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Global warming vs. climate change, taxes vs. prices: Does word choice matter?

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Abstract Does "climate change" seem like a less serious problem than "global warming" to Americans and Europeans? Does describing the costs of climate change mitigation in terms of "higher taxes" instead of "higher prices" reduce public support for such efforts? In an experiment embedded in an American national survey, respondents were randomly assigned to rate the seriousness of "global warming," "climate change," or "global climate change." Contrary to predictions made by a leading political strategist, the full sample and political Independents perceived "climate change" and "global warming" to be equally serious. Among Republicans, "climate change" was perceived to be more serious than "global warming," whereas the reverse was true among Democrats. A similar experiment embedded in a survey of residents of 31 European countries showed that "global warming" and "climate change" were perceived to be equally serious problems. And an experiment embedded in an American survey showed that describing the increased costs of climate change mitigation legislation via "higher taxes" instead of via "higher prices" did not reduce popular support for such legislation, also contradicting a political strategy memo. Thus, word choice may sometimes affect public perceptions of the climate change seriousness or support for mitigation policies, but a single choice of terminology may not influence all people the same way, making strategic language choices difficult to implement.

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1 Introduction

In an advisory memo to the Republican Party written in 2002, political strategist Frank Luntz said, "It's time for us to start talking about 'climate change' instead of global warming. ... 'Climate change' is less frightening than 'global warming.' As one focus group participant noted, climate change 'sounds like you're going from Pittsburgh to Fort Lauderdale.' While global warming has catastrophic connotations attached to it, climate change suggests a more controllable and less emotional challenge" (Luntz 2002, p. 142).

Luntz went on: "Republicans can redefine the environmental debate and make inroads on what conventional wisdom calls a traditionally Democratic constituency, because we offer better policy choices to the Washington-run Bureaucracy. But we have to get the talk right to capture that *segment of the public that is willing to give President Bush the benefit of the doubt* on the environment—and they are out there waiting. The words on these pages are tested—they work!" (Luntz 2002, p. 142, emphasis added).

Thus, Luntz proposed that people consider "global warming" to be a more serious problem than "climate change." This assertion is consistent with conclusions reached by Whitmarsh (2009) based on a survey of residents of a town in southern England. In that study, more respondents thought that "climate change" was natural than thought so about "global warming", which respondents were more likely to think was human-caused. Global warming was rated significantly more personally important and of greater concern to respondents than was climate change. However, the vast majority of attitude measures were answered the same regardless of which of the two phrases was used in the question.[1]

In this paper, we first report the results of an experiment embedded in a national survey of American adults testing differences in reactions to the phrases "global warming," "climate change," and "global climate change" by assessing the amount of seriousness that respondents ascribe to each of them. Then we report a second study assessing the impact of the wording change via an experiment embedded in surveys done in 31 European countries.

In analyzing the American data, we explored whether choosing optimal language had different effects among Republicans, Independents, and Democrats. And with the European data, we examined the wording effect among people on the left, in the center, and on the right of the ideological spectrum. Much research has documented differences between partisan groups in terms of how they think about this issue (e.g., Dunlap and McCright 2008; Malka and Krosnick 2009; see also Dunlap et al. 2001), and it is interesting to explore whether this partisan gap depends at all on the choice of language used in survey questions.

In a third study, we explored the impact of another shift in wording on Americans' thinking. In a memo written by Republican staffers on the U.S. Senate Committee on Environment and Public Works (2009), House and Senate energy and environment

[1] Lorenzoni et al. (2006) compared a survey in the U.S. that used the term "global warming" with a survey done in Great Britain using the term "climate change." The confounding of language with country precludes drawing any conclusions about different reactions to terminology per se.

staffers were advised that "We must effectively communicate to the American people that cap-and-trade is a massive new energy tax that will affect every aspect of their lives." The memo then went on to quote a comment by economist Martin Feldstein in the Wall Street Journal: "Anyone who drives a car, uses public transportation, consumes electricity or buys any product that involves creating CO2 in its production would face higher prices." Would shifting from emphasizing the term "prices" (as in Feldstein's quote) to emphasizing the word "taxes" instead (as in the first sentence) make Americans react more negatively to paying for the cost of climate change mitigation? We tested this possibility in another national survey.

2 Study 1

2.1 Method

2.1.1 Respondents

A total of 3,325 American adults completed a survey via the Internet in May of 2008. This was not a scientific representative sample of the nation and was instead a group of people who volunteered to participate in surveys via the Internet in return for monetary and non-monetary rewards. Survey Sampling International (SSI) recruited these people via thousands of diverse websites, in some cases through the websites themselves and in some cases through data aggregators (websites where one can sign-up to participate in multiple online panels at once). A total of 446,476 SSI adult panelists living in the United States were invited to participate in the survey. In the selection of panelists, men were oversampled, because male SSI panelists had displayed lower response rates than had female SSI panelists.

Invitations were sent by email with a subject line of "New Survey Opportunity for you." In the email invitation, prospective respondents were told that the survey would last 10 to 12 min and that if they completed the survey, they would earn an "Instant Win game play" (which could win them a prize right away) and an entry in a $25,000 sweepstakes. 11,443 people began completing the questionnaire, 3,337 of whom were randomly assigned to complete this study (the remaining respondents answered questions unrelated to this study). 3,325 people answered the questions that constituted this study.

2.1.2 Measures

Respondents were randomly assigned to be asked one of three different versions of a question measuring perceptions of problem seriousness:

GW: "If nothing is done to reduce *global warming* in the future, how serious of a problem do you think it will be?"

CC: "If nothing is done to reduce *climate change* in the future, how serious of a problem do you think it will be?"

GCC: "If nothing is done to reduce *global climate change* in the future, how serious of a problem do you think it will be?"

Half of the respondents were randomly assigned to be given the response options in this order: *Extremely serious, Very serious, Moderately serious, Slightly serious, Not serious at all*. We refer to this as the "high start order." The other half of the respondents were shown the response options in the reverse order. We refer to this as the "low start order." For analysis, the responses were coded extremely serious = 1, very serious = 0.75, moderately serious = 0.5, slightly serious = 0.25, and not serious at all = 0.

All respondents reported their identification with a political party by answering this question: "Generally speaking, do you usually think of yourself as a Republican, a Democrat, an Independent, or something else?" People who said "Independent" or "something else" were treated as Independents in the analyses reported here.

2.1.3 Results

Global warming vs. climate change vs. global climate change in the full sample In the full sample, global warming ($M = 0.62$), climate change ($M = 0.63$), and global climate change ($M = 0.63$) were perceived to be equally serious on average (GW vs. CC: t (2,233) = 0.55, $p = 0.58$; GW vs. GCC: t (2,185) = 0.62, $p = 0.54$; CC vs. GCC: t (2,215) = 0.08, $p = 0.94$). Likewise, the three phrases were not rated significantly differently from one another on average among people who received the high start order (GW vs. CC: t (1,144) = 0.56, $p = 0.58$; GW vs. GCC: t (1,107) = 1.31, $p = 0.19$; CC vs. GCC: t (1,123) = 0.75, $p = 0.45$) or among people who received the low start order (GW vs. CC: t (1,082) = 0.22, $p = 0.83$; GW vs. GCC: t (1,074) = 0.39, $p = 0.70$; CC vs. GCC: t (1,090) = 0.64, $p = 0.53$). All this is inconsistent with the claim that people view climate change or global climate change as less serious than global warming.

The full distributions of seriousness ratings were also equivalent for global warming, climate change, and global climate change (see the top panel of Table 1). No pair-wise difference between these distributions was statistically significant (GW vs. CC: χ^2 (4) = 7.87, $p = 0.10$; GW vs. GCC: χ^2 (4) = 2.30, $p = 0.68$; CC vs. GCC: χ^2 (4) = 4.19, $p = 0.38$). Likewise, the three distributions were not significantly different from one another among people who received the high start order (GW vs. CC: $\chi^2(4) = 2.36$, $p = 0.67$; GW vs. GCC: χ^2 (4) = 1.91, $p = 0.75$; CC vs. GCC: χ^2 (4) = 2.77, $p = 0.60$; see the second panel of Table 1).

Among people who received the low start order, the distribution of ratings of global climate change was not significantly different from the distributions of ratings of global warming (χ^2 (4) = 5.54, $p = 0.24$) or of climate change (χ^2 (4) = 4.37, $p = 0.36$; see the third panel of Table 1). However, the distributions of ratings of global warming and climate change were significantly different from one another (χ^2 (4) = 16.34, $p = 0.003$). Respondents were more likely to rate global warming as "extremely serious" than they were to rate climate change that way (χ^2 (1) = 7.33, $p = 0.003$), which might seem to be consistent with the claim that people see the former as more serious than the latter. But people were also marginally significantly more likely to rate global warming as "not serious at all" or "slightly serious" than they were to rate "climate change" as such (χ^2 (1) = 3.19, $p = 0.07$). Thus, global warming was rated more extremely (either extremely high in seriousness or extremely low in seriousness) than was climate change. This, too, is inconsistent with the claim that people see global warming as more serious than climate change.

Table 1 Study 1: seriousness rating distributions

Question wording	Not serious at all	Slightly serious	Response			Total	*N*
			Moderately serious	Very serious	Extremely serious		
Full sample							
Global warming	13.36%	11.01%	18.14%	28.43%	29.06%	100%	1,108
Climate change	12.30%	8.96%	19.77%	32.43%	26.54%	100%	1,138
Global climate change	11.58%	10.94%	19.28%	29.94%	28.27%	100%	1,079
High start order							
Global warming	12.39%	9.73%	18.41%	31.68%	27.79%	100%	565
Climate change	13.08%	7.40%	18.59%	31.15%	29.78%	100%	581
Global climate change	10.66%	9.19%	17.65%	31.43%	31.07%	100%	544
Low start order							
Global warming	14.36%	12.34%	17.86%	25.05%	30.39%	100%	543
Climate change	11.49%	10.59%	21.01%	33.75%	23.16%	100%	557
Global climate change	12.52%	12.71%	20.93%	28.41%	25.42%	100%	535
Independents							
Global warming	16.62%	9.97%	17.82%	25.98%	29.61%	100%	331
Climate change	15.32%	10.12%	18.50%	31.21%	24.86%	100%	346
Global climate change	15.64%	11.35%	20.25%	27.30%	25.46%	100%	326
Republicans							
Global warming	23.58%	17.90%	20.45%	28.41%	9.66%	100%	352
Climate change	19.64%	14.80%	23.87%	27.19%	14.50%	100%	331
Global climate change	18.96%	19.27%	23.24%	22.94%	15.60%	100%	327
Democrats							
Global warming	2.35%	6.12%	16.47%	30.35%	44.71%	100%	425
Climate change	4.77%	3.90%	17.79%	37.09%	36.44%	100%	461
Global climate change	2.82%	4.23%	15.49%	37.32%	40.14%	100%	426

Party identification The same patterns seen so far appeared among Independents (see the fourth panel of Table 1).[2] Average perceived seriousness was the same for Independents' ratings of global warming ($M = 0.61$), climate change ($M = 0.60$), and global climate change ($M = 0.59$). No pair-wise difference between these means was statistically significant (GW vs. CC: t (675) $= 0.17$, $p = 0.87$; GW vs. GCC: t (655) $= 0.58$, $p = 0.56$; CC vs. GCC: t (670) $= 0.43$, $p = 0.67$). No pair-wise difference between these distributions was statistically significant, either (GW vs. CC: χ^2 (4) $= 3.25$, $p = 0.52$; GW vs. GCC: χ^2 (4) $= 2.03$, $p = 0.73$; CC vs. GCC: χ^2 (4) $= 1.42$, $p = 0.84$).

Among Republicans, global warming ($M = 0.46$) was perceived to be marginally significantly less serious than climate change on average ($M = 0.51$; t (681) $= 1.90$, $p = 0.06$; see the fifth panel of Table 1). Climate change and global climate change were perceived to be equally serious (t (656) $= 0.50$, $p = 0.62$). Although the average

[2]Party identification was a marginally significant moderator of the relation between question wording and seriousness ratings for the comparison of global warming with climate change: Wald (8) = 14.69, $p = 0.07$ and global warming vs. global climate change: Wald (8) = 14.83, $p = 0.06$; but it was not a significant moderator in the comparison of climate change with global climate change: Wald (8) = 4.36, $p = 0.82$.

seriousness of global warming was not significantly different from that of global climate change ($M = 0.49$; t (677) = 1.39, $p = 0.17$), the distributions of seriousness ratings of these two phrases differed marginally significantly (χ^2 (4) = 9.21, $p = 0.06$). Fewer Republicans described global warming as "extremely serious" (9.66%) than said so about global climate change (15.60%; χ^2 (1) = 5.46, $p = 0.02$). The distribution of seriousness ratings of climate change was not significantly different from the distribution of seriousness ratings of global warming (χ^2 (4) = 6.54, $p = 0.16$) or global climate change (χ^2 (4) = 3.31, $p = 0.51$).

The pattern of results among Democrats was the opposite (see the sixth panel of Table 1). Global warming ($M = 0.77$) was perceived to be marginally significantly more serious than climate change on average ($M = 0.74$; t (884) = 1.76, $p = 0.08$). Likewise, the distribution of seriousness ratings of global warming was significantly different from the distribution of seriousness ratings of climate change (χ^2 (4) = 12.69, $p = 0.01$), because more Democrats rated global warming as extremely serious (44.71%) than did so for climate change (36.44%). Global climate change's ($M = 0.77$) average rated seriousness was equal to that of global warming (t (849) = 0.17, $p = 0.86$) and of climate change (t (885) = 1.63, $p = 0.10$). And the distribution of seriousness ratings of global climate change was not significantly different from that of global warming (χ^2 (4) = 5.88, $p = 0.21$) or climate change (χ^2 (4) = 3.76, $p = 0.44$).

Response choice order Combining across the three question wordings, respondents rated the problem as significantly more serious on average when given the high start order ($M = 0.64$) than when given the low start order ($M = 0.61$; t (3,323) = 2.89; $p = 0.004$). This occurred because people were more likely to rate the problem as extremely serious or very serious when those options were presented first than when they were presented last (60.95% vs. 55.41%; χ^2 (1) = 10.46, $p = 0.001$). This constitutes a primacy effect, which is common in rating scales (Malhotra et al. Unpublished manuscript, in preparation).

Among respondents with some college or less education, the primacy effect was sizable. The proportion of people who rated the problem as extremely serious or very serious when those options were presented first was 62.49%, compared to 55.89% when those options were last, a difference of 6.60% (χ^2 (1) = 9.04, $p = 0.003$, $N = 2{,}005$). Among respondents with a college degree or more education, the primacy effect was non-significant. The proportion of people who rated the problem as extremely serious or very serious when those options were presented first was 59.40%, compared to 58.14% when those options were last, a difference of 1.26% (χ^2 (1) = 0.14, $p = 0.71$, $N = 861$). Consistent with past research (e.g., Krosnick and Schuman 1988), education was a marginally significant moderator of the relation between response choice order and seriousness ratings (Wald (1) = 13.36, $p = 0.09$, one-tailed).

3 Study 2

Our next study explored differences in Europeans' reactions to the phrases "global warming" and "climate change."

3.1 Method

3.1.1 Respondents

For the Special Eurobarometer No. 300 (European Commission 2009), computer assisted face-to-face interviews were conducted in all 25 European Union member countries, the remaining Accession countries (Bulgaria and Romania) and Candidate countries (Croatia and Turkey), the Turkish Cypriote Community, and the Former Yugoslav Republic of Macedonia (TNS Opinion & Social 2008). Between March and May of 2008, 30,170 interviews were conducted in respondents' homes.

Sample selection was carried out separately for each country, following the same sampling design. The starting point of the sampling process was the selection of "administrative regional units", which are geographical areas defined for each country by the Statistical Office of the European Community. Regions with populations between 800,000 and 3 million inhabitants were randomly selected as primary sampling units, and selection of these units was systematic with probability proportional to population size. From the sampled administrative areas, clusters of starting addresses where randomly selected, and further addresses were chosen based on random decisions about which direction to walk in, which building to enter, and which household to consider. Within each household, the adult resident whose birthday was closest in the future to the interview date was selected to be interviewed.

Data collection was designed and coordinated by TNS Opinion & Social (a consortium between Taylor Nelson Sofres and EOS Gallup Europe), and the fieldwork was carried out in each country by a national institute. The questionnaire was initially developed in English and French. Each of the national institutes was responsible for translating it into the appropriate language(s) and used back translation (Brislin 1970) to evaluate the accuracy of the translation.

3.1.2 Measures

Respondents answered two questions measuring perceived problem seriousness, and each respondent was randomly assigned to be asked about either "global warming" or "climate change."[3]

Open-ended question "In your opinion, which of the following do you consider to be the most serious problem currently facing the world as a whole? (Global warming/Climate change), International terrorism, Poverty, Lack of food and drinking water, The spread of an infectious disease, A major global economic downturn, The proliferation of nuclear weapons, Armed conflicts, The increasing world population." The answer choices were printed on a card that was handed to the respondents.

Rating scale "And how serious a problem do you think (global warming/climate change) is at this moment? Please use a scale from 1 to 10. 1 would mean that it is not a serious problem at all and 10 would mean that it is extremely serious." The

[3]This is the English version from which translations were produced for each country. A French version was also given to the countries to translate from as well. The exact wordings used in most fielded languages are available from http://ec.europa.eu/public_opinion/archives/eb_special_en.htm.

rating scale was printed on a card that was handed to the respondents. Answers were recoded to range from 0 (meaning the least serious) to 1 (meaning the most serious).

Left-right ideology "In political matters people talk about 'the left' and 'the right.' How would you place your views on this scale?" Respondents were handed a card showing a 10-point rating scale, with 1 labeled "left" and 10 labeled "right." Respondents who placed themselves at 1, 2, 3, or 4 were treated as on the "left", those at 5 or 6 were treated as in the "center", and those at 7, 8, 9, or 10 were treated as on the "right."

3.2 Results

3.2.1 Global warming vs. climate change in the full sample

Open-ended question Respondents were more likely to cite climate change as the most serious problem facing the world (63.53%) than they were to cite global warming (62.32%, χ^2 (1) = 4.71, $p < 0.03$; see columns 1 and 2 in rows 1 and 2 of Table 2).

Rating scale Global warming and climate change were perceived to be equally serious on average ($M = 0.77$ for both; t (29,101) = 0.03, $p = 0.97$; see column 4 in rows 1 and 2 of Table 2). These results are inconsistent with the claim that people view climate change as less serious than global warming.

3.2.2 Ideology

Open-ended question Among Europeans in the "center," people were equally likely to mention global warming as the most serious problem as they were to mention climate change (63.30% vs. 64.88%; χ^2 (1) = 2.47, $p = 0.12$; see columns 1 and 2 in rows 3 and 4 of Table 2). People on the "right" cited global warming as the most

Table 2 Study 2: responses to the open-ended and rating scale questions

Question wording	Which of the following do you consider to be the most serious problem currently facing the world as a whole?			How serious a problem do you think global warming is at this moment?	*N*
	Mentioned	Not mentioned	Total	Mean seriousness	
Full sample					
Global warming	62.32%	37.68%	100%	0.77	15,062
Climate change	63.53%	36.47%	100%	0.77	15,108
Center					
Global warming	63.30%	36.70%	100%	0.76	4,521
Climate change	64.88%	35.12%	100%	0.76	4,599
Right					
Global warming	62.98%	37.02%	100%	0.76	3,679
Climate change	62.99%	37.01%	100%	0.76	3,753
Left					
Global warming	65.65%	34.35%	100%	0.78	3,610
Climate change	67.27%	33.73%	100%	0.79	3,675

important problem just as often as they cited climate change (62.98% vs. 62.99%; χ^2 (1) = 0.0001, $p = 0.99$; see columns 1 and 2 in rows 5 and 6 of Table 2). And people on the "left" cited climate change as the most important problem just as often as they cited global warming (67.27% vs. 65.65%, χ^2 (1) = 2.13, $p = 0.14$; see columns 1 and 2 in rows 7 and 8 of Table 2). Ideology was not a significant moderator of the impact of the question wording manipulation (global warming vs. climate change) on answers to the open-ended question (Wald (2) = 1.44, $p = 0.49$). All this is inconsistent with Luntz's hypotheses.

Rating scale Europeans in the "center" rated global warming just as serious as they rated climate change ($M = 0.76$ for both phrases; t (8,934) = 0.16, $p = 0.87$; see column 4 in rows 3 and 4 of Table 2). Among people on the "right," average perceived seriousness was the same for global warming as it was for climate change ($M = 0.76$ for both phrases; t (7,244) = 1.13, $p = 0.26$; see column 4 in rows 5 and 6 of Table 2). And people on the "left" rated global warming and climate change as equally serious on average ($M = 0.78$ vs. 79, respectively; t (7,111) = 1.76, $p = 0.08$; see column 4 in rows 7 and 8 of Table 2). Ideology was not a significant moderator of the impact of the question wording manipulation on ratings of seriousness (F (2) = 2.08, $p = 0.12$).

3.2.3 Country by country full samples

Open-ended question In 23 of the 31 countries, respondents were just as likely to mention global warming as the most serious problem as they were to mention climate change. Of the remaining eight countries, respondents were less likely to mention global warming than climate change as the most serious problems in six: Spain (53.68% vs. 65.66%; χ^2 (1) = 15.15, $p < 0.0001$), Sweden (68.47% vs. 79.76%; χ^2(1) = 16.75, $p < 0.0001$), Estonia (52.71% vs. 61.02%; χ^2 (1) = 7.07, $p < 0.01$), Lithuania (55.04% vs. 60.76%; χ^2 (1) = 3.43, $p = 0.06$), Denmark (67.28% vs. 72.29%; χ^2 (1) = 2.99, $p = 0.08$), and Germany (67.42% vs. 73.79%; χ^2 (1) = 7.49, $p < 0.01$). The opposite pattern was found in the remaining two countries; global warming was mentioned more often than climate change as the most serious problem: France (73.62% vs. 66.67%; χ^2 (1) = 6.01, $p = 0.01$), and the Turkish Cypriot Community (75.09% vs. 51.95%; χ^2 (1) = 29.04, $p < 0.0001$).

Rating scale Global warming was perceived as equally serious as climate change in 28 of the 31 countries. In Slovakia and in the Netherlands, climate change was rated as more serious than global warming ($M = 0.80$ vs. 0.78, t (1,025) = 2.56, $p < 0.01$ for Slovakia and $M = 0.66$ vs. 0.64; t (1,029) = 1.91, $p = 0.06$ for the Netherlands). In Great Britain, the opposite pattern appeared: global warming was rated as more serious than climate change ($M = 0.67$ vs. 0.64, t (958) = 2.02, $p = 0.04$).

4 Study 3

Our final study explored whether shifting language from "higher prices" to "higher taxes" decreased public support for climate change mitigation legislation in the United States.

4.1 Method

4.1.1 Respondents

GfK Roper Public Affairs & Media (a division of GfK Custom Research North America) conducted a telephone survey of 1,005 American adults via Random Digit Dialing using a sample provided by Survey Sampling International. The interviews were conducted November 17th–November 29th, 2009; 705 respondents were interviewed on landlines, and 300 were interviewed on cellular telephones. The survey sample included the contiguous 48 states, Alaska, and Hawaii. Interviews were conducted in both English and Spanish.

The combined landline and cell phone data were weighted to account for probabilities of selection, as well as age, sex, education, and race, using targets from the March 2008 supplement of the Current Population Survey. In addition to these factors, the weighting takes into account patterns of land and cell phone usage by region from the 2008 Spring estimates provided by Mediamark Research Inc.

4.1.2 Measures

Respondents were randomly assigned to be asked one of two versions of a question about gasoline consumption. Version one asked:

For each of the following, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming:

- Increasing gasoline prices so people either drive less or buy cars that use less gas.

Version two asked: For each of the following, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming:

- Increasing taxes on gasoline so people either drive less or buy cars that use less gas.

4.1.3 Results

30.14% of respondents said that they favored "increasing gasoline prices" ($N = 496$), whereas 35.36% said they favored "increasing taxes on gasoline" ($N = 497$). These percentages are not significantly different (Rao-Scott χ^2 (1) $= 1.70$, $p = 0.19$). Thus, although the trend suggested that the word "taxes" might have increased the appeal of this policy, the wording change's manipulation was not statistically reliable.

5 Conclusions

If, as Luntz asserted (2002), the phrase *climate change* is "less frightening" and sounds like a "more controllable challenge" than "global warming" (p. 142), respondents' seriousness ratings should have reflected this difference. Contrary to this expectation, climate change was not perceived to be less serious than global warming in the full sample of American respondents nor in the full sample of Europeans.

Interestingly, the pattern Luntz predicted did appear among the people who were presumably least likely to be sympathetic to President Bush: Democrats. The opposite pattern appeared among Republicans. And wording made no difference among Independents. The two crosscutting trends among the partisan groups cancelled

one another out and were muted further by the lack of wording influence among Independents.

This pattern of effects is especially interesting in light of the goal of political communicators to target their messages to subsets of the general public. If Republican communicators were interested in reducing public concern about the problem and could target only Democrats with messages using the phrase climate change, our results suggest that this word choice would reduce their perceptions of the seriousness of the problem. And if Independents happened to be exposed to those messages, the choice of phrase would have no impact on their perceptions of seriousness, so no harm would be done regarding achieving the Republican communicators' goal. But if Republican citizens were unintentionally exposed to those same messages, the choice of the phrase "climate change" would have been counter-productive for achieving the Republican communicators' goal and in fact would have eliminated any "benefit" gained among Democratic citizens by using that phrase.

There is a small bit of irony in these results. For over a decade, natural scientists have wanted to increase public perceptions of the seriousness of global warming. At the same time, natural scientists have advocated shifting from talking about global warming to talking about climate change, because the latter is more technically accurate. Our results suggest that this shift in communication strategy may have had no impact on perceived seriousness in the nation as a whole but may have reduced perceived seriousness among the citizens most likely to be supportive of the natural scientists' views on the issue: Democrats (see Malka and Krosnick 2009).

On the whole, then, the present findings suggest that the choice of global warming vs. climate change has had little if any impact on national-level perceptions of the seriousness of the problem. So strategically choosing between these words may have had little consequence when speaking to the nation as a whole. But if opinion leaders wish to inspire citizens to pressure government to ameliorate climate change or simply to express concern about it in surveys, those opinion leaders should use the phrase "global warming" when talking to Democrats (who are most likely to be responsive) and should instead say "climate change" when talking to Republicans. The reverse would be preferable for opinion leaders interested in decreasing real or apparent public concern about the problem.

It is especially interesting to note the impact of language on the apparent partisan division in attitudes regarding global warming. Much past research has shown that in recent years, Democrats have expressed considerably more concern about climate change than have Republicans in America (e.g., Dunlap and McCright 2008; Malka and Krosnick 2009; see also Dunlap et al. 2001). Study 1 shows that this gap was considerably larger when the term "global warming" was used (35 percentage points) than when the term "climate change" was used (22 percentage points; see Table 1). This shrinking of the gap occurred because relative to "global warming", the term "climate change" reduced the proportion of Democrats who reported high seriousness and increased the number of Republicans who reported high seriousness. Thus, the partisan gap was partly language-driven, and the term "climate change" effectively shrank that gap.

Studies 2 and 3 reinforced the conclusion that language choices in this domain are not especially consequential. Study 2 showed that across 31 European countries, global warming and climate change were perceived to be equally serious problems. And Study 3 showed that using the phrase "higher taxes" instead of "higher prices" was not effective at reducing public support for climate change mitigation legislation.

These studies illustrate that the many claims about language choice made in recent years (e.g., Butler 2004; Lakoff 1996, 2004; Luntz 1988, 2007) can be tested scientifically and objectively. Quite often, such claims are justified simply on intuitive grounds but are not evaluated by any empirical data. Thus, as reasonable as these assertions might be, they just might be incorrect. And as we have seen, any general assertions about the effects of language choice might hold only among some subgroups of the electorate but not among others. Therefore, rigorous testing using experimental designs such as the simple ones used here can be very useful for discerning invalid speculation from true insight.

Finally, it is useful to note that consistent with previous research on order effects, the order of presentation of the response options in Study 1 had a significant effect on how respondents rated problem seriousness in this experiment. The primacy effect that appeared here was the same effect documented in many other past studies of rating scales and appeared here, as in past research, to be most common among people most likely to satisfice when answering survey questions: respondents low in education. It is therefore important to counter-balance rating scale point order in surveys in order to avoid bias.

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