# "GLOBAL WARMING" OR "CLIMATE CHANGE"?
## WHETHER THE PLANET IS WARMING DEPENDS ON QUESTION WORDING

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**Abstract**  In public discourse and survey research, global climate change is sometimes referred to as "global warming" and sometimes as "climate change." An analysis of web sites of conservative and liberal think tanks suggests that conservatives prefer to use the term "global warming" whereas liberals prefer "climate change." A question wording experiment ($N = 2267$) illustrates the power of these frames: Republicans were less likely to endorse that the phenomenon is real when it was referred to as "global warming" (44.0%) rather than "climate change" (60.2%), whereas Democrats were unaffected by question wording (86.9% vs. 86.4%). As a result, the partisan divide on the issue dropped from 42.9 percentage points under a "global warming" frame to 26.2 percentage points under a "climate change" frame. Theoretical and methodological implications are discussed.

Many Americans remain skeptical that global climate change is really happening. Despite scientific consensus that the planet is warming (Oreskes 2004), 33% of Americans see "no solid evidence" for this (Pew 2009). This skepticism

varies by political orientation, with 57% of Republicans but only 17% of Democrats endorsing the "no solid evidence" response. Given that existence beliefs are considered to be the "gatekeeper" in climate policy engagement, it is important to understand the factors that influence whether citizens believe that global climate change is real (Krosnick et al. 2006). These factors include political orientation (e.g., Krosnick, Holbrook, and Visser 2000), perceived and actual temperature increases (e.g., Joireman, Truelove, and Duell 2010; Krosnick et al. 2006; Weber 1997, 2006), years of education, and exposure to and trust in science and the media (Corbett and Durfee 2004). We add to this list by exploring a variable that has received little attention, namely, whether the phenomenon is framed as "global warming" or as "climate change" in the survey question itself.

## "Global warming" vs. "climate change"

Although global climate change entails more than rising temperatures, the terms "global warming" and "climate change" are used interchangeably in public discourse and opinion polls on this issue (e.g., PIPA/Knowledge Networks 2005; see Whitmarsh 2009 for a discussion). But as survey researchers have long been aware (e.g., Cantril 1944; Payne 1951), minor changes in question wording can elicit major shifts in the obtained responses, a message reiterated in the literature on framing effects in judgment and decision research (e.g., Tversky & Kahneman 1981). In American politics, partisans routinely use the power of terms to frame political issues in ways that promote ideologically consistent attitudes and beliefs (Lakoff 2005; Sniderman and Theriault 2004).

These terms may influence beliefs by drawing attention to certain aspects of the issue at the expense of others and by inviting differential associations (see Druckman 2001 for discussion of emphasis framing). The term "global warming" focuses attention on temperature *increases*, for which seemingly contradictory evidence abounds — for example, record snowfalls in the Eastern U.S. in 2010 (Samenow 2010). In fact, unusually cold days can play a key role in the climate debate, as illustrated by the headline, "Gore to warn of 'global warming' on New York City's coldest day in decades!" (Drudge 2004). The term "climate change," in contrast, may recruit more general associations of temperature *changes*, which can easily accommodate unseasonably cold temperatures and record snowfalls. In addition, Whitmarsh (2009) observed that "global warming" evokes stronger connotations of human causation, whereas "climate change" evokes stronger connotations of natural causation. This difference is relevant in American politics, where conservatives have long expressed skepticism about the phenomenon itself and its human origins in particular (McCright and Dunlap 2000), as reflected in recent survey data: whereas 50% of Democrats felt that the planet's warming is caused by human activity, only 18% of Republicans agreed (Pew 2009).

These differential associations of "global warming" and "climate change" raise the possibility that the use of these terms differs by political orientation. We demonstrate that this is indeed the case.

## Word choice on partisan web sites

To assess whether the use of "global warming" and "climate change" varies by political orientation, we searched for these terms on the official web sites of partisan think tanks and recorded the number of web pages (i.e., html files) returned for each term. To categorize think tanks as liberal or conservative, 19 experts (14 faculty members and 5 graduate students from U.S. political science departments) judged the political orientation of an initial set of 36 think tanks listed as liberal or conservative on Wikipedia's *List of think tanks in the United States* in October, 2009.[1] Experts indicated whether or not they felt knowledgeable enough to judge each think tank, and if so, rated its political orientation (1 = mainly Liberal/Democrat; 5 = mainly Conservative/Republican). Only think tanks for which the expert judgments matched the Wikipedia categorization were included in the analysis;[2] five think tanks returned no files for either term or returned files that did not contain the searched term. This left 26 think tanks for analysis: 12 categorized as conservative (e.g., The Heritage Foundation, Hoover Institution) and 14 categorized as liberal (e.g., Center for American Progress, Brookings Institution).

The number of files returned varied widely, from 0 to more than 18,000 ($M = 754.71$, $SD = 2966.53$). Because we were interested in whether "global warming" or "climate change" returned more files (not the absolute number of files), we performed a chi-square analysis on this binary outcome variable. Results revealed that a majority of conservative web sites (i.e., 9 of 12) returned more "global warming" files than "climate change" files, whereas a majority of liberal web sites (i.e., 10 of 14) returned more "climate change" files than "global warming" files ($\chi^2$ (1, $N = 26$) = 5.57, $p = .02$; Fisher's exact test: $p < .05$). Given the politicization of global climate change in America (Krosnick et al. 2000), this pattern may reflect the selective use of these terms for political advantage, consistent with "global warming" being easier to discredit than "climate change." However, this difference in partisan terminology does not necessarily imply that survey questions would elicit different levels of belief when they refer to "global warming" rather than "climate change."

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1. Searches in October 2009 and September 2010 yielded substantively equivalent findings; we report on the latter search.
2. Mean think tank ratings < 3.00 were considered liberal; $M$s > 3.00 were considered conservative. We excluded five think tanks about which experts and Wikipedia disagreed (three categorized oppositely and two with $M$s = 3.00, indicating ideological balance). Both sources of categorization have limitations, which are attenuated by inter-source agreement. On average, nine experts provided judgments for the think tanks included in the final set.

## A question wording experiment

To assess the impact of these terms on existence beliefs, we conducted a randomized question wording experiment. We predicted that an otherwise identical question would (i) elicit lower levels of existence beliefs when worded in terms of "global warming" rather than "climate change," and that (ii) this effect would be more pronounced for respondents who self-identify as Republicans (as opposed to Democrats or Independents) for the reasons discussed above.

## Method

The key belief question was embedded in the American Life Panel (ALP) and modeled after a survey by ABC News, Stanford University, and Time Magazine (2006). It read:

> 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? (Definitely **has not been** happening; Probably **has not been** happening; Unsure, but leaning toward it **has not been** happening; Not sure either way; Unsure, but leaning toward it **has been** happening; Probably **has been** happening; Definitely **has been** happening)[3]

Respondents also reported their political self-identification (Democrat, Republican, Independent, or Other/none of the above), educational attainment, and environmental concern, the latter of which was borrowed from the same earlier survey and used here as a brief, one-item measure (see Appendix for question wordings). Age, gender, and ethnicity were available from the standard ALP demographics.

The ALP (https://mmicdata.rand.org/alp) is a web panel conducted by the RAND Corporation. Panelists are recruited primarily from respondents to the Survey of Consumer Attitudes conducted by the University of Michigan; they are individuals aged 18 years or older with Internet access who typically complete one 30-minute session each month and are provided a $20 incentive per session. ALP sampling procedures result in a diverse pool of participants that is adequate

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3. Italics and bolding are original. Response options were presented vertically with radio buttons and were coded 1 through 7 for analysis (with 7 = Definitely **has been** happening).

**Table 1. Distribution of Demographic Variables by Question Wording (GW = "global warming"; CC = "climate change")**

| Variable | Overall | GW | CC |
|---|---|---|---|
| Political Self-identification | | | |
| Republican | 32.4% | 31.2% | 33.7% |
| Democrat | 35.5% | 36.2% | 34.8% |
| Independent | 22.7% | 23.4% | 22.0% |
| Other/None of the above | 9.4% | 9.2% | 9.6% |
| Sex | | | |
| Female | 58.8% | 58.4% | 59.1% |
| Ethnicity | | | |
| White/Caucasian | 90.0% | 90.6% | 89.4% |
| Black/African American | 5.8% | 5.4% | 6.2% |
| American Indian/Alaskan | 0.7% | 0.8% | 0.5% |
| Asian/Pacific Islander | 1.6% | 1.7% | 1.5% |
| Other | 1.9% | 1.4% | 2.4% |
| Educational Attainment | | | |
| $\leq 8^{th}$ grade | 0.4% | 0.6% | 0.2% |
| Some high school | 2.5% | 2.8% | 2.2% |
| High school graduate | 16.1% | 15.6% | 16.6% |
| Some college | 30.3% | 30.5% | 30.1% |
| College graduate | 30.2% | 29.5% | 30.8% |
| Post-graduate education | 20.5% | 20.9% | 20.1% |
| Nationality | | | |
| Born in U.S. | 95.0% | 95.0% | 95.1% |
| U.S. citizen | 98.8% | 98.8% | 98.7% |
| Age (years) | | | |
| Mean | 50.15 | 49.95 | 50.36 |

for randomized experiments (see Table 1 for a summary of demographic information), although the sample is not representative of the American public.[4]

A total of $N = 2267$ respondents participated in this wave of the ALP between April 15 and June 10, 2009. The response rate (number of completed ALP questionnaires/size of selected sample) was 78.07%. Respondents were randomly assigned to one of the two wording conditions when they reached

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4. Despite the non-representative sample, analysis of demographic variables with existence beliefs (pooled across experimental conditions) reiterated observations in the literature. Education was significantly associated with belief ($F(3, 2257) = 22.73, p < .001$); those with post-graduate education reported greater belief ($M = 5.76, SD = 1.62$) than any other group (college graduates: $M = 5.14$, $SD = 1.91$; some college: $M = 4.96, SD = 1.86$; high school diploma or less: $M = 4.91, SD = 1.71$) ($ps < .001$, Bonferonni correction for multiple comparisons). Environmental concern was also positively correlated with belief ($r = 0.42, p < .001$), and females reported greater belief than males ($M_{females} = 5.29, SD = 1.73; M_{males} = 4.99, SD = 1.95$) ($F(1, 2260) = 15.03, p < .001$). Belief was unrelated to age ($r = .00, ns$) and ethnicity ($F(4, 2256) = 1.57, ns$).

the experimental question. Four respondents terminated the questionnaire prior to the experimental question. In addition, two respondents assigned to the "climate change" condition were excluded: one because of missing data on the experimental question and one because of missing data on the political self-identification question. This leaves $N = 2261$ for the main analysis.

## Results and discussion

Recall that we expected belief in the existence of global climate change to be lower when the phenomenon was referred to as "global warming" rather than "climate change," especially among Republican respondents. As shown in Table 2, overall, 74.0% of respondents endorsed a value of 5 or above (implying that they believed the phenomenon to be real) when the question referred to "climate change." Only 67.7% did so when it referred to "global warming," resulting in an overall wording effect of 6.3 percentage points ($\chi^2 (1, N = 2261) = 10.66, p = .001$). A breakdown by political self-identification reveals that this pattern is driven by Republican respondents: 60.2% of Republicans endorsed a value of 5 or above when the question referred to "climate change," whereas only 44.0% did so when it referred to "global warming," resulting in a wording effect among Republicans of 16.2 percentage points ($\chi^2 (1, n = 732) = 19.60, p < .001$). Put otherwise, a majority of Republicans *endorsed* that "climate change" is real (60.2% provided ratings of 5 or above) but *doubted* that "global warming" is real (56.0% provided ratings of 4 or below). In contrast, Democrats were unaffected by the framing manipulation: 86.4% of Democrats endorsed a value of 5 or above for "climate change" and 86.9% did so for "global warming" ($\chi^2 (1, n = 803) < 1, ns$). As a result, the partisan divide on whether global climate change is really happening drops from 42.9 percentage points under "global warming" framing to 26.2 percentage points under "climate change" framing.

Finally, Independents and Others showed only small and non-significant wording effects: 74.0% of Independents endorsed 5 or above for "climate change" whereas 69.5% did so for "global warming" ($\chi^2 (1, n = 514) = 1.27, ns$), and 77.1% of Others endorsed 5 or above for "climate change" whereas 68.3% did so for "global warming" ($\chi^2 (1, n = 212) = 2.12, ns$).

A 2 (Condition: "global warming" vs. "climate change") x 4 (Political self-identification: Democrat, Republican, Independent, or Other) between-subjects ANOVA tested for corresponding effects on mean levels of belief. Reiterating the above observations, belief in the phenomenon was significantly lower when the question referred to "global warming" ($M = 5.05, SD = 1.90$) rather than "climate change" ($M = 5.30, SD = 1.74$); $F (1, 2253) = 10.76, p < .01$, for the main effect of question wording. In addition, a main effect of political self-identification emerged ($F (3, 2253) = 121.89, p < .001$), and post-hoc contrasts revealed that Democrats reported significantly greater belief ($M = 5.94, SD = 1.37$) than all other groups, whereas Republicans ($M = 4.29, SD = 1.93$) reported significantly less belief than all other groups ($ps < .001$, Bonferonni correction for multiple comparisons); Independents and Others fell in between ($M = 5.18$,

**Table 2. Distribution of Existence Beliefs by Political Self-identification and Question Wording (GW = "global warming"; CC = "climate change")**

| Reported Existence Belief | Overall | | Republicans | | Democrats | | Independents | | Others | |
|---|---|---|---|---|---|---|---|---|---|---|
| | GW | CC | GW | CC | GW | CC | GW | CC | GW | CC |
| 1 = Definitely has not been happening | 6.6% | 3.9% | 12.7% | 5.1% | 1.9% | 1.3% | 6.6% | 5.4% | 4.7% | 5.7% |
| 2 = Probably has not been happening | 8.4% | 6.8% | 18.2% | 14.3% | 2.6% | 1.0% | 6.2% | 5.4% | 3.7% | 4.8% |
| 3 = Leaning has not been happening | 8.2% | 7.6% | 14.1% | 11.4% | 2.9% | 5.2% | 9.2% | 6.6% | 6.5% | 5.7% |
| 4 = Unsure | 9.0% | 7.6% | 11.0% | 8.9% | 5.7% | 6.0% | 8.5% | 8.7% | 16.8% | 6.7% |
| 5 = Leaning has been happening | 13.9% | 15.7% | 14.1% | 17.0% | 12.1% | 13.6% | 15.1% | 15.7% | 17.8% | 18.1% |
| 6 = Probably has been happening | 25.6% | 27.8% | 20.2% | 28.9% | 29.2% | 27.0% | 27.9% | 28.5% | 23.4% | 25.7% |
| 7 = Definitely has been happening | 28.2% | 30.5% | 9.7% | 14.3% | 45.6% | 45.8% | 26.5% | 29.8% | 27.1% | 33.3% |
| % High Belief ($\geq$ 5) | 67.7% | 74.0% | 44.0% | 60.2% | 86.9% | 86.4% | 69.5% | 74.0% | 68.3% | 77.1% |
| Mean Belief | 5.05 | 5.30 | 3.95 | 4.62 | 5.94 | 5.94 | 5.09 | 5.29 | 5.18 | 5.37 |
| N | 1162 | 1099 | 362 | 370 | 421 | 382 | 272 | 242 | 107 | 105 |

$SD = 1.81$ and $M = 5.27$, $SD = 1.72$, respectively). More importantly, the predicted interaction of question wording with political self-identification was significant, $F(3, 2253) = 5.32$, $p = .001$. Specifically, Republicans were less likely to believe that "global warming" is real ($M = 3.95$, $SD = 1.96$) than that "climate change" is real ($M = 4.62$, $SD = 1.84$) ($p < .001$, Bonferonni correction for multiple comparisons); no other political group was significantly affected by the wording manipulation ($Fs < 1.74$, *ns*). These effects remained significant when controlling for personal background variables; importantly, the influence of question wording was not moderated by any of them ($Fs < 1.13$, *ns*, for all interactions).

## Conclusions

In sum, Republican respondents were more skeptical that global climate change is a real phenomenon when an otherwise identical question was worded in terms of "global warming" rather than "climate change"; no other political group (Democrats, Independents, and Others) was significantly affected by question wording. This finding is compatible with the observation that conservative think tanks use the term "global warming" more often than "climate change," whereas liberal think tanks use "climate change" more often than "global warming." We surmise that both observations reflect associative differences between these terms. Most importantly, "global warming" entails a directional prediction of rising temperatures that is easily discredited by any cold spell, whereas "climate change" lacks a directional commitment and easily accommodates unusual weather of any kind. Moreover, "global warming" carries a stronger connotation of human causation, which has long been questioned by conservatives (McCright & Dunlap 2000; Whitmarsh 2009). Both of these aspects make "global warming" a more appealing frame for those who favor the status quo in climate policy. Our results suggest that this frame has the intended effects, at least for a conservative audience: whereas a majority of Republican respondents (56.0%) *doubted* the existence of "global warming," a majority of Republicans (60.2%) also *endorsed* that "climate change" was real.

Given that liberal think tanks emphasized "climate change" more than "global warming," one might expect Democrats to report greater belief under the "climate change" frame. This was not the case. Two factors may contribute to this observation. First, Democrats tended to endorse high belief ($Ms = 5.94$ on a 7-point scale), raising the possibility of a ceiling effect. Second, Democrats' beliefs about global climate change might be more crystallized and thus less influenced by subtle manipulations, consistent with research showing that stronger attitudes are more resistant to change (Krosnick and Smith 1994).

A couple of caveats are worth noting. First, although our data are consistent with the interpretation that associative differences between these terms result in differential levels of existence beliefs across partisans, global warming and climate change are technically distinct phenomena, the former referring to increases in average surface-level temperatures and the latter referring to any number of

deviations from long-term climate trends (Environmental Protection Agency 2010). Awareness of this distinction might contribute to differential responses among highly sophisticated respondents. Given that we found no interaction between question wording and educational attainment, this possibility seems unlikely. Second, although the ALP sample is highly heterogeneous, it is not representative of the American public. Accordingly, the observed percentage differences are not reliable estimates of population differences, although the pattern of the observed experimental effects is likely to be robust.

In conclusion, these experimental findings call attention to the role of question wording in surveys that assess Americans' opinions about global climate change. At present, survey researchers' choice of term seems somewhat haphazard—some surveys refer to the phenomenon as "global warming" (e.g., CBS News and *New York Times* 2006), others as "climate change" (e.g., Bloomberg 2009), and still others use the terms simultaneously (e.g., "global warming or climate change"; PIPA/Knowledge Networks 2005). As our findings indicate, the choice of term strongly affects the obtained answers and does so differentially, giving rise to pronounced differences in the apparent partisan divide on this policy issue. Given that political engagement with regard to global climate change requires one to assume that it is real, citizens' existence beliefs play a crucial role in the public policy process (Krosnick et al. 2006). Hence, the dynamics underlying the observed framing effects and their role in public discourse deserve closer attention.

## Appendix – Question wording

Political self-identification. Generally speaking, when it comes to politics which of the following do you usually think of yourself as? *A Democrat*; *A Republican*; *An Independent*; *Other/none of the above*

Environmental concern. During the next year, how much do you want the American public to do to help the natural environment? $1 = $ *A great deal*; $2 = $ *A lot*; $3 = $ *A moderate amount*; $4 = $ *A little*; $5 = $ *Nothing* (reverse-scored for analysis)

Educational attainment. What was the last grade of school you completed? $1 = 8^{th}$ *grade or less*; $2 = $ *Some high school*; $3 = $ *Graduated high school*; $4 = $ *Some college*; $5 = $ *Graduated college*; $6 = $ *Post-graduate* (due to small Ns, options 1 through 3 were combined for analysis)

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