

# Does the label really matter? Evidence that the US public continues to doubt “global warming” more than “climate change”

Jonathon P. Schuldt<sup>1</sup> · Peter K. Enns<sup>1,2</sup> ·  
Victoria Cavaliere<sup>1</sup>

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**Abstract** Does the public doubt the existence of “global warming” more than “climate change”? While previously published research suggests that it does, others have argued that this effect either never existed or has disappeared amid broader shifts in public opinion. We draw on survey response theory to help reconcile this debate. We then analyze data from an October 2016 probability-based survey experiment ( $n = 1461$  US adults) to test the prediction that the US public (and particularly, Republicans) continue to respond differently when asked whether global warming vs. climate change exists. Indeed, respondents who were asked about climate change responded “Yes” (definitely or somewhat) more often (85.8%) than respondents who were asked about global warming (80.9%), an effect observed for Republicans (74.4 vs. 65.5%) but not Democrats (94% in both conditions). We discuss broader implications for US public opinion and discourse in an era of significant proposed government rollbacks of climate and environmental policy.

## 1 Introduction

The US appears to be entering a new era of climate change politicization. In the months since the 2016 US presidential election, Donald Trump and a number of Republican legislators have pushed for rollbacks of environmental policy and regulations, including moves to defund climate change efforts and to pull the US out of the COP21 (Paris) agreement. Although the views of the current administration appear to stand starkly at odds with the strong scientific consensus that climate change is real and primarily caused by human activities (Cook et al. 2016),<sup>1</sup> the politicization of environmental issues is nothing new. Indeed, public opinion data demonstrate that environmental

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<sup>1</sup>In a recent interview, Scott Pruitt, the chief of the Environmental Protection Agency who was appointed by Mr. Trump, disagreed that carbon dioxide is a “primary contributor” to global warming (Davenport 2017).

✉ Jonathon P. Schuldt  
jps56@cornell.edu

<sup>1</sup> Cornell University, Ithaca, NY, USA

<sup>2</sup> Roper Center for Public Opinion Research, Ithaca, NY, USA

issues, and climate change in particular, have grown increasingly politicized over the past two decades (Dunlap et al. 2016), prompting much research into the factors that shape environmental attitudes and beliefs (e.g., Bolsen et al. 2015; O'Connor et al. 1999; Krosnick et al. 2000; Lorenzoni and Pidgeon 2006; Maibach et al. 2011; McCright and Dunlap 2011).<sup>2</sup>

One such factor that remains a topic of conversation and debate is the name, or label, used to represent the phenomenon—particularly, “global warming” vs. “climate change.” Since as early as 2003, when an internal memo by Republican strategist Frank Luntz advised the George W. Bush administration to talk in terms of climate change rather than global warming because the former was thought less frightening (Burkeman 2003), the matter of labeling as a tool for political influence has been frequently discussed in the blogosphere, including the myth that liberals invented the term climate change to replace global warming because the planet’s warming trend has ceased (Romm 2010). Despite these discussions, to date, empirical research into the possible influence of these labels on public responses has been limited. Using data from a recent US nationally representative survey experiment, we show that the public continues to doubt the existence of global warming more than climate change and that Republicans appear to account for this difference. After discussing our theoretical expectations and presenting the evidence, we then discuss implications of this finding for US public opinion, environmental communication, and policy action (or inaction) in a time of heightened politicization of climate and environmental issues.

## 2 Public and partisan environmental attitudes

In their recent analysis of Gallup data from 1997 to 2016, Dunlap et al. (2016) argue that the partisan divide on climate change has not only persisted but *widened*: whereas 52% of Democrats and 48% of Republicans polled in 1997 agreed that “the effects of global warming have already begun,” these figures diverged substantially by 2007 (70% of Democrats vs. 45% of Republicans) and showed a still larger divide in 2016 (75% of Democrats vs. 41% of Republicans). A widening divide is also apparent in related survey measures, such as those assessing the belief that human activities are responsible for rising global temperatures and that the news generally exaggerates the severity of global warming (Dunlap et al. 2016) (see also Palm et al. 2017).

In addition to the growing partisan divide, these survey questions highlight how polls focused on climate change routinely include questions worded in terms of “global warming”. Global warming is related to and is often treated as a synonym for climate change in colloquial use, but in fact carries a distinct meaning. In general, global warming refers to the rising global average surface-level temperatures that scientists have linked to human activities (chiefly, fossil fuel combustion that creates heat-trapping greenhouse gases), whereas climate change encompasses broader changes to the state or variability of the climate (e.g., increased precipitation, ocean acidification) (see IPCC, 2017; “Working Group I”). Echoing their distinct meanings, research suggests that these labels are perceived differently by the public, such that global warming prompts stronger thoughts related to heat and human causality, whereas

<sup>2</sup> Of course, partisan evaluations have diverged on other issues too, including the economy (e.g., Enns, Kellstedt, and McAvoy 2012). Much of the survey data used in these studies are available through the iPOLL Databank maintained by the Roper Center for Public Opinion Research (<https://ropercenter.cornell.edu/CFIDE/cf/action/home/index.cfm>).

climate change invites associations with broader alterations to the climate and natural (vs. human) processes (Leiserowitz et al. 2014; Whitmarsh 2008).

For these reasons, researchers have drawn on framing theory (e.g., Chong and Druckman 2007) to examine whether the public responds differently depending on which label is used to represent the issue in surveys (see Schuldt 2016 for a review). In addition to non-experimental approaches (e.g., Lorenzoni et al. 2006), a handful of survey experiments have been conducted to date, which have yielded seemingly inconsistent results. In a national-level survey experiment, Schuldt et al. (2011) randomly assigned 2267 US adults recruited from the American Life Panel in Spring 2009 to different versions of the following existence belief question (alternative wording in brackets): “You may have heard about the idea that the world’s temperature may have been [going up/changing] over the past 100 years, a phenomenon sometimes called [global warming/climate change]. What is your personal opinion regarding whether or not this has been happening?” {1 = Definitely has not been happening; 2 = Probably has not been happening; 3 = Unsure, but leaning toward has not been happening; 4 = Not sure either way; 5 = Unsure, but leaning toward has been happening; 6 = Probably has been happening; 7 = Definitely has been happening}. Results revealed greater belief in the climate change than the global warming condition in the overall sample (i.e., 74.0 vs. 67.7% endorsed a response of 5 or greater), an effect that was attributable to a sizable wording effect among Republican respondents in particular (60.2 vs. 44.0%). This pattern replicated in a later national survey experiment featuring 2041 US adults from GfK’s KnowledgePanel in Summer 2012, in which respondents were again more likely to endorse high belief in climate change vs. global warming (69.9 vs. 62.0%), particularly Republicans (59.1 vs. 46.2%) (Schuldt et al. 2015).

Yet, other work challenges the global warming/climate change wording effect. Dunlap (2014) reported similar responses to both labels in a split-ballot experiment measuring perceived problem seriousness, embedded within the April 2014 Gallup Environmental Poll: “Turning now to the environment, in your view, is the issue of [global warming/climate change]...?” Similar portions reported seeing the issue as a “crisis” (15 vs. 13%), a “major problem” (36 vs. 35%), a “problem” (16 vs. 17%), and “not a real problem” (28 vs. 32%), a pattern that did not differ by partisanship. Dunlap (2014) concluded that the earlier finding “that Republicans are more likely to be skeptical about global warming than about climate change” is “not well established, and the public’s interpretations of the two terms may be evolving.”<sup>3</sup>

However, there are important differences between the studies by Schuldt et al. (2011, 2015) and Dunlap (2014) that could explain their seemingly inconsistent results. First, the studies examined different beliefs: existence beliefs (Schuldt et al. 2011, 2015) and problem seriousness (Dunlap 2014).<sup>4</sup> The focus on existence beliefs vs. problem seriousness matters because Krosnick et al. (2006) demonstrate that these concepts, while related, are theoretically distinct. Specifically, Krosnick et al. (2006) show that higher-order judgments of problem seriousness are not simply a function only of lower-order existence beliefs but also of other inputs including attitudes, belief certainty, and individual experiences with weather. Therefore, it is

<sup>3</sup> Dunlap (2014) also found that Republicans responded similarly to global warming and climate change when both terms appeared in adjacent survey questions (as opposed to a split-ballot design). This result, however, is not as surprising because soliciting the public’s responses to both labels in the same block of survey questions likely inflates the consistency of responses by rendering cognitive associations shared by both terms highly accessible and because respondents may infer that pollsters are intentionally using the terms interchangeably (see Conrad et al. 2014; Zaller and Feldman 1992).

<sup>4</sup> Leiserowitz et al. (2014) have also done important work on the potential for differential responses to global warming and climate change and have found partisan differences in open-ended responses and perceiving the issue as a problem.

possible that partisans may react differently to these labels when reporting on whether the issue *exists*, yet react similarly when asked to judge problem seriousness, due to the additional considerations informing that judgment.<sup>5</sup> Second, a feature of the experimental design used by Schuldt et al. (2011, 2015) may also contribute to this inconsistency. As described above, in addition to the labeling manipulation, the questions featured in those experiments varied whether respondents were told that the world's temperature may have been “going up” (global warming condition) or “changing” (climate change condition), a potential confound that may have contributed to the reported effect. That is, to the extent that doubt about the existence of global warming, in particular, is motivated by direct experiences that seem to contradict the notion of increasing temperatures (e.g., cold winters, snow storms) (see Schuldt and Roh 2014), then making explicit reference to increasing temperatures in the survey question could have compounded the effect. For this reason, it is important to test whether the global warming and climate change labels, by themselves (i.e., stripped of temperature information), would invite different levels of existence belief in the survey context.

### 3 The present study

The current research examines whether members of the US public—and Republicans in particular—continue to report less belief in global warming than climate change by analyzing recent data from a national-level survey experiment in which the potentially confounding wording was eliminated. There are important theoretical and practical reasons for doing so. Compared to survey data from the three-year period from 2011 to 2013, data from 2014 to 2016 suggest that partisan disagreement about the existence of global warming has *increased* (Dunlap et al. 2016). Thus, better understanding whether the partisan divide may be exaggerated or attenuated by how the issue is labeled in survey questions (global warming vs. climate change) may be more important now than previously. The need to illuminate the factors that influence the apparent partisan divide is further motivated by research suggesting that polling data not only reflect public opinion but may also *influence* it, through news coverage that increases the salience of poll results among the public (e.g., Hardy and Jamieson 2005). In the case of climate change, headlines that highlight substantial political polarization (“Poll Finds Deep Split on Climate Change, Party Allegiance Is a Big Factor”; Schlossberg 2016) may reinforce such divisions by cueing partisans to what their group believes, an acute possibility for issues like climate change, about which opinions are shaped significantly by cultural affiliations (Kahan et al. 2012). Although previous research suggests a nearly 40% reduction of the apparent partisan divide under climate change as compared to global warming wording (Schuldt et al. 2011), it remains unknown whether this reduction is fully attributable to the labeling difference, rather than to the potential confound mentioned previously (i.e., references to temperatures going up vs. changing).

### 4 Method

To examine whether the US public continues to respond differently to the global warming and climate change labels, we embedded a split-ballot survey experiment testing this labeling effect

<sup>5</sup> Villar and Krosnick's (2011) study offers some support for this notion, as they did not find significant differences with regard to whether Republicans and Democrats judge global warming or climate change as serious.

within a national probability survey of 1461 US adults fielded October 5–25, 2016, by GfK/Knowledge Networks. The survey contained a variety of questions about contemporary social and political issues. Approximately halfway through the survey, following a block of questions unrelated to environmental issues (i.e., about immigration), respondents were asked the existence belief question: “Do you believe [global warming/climate change] is really happening?” {Yes, definitely; Yes, somewhat; No}. Demographic variables including age, education, income, and party identification (1 = Strong Republican, 2 = Not Strong Republican, 3 = Leans Republican, 4 = Undecided/Independent/Other, 5 = Leans Democrat, 6 = Not Strong Democrat, 7 = Strong Democrat) were provided by GfK’s standard public affairs profile. For analytic purposes, we collapsed “Yes, definitely” and “Yes, somewhat” responses into a binary (Yes or No) belief measure and recoded party identification into three categories (Republican, Independent, Democrat, including leaners as partisans). Data were weighted using an iterative proportional fitting procedure based on gender, race/ethnicity, census region, education, and household income (see [www.gfk.com](http://www.gfk.com) for details). Eleven respondents had missing data or refused the existence belief question, leaving  $n = 1450$  for the main analysis.

## 5 Results

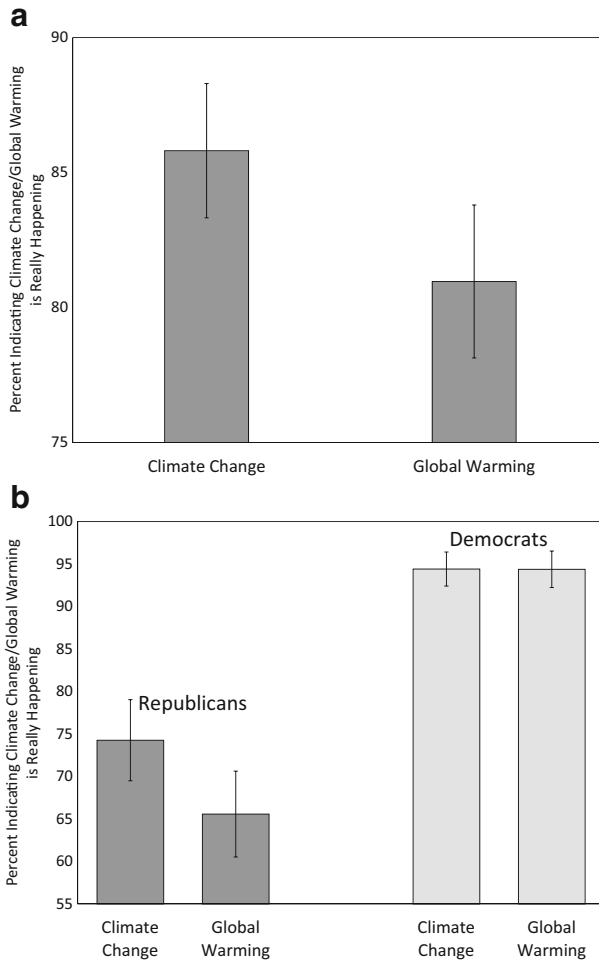
Figure 1 depicts the experimental effect of the wording treatment, both overall (Fig. 1a) and by party identification (Fig. 1b). Among respondents in the climate change condition, 85.8% (i.e., 633 of 738) gave one of the two Yes responses (Yes, definitely or Yes, somewhat), as compared to 80.9% (i.e., 576 of 712) in the global warming condition, for an overall wording effect of 4.9% points ( $\chi^2 = 6.21, p = .01$ ) (Fig. 1a).<sup>6</sup> This result suggests that the wording effect on existence beliefs remains detectable in data collected more than 7 years after those that were originally analyzed by Schuldt et al. (2011); moreover, it suggests that this effect is indeed attributable to the different labels themselves and not to other wording differences featured in previous experiments.<sup>7</sup>

We were also interested in whether this effect varied by partisanship. Recall that Schuldt et al. (2015) found evidence in support of their hypothesis that, “The expected effect will be more pronounced among groups that typically report greater climate skepticism, namely, Republicans” (p. 73). Dunlap (2014), by contrast, concluded that, “These results suggest that those who argue that campaigns to promote action to reduce greenhouse gas emissions should employ the term climate change rather than global warming may be mistaken.” We code partisanship identically to Schuldt et al. (2015, p.82, Note 4). Our analysis revealed an effect among Republicans but not Democrats (Fig. 1b).<sup>8</sup> Specifically, among Republicans, 74.4% (i.e., 235 of 316) of those in the climate change condition gave a Yes response, as compared to 65.5% (i.e., 215 of 328) in the

<sup>6</sup> The non-collapsed belief responses reveal different patterns particularly for the Yes, definitely (55.4% for climate change vs. 49.2% for global warming) and No responses (14.2% for climate change vs. 19.1% for global warming). Similar percentages of Yes, somewhat responses were observed across conditions (30.4% for climate change vs. 31.7% for global warming).

<sup>7</sup> We also conducted a separate identical telephone (cell and landline) survey through Cornell’s Survey Research Institute. Although we focus on the GfK survey because the analytic sample size is much larger (1,422 vs. 604), the weighted results were substantively equivalent in both surveys, with a greater proportion of respondents indicating that “climate change” is happening than “global warming.” Because of the small sample size and because the partisanship response options were different, we did not analyze the experimental manipulation in the SRI survey by partisanship.

<sup>8</sup> Due to the small number of independents in the sample after leaners were coded as partisans ( $n = 28$ ), we excluded these respondents from the party identification analysis.



**Fig. 1** Graphs depicting the effect of “climate change” vs. “global warming” labeling on reported existence beliefs, in the overall sample **a** and by party identification **b**. Error bars depict the 95% confidence intervals

global warming condition, for a Republican-specific wording effect of 8.9% points ( $\chi^2 = 5.95$ ,  $p = .02$ ).<sup>9</sup> Among Democrats, in contrast, the percentage did not differ between the climate change condition (94.3%; 382 of 405) and the global warming condition (94.4%; 352 of 373). Put differently, the gap between Democrats and Republicans on existence beliefs fell from 28.9% points under global warming wording to 19.9% points under climate change wording, for a 30% reduction in the apparent partisan divide. Finally, we note that the experimental effect remains significant when we control for covariates suggested by past research on climate change and environmental public opinion, namely, age, gender, education, income, and race/ethnicity (e.g., Finucane et al. 2000; Hamilton 2011; Schuldt and Pearson 2016) (see Appendix).

<sup>9</sup> As in the overall sample, among Republicans, the non-collapsed belief responses reveal different patterns particularly for the Yes, definitely (33.9% for climate change vs. 24.3% for global warming) and No responses (25.6% for climate change vs. 34.3% for global warming). Republicans’ Yes, somewhat responses were similar across conditions (40.5% for climate change vs. 41.3% for global warming).

## 6 Discussion and conclusion

The present finding that the US public is more likely to doubt the existence of global warming than climate change—and that Republicans are driving the effect—replicates previously published findings while also contributing to the discussion regarding the reliability of question wording effects over time and amid broader shifts in public opinion toward this leading environmental issue. Since 2009, when some of the original data on this labeling effect were collected (Schuldt et al. 2011), public opinion in the US grew more accepting of the reality and anthropogenic nature of the issue, prompting some to argue that the public may no longer respond differently to these terms (Dunlap 2014). However, acceptance of human-caused climate change remains highly polarized (Dunlap et al. 2016; Palm et al. 2017). The present findings suggest that the existence beliefs of Republicans continue to be sensitive to how this issue is labeled, and that this effect is found even when we remove language featured in previous survey experiments that could have contributed to those results (i.e., references to temperatures going up vs. changing). These results hold important implications for both survey researchers and public discourse among elites and the general public.

With regard to survey research, these results suggest that both scholars and practitioners of public opinion should bear in mind the known influence of survey context and design considerations on survey responses (see Krosnick and Presser 2010; Schuman and Presser 1996; Schwarz 1999; Schwarz and Sudman 1992). For instance, just as respondents asked about global warming *or* climate change (e.g., in a between-subject experimental design) may respond differently than those asked about both global warming *and* climate change (see Dunlap 2014), believing that an issue *exists* and perceiving it to be a *serious problem* are theoretically distinct (Krosnick et al. 2006), which may account for the partisan differences observed on one measure but not the other.

With regard to broader public discourse, these results carry important implications for how political elites and citizens discuss important environmental issues in an era of heightened politicization. It is notable that Twitter messages from Donald Trump use the term global warming more than climate change<sup>10</sup> and frequently associate global warming with a hoax theme. For instance, in November 2012, Mr. Trump tweeted: “The concept of global warming was created by and for the Chinese in order to make US manufacturing non-competitive.” And in January 2014, he wrote: “The weather has been so cold for so long that the global warming HOAXSTERS were forced to change the name to climate change...” (Trump Twitter Archive 2017). Our findings suggest that this rhetorical strategy may be successful, in part, because the US public—and the president’s Republican constituents in particular—are more likely to doubt the existence of global warming as compared to climate change. These observations also complement recent research suggesting that global warming is more frequently paired with hoax themes among the broader Twitter public, and especially in Republican-leaning states (Jang and Hart 2015).

Thus, overall, our findings demonstrate that survey respondents continue to respond differently when asked whether global warming or climate change really exists, while shedding light on the dynamics that link elite and public discourse with public opinion on this leading environmental issue. While we chose to examine the labeling effect on existence beliefs for replication purposes and because these beliefs have been theorized as the

<sup>10</sup> The corpus of Donald Trump’s Twitter posts can be searched here: <http://www.trumptwitterarchive.com/archive>. A search conducted on May 3, 2017, returned a total of 106 tweets containing global warming and 38 containing climate change.



“gatekeeper” in the policy process (Krosnick et al. 2006), future research should consider whether this effect extends to different types of climate skepticism (e.g., trend vs. attribution skepticism; see Rahmstorf 2004) as well as other climate-related beliefs and risk perceptions (Poortinga et al. 2011) that are routinely polled in national surveys.

## Appendix

Table 1

**Table 1** Odds ratios from logistic regression models in the overall sample and by partisanship (Republicans vs. Democrats), controlling for covariates

Variable	Overall sample		Republicans		Democrats	
	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>
Label (0 = global warming, 1 = climate change)	1.36*	.04	1.49*	.02	1.00	1.00
Age	1.00	.58	1.00	.40	1.01	.47
Gender (0 = male, 1 = female)	1.49*	.01	1.53*	.02	1.19	.58
Education	1.05	.22	1.04	.42	1.09	.28
Household Income	1.00	.83	.98	.44	1.03	.38
Race/ethnicity (0 = white, 1 = non-white)	.83	.33	1.05	.84	.53	.07

Whereas the “climate change” condition (relative to the “global warming” condition) increased the likelihood of responding “Yes” on the existence belief question among the overall sample and Republicans, the odds ratio did not indicate a significant effect among Democrats. Age, education, and income were modeled as continuous variables. Age ranged from 18 to 92 years; education ranged from 1 = no formal education to 14 = professional or doctorate degree; and household income ranged from 1 = less than \$5000 to 21 = \$250,000 or more. Race/ethnicity was re-coded from GfK’s standard five-category variable to a binary variable (white, non-white). Due to list-wise deletion of cases, the overall analytic sample was  $n = 1422$

\* $p < .05$

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