables are nearly identical to Study 1.[12] Table 3 presents results of our ordered probit models of *Temperature change* and *Global warming*. As above, we estimate interactive models but also present separate subgroup models in the Online Appendix to facilitate interpretation. In this case, we differentiate the sample by identification as strong Republicans (all are GOP identifiers). We find that *Graph* alone is effective – it reduces misperceptions about temperature change for both groups ($p < .01$). It also makes Republicans who don't identify strongly with their party more likely to acknowledge global warming as real and man-made ($p < .05$) unlike strong Republicans, who are not measurably affected. However, we cannot

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[12] We exclude an indicator for black respondents (only two are in the sample).

reject the null of no difference in effects between them directly ($p < .16$). By comparison, *Text* does not significantly change respondents' beliefs about temperature change or global warming. When we compare marginal effects, we find that *Graph* alone is more effective at reducing misperceptions about temperature change than *Text* alone for both groups of Republicans ($p < .01$) but we observe no measurable difference in effects on more general beliefs about global warming for either group.[13]

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

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

*$p < .05$, ** $p < .01$. Ordered probit models with robust standard errors in parentheses. Cutpoints omitted but available upon request.

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[13] This finding do not seem to result from differences in processing – a post-treatment recall question found few significant differences between *Text and Graph* and no difference in reading time (available upon request).

In addition, *Affirmation* somewhat reduces misperceptions for both groups of Republicans, but in different ways. Contrary to expectations, *Affirmation* somewhat decreases the likelihood that non-strong Republicans who did not receive *Graph* or *Text* will reject the scientific consensus on *Global warming* ($p < .10$), an effect that is measurably different from that observed among strong Republicans ($p < .05$). Also, as in Study 1, the *Affirmation x graph* interaction is in the opposite direction from expectations and marginally significant for non-strong Republicans ($p<.06$).

Figure 3

Global temperatures have decreased or stayed the same
Self–identified Republicans only
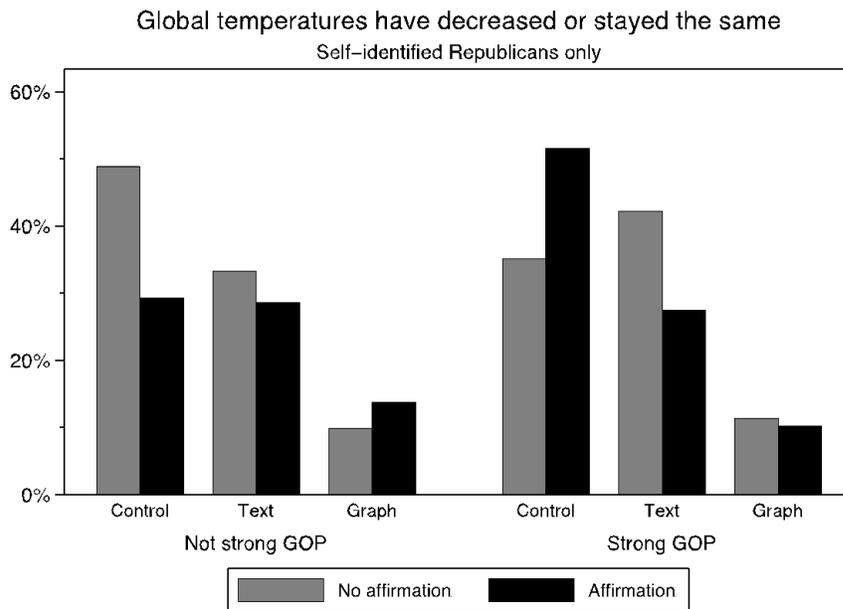
Predicted probabilities from the models in Appendix Table 4.

By contrast, while the effect of *Affirmation* alone is not significant for strong Republicans, it has a suggestive effect when combined with *Graph*. The effect of *Graph* on global warming beliefs is significant for this subgroup when respondents are affirmed ($p<.05$) but not otherwise, a difference that is nearly statistically significant ($p<.11$).

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

Figure 4
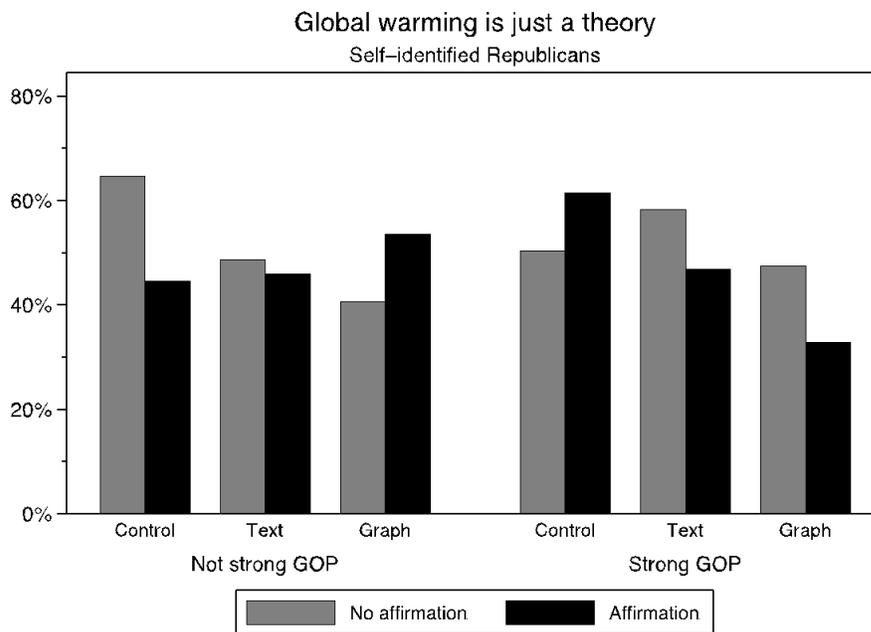
Predicted probabilities from the models in Appendix Table 4.

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

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

Study 3: Discussion

The results of Study 3 are consistent with the findings of Studies 1 and 2 in suggesting that some people suffer from information deficits but that others may also be threatened by accurate information. When we directly compare the effectiveness of *Graph* and *Text* at reducing information deficits, we find that a graphical correction decreases misperceptions about temperature change more than an equivalent text correction, which is consistent with the observed contrast between Studies 1 and 2 (in which *Graph* was effective at reducing misperceptions) and previous studies that found corrective text about controversial issues to often be ineffective (e.g., Nyhan and Reifler 2010). We also observe some partial evidence that *Affirmation* can help reduce misperceptions among Republicans who do not identify strongly with their party, but as in Study 1, this effect is not significantly different from that observed among strong Republicans. Finally, unlike in Studies 1 and 2, however, *Affirmation* seems to improve respondents' receptivity to corrective information among strong Republicans; the marginal effect of the *Graph* treatment significantly reduces misperceptions only among those respondents who were affirmed.

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

Conclusion

We find that providing participants with graphical information significantly decreases false and unsupported factual beliefs versus controls (Studies 1 and 2) and versus equivalent textual information (Study 3). The threatening nature of corrections may also cause people to reject counter-attitudinal information. Here, our results are less consistent. Affirming respondents' self-worth can in some cases reduce misperceptions for those who are most likely to be misinformed, but these effects often do not significantly differ from those observed in other subgroups. Moreover, self-affirmation does not consistently increase receptivity to corrective information as previous research suggests.

These results have several important implications. First, misperceptions are not simply a result of information deficits. Providing correct information did not eliminate false or unsupported beliefs; many respondents continued to hold false beliefs, which suggests psychological factors also play an important role. Second, information deficits can be reduced. Consistent with prior research on the effectiveness of graphical information in place of tables (e.g., Meyer et al. 1999), graphical corrections appear to be more effective than text at reducing misperceptions. This finding suggests that the format in which information is presented matters. Our positive finding is consistent with the broader literature about visual statistical learning (e.g., Fiser and Aslin 2002; Turk-Browne et al. 2005). Third, our affirmation results provide limited evidence that some people may already implicitly know the facts or are capable of making more accurate inferences if buttressed against identity threats. However, we find little evidence that self-affirmation makes people more open-minded when they receive corrective information directly – a result that conflicts with prior findings in social psychology. Importantly, this disappointing result does not appear to unique to our study. Others have similarly found that self-affirmation has had little effect in reducing polarization

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(Levendusky N.d.), selective exposure (Stroud N.d.; Lyons N.d.), and misperceptions (Lyons N.d.). We cannot definitively explain why self-affirmation failed to have the anticipated effect but wish to highlight these results given recent concerns about reproducibility in psychology (Gelman 2016). Several explanations are worth considering. First, the premise that people engage in worldview-consistent motivated reasoning in response to corrective information may be incorrect. The second possibility is that affirmation manipulations are not that powerful in the presence of an information stimulus. Finally, our studies only contained limited measures of attention. It is possible that respondent inattention or a lack of engagement with the manipulation somehow attenuated the effect of the self-affirmation or changed how it interacted with corrective information.

Other limitations of our study should be noted. First, while we find that graphs substantially reduce misperceptions, our studies were not designed to examine *why* they are so effective. Congruence between the presentation of the information and the structure of the data appears to help make graphs effective (Meyer et al 1999; Zacks and Tversky 1999), but further research is needed to investigate how the processing of graphical and textual corrections differs. For instance, evidence suggests that visual statistical learning is not governed by automaticity; learning requires attention (Turk-Browne et al. 2005). We therefore strongly encourage future research on the extent to which learning is automatic for graphs compared to text and how much attention is necessary for learning to occur from each. Similarly, future research should explore whether graphics and text require differing levels of cognitive effort and whether these differences exacerbate or ameliorate directionally motivated reasoning about political information and facts. In addition, future research should examine the durability of the treatment effects we observe – a question we did not examine.

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

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

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Online appendix

Study 1

Affirmation treatment

[Part 1]

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

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

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

[Part 2]

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

Affirmation control

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

Graph treatment

[All respondents]

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

[Treatment group only]

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

Weekly insurgent attacks in Iraq
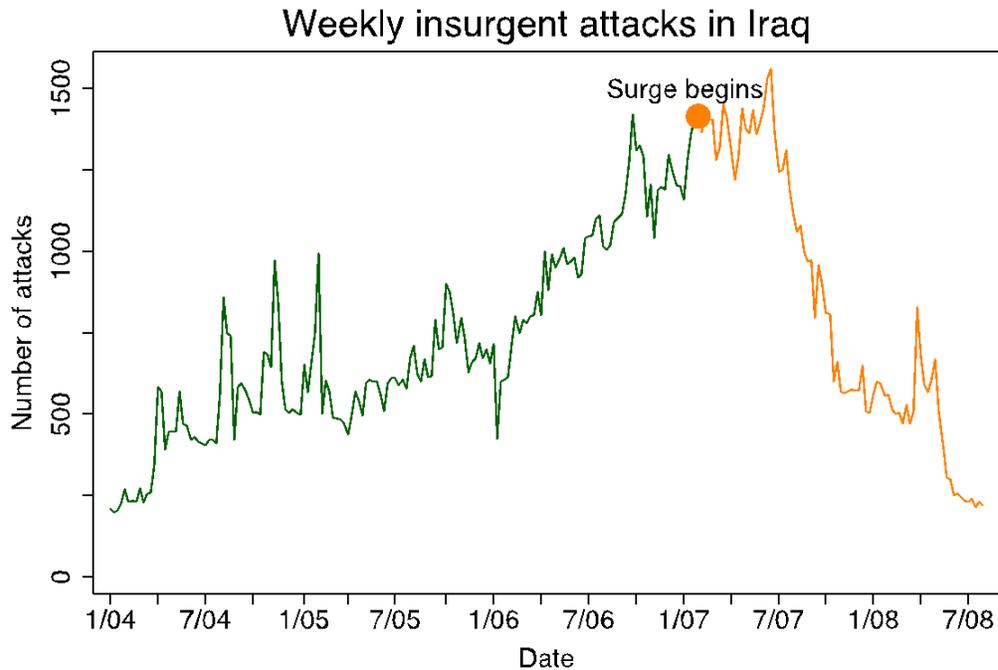
Source: Multi-National Force –– Iraq

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
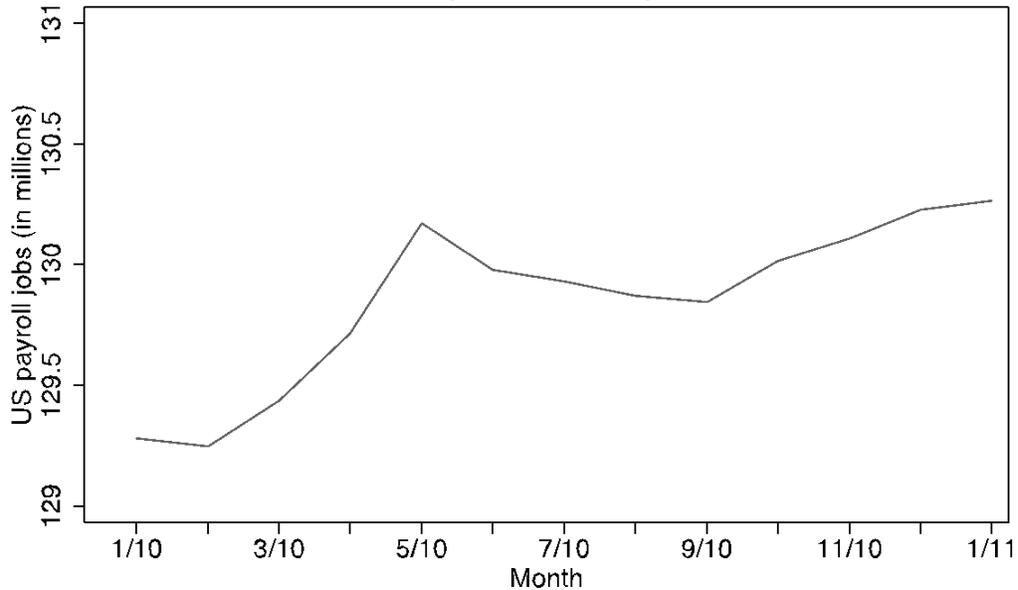### January 2010–January 2011

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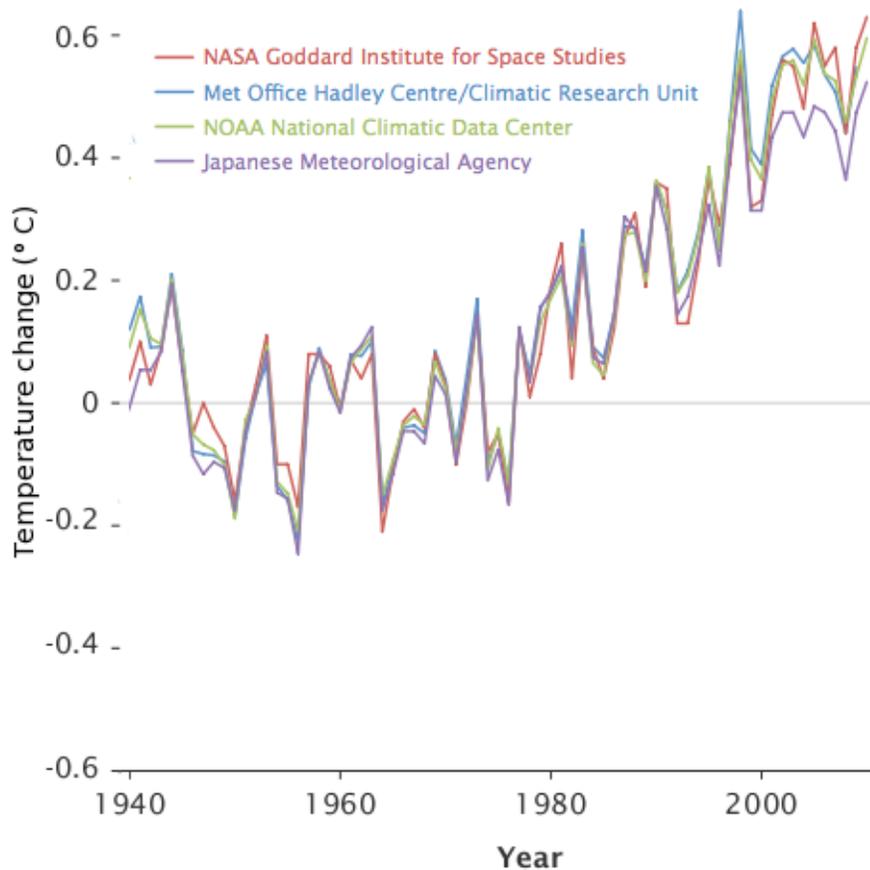
Please indicate your favorite color.
-Red
-Pink
-Orange
-Brown
-Yellow
-Green
-Blue
-Purple
-None of the above

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.

Now we would like to turn to a different topic.

Dependent variables

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

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

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

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

Sample composition

CCES (Study 1)

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

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

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

Mechanical Turk (Study 2)

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

Qualtrics (Study 3)

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

Appendix Table 1: Summary statistics

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

Appendix Table 2

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

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

*$p < .05$, ** $p < .01$. Ordered probit models estimated using survey weights. Cutpoints omitted but available upon request.

Appendix Table 3

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

	Approve		Neither		Disapprove	
	Not MIP	MIP	Not MIP	MIP	Not MIP	MIP
Affirmation	-0.39	0.51	0.41	0.61	0.09	-1.04*
	(0.35)	(0.49)	(0.46)	(0.34)	(0.27)	(0.42)
Graph	-1.71**	-1.52**	-0.83*	-1.85**	-1.69**	-2.27**
	(0.43)	(0.38)	(0.36)	(0.38)	(0.31)	(0.51)
Affirmation x graph	0.94	-0.07	-0.61	-1.29*	-0.34	1.06
	(0.51)	(0.58)	(0.72)	(0.57)	(0.42)	(0.58)
Black	0.48	0.24	0.92	-0.46	2.90**	-0.14
	(0.35)	(0.38)	(0.69)	(0.81)	(1.09)	(0.65)
Female	0.24	0.33	0.52	-0.14	0.02	0.39
	(0.29)	(0.30)	(0.30)	(0.25)	(0.21)	(0.26)
College graduate	-0.62	-0.17	0.63*	-0.51*	-0.16	-0.63*
	(0.33)	(0.30)	(0.31)	(0.26)	(0.21)	(0.26)
GOP (with leaners)			0.25	-0.17	0.26	-0.57*
			(0.36)	(0.28)	(0.36)	(0.26)
Independent	0.97	0.91	0.47	0.43	0.42	-0.43
	(0.65)	(0.47)	(0.40)	(0.32)	(0.41)	(0.61)
N	66	72	59	90	113	71

p < .05, ** *p* < .01. Ordered probit models with robust standard errors in parentheses. Cutpoints omitted but available upon request.

Appendix Table 4

Study 3: Misperceptions about temperature change and its causes

	Temperature change		Global warming/causes	
	Not strong GOP	Strong GOP	Not strong GOP	Strong GOP
Affirmation	-0.52	0.44	-0.52	0.29
	(0.30)	(0.31)	(0.29)	(0.30)
Graph	-1.27**	-0.85**	-0.62*	-0.07
	(0.30)	(0.32)	(0.27)	(0.29)
Text	-0.41	0.19	-0.41	0.20
	(0.24)	(0.29)	(0.27)	(0.33)
Affirmation x graph	0.72	-0.51	0.85*	-0.68
	(0.42)	(0.44)	(0.41)	(0.42)
Affirmation x text	0.39	-0.86*	0.45	-0.59
	(0.39)	(0.41)	(0.45)	(0.45)
Female	-0.05	-0.47**	-0.05	0.08
	(0.16)	(0.16)	(0.18)	(0.18)
College graduate	-0.21	0.24	-0.04	0.04
	(0.16)	(0.17)	(0.19)	(0.19)
Extremely imp. issue	-0.27	-0.52	-0.44	-0.78*
	(0.45)	(0.40)	(0.34)	(0.33)
N	184	173	185	173

$* p < .05, ** p < .01$. Ordered probit models with robust standard errors in parentheses. Cutpoints omitted but available upon request.