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Religion, Partisanship, and Attitudes Toward Science Policy

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Abstract

We examine issues involving science which have been contested in recent public debate. These “contested science” issues include human evolution, stem-cell research, and climate change. We find that few respondents evince consistently skeptical attitudes toward science issues, and that religious variables are generally strong predictors of attitudes toward individual issues. Furthermore, and contrary to analyses of elite discourse, partisan identification is not generally predictive of attitudes toward contested scientific issues.

Keywords

science, religion, evolution, climate change, stem cell research, partisanship

During the last decades of the 20th century, and the first years of the 21st, there have emerged in U.S. politics a number of political issues involving claims about scientific knowledge. That is, the science of evolution, climate change, and biological research have been a source of contention in contemporary U.S. politics. As these issues involve a number of public policy areas, including school curricula, reproductive freedom, support for scientific research, and environmental regulation, these policies, as well as the scientific evidence and reasoning underlying policy alternatives, have recently been contested in U.S. politics. Science and technology are increasingly subject to political pressures seeking to influence pedagogy, regulate technology, and finance expensive new developments in science and medicine—as recent controversies over school curricula, stem cell research, and global warming have emerged and continued (Bybee, 2008; Lerner, 2000; Reichardt, Cyranoski, & Schiermeier, 2004; Sherkat, 2011; Skoog, 2005).

Corresponding to this level of political activity, the question of public attitudes toward science has attracted a great deal of scholarly attention. Several studies have shown an increasing pattern of distrust of science in the United States (Gauchat, 2012; Mooney, 2005). Several of these have investigated the causes and effects of scientific literacy, and have generally shown that science knowledge is a strong predictor of adult scientific attitudes (Bauer, Petkova, & Boyadjieva, 2000; Hayes & Tariq, 2000; Laugksch, 2000; Miller, 2004). Gauchat (2008) has shown that there exist mechanisms that underlie this relationship. Gauchat explores three attitudes toward the value of science: lack of science knowledge/scientific literacy, strong religious (Evangelical) faith, and social embeddedness/social context. These three explanatory factors are thought to contribute to the understanding of

antiscience attitudes. In an analysis of elite discourse, Stenmark (2013) showed that there are a variety of epistemological and substantive disagreements among proponents of scientific and religious worldviews.

Recent studies of scientific literacy have used variations of the scientific literacy scale. Sherkat (2011) confirmed that fundamentalist believers in the United States have lower levels of scientific literacy when compared with secular Americans. Religious variables have significant effects on such attitudes, and these effects are stronger than those associated with gender, race, and income. Roos (2012) expanded the study of scientific literacy by showing the bidimensional structure of the scientific literacy scale (see also Bann & Schwerin, 2004; Miller, 1998, 2004). Roos advises researchers to create two separate scales (instead of a single summed scale) for a more accurate measurement of science knowledge; one for life science knowledge and one for physical sciences knowledge. For example, two items in the study about evolution and the big bang appear to represent a religious belief dimension termed, “Young Earth Worldview,” rather than being related to other aspects of scientific knowledge.

Some studies have examined the negative relationship between science knowledge/scientific literacy and levels of trust in science. Gauchat’s (2008) study on science and public trust show that conservatives have a low trust in

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science. Furthermore, Gauchat's (2012) study of public trust and science in the United States, 1974 to 2010, show that group differences are stable with respect to specific attitudes over time, except among respondents who identify themselves as conservatives. At the beginning of the longitudinal study conservatives had the highest trust in science, but at the end of the study period conservative exhibited the lowest level of trust in science.

Moreover, there have been several recent studies exploring the contemporary relationship between religion and scientists. (Baker, 2012; Ecklund, 2010; Ecklund & Park, 2009; Ellison & Musick, 1995; Evans, 2011, 2012; Evans & Evans, 2008; Scheitle, 2011; Sherkat, 2011). Studies of political involvement by scientists such as Evans (2013) showed evidence for increasing opposition by Biblical literalists to the involvement of scientists in social debates about moral issues, and, furthermore, that fundamentalists are less likely to have confidence in scientists than the nonreligious. Freeman and Houston (2011) showed that respondents who believe that human evolution is "true" are more supportive of funding for scientific research than those who view evolution as "false" or "don't know."

For the most part, this impressive literature has focused on attitudes toward science at a relatively high level of abstraction. Much of this literature carries the implicit assumption that such attitudes as confidence toward science, or scientific literacy, will be applied to specific areas of public policy. Given the varying nature of cognitive sophistication of the American public (Converse, 1964; Zaller, 1992), this assumption is not necessarily warranted. One cannot assume, for example, that respondents who have low levels of confidence in "the scientific community" will be skeptical of specific claims about global warming, or will be opponents of the teaching of evolution in public schools. Our purpose in this study is to examine public attitudes toward three specific issues that might be characterized as "contested science": evolution, climate change, and stem cell research. We hope to provide explanations of variations in these attitudes, and to determine whether skeptical attitudes about science issues exhibit a coherent structure. While previous research has emphasized general attitudes toward, and knowledge of, science, we focus our attention on more specific attitudes related to contemporary issues of public policy.

Contested Science in U.S. Politics

Of course the evolution controversy is a hardy perennial of U.S. politics, and is the oldest of the three issues considered here. The teaching of evolution in education has been contentious since the Scope trial of 1925. Since *Scopes*, the evolution debate has focused on the teaching of evolution, and its alternatives, in public schools. There have been recent developments within U.S. school boards and at the state legislative level in which some states have tried to limit, change revised or modify how evolution is taught in public schools

or state education programs, and recent antievolution activity has shown no sign of abating in the early years of the 21st century (see Jelen & Lockett, 2013, for a detailed description of some of these policies). For example, in 2012 a bill was passed, and approved by Intelligent Design proponents in the state of Tennessee. Scientists and science educators are apprehensive that the law may limit or misrepresent students' understanding of creationism, and lead to the denial of global warming in science. The Bill "protects" teachers who examine the "scientific strengths and scientific weaknesses of existing scientific theories covered in the course being taught" such as evolution and climate change (Zabarenko, 2012). Many fundamentalists believe that education, especially the teaching of evolution is essentially worthless, contradicts an inerrant belief in the Bible, or it is valueless if not taught in a religious content and orientation (Darnell & Sherkat, 1997).

In general, courts have not been sympathetic as state boards of education. Courts have struck down measures intended to prohibit the teaching of evolution (*Epperson v. Arkansas*, 1968) to mandate the teaching of creationism as an alternative to evolutionary theory (*Edwards v. Aguillard*, 1987) and to require the teaching of "intelligent design" (*Kitzmiller v. Dover Area School District*, 2005). Nevertheless, the continued litigation and legislative activity concerning the teaching of evolution and its alternatives suggests that the issue of evolution/creationism remains salient for many Americans (Irons, 2007). Furthermore, the ongoing nature of the controversy has occasioned intense political conflict (Hitchens, 2009), and has had important effects on the delivery of science education at the middle school and secondary levels (Allen, 2008; Berkman & Plutzer, 2010; National Public Radio, 2005).

Various movements and organizations have used scientific terminology to promote "creation science" or, more recently, intelligent design (for a history and critique of this "movement," see Forrest, 2004, 2007). The U.S. National Academy of Sciences has stated that "creationism, intelligent design, and other claims of supernatural intervention in the origin of life or of species are not science because they are not testable by the methods of science" (Science, 1999).

At the level of public opinion, the evolution question remains contested. A series of Gallup polls in the United States, taken from 1982 through 2008 on "Evolution, Creationism, Intelligent Design" have found that a plurality of Americans (ranging from 43% to 47%) have believed that "God created human beings in pretty much their present form at one time within the last 10,000 years or so." Between 35% and 40% endorsed the view that "Human beings have developed over millions of years from less advanced forms of life, but God guided the process." Only a small minority, ranging from 9% to 14%, agreed that "God had no part in the process" (Newport, 2004, 2007, 2010c). Opposition to evolution has been shown to be related to evangelical denominational affiliation, biblical literalism, and lower levels of

formal education (Bishop, 2007; Lockett, 2010). Baker (2013) has noted the limited effects of formal education on the creationist attitudes of respondents who hold an inerrant view of the Bible. Skepticism about evolution occurs even among relatively irreligious, highly educated citizens. Although there is substantial opposition to evolution even among highly educated and irreligious people, the existing empirical literature suggests that religious memberships, beliefs, and practices are the primary sources of opposition to evolutionary theory. Furthermore, Newport (2007) has shown that there are substantial partisan differences in acceptance of evolutionary theory, with Republicans being significantly more skeptical than Democrats or Independents.

The general issue of environmentalism has been a source of intermittent, yet recurring controversy in U.S. politics. Concern with “conservation” dates back at least as far as the administration of Theodore Roosevelt, and perhaps culminated with the environmental movement of the late 1960s and early 1970s. This movement ushered in a series of regulatory politics, as well as the creation of the Environmental Protection Agency.

Perhaps the most recent permutation in the enduring general issue of environmentalism is the question of climate change, or more colloquially, “global warming.” The hypothesis that the earth’s atmosphere is warming as the result of human activity, and that such temperature changes may have profound consequences for the earth’s habitability, has been extremely controversial. Furthermore, this controversy has had partisan and religious underpinnings. Most recently, President Obama’s (The White House, 2013) February 2013 state of the union address urged the nation country to do more to combat climate change. By contrast, a number of Republican leaders have expressed substantial reservations about climate change, and some have charged supporters of the global warming hypothesis with duplicity (Dade, 2011). While skepticism about climate changes is by no means universal among Grand Old Party (GOP) leaders, there do appear to be important partisan differences at the elite level. Indeed, the title of Christopher Mooney’s *The Republican War on Science* (2005) documents a great deal of party-based controversy over this issue in the U.S. Congress.

At the level of the mass public, the issue of climate change has not received nearly the scholarly attention of the evolution issue, perhaps as a result of the relative novelty of the controversy. The proportion of Americans who believe that the effects of global warming rose to a peak in 2008 and then declined. A similar trend was found regarding the belief that global warming is a threat to their lifestyle within their lifetime (Newport, 2010b). This trend has continued into 2012, and the Gallup Surveys have shown large partisan differences (Saad, 2012). Reporting on the results of focus groups, Draper (2013) has shown that, to some extent, the Republican Party is considered “anti-science,” and this image is most often manifested in attitudes toward climate change. To some extent, then, the elite level activity documented by Mooney has been shown to reflect differences among ordinary citizens.

The role of religion in accounting for variation in environmental attitudes appears to be changing. In an earlier study, Guth, Green, Kellstedt, and Smidt (1995) showed that evangelicals are less supportive of environmental regulation than nonevangelicals, and that this tendency is strongest among respondents who believe that God gave humanity “dominion” over the earth. However, recent studies (see especially Danielson, 2013) have suggested that evangelical elites have become more likely to embrace attitudes supporting environmental regulation and protection.

Finally, in recent years there has been much attention and tension between politics and science on the issue of embryonic stem cell research. This issue has become controversial, in large part because of its connection with the question of legal abortion (Jelen & Wilcox, 2003). Differences in attitude between religion and science about stem-cell usage have been a key role in the contention between biological research and politics. For example, the Catholic Church questions the propriety of scientific endeavors with respect to stem cell research (Sherkat, 2011).

Again, at the elite level, there have been clear ideological and partisan differences. In 2001 the policy of the George W. Bush administration limited funding of embryonic stem cell research, and promised to develop and implement “strict guidelines” on the research. In March 2009, a new executive order signed by President Barack Obama ended the nearly 8-year-old ban on federal funding for most stem cell research, saying it ushered in a new era of possibility (The White House, 2009). In August 2010, a U.S. federal district judge ruled against President Obama’s 2009 executive order that expanded embryonic stem cell research, asserting that it violated a ban on federal money being used to destroy human embryos (Harris, 2010).

Surveys of public opinion show that, although a majority of Americans accept the morality of stem cell research, there exists a substantial minority (about one in three) who do not. Such opponents of embryonic research are most likely to be highly religiously observant, ideologically conservative, and Republican (Newport, 2010a).

In this study, we examine public attitudes toward three issues involving what might be termed *contested science*: evolution, stem-cell research, and climate change. For convenience, we characterize disbelief in evolution or climate change, or opposition to stem cell research, as “skeptical” attitudes toward the issue in question. We hypothesize that skeptical attitudes toward each of these issues will be related to doctrinally conservative religious affiliations and attitudes, Republican partisanship, and ideological conservatism.

Data and Method

Data for this study were taken from the 2006 General Social Survey (GSS; Smith, Marsden, Hout, & Kim, 2013). This version of the GSS contains a number of items related to scientific knowledge, and attitudes toward policy issues to which such knowledge is relevant.

Table 1. Frequency Distribution of Measures of Science Attitudes.

<i>Evolution:</i>	
Human beings, as we know them today, developed from earlier species of animals (Is that true or false)?	
True	49.6
False	50.4
	<u>1,570</u>
<i>Stem cell research:</i>	
Recently, there has been controversy over whether the government should provide any funds at all for scientific research that uses “stem cells” taken from human embryos. Would you say that government definitely should fund such research, probably should fund such research, probably should not fund such research, or definitely should not fund such research?	
Should ¹	74.3
Should not ²	25.7
	<u>855</u>
<i>Global warming:</i>	
On a scale of 1 to 5, where one means “near complete agreement” and 5 means “No agreement at all,” to what extent do environmental scientists agree among themselves about the existence and causes of global warming?	
High agreement ³	45.9
Low agreement ⁴	54.1
	<u>850</u>
<i>General Skepticism (per cent expressing skepticism on all three measures)</i>	
Low skepticism	10.0
High skepticism	90.0
	<u>692</u>

Source. Computed from General Social Surveys, 2006.

¹Definitely should or probably should.

²Probably or definitely should not.

³1-2.

⁴3-5.

The main dependent variables are attitudes toward three “contested” scientific issues: Human evolution, stem research, and climate change (see Table 1 for question wording and marginal distributions). The human evolution variable is a dichotomous item, asking whether the respondent believes that humans evolved from earlier species of animals. This item differs from questions on other surveys, in which respondents are offered alternatives endorsing special creation, theistic evolution, or evolution that does not involve divine intervention (Newport, 2004, 2007). Nevertheless, the distribution of evolution attitudes in the GSS is comparable with other surveys, with a slight majority rejecting human evolution.

Similarly, the “stem cell research” item is not ideal, in that respondents are not asked about the morality of stem cell research, but whether such scientific activity should be funded by the government. Nevertheless, despite the fact that the funding item is likely “harder” than a more direct measure (e.g., one could favor conducting stem cell research, but oppose using taxpayer dollars to support it), nearly three in four respondents favor government expenditures for this purpose.

Table 2. Bivariate Relationships (Gamma) Among Science Items.

	Evolution	Stem cell research	Global warming agreement
Evolution	1.0		
Stem cell research	.491	1.0	
Global warming agreement	.111	.172	1.0

Source. Computed from General Social Surveys, 2006.

Finally, the “global warming” item is also limited. Respondents are not asked whether climate change is occurring, or whether human activity is causing any such change, but simply about the extent of agreement among scientists about “the existence and causes” of global warming. We regard this item as having a certain level of face validity, as the extent of consensus concerning climate change is a point of contention in recent and contemporary political discourse that is often raised by global warming skeptics (Mooney, 2005). Opponents of public policies designed to ameliorate or reverse climate change often suggest that scientists disagree among themselves about the existence, causes, and extent of global warming.

To facilitate comparison, and to permit the construction of indices, each item was dichotomized. The evolution item is, of course, dichotomous, and the stem cell research question lends itself to a natural “agree/disagree” simplification. The recoding of the climate change item is more complex, since a plurality of respondents (37%) selected the intermediate response (3). These were coded as endorsing a “low agreement” response, but the coding decision on the global warming item is, to some extent, arbitrary.

We also computed a measure of general scientific skepticism, which simply identifies respondents who express skeptical attitudes on all three issues under consideration. As Table 1 shows, only 10% of respondents occupy this category, which represents substantially fewer respondents than would be expected by random chance.

The relative scarcity of respondents who take consistently skeptical positions on issues of science policy is further documented in Table 2, which contains the bivariate relationships between each pair of items. As the data presented in this table show, these relationships are statistically significant, and in the expected direction, but rather weak. The coefficient (gamma) between attitudes toward evolution and stem cell research is relatively robust (.491), but the bivariate coefficients involving the global warming item are about one third as strong. For the GSS sample as a whole, then, it seems unlikely that there exists anything approaching a consistently and generally skeptical attitude toward issues of contested science.¹

Sources of Attitudes Toward Contested Science

To assess the sources of attitudes toward each of these issues, relatively simple multivariate models (logistic regression)

Table 3. Multivariate Models of Science Attitudes (Logistic Regression).

	Evolution	Stem cell research	Global warming	General skepticism
Education	-0.092***	-0.026	-0.093**	-0.033
Age	0.019**	-0.007	0.000	0.001
Sex	0.362**	0.079	0.146	0.176
Republican	0.127	0.255	0.272	-0.020
Democrat	-0.094	-0.494*	-0.138	-1.996**
Ideology	0.248***	0.301***	0.102 [†]	0.383**
Catholic	-0.192	-0.138	-0.068	-0.833
Evangelical	0.976***	0.351 [†]	0.319 [†]	0.588 [†]
Bible view	1.085***	.494***	.088	1.023**
Constant	1.098*	-0.977	0.504	-1.955*
Nagelkerke R^2	.374	.165	.056	.156
<i>n</i>	1,488	810	803	661

Source. Computed from General Social Surveys, 2006.

[†]significant at .10. *significant at .05. **significant at .01. ***significant at .001.

were estimated. The effects of three sets of independent variables were considered. First, a parsimonious set of demographic variables (age, gender, and education) was included.² We also include a set of political variables. The models include dummy variables for Republican and Democratic identification, with independents constituting the comparison category.³ We use discrete dummy variables, rather than the standard 7-point party identification scale, because we anticipate that the effects of partisanship may be asymmetrical. That is, Republicans may receive partisan cues related to issues of contested science, and Democrats may not (or vice versa). We also estimate the effects of 7-point ideological self-placement scale, running from “extremely liberal” to “extremely conservative.”

Finally, the effects of three religious variables are considered: We include dummy variables for Roman Catholicism and membership in an evangelical denomination (Smith, 1990). We also examine the effects of a question tapping respondent attitudes toward the authority of the Bible. These measures correspond to the dimensions of “believing” and “belonging” that are thought to have independent effects on political attitudes (see especially Green, 2010).

The sources of skeptical attitudes toward scientific issues are examined in Table 3. As Table 3 shows, all three demographic variables are significantly related to attitudes toward evolution. Respondents of lower education, older respondents, and women are all less likely to believe in human evolution than other respondents. Lower levels of education are only related to skeptical attitudes toward global warming, while none of the included demographic variables are related to support for government funding of stem cell research.

Affiliation as a Roman Catholic is not significantly related to attitudes toward any of the three science issues considered here. As might be expected, membership in an evangelical denomination and a literal view of the Bible’s authority are significantly and strongly related to attitudes toward human

evolution. In view of the historic tension between doctrinally conservative Christianity and evolutionary science (Jelen & Lockett, 2010), such a result is not surprising. Evangelical denominational affiliation is marginally related to attitudes toward stem cell research and global warming ($p < .10$), and attitudes toward the Bible are significantly related toward stem cell research.

Self-identification as a conservative is significantly related to attitudes toward evolution and stem cell research, and marginally significantly related to attitudes toward global warming ($p < .10$).⁴ What is most surprising is the virtual irrelevance of partisanship in predicting any of the three issue attitudes considered here. Identification as a Democrat is significantly related to approval of government funding of stem cell research, but no other coefficient relating partisanship to attitudes concerning scientific issues even approaches statistical significance. Given the importance of elite-level Republican activities on these issues (Draper, 2013; Mooney, 2005), the fact that Republican identifiers are not significantly more skeptical than independents on any of these questions is quite unexpected.

Thus, attitudes toward evolution conform most closely to our expectations. Religion and demographic variables are strong and significant predictors of disbelief in human evolution. By contrast, the effects of all three sets of independent variables on attitudes toward stem cell research and climate change are somewhat weaker.

Is there anything distinctive about the minority of respondents who respond in a consistently skeptical manner to these issues? This question is addressed in the last column of Table 3, which contains the results of multivariate models estimated to predict consistent skepticism about science policy. These data appear to support the importance of religious variables, and the general irrelevance of partisanship, to policy skepticism regarding issues of science. The most important predictor of general skepticism is the respondent’s view

of the Bible, while affiliation with an evangelical denomination is significant at .10. Although the effects of Democratic identification attain conventional statistical significance, this result is entirely driven by great support among Democratic identifiers for stem-cell research. When an index of attitudes toward evolution and climate changes is included, the effects of Democratic identification are rendered insignificant.⁵

Discussion

The most important findings of this study are negative. First, there is no evidence that there exists any constituency of science policy skeptics. The three attitudes toward specific areas of science policy are very weakly related, and very few respondents exhibit consistently skeptical attitudes. There are significant relationships between general skepticism and variables associated with aspects of evangelical Protestantism (Biblical literalism and evangelical denominational affiliation), but these are relatively weak and may not represent a more general attitude of intellectual doubts concerning the policy implications of science. Rather, each issue attitude under consideration here appears to attract skeptical issue specialists. This result is consistent with the findings of Lockett (2010), who found that the effects of confidence in the scientific community on attitudes toward evolution were not significant once religious attitudes had been controlled. The relationship between attitudes toward evolution and stem cell research is moderate and significant, which supports those reported by Roos (2012), which suggest that some attitudes toward science exhibit substantial religious components.

Second, and perhaps more surprisingly, party identification is virtually irrelevant to skeptical attitudes toward science issues. With the sole exception of the relationship between Democratic identification and support for stem-cell research, partisanship is not significantly related to any of the issues considered here. Given the nature of elite-level discourse on evolution and climate change, this is a rather unexpected finding.

Third, as might be expected, religious variables, including evangelical denominational affiliation and high views of the authority of Scripture, are strongly and significantly related to attitudes toward evolution. The same variables are related, albeit somewhat less strongly, to attitudes toward stem-cell research, but are not significantly related to a belief that there exists a scientific consensus about climate change.

Finally, it is of interest that variables that do not appear directly related to socializing agents are most consistently related to skeptical attitudes toward science issues. While party identification and evangelical denominational affiliation might suggest that respondents are exposed to elite communications, and that such people might find communications more or less credible, it is not clear why ideological self-identification or respondent views of the Bible's authority should be as efficacious as we observe. The latter set of predictors seems more "private," and less directly relevant to

elite messages (see Zaller, 1992). This is a puzzle, which requires further investigation.

In one sense, the general lack of coherence of our findings may not be surprising. With the exception of evolution, which is an old controversy in U.S. politics, issues involving the truth claims of science seem likely to be "hard" issues (Carmines & Stimson, 1980), which involve relatively high levels of information and are correspondingly cognitively demanding. Such issues do not lend themselves to simple characterization or incorporation into more general belief systems or ideologies.

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Notes

1. For the entire sample, the reliability (Cronbach's α) for these three items is .280; for members of evangelical denominations only, $\alpha = .199$.
2. The inclusion of race in the models reported here makes no measurable difference in the findings.
3. Independent leaners were coded as partisans. See Petrocik (1974).
4. It should be noted that, due to the split half method used in the science module of the 2006 General Social Survey (GSS), the N s for the models related to stem cell research and global warming are just over half that were used in the evolution model. Thus, we are inclined to report coefficients that approach, but do not meet, conventional levels of statistical significance.
5. The inclusion of a measure tapping "confidence in the scientific community" does not alter the results presented here, although the coefficient associated with the confidence measure itself is significant a .05. Moreover, stratifying the sample by levels of scientific knowledge does not appear to affect any of the results (see Sherkat, 2011).

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