



## Conservative and Liberal Views of Science

### Does Trust Depend on Topic?

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#### Summary

Conservative distrust of scientists regarding climate change and evolution has been widely expressed in public pronouncements and surveys, contributing to impressions that conservatives are less likely to trust scientists in general. But what about other topics, where some liberals have expressed misgivings too? Nuclear power safety, vaccinations, and genetically modified organisms (GMOs) are three often-mentioned examples. For this report, five similarly worded survey questions were designed to test the hypothesis that, depending on the issue, liberals are just as likely to reject science as conservatives. The five questions were included along with many unrelated items in telephone surveys of over 1,000 New Hampshire residents.

As expected, liberals were most likely and conservatives least likely to say that they trust scientists for information about climate change or evolution. Contrary to the topic-bias hypothesis, however, liberals also were most likely and conservatives least likely to trust scientists for information about vaccines, nuclear power safety, and GMOs. Liberal-conservative gaps on these questions ranged from 55 points (climate change) to 24 points (nuclear power), but always in the same direction. These results pose a challenge for some common explanations of political polarization in views about science.

#### Introduction

Scientists are in strong agreement that human activities, by altering the composition of Earth's atmosphere, are changing the climate and pushing it in directions that we probably won't like. Research showing evidence of anthropogenic (human-caused) climate change has been reviewed in detail for a series of reports by the Intergovernmental Panel on Climate Change<sup>1</sup> and

#### KEY FINDINGS



Seventy-one percent of New Hampshire residents surveyed say they trust scientists as a source of information about vaccines.



Trust in scientists is also high regarding climate change (62 percent), nuclear power safety (69 percent), and evolution (63 percent).



Expressed trust is lower regarding genetically modified organisms (GMOs) (47 percent), partly because fewer people feel familiar enough to give an opinion on this topic.



Trust in scientists as a source of information on all five topics increases with education.



Trust in scientists as a source of information on all five topics is significantly higher among liberals than conservatives, contradicting the hypothesis that bias goes in opposite directions depending on the topic.

supported in statements by all of the leading organizations of scientists.<sup>2</sup> Independently conducted surveys of climate scientists<sup>3</sup> and analyses of published scientific reports<sup>4</sup> find over 95 percent agreement on the existence of this problem. This strong consensus among scientists comes through clearly in discussions at professional meetings and in new research papers published each month.

In contrast to the high level of agreement among scientists, opinions among the U.S. public and politicians vary widely, largely along partisan lines.<sup>5</sup> Survey researchers find that climate-change questions are some of the most divisive ones they ask.<sup>6</sup> Majorities of liberals and moderates, but relatively few conservatives, accept the scientific consensus that human activities are changing Earth's climate.<sup>7</sup> Similar divisions appear on

questions asking whether people believe there even *is* a climate-change consensus among scientists.<sup>8</sup> Liberals and moderates, who tend to agree with the scientists about climate change, also more often say they trust scientists for information on this topic. Conservatives, who tend to reject the scientific consensus, also are less inclined to say they trust scientists. In Congress, some conservative leaders have denounced climate studies as a “hoax” and have sought to defund research activities, including the use of satellites to study the Earth.<sup>9</sup>

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Liberal misgivings about nuclear power and GMOs are well known, but our question here is different: is there evidence that liberals disproportionately tend to distrust scientists, and favor other sources instead, when it comes to evaluating the risks and benefits in these publicly controversial areas?

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Conservative distrust of science on climate change illustrates a broader phenomenon of ideology-based rejection that has been examined by many recent studies.<sup>10</sup> Some other prominent examples such as evolution also involve mainly conservative opposition. Researchers and political analysts have looked for examples of bias going the opposite direction, where liberals rather than conservatives disproportionately express distrust of scientists or reject a clear scientific consensus. Evidence for opposite bias has been found in experiments<sup>11</sup> in which information was controlled—such as reading a paragraph that makes a scientific claim. Real-world examples of major domains in which a scientific consensus was disproportionately rejected by liberals are harder to identify, but three main possibilities have been suggested: vaccinations, nuclear power safety, and GMOs. Evidence that liberals are disproportionately biased against science on these topics has been anecdotal, however.<sup>12</sup>

One recent paper tested for topic biases by comparing results from two survey questions that asked people whether they trust scientists for information about climate change or about vaccines.<sup>13</sup> As expected, trust in scientists regarding climate change was higher among Democrats and independents and lowest among Tea Party supporters. Unexpectedly, trust in scientists regarding vaccines was also higher among Democrats and independents and lowest among Tea Party supporters. These findings go against

claims that liberals disproportionately reject science on vaccines in the same way that conservatives do on climate.

Neither the vaccine nor the climate change survey question asks *what* people believe on these topics, but simply whether they trust scientists as a source of information. Science is a process for systematically learning about causes and effects, and the emerging knowledge about vaccines is a case in point. An Institute of Medicine review of scientific research on vaccines, for example, found many instances in which fears of side effects appeared unfounded, such as the alleged link between measles, mumps, and rubella (MMR) vaccination and autism, but also noted instances in which genuine risks were identified or the evidence remained too limited for conclusions.<sup>14</sup> Studies of individuals who express distrust of scientists regarding vaccines have found them more likely to credit information from non-science sources, however, such as websites or people they know.<sup>15</sup>

Similar observations could apply to nuclear power safety and GMOs. Both are important topics that draw scientific attention, resulting in an extensive and diverse record of research. However, both have also been topics of controversy among the general public. Liberal misgivings about nuclear power and GMOs are well known, but our question here is different: is there evidence that liberals disproportionately tend to distrust scientists, and favor other sources instead, when it comes to evaluating the risks and benefits in these publicly controversial areas? In this brief, we test that hypothesis, and extend the earlier climate change/vaccines comparison, using data from more than 1,000 new survey interviews.

## Do You Trust Scientists for Information About...?

The Granite State Poll, run by the Survey Center at the University of New Hampshire, conducts cell and landline telephone interviews with random samples of state residents four times each year. Although many of its questions seek political opinions, the poll provides a platform for research on other topics as well.<sup>16</sup>

The poll recently asked five “trust scientists” questions (see Box 1). Two of these, on climate change and vaccines, were discussed in an earlier paper<sup>17</sup> that used data from New Hampshire surveys conducted in July and October 2014 and a separate survey from Oregon. In comparing responses across political parties, the paper found that Democrats were most likely and Tea

**Box 1. Questions About Trust in Scientists**

Would you say that you trust, don't trust, or are unsure about scientists as a source of information about ...

- Vaccines
- Climate change
- Nuclear power safety
- Evolution
- Genetically modified organisms (GMOs)

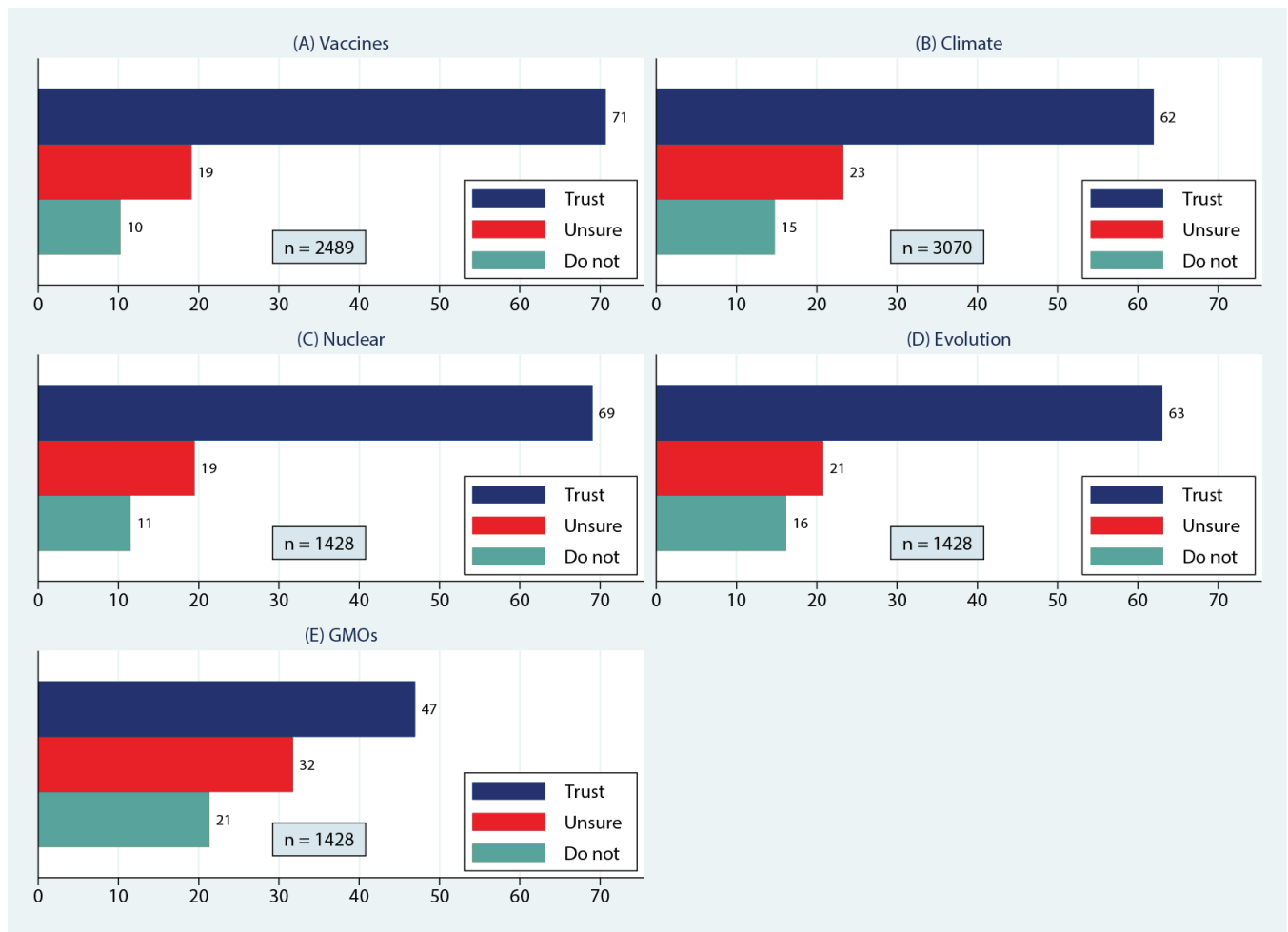
(The order of “trust” and “don't trust” choices read by interviewers was rotated to avoid bias.)

Party supporters least likely to say they trust scientists for information on either climate change or vaccines.

This brief broadens that analysis using additional data. Two New Hampshire surveys conducted in April and July 2015 asked new questions regarding trust in scientists for information about nuclear power safety, evolution, and GMOs.<sup>18</sup> In addition to comparison by political party, this brief compares attitudes by self-described political ideology.

Responses to all five questions are graphed as bar charts in Figure 1. Each chart also notes the number of respondents (*n*) who were asked that question. A large majority (71 percent) of the 2,489 respondents

**FIGURE 1. TRUST IN SCIENTISTS AS SOURCE OF INFORMATION ON FIVE ISSUES**



Note: N = number of respondents. Confidence intervals for these weighted percentages are within plus or minus 3 percentage points.

who were asked the vaccine question said they trust scientists for information on this topic (first panel). Majorities also trust scientists regarding climate change (62 percent), nuclear power safety (69 percent), and evolution (63 percent). In each of these cases, less than 20 percent said they do not trust scientists.

Regarding GMOs, the level of trust drops below half (47 percent), while distrust edges a bit higher (21 percent). These GMO responses do not necessarily indicate a dimmer view of scientists, however. A previous survey asking different questions found that more than 40 percent of respondents said they did not know enough about GMOs to offer an opinion.<sup>19</sup> Similarly, 32 percent here said they were unsure or did not know about trusting scientists regarding GMOs, and some of the remainder with low knowledge may have said “do not trust,” boosting that percentage as well. Despite the

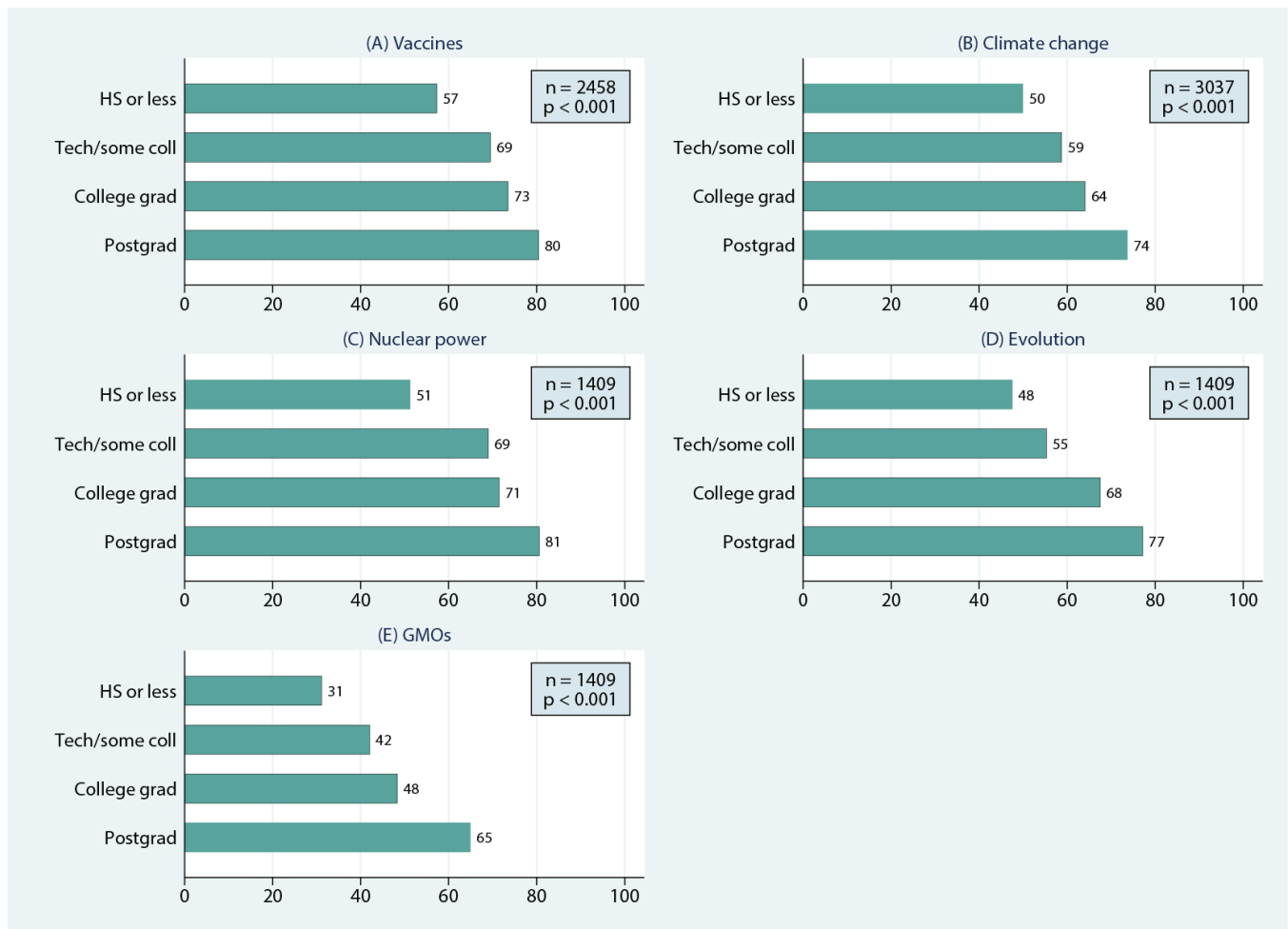
lower familiarity associated with GMOs, we included this issue because it has been mentioned by some commentators as an area that would show liberal bias.

With this caveat about interpreting the GMO responses, the Figure 1 results offer modest encouragement regarding public trust in scientists. The following sections explore how levels of trust vary with education and politics.

## Education and Trust in Scientists

The earlier study mentioned above<sup>20</sup> found that trust in scientists on both climate change and vaccines is higher among respondents with college education. The same holds true in this expanded dataset and extends to nuclear power, evolution, and GMOs (Figure 2). For each of the five topics, the percentage who said they trust scientists for information rises with education,

**FIGURE 2. TRUST IN SCIENTISTS, BY EDUCATIONAL LEVEL OF RESPONDENT**



Note: Number of respondents (n) and significance test probabilities (p) are given within each chart. In general, a p value below 0.05 (five chances in a hundred) is considered significant, meaning there can be reasonable confidence a relationship exists in the larger population (New Hampshire adults) from which these random samples were drawn. The probabilities here are much lower, below 0.001 or one chance in 1,000.

producing a 23- to 34-point spread between respondents with a high school education or less and those with post-graduate education. Regarding vaccines, the percentage rises from 57 to 80 percent, on climate from 50 to 74 percent, on evolution from 48 to 77 percent, and on GMOs from 31 to 65 percent. All education/trust relationships depicted in Figure 2 are statistically significant, as indicated by the probabilities ( $p$ ) given in each chart.<sup>21</sup>

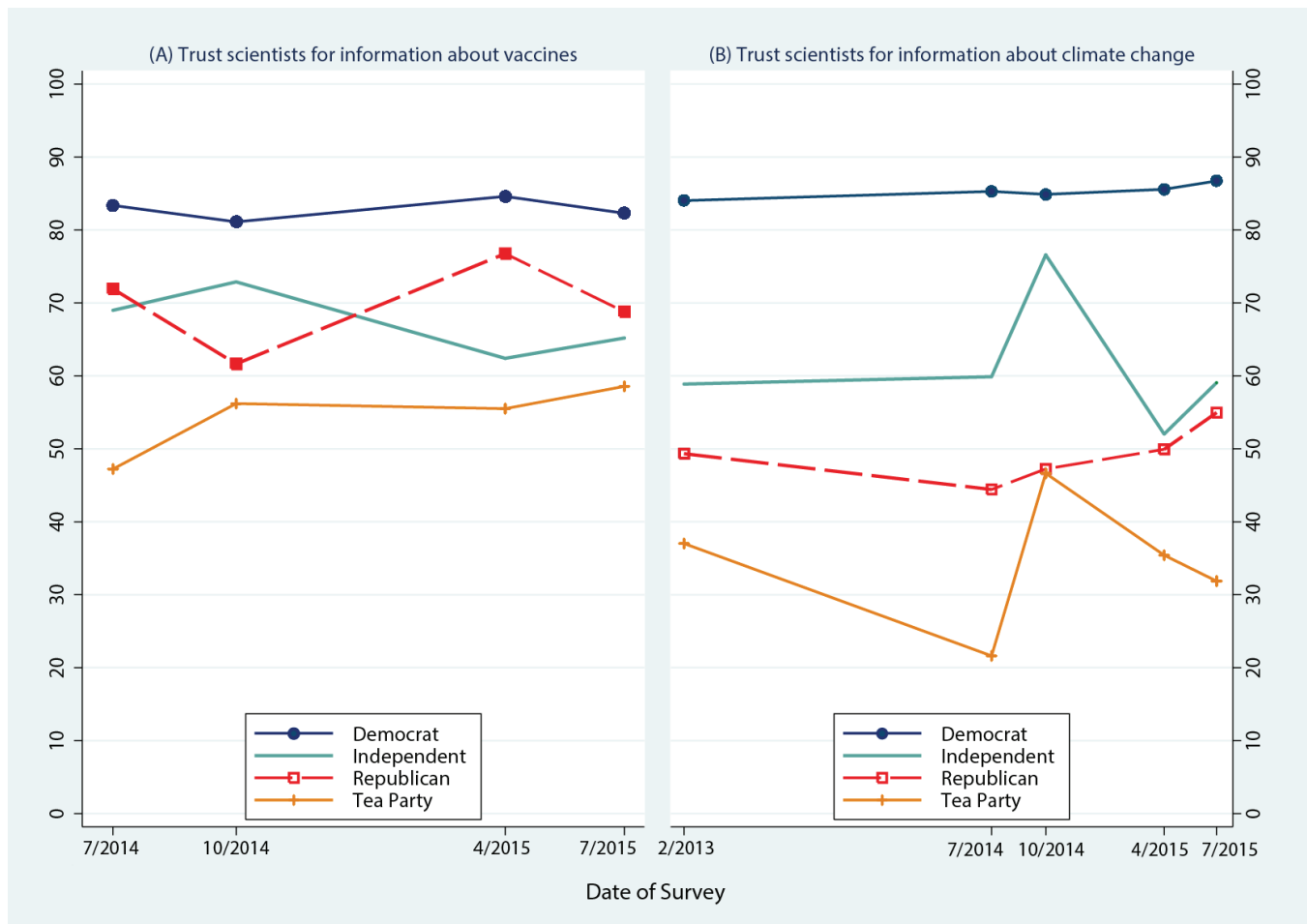
### Partisan Divisions on Vaccines and Climate Change

Figure 3 employs the four-party classification from the study cited above<sup>22</sup> to track partisan differences over time in attitudes about vaccines and climate change. Combining the results from the earlier study with our

expanded dataset yields four surveys that asked the vaccines question and five that asked about climate change. The up-and-down fluctuations in both plots appear statistically random, meaning that they fall within the normal variation expected from survey sampling. More noteworthy is their common pattern. On both questions across all of these surveys, Democrats expressed the most trust in scientists, while Tea Party supporters expressed the least. The views of independents and non-Tea Party Republicans are not as distinct from each other, a finding that also fits with earlier research.<sup>23</sup>

The vaccines result in the first panel of Figure 3 runs opposite to claims that, on this topic, liberals would be less likely than other groups to trust scientists. It lends support instead to contrary claims that across diverse science topics where there has been public controversy,

**FIGURE 3. TRUSTS IN SCIENTISTS ON VACCINES AND CLIMATE CHANGE, BY POLITICAL IDENTIFICATION OF RESPONDENT**



liberals are more likely and conservatives less likely to trust scientific evidence. However, Figure 3 involves only two questions. The next section examines all five of the trust-scientists items and compares them by liberal to conservative ideology instead of by party.

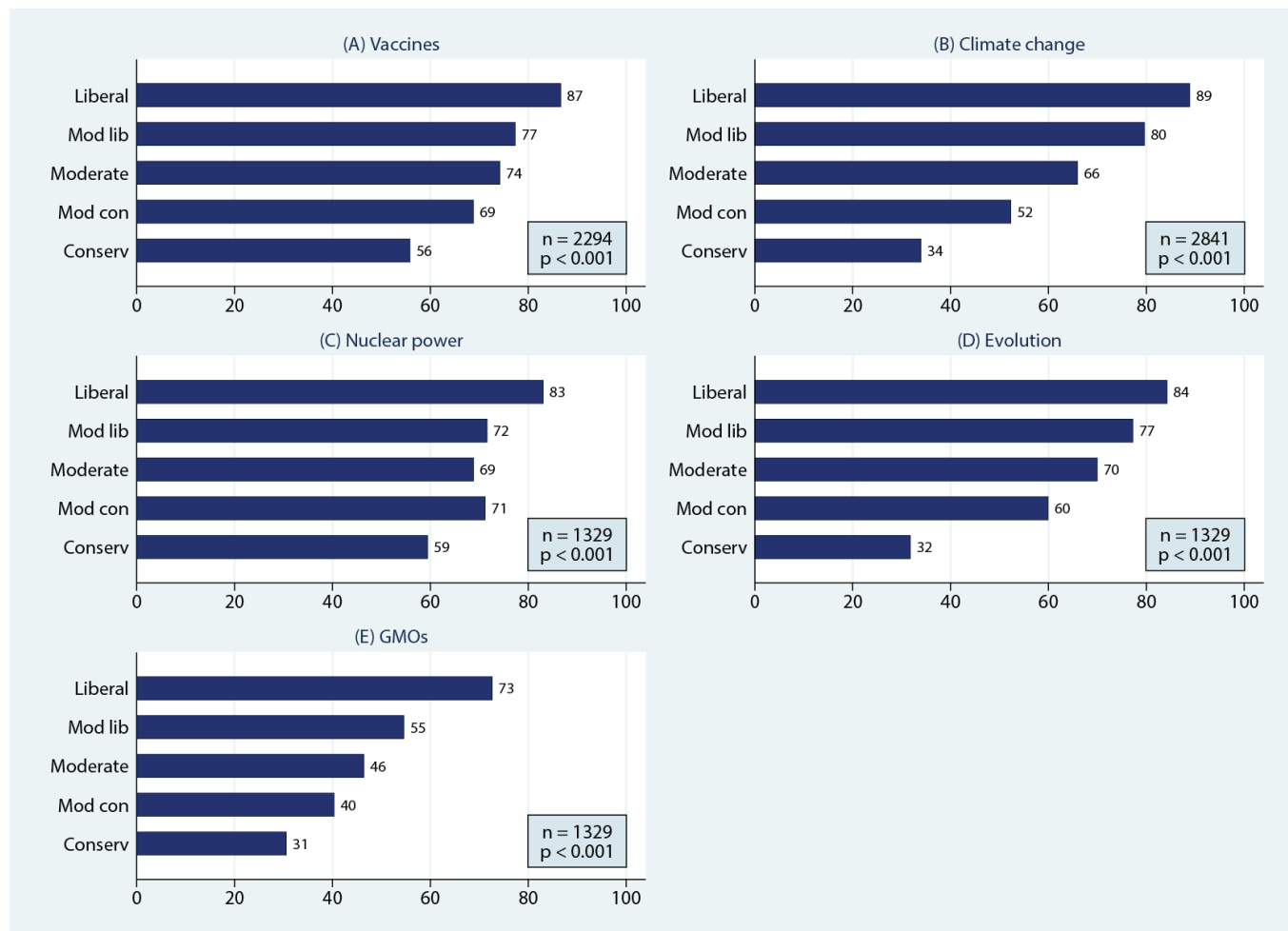
## Political Ideology and Trust in Scientists

The Granite State Poll routinely asks respondents to place themselves on a nine-point scale from extremely liberal to extremely conservative, with moderate (leaning neither way) in the center. Although the original version of this scale has nine categories, analysis suggests that in practice some of these are not very different. For example, the distinction between “moderate, leaning a little more toward the conservative side” (six

on the scale where five is plain moderate) and “somewhat conservative” (seven) does not seem to be sharp in many people’s minds, judging by the similar answers these two groups give to other questions. For our purposes it makes sense to use a simpler scheme with just five categories: liberal, moderately liberal, moderate, moderately conservative, or conservative.<sup>24</sup>

Figure 4 breaks down the percentage of trust-scientists responses by ideology. Most of the ideology/trust relationships charted in Figure 4 are stronger than the education/trust relationships charted in Figure 2. On topics from vaccines to GMOs, liberals are most likely and conservatives least likely to say they trust scientists for information. For example, 87 percent of liberals, 74 percent of moderates, and 56 percent of conservatives say that they trust scientists for information about vaccines. Eighty-three

**FIGURE 4. TRUST IN SCIENTISTS, BY IDEOLOGY OF RESPONDENT**



Note: The number of respondents (n) and significance test probabilities (p) are given within each chart. In every case, the relationships are statistically significant, yielding p values below 0.001.

percent of liberals, 69 percent of moderates, and 59 percent of conservatives say they trust scientists for information about nuclear power safety. Seventy-three percent of liberals, 46 percent of moderates, and just 31 percent of conservatives say they trust scientists for information about GMOs. Moderate liberals and moderate conservatives fill the spaces in between.

The vaccines, nuclear power, and GMO questions were specifically chosen to test whether on those topics liberals would be more inclined than conservatives to reject science. In fact, the proportion of liberals expressing trust in scientists is almost the same for vaccines as it is for climate change, and not much lower for nuclear power. Conservatives' trust ranges from 24 to 55 points lower than liberals' trust across all five science domains. These results overturn the proposition that with this selection of topics we would find opposite and similarly strong ideological biases slanting in both directions. If such opposite biases exist, their effects are relatively weak, limited to narrowing the liberal-conservative gap on some issues.

## Discussion

The content of particular science domains undoubtedly affects public perceptions. Some authors go a step further to argue that topical science-trust questions (for example, whether you trust scientists on climate change, or on nuclear power) basically measure the same thing as questions asking about your general attitudes regarding that topic.<sup>25</sup> Others have noted theory and data supporting the idea that economic or policy implications associated with particular science domains affect how people with different ideologies view them. For example, liberals tend to be more supportive of research on the environment, whereas conservatives prefer research that supports economic production.<sup>26</sup> Both the domain-attitude and policy-implication theories must be partly true, but neither predicts the unidirectional pattern seen in Figure 4.

Our data include, of course, many liberals who distrust scientists on each topic and many conservatives who do trust them. Some liberals who distrust scientists regarding nuclear power safety, for example, might be motivated by ideological or cultural reasoning, as are some conservatives regarding climate change. The proportions in these groups are quite

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different, however. Only 17 percent of liberals say they distrust or are unsure about scientists regarding nuclear power safety, compared with 66 percent of conservatives regarding climate change.

In a similar vein, experimental research has shown that both liberals and conservatives exhibit bias in evaluating scientific or scientific-sounding claims that impinge on their political and cultural beliefs.<sup>27</sup> Some evidence suggests such biases are more prevalent among conservatives, however.<sup>28</sup> Statements by conservative political leaders disparaging major areas of science reinforce impressions from survey and experimental data that science rejection, while cutting both ways, remains more widespread on the right than the left. Further indications come from the observation that the science domains on which the public is most politically polarized—climate change and evolution—have predominantly conservative opposition.

Observing that such a pattern exists does not explain why it exists. Contrasting liberal and conservative psychological characteristics have been proposed as one type of theoretical explanation,<sup>29</sup> sometimes termed the “intrinsic thesis.” In contrast, the more sociological “contextual thesis” attributes liberal/conservative differences on science to institutional and political factors, including the role of media.<sup>30</sup> Cultural identity and social-group influence form part of the context as well.<sup>31</sup> Judging the relative importance of psychological and sociological factors is beyond the scope of this brief. Figure 4 sketches a reality, however, that any theory should address.

## Endnotes

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2. For one example, see the American Geophysical Union's 2013 position statement, "Human-Induced Climate Change Requires Urgent Action," [http://sciencepolicy.agu.org/files/2013/07/AGU-Climate-Change-Position-Statement\\_August-2013.pdf](http://sciencepolicy.agu.org/files/2013/07/AGU-Climate-Change-Position-Statement_August-2013.pdf). A full list with information and links appears on the Wikipedia page, "Scientific Opinion on Climate Change," [https://en.wikipedia.org/wiki/Scientific\\_opinion\\_on\\_climate\\_change](https://en.wikipedia.org/wiki/Scientific_opinion_on_climate_change).
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10. G. Gauchat, "Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010," *American Sociological Review* 77, no. 2 (2014): 167–87, doi: 10.1177/0003122412438225; S. Lewandowsky, G. E. Gignac, and K. Oberauer, "The Role of Conspiracist Ideation and Worldviews in Predicting Rejection of Science," *PLoS ONE* 8, no. 10 (2013): e75637, doi:10.1371/journal.pone.0075637; A. M. McCright et al., "The Influence of Political Ideology on Trust in Science," *Environmental Research Letters* (2013), doi:10.1088/1748-9326/8/4/044029; L. Nadelson et al., "I Just Don't Trust Them: The Development and Validation of an Assessment Instrument to Measure Trust in Science and Scientists," *School Science and Mathematics* 114, no. 2 (2014): 76–86, doi: 10.1111/ssm.1205.
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16. For example, see L. C. Hamilton, “Tracking Public Knowledge and Perceptions About the Arctic,” *Witness the Arctic* 19, no. 2 (2015):9–14 (Fairbanks, AK: Arctic Research Consortium of the U.S.), <http://www.arcus.org/witness-the-arctic/2015/2/article/23160>.

17. L. C. Hamilton, J. Hartter, and K. Saito, “Trust in Scientists on Climate Change and Vaccines,” *Sage Open* (2015). doi: 10.1177/2158244015602752

18. The specific New Hampshire surveys that carried each question are as follows: vaccines (2,489 interviews in July and October 2014; April and July 2015); climate change (3,070 interviews in February 2013; July and October 2014; April and July 2015); nuclear power safety (1,428 interviews in April and July 2015); evolution (1,428 interviews in April and July 2015); and GMOs (1,428 interviews in April and July 2015). Vaccine, climate change, evolution, and GMO percentages exhibit no significant differences between surveys, and all responses to each question are pooled for the analyses in this brief.

19. Hamilton, “Do You Trust Scientists About the Environment?”

20. Hamilton, Hartter, and Saito, “Trust in Scientists on Climate Change and Vaccines.”

21. Significance test probabilities shown in Figures 2 and 4 derive from *F* tests in a weighted logistic regression corresponding to each two-variable chart. These probabilities assess how likely we would be to see such strong statistical relationships in random samples, if the null hypothesis (no relationship in the larger population) were true.

22. The four “parties” are self-identified Democrats, independents, Republicans, and Tea Party supporters (whatever their original party identification). See Hamilton and Saito, “A Four-Party View of U.S. Environmental Concern,” for more discussion of party coding schemes.

23. Hamilton and Saito, “A Four-Party View of U.S. Environmental Concern.”

24. Analyses similar to Figure 4 but instead using seven categories or the original nine yield more complicated graphics, but the same basic conclusions. To define the five categories in Figure 4, we grouped the original nine-point scale as follows:

- (1) Liberal—“extremely liberal” or “fairly liberal”
- (2) Moderately liberal—“somewhat liberal” or “moderate, leaning toward liberal”
- (3) Moderate—“moderate, leaning neither way”
- (4) Moderately conservative—“somewhat conservative” or “moderate, leaning toward conservative”
- (5) Conservative—“extremely conservative” or “fairly conservative”

People who said they didn’t know or otherwise declined to answer the ideology question (about 7 percent of the total) were not placed into one of these categories, but set aside for the analysis in Figure 4.

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