

Chapter 4

Public Perceptions of Global Warming: Understanding Survey Differences

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Abstract Since 2007, no scientific body of national, or international, standing rejects the findings of human-induced climate change. Yet in the United States, public opinion and public policy remain deeply divided on the issue. I review five longitudinal surveys from Yale/George Mason, Stanford/Resources for the Future, University of Michigan/Brookings, Gallup, and the Pew Research Center to understand different surveys of Americans have different results to the question “Does global warming exist?” I find that question wording makes a difference, and researchers may want to focus their efforts on answering the questions that lead to the “Don’t know” responses.

Keywords Climate change • Global warming • Public opinion • Polls

4.1 Introduction

The vast majority of scientists and researchers agree that man-made emissions are likely exacerbating climate change; since 2007 no scientific body has disagreed with this position (Oreskes 2007). However, it is clear from US news articles to the contrary (e.g., Taylor 2013) that Americans remain deeply divided on whether anthropogenic climate change exists. As this makes many forms of climate change legislation nearly impossible to achieve a bipartisan consensus, this begs further study into how and why respondents answer “Is global warming happening?”

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4.2 Background: A Snapshot of Current Beliefs

To begin to understand the breadth of the disagreement, we examined news headlines from June 2014. The following three articles presumably were generated in response to the US Environmental Protection Agency’s (EPA) June 2, 2014, proposal to regulate utilities’ greenhouse gas emissions (EPA 2014). First, in New York Times, “Is Global Warming Real? Most Americans Say Yes” suggests that most Americans believe in global warming (Kopicki 2014). Second, the Washington Post/ABC News in “Broad Concern about Global Warming Boosts Support for New EPA Regulations” is more lukewarm, but still suggests that most Americans are in favor (Langer 2014). Third, the Pittsburgh Post-Gazette’s “Pennsylvania voters favor EPA greenhouse gas curbs, poll shows” also shows that that Americans believe in global warming (Hopy 2014). Based on these headlines, it would seem clear that the majority of Americans believe global warming is real and support regulation of greenhouse gas emissions.

Then let’s take a longer-term perspective to try and better understand what Americans really think. Figure 4.1 shows America’s response to Stanford University,

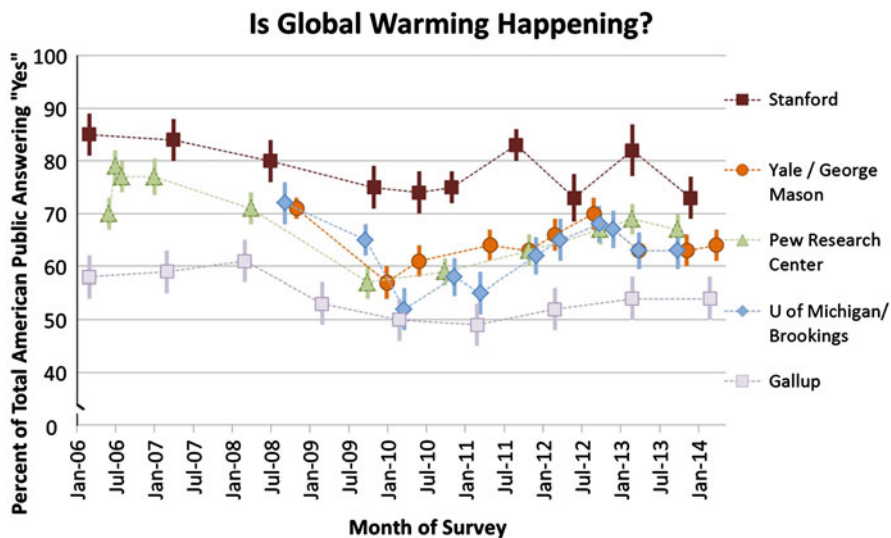


Fig. 4.1 Percent of total American public answering “Yes” to the question “Is global warming happening?” *Top*: Where possible, interpret *loosely*, as in “Temperature may already have or may in the future warm; no causal attribution.” *Bottom*: Where possible, interpret *strictly*, as in “Temperatures have been increasing; this is at least partially caused by man.” The vertical bars give the polling error indicated by the survey authors (Sources: Yale (Leiserowitz et al. 2012a, b, c, 2013, 2014), U Michigan/Brookings (Borick and Rabe 2012a, b, 2013, 2014), Stanford (Krosnick and MacInnis 2011; Krosnick 2012; Jordan 2013; Harrison 2013; Resources for the Future 2014), Gallup (Saad 2012, 2013, 2014), and Pew (2011, 2012, 2013, 2014))

Yale University/George Mason, the Pew Research Center, the University of Michigan (previously Brookings), and Gallup polls asking basically the same question: “Is global warming happening?” While the differences among polls likely occur due to question wording, one stark realization stands out. Since 2006, a majority (50–85 %) of Americans have agreed that global warming is happening, but there is also variance among those numbers. This variance is likely sufficient to influence policymakers’ actions, particularly when broken out on a state, regional, or congressional district level.

4.3 Grounding the Problem: Understanding the Responses

To better understand why the different polls fail to agree, I decided to look more closely at the wording in each survey. Table 4.1 gives a breakdown of the slightly different slices of “Is global warming happening?” that each survey asks for, and the subsections below give more detail about each question. For each survey, I highlight the answer to the question “Is global warming happening?” in the text and in Fig. 4.1. If the option is given, I interpret this in two ways:

1. *Loosely* Where possible, interpret as “Temperature may already have or may in the future warm; no causal attribution.”
2. *Strictly* Where possible, interpret as “Temperatures have been increasing; this is at least partially caused by man.”

Table 4.1 A breakdown of the slightly different slices of “Is global warming happening?” that each survey asks for

Research group	Time frame	Certainty level	Type of change	Attribution
Stanford	100 years ago to present	May have been going up	Slow change in temperature	None specified
Yale/George Mason	150 years ago to unspecified future time	Has been increasing/may be increasing	Change in temperature may affect climate	None specified
Pew Research Center	Unspecified historic time to present	Solid evidence	Earth is warming	Human activity, natural patterns, don’t know
University of Michigan/Brookings	40 years ago to present	Solid evidence	Earth is warming	None specified
Gallup	Unspecified historic time to different future ranges	Will or has already happened	Effects of global warming are happening	None specified

4.3.1 *Stanford*

Stanford Woods Institute Senior Fellow Jon Krosnick has been conducting public opinion studies on climate change and related efforts since at least 2006 (Krosnick and MacInnis 2011; Krosnick 2012; Stanford 2013; Harrison 2013; Jordan 2013). Now run by Stanford University's Political Psychology Research Group (Resources for the Future 2014), this survey question continues to be run roughly every year:

- Q: You may have heard about the idea that the world's temperature may have been going up slowly over the past 100 years. What is your personal opinion on this—do you think this has probably been happening, or do you think it probably has not been happening?
- A: Has been happening, Has not been happening, Don't know/refuse?

The values we report in Fig. 4.1 are the “*Has been happening*” (73–85 %); approximately 2–3 % of respondents typically answer “*Don't Know/ refuse*.” The percentage point error is between ± 3 and ± 5 depending on the number of respondents for each survey. Likely, this has the highest value of “yes” for all the polls because it emphasizes a slow change over the last century and uses the word choice “probably.”

4.3.2 *Yale/George Mason*

The Yale Project on Climate Change Communication and the George Mason University Center for Climate Change Communication have successfully collaborated for several years on this question (Leiserowitz et al. 2012a, b, c, 2013, 2014). The 2014 PIs, Anthony Leiserowitz, Geoff Feinberg, Seth Rosenthal, Edward Maibach, and Connie Roser-Renouf, have asked roughly twice a year:

- Q: Recently, you may have noticed that global warming has been getting some attention in the news. Global warming refers to the idea that the world's average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world's climate may change as a result. What do you think? Do you think that global warming is happening?
- A: Yes, No, Don't Know.

The values we report are the “*Yes*” (61–71 %); approximately 10–20 % of respondents typically answer “*Don't Know*.” The percentage point error is between ± 2 and ± 3 depending on the number of respondents each survey. Similarly to the Stanford poll, this poll adds uncertainty by using “*may*,” so we would expect similar results. Unfortunately, this poll had a much higher response of “*Don't Know*,” possibly due to the final phrase “*the world's climate may change as a result*.” To compare the two, if you assume that half of all “*Don't Knows*” would have answered “*Yes*,” this polling will then agree quite strongly with the Stanford finding.

4.3.3 *Pew Research Center*

The Pew Research Center based in Washington, D.C., conducts nonpartisan, non-advocacy public opinion polling and demographic research. Regarding global warming (Pew 2011, 2012, 2013, 2014), it asks:

- Q: Is there solid evidence the earth is warming?
 A: Yes (because of human activity), Yes (because of natural patterns), Yes (don't know), No, Mixed evidence/Don't Know

The values we report are those answering *loosely*, “Yes (*any answer*)” (57–77 %), and those answering *strictly*, “Yes (*because of human activity*)” (34–47 %); approximately 6–10 % of respondents typically answer “*Mixed evidence/Don't Know*.” The percentage point error is ± 3 . Likely, this falls in the middle of the pack because they ask respondents about “solid evidence,” as opposed to the first two polls that express high levels of uncertainty.

4.3.4 *University of Michigan/Brookings*

This poll was initially housed at Brookings as the National Survey of American Public Opinion on Climate Change (NSAPOCC) and is now run through University of Michigan's Center for Local, State, and Urban Policy's National Surveys on Energy and Environment (Borick and Rabe 2012a, b, 2013, 2014). There was no noticeable change when switch occurred in December 2011. They ask:

- Q: Is there solid evidence that the average temperature on Earth has been getting warmer over the past four decades?
 A: Yes, No, Don't know

The values we report are the “*Yes*” (52–72 %); here again the “*Don't knows*” are quite high at approximately 10–20 %. The percentage point error is between ± 3 and ± 4 depending on the number of respondents each survey. Likely, this falls lower because they ask respondents about “*solid evidence*” in the “*past four decades*,” as opposed to the first two polls that express high levels of uncertainty over a century or longer.

4.4 Gallup

Gallup has extensive experience running polls on just about any US policy question that exists. Of our surveys, they are the only ones to have consistently asked their question the same month (March) of every year since at least 2006 (Saad 2012, 2013, 2014). Specifically,

- Q: Which of the following statements reflects your view of when the effects of global warming will begin to happen:

- A: They have already begun to happen, they will start happening within a few years, they will start happening within your lifetime, they will not happen within your lifetime, but they will affect future generations, or they will never happen?

We report those who answered *loosely*, everything except “*They will never happen*” (81–92 %), and those answering *strictly*, “*They have already begun to happen*” (49–61 %). The percentage point error is ± 4 . We suspect there is a low response rate in this instance because the question didn’t ask about “*global warming*”; it asked about “*the effects of global warming*.” Also, this question has a much more specific timeline than the other questions.

4.5 Discussing the Effect of Demographics

Prior to interpreting these results, we must first ask whether the differences in response might be due to demographics of the respondents. It is a common practice in surveys to obtain a large enough respondent pool to include the views of the entire population and then weight particular responses to adjust the convenience sample into a true representative sample. In each of the surveys reported here, the researchers obtained sufficient participants (typically 1,000 or more) and then adjusted their results to reflect the entire United States. The uncertainty caused by this analysis is typically ± 2 to 5 percentage points per response and reported in both the text and in Fig. 4.1. Since all of the surveys included have interpreted their results in this manner, the differences should not be due to demographics.

However, the question of demographics remains interesting. Consequently, many studies, including each of the five longitudinal studies referenced in this chapter, have examined respondent demographics. For instance, the Yale group has split their respondents into “Six Americas” with differing responses to whether global warming was real: alarmed, concerned, cautious, disengaged, doubtful, and dismissive (Leiserowitz et al. 2014). Each group has different demographics, including age, sex, race, and wealth. For instance, the “alarmed” group believes in global warming and is highly worried about the consequences. This group tends to be moderate to liberal Democrats who are women, older to middle aged, college educated, and of upper income levels. On the opposite end of the spectrum, the “dismissive” group tends to not believe global warming exists. This group tends to be high-income, well-educated, white men who are very conservative Republicans.

John Ramos (2014) examines whether education level affects the response. He used the 2010 Cooperative Congressional Election Study (CCES) asked over 50,000 respondents (CCES 2010):

- Q: “From what you know about global climate change or global warming, which one of the following statements comes closest to your opinion?”
- A: “Global climate change has been established as a serious problem, and immediate action is necessary,” “There is enough evidence that climate change is taking place and some action should be taken,” “We don’t know enough about global climate change, and more research is necessary before taking any actions,” “Concern about

global climate change is exaggerated. No action is necessary,” or “Global climate change is not occurring; this is not a real issue.”

For this framing, education has little effect on views on climate change.

4.6 Lessons Learned

Given that each survey samples a demographically similar group of US citizens and therefore demographics are not causing the differences, the above analysis illustrates two points. First, *question wording makes a difference in the polling results*. For instance, recall we interpreted the question “Is global warming happening?” in the strictest sense possible: temperatures have been rising in the past and this is due to mankind’s activities. This may not be the same interpretation that others might use. For instance, the Stanford question is only about temperatures; someone who believes that temperatures are increasing, regardless of the reason, would answer “yes.” However, the Yale survey mentions global warming; a reader who believes temperatures are increasing but not because of human activity may answer “yes” or “no,” depending on their understanding of whether “global warming” means warming caused by greenhouse gases in the atmosphere. Other differences between the questions arise; for instance, respondents are much more likely to agree with survey questions that ask about more gradual change over longer time periods and mention uncertainty, as opposed to questions that ask about fast and certain change over shorter time periods. Second, *researchers may want to focus their efforts on answering the questions that lead to the “Don’t know” responses*. While we cannot infer how the 10–20 % of respondents in the Stanford and Michigan polls might have answered if the question was clearer, it may be that with clearer questions and answers to them, these reports would show very different “Yes” results.

4.7 Conclusions

This chapter discussed five longitudinal studies using various wording to ask Americans whether they believe global warming exists. After controlling for demographics, I find that question wording makes a difference, and researchers may want to focus their efforts on answering the questions that lead to the “Don’t know” responses. As scientists and engineers, we have an obligation to help those who “Don’t know” better understand climate change and the methods that can be used to mitigate emissions and adapt to the changes that may be in our future. Although it’s not very easy to take a step outside of our normal comfort zone and explore the policy implications of our work, it’s important that we do so. Yet, to truly prepare for our future, we will need to understand not only the science of climate change

and engineering to mitigate greenhouse gas emissions and adapt to climate change but also the policy implications for the challenges of our time.

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