

3-29-2010

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“It’s Only a Theory”: Science, Religion and Attitudes Toward Evolution

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Prepared for delivery at the annual meeting of the Western Political Science Association, San Francisco, April, 2010.

Abstract

The controversy over evolution is a long standing one in American politics. The issue is often depicted as a conflict between science and religion. In this paper the effects of confidence in science and confidence in religion on attitudes toward human evolution are estimated. Bivariate analysis shows that confidence in science is positively related to belief in human evolution, while confidence in religion has a negative relationship. However, these effects become very weak when controls for religious beliefs and affiliation are imposed. Religious variables, rather than attitudes toward science, seem to be the main sources of attitudes toward evolution.

Introduction

Since the publication of *On The Origin of Species*, the theory of evolution has been a source of enormous controversy. The debate over the veracity and teaching of the theory of evolution has been intensely contested in American politics. Evolution is a perennial issue in U.S. politics. The landmark Scopes “Monkey Trial” of 1925 was catalyst for a strong national divide between creationists and evolutionists, which has persisted to the present day. Indeed, the issue of evolution was raised in the first Republican Presidential debate in 2008, with three Presidential candidates expressing disbelief in evolution (*New York Times* 2007).

Since *Scopes*, the evolution debate has focused on the teaching of evolution, and its alternatives, in public schools. In view of the fact, there have been continued attempts of state legislatures to limit teaching of evolution and/or teaching versions of creationism sympathetic. For example, in a revision of a 1976 evolution teaching law implemented in 1990, public schools in Kentucky have permission to teach creationism along with evolution. The statute states that any educator who desires to may teach “the theory of creation as presented in the Bible.” In September 2005 a bill written by Michigan state legislators was formulated with a goal to guarantee that students will be able to “use the scientific method to critically evaluate scientific theories including, but not limited to, the theories of global warming and evolution.” Earlier in 2004 the state made an effort to include intelligent design within state science standards but the bill was unsuccessful in passing. (NPR 2005).

Subsequently, courts have not been sympathetic. 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]). The continued litigation over the teaching of evolution and its alternatives suggests that the issue of evolution/creationism remains salient for many Americans (Irons 2007).

For many protagonists in the evolution/creation controversy, what is at stake is the authority of the Bible. The three Christian faith traditions considered in this study have deep historical roots with respect to Scriptural interpretation.¹ Therefore, differences in attitudes toward evolution and creationism reflect large differences in historical circumstance and in styles of biblical exegesis. This controversy has been most prominent among Protestants, for whom Scripture is quite salient. A basic insight of the Protestant Reformation has been the sole authority of the Bible in matters of belief, but, in the United States and elsewhere, the precise nature of that authority has been the object of a great deal of contention.

In the United States, Mainline Protestants are less likely to express beliefs in biblical inerrancy. Many observers suggest that “Mainline Protestantism,” as a distinctive religious tradition, has its roots in the Social Gospel movement of the late 19th and early 20th centuries (Wald and Calhoun-Brown 2007). Although most accounts of the Social Gospel emphasize the ethical demands of the Scripture, as opposed to personal holiness (Rauschenbusch 1917; Gilkey 1968; Garrett 1973) the larger context of the movement reflects the need to adapt our understanding of the Bible to reflect the nature of the historical context in which the Bible is being read. Therefore, an important implication of the Social Gospel movement is the compatibility between the Scriptures and the insights of modern science. (Wilcox and Larson 2006).

¹ Although Jews have not been active in this debate, they have been included for purposes of comparison.

The National Council of Churches (NCC), clarified Mainline perspectives in a March 26, 2006 press release. It stated, “many well informed and well educated people believe that the teachings of science and religion enrich each other” (NCC 2006b. See also NCC 2006a). It seems clear that, at the leadership level, many Mainline Protestants do not perceive a conflict between religion and science. Even highly religious Mainline Protestants seem likely to believe in human evolution.

By contrast, doctrinally conservative Protestants (such as Evangelicals, and especially fundamentalists) hold more literalist views of Scripture. The fundamentalist movement in the United States began as a reaction to the Social Gospel movement. In 1910, a series of essays, entitled *The Fundamentals*, was published by Milton and Lyman Steward (Wilcox and Larson 2006). *The Fundamentals* emphasized the importance of an authoritative reading of the Bible, and the dangers associated with higher criticism or sophisticated exegesis of Scripture. Fundamentalism provides the intellectual roots of contemporary Evangelicalism in the United States, and constituted a firm and stable reaffirmation of the inerrancy of the Bible.

Consequently, Evangelical (and especially fundamentalist) opposition to evolution has been a prominent aspect of Evangelical culture since the *Scopes* trial. Evolution is thought to cast doubt on the veracity of the account of creation in Genesis, and, therefore to challenge the Bible’s authority (Wills 1990; IFCA 2005). Therefore, it is to be expected that Evangelical Protestants are likely to be skeptical about evolution, and to support the reaching of creationism as an alternative (Woodrum and Hoban 1992; Mazur 2004; Bishop 2007; Wilcox and Larson 2006).

The Roman Catholic Church has not been a foe of evolutionary theory. Evolution and creation are regarded as compatible by Church leaders, since the process of evolution is believed to be guided by God. Pope Benedict XVI has stated that the evolution theory does not explain all of the philosophical questions of human existentialism, and scientists may have an inappropriately narrow view of the development of human origin. Nevertheless, Benedict XVI has expressed the belief that evolution represents a plausible and well-supported scientific perspective (Benedict 2007).

Why is religion so important in public debate over a scientific theory? For many Americans, evolution challenges belief in the Bible, and threatens to undermine religion. (Mazur, 2004). For some, evolution pits insights of science against religious belief. The research question is, ‘why some people believe in evolution and some people do not?’ The question is important, because, to date, there have not been empirical studies relating public attitudes toward science to beliefs about evolution among ordinary citizens. The debate over the veracity and teaching of scientific theory of evolution has been intensely contested in American politics. Evolution is a perennial issue in the political and social life of the United States.

Of course, at the activist level, opponents of evolution have used the trappings of science to advance their alternative viewpoints. Various spokespersons have employed scientific terminology to promote “creation science” or, more recently, intelligent design. It is not clear, however, that members of the mass public regard creationism or ID as genuinely scientific theories. Therefore, evolution controversy is often thought to pit religion against science (Mooney 2005). The purpose of this paper is to investigate empirically importance of attitudes toward science and religion in attitudes toward human evolution.

Literature Review

There is substantial opposition to evolutionary theory among members of the mass public. This study is important because to date, there has been relatively little empirical work on the nature of attitudes toward evolution and creationism (Bishop 2007). However, in several studies, a plurality of Americans have endorsed “special creation” which means people were created as described in the book of Genesis (Newport 2004, 2006; Bishop 2007); rather than evolving over many years, humans were directly created by God in one week. This plurality persists even when respondents are offered an explicitly theological version of evolutionary theory (suggesting, for example, that evolution is a process “guided by God”). Therefore, many Americans appear to have very precise beliefs about the nature of creation, and reject accounts of evolution which allow for divine intervention in the process.

Religious variables have been shown to be important predictors of belief in special creation. Freeland and Houston (2009); have shown that religious belief is a stronger predictor of attitudes toward evolution than is membership in a congregation associated with a particular faith tradition, while Haider-Markel and Joslyn (2008) have suggested that religious variables generally are more strongly associated with attitudes toward creationism than is the respondent’s level of formal education. Skepticism about evolution occurs even among relatively irreligious, highly educated citizens (Bishop 2007). 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.

While popular accounts of the evolution controversy have emphasized the issue as a clash between science and religion (Mooney 2005, Hitchens 2009), there do not exist, to my knowledge, studies which investigate the role of attitudes toward science and religion in explaining attitudes toward evolution. Previous studies have included the effects of taking science courses in college (Freeman and Houston 2009) and formal education (Haider-Markel and Joslyn 2008). In this study, I hope to address directly the role of subjective attitudes toward science and religion as sources of attitudes toward human evolution.

Theory

The specific research question to be investigated is whether, and to what extent, confidence in science, and confidence in religion affects attitudes toward human evolution. I would anticipate that confidence in science will be positively related to belief in evolution, and high confidence in religion will be related to disbelief in evolution. Further, I would expect that respondents who perceive conflict between science and religion would have particularly strong attitudes about evolution, with respondents placing a higher value on science being more supportive of evolution, and those who place a high value on religion (relative to science) being more skeptical about evolution.. As previous literature has suggested, religious variables are quite important in accounting for variations in attitudes toward evolution.

Specifically, the following hypotheses will be tested:

Hypothesis 1: People who have a high confidence in the science community are more likely to believe in evolution. Evolution is widely believed among scientists; and with confidence in science more likely to find evolutionary theory plausible.

Hypothesis 2: People who have a low confidence in organized religion are more likely to believe in evolution. Previous research shows belief in evolution negatively related to religiosity, even among non-Evangelical churches. Religious people are more likely to have confidence in religion, and more likely to believe in special creation.

Hypothesis 3: People who have high confidence in science and low confidence in organized religion are more likely to believe in evolution. People with low confidence in science and high confidence in organized religion are less likely to believe in evolution It is expected that people with extreme scores on difference variables likely to perceive a conflict between science and religion.

The effects of a number of control variables are considered. Most of these are religious in nature. As noted, leaders of different denominational traditions promote diverse attitudes toward evolution, with Evangelicals being most skeptical, and Catholics and Mainline Protestants being more accepting of evolutionary theory (Jelen and Lockett 2010). Therefore I would expect respondents who belong to Evangelical denominations to be less likely than others to believe in human evolution. Similarly, it is also anticipated that belief in an inerrant Bible will be associated with disbelief in evolution, since many opponents of evolution believe that evolution undermines faith in the authority of Scripture (Wills 1990). It is also expected that frequent church attendees will be less likely to express support for evolutionary theory. If attitudes toward science in fact have an independent impact on attitudes toward evolution, one would anticipate those effects to persist even in the face of controls for a variety of religious variables. Therefore the causal relationships between the main independent variables and the dependent variable are not expected to be attributable to other factors.

Controls are also imposed for respondent education, race, and sex. I would expect belief in evolution to vary directly with the respondent's level of formal education. Conversely, the greater religiosity of women and African-Americans might predispose such respondents to disbelieve in evolution (Freeman and Houston 2009). Further, even relatively irreligious women and African-Americans might be part of social networks in which evolution is disparaged.

Research Design

The source of the data used in this study is from the 2006 General Social Survey. This is a national probability sample of adult population in US, and has been used in previous studies of public attitudes toward evolution (Freeman and Houston 2009).

The dependent variable is respondents' attitudes toward human evolution. [EVOLVED] "Human beings, as we know them today, developed from earlier species of animals. (Is that true or false?)." It is perhaps noteworthy that the word 'evolution' does not appear in the question itself. This may make it easier for respondents to respond affirmatively to the question since the word "evolution" may be emotionally charged for some respondents. A possible source of invalidity can exist when a "true" response includes theistic as well as atheistic evolution. Unlike other studies, this item does not contain an explicit alternative for theistic evolution. This might be a source of confusion for some respondents and therefore a possible source of measurement error.

There are three main independent variables in this study. Two main independent variables are questions measuring respondents' attitudes about confidence in science and respondents' confidence in religion. "I am going to name some institutions in this country. As far as the people running these institutions are concerned, would you say you have a great deal of

confidence, only some confidence, or hardly any confidence at all in them? C. Organized religion [CONCLERG]; K. Scientific Community [CONSCI].” The third main independent variable is the difference between respondents’ confidence in science and confidence in religion [SCIREL]. The difference term has a range of -2 (high confidence in science, low confidence in religion) to 2 (low confidence in science, high confidence in religion). This variable is designed to identify respondents who might be most likely to perceive a conflict between science and religion. The effects of these independent variables on the attitudes toward human evolution are estimated in bivariate and multivariate analyses.

Because the dependent variable is dichotomous, multivariate models are estimated using logistic regression. Three different multivariate models are estimated. The first is a baseline model, which includes dummy variables for denominational affiliation; Mainline Protestant, Roman Catholic, Jewish and None. Evangelical Protestant affiliation is the comparison category. The coding of Catholics, Jews, and “nones” is straightforward; respondents were asked to state their religious preferences. Evangelical Protestants were Protestants who were adherents of Evangelical or fundamentalist denominations (see Smith 1990), while Mainline Protestants were Protestants who did not consider themselves members of Evangelical denominations.²

Other religious variables include respondents’ attitudes toward the Bible (a dummy variable which isolates respondents who believe in the literal truth of the Bible), and church attendance. Control variables include the respondent’s race, gender and level of formal education.

² This procedure involves the use of variable FUND in GSS. Evangelicals are Protestants who are coded 1 on variable FUND, while Mainline Protestants are those coded 2 or 3.

A second, 'simple' model includes the variables contained in the baseline model as well as the items measuring confidence in science and confidence in religion. In this model, the independent effects of confidence in science and religion are estimated separately.

Finally, a third 'difference' model includes the baseline model as well as the variable measuring the difference between respondents' confidence in science and respondents' confidence in religion.³ The "difference" model includes a variable which measures the extent to which respondents believe there is a conflict between science and religion.

Results

Table 1 shows a slight majority of Americans do not believe in human evolution. If the true response (49.6) is understood to include atheistic and theistic evolution, this result is quite similar to previous research (Bishop 2007; Newport 2004, 2006). Therefore, there is substantial variation in American attitudes about evolution. The "false" response appears to tap belief in special creation, and attracts the support of a majority of respondents..

Table 1 About Here

Table 2 provides preliminary support for hypotheses 1, 2, and 3. People who have high confidence in science have high belief in evolution and the reverse is true. People who have high confidence in religion have low belief in evolution. The effects are especially striking with respect to the difference variable. Nearly 80 percent of people who have high confidence in science and low confidence in religion express belief in human evolution. By contrast, 76% of

³ The simple confidence variables and the difference variable are considered separately because of high multicollinearity. In general correlating the independent variables shows no problem with multicollinearity; however the confidence variables (confidence in science and confidence in religion) are highly collinear with the variable computing the difference. Regressing the confidence variable on the different score yields an R of 1.0 (Lewis-Beck, 1980. 60).

respondents who have low confidence in science and high confidence in religion express disbelief in evolution. Therefore, the bivariate relationship between confidence variables and attitudes about evolution are moderately strong in the expected direction.

Table 2 About Here

Table 3 contains the results of several multivariate analyses.⁴ The first is the baseline model, which contains few surprises. When compared to Evangelicals, respondents from all other religious tradition are likely to believe in human evolution. The coefficients associated with Mainline Protestantism, Roman Catholicism, Judaism and Agnosticism are strong, significant and negative (the expected direction). As noted by examination of the probability changes, the difference between Evangelicals and Mainline Protestants (-.126) is smaller than the contrast between Evangelicals and the three non-Protestant religious groups (-.206 for Catholics, -1.23 for Jews, and -.193 for agnostics).

Table 3 About Here

Similarly, higher levels of education are associated with belief in evolution while belief in the literal Bible and high church attendance are associated to disbelief in human evolution. Perhaps surprisingly, the effects of race and gender are not statistically significant.

Hence, several difference aspects of religion have independent effects on attitude toward evolution. These include frequent church attendance, a strong view of Bible authority, and membership in an Evangelical denomination are all related to belief in evolution. Further, the effects of formal education are moderately strong and significant, while the coefficients associated with race and gender do not attain statistics significance. The predictive power of the

⁴ The LR chi square test shows that all three models presented in Table 3 are significant at .001.

model is moderately impressive (Pseudo $R^2 = .2466$) and the proportional reduction of error (PRE= 48.8).

The second model in Table 3 is termed the simple model. The model contains all of the independent variables in the baseline model, as well as separate items measuring respondents' confidence in science and organized religion. The inclusion of the confidence variables has virtual no effect on the coefficients associated with the variables contained in the baseline model, one exception to this generalization is the effects of Jewish affiliation are slightly stronger in the simple model.

I am most interested in the effects of confidence in science and confidence in religion for purpose of this paper although the effect of confidence in religion are in the expected direction, this relationship is not significant. This may not be surprising because the model contains several religious variables.

The effects of confidence in science are statistically significant but are quite weak. The change in probability associated with confidence in science is just under 4 percent; this means that, for example, a respondent who has only some confidence in science is 4 percent more likely to disbelieve in evolution than a respondent who has a great deal of confidence in science, when all the other variables are taken into account. By contrast, a respondent affiliated with Judaism is 33 percent more likely to believe in evolution than a respondent affiliated with an Evangelical Christian denomination; and a respondent who believes in the literal Bible is 28 percent less likely to believe in evolution than one who does not.

The inclusion of confidence variables has minimal effects on the overall performance of the model. The Pseudo R^2 for the simple model is only .0008 percent greater than that of the

baseline model (.2476 - .2466). The proportion of reduction in error increases by less than 2 percent.

The third model in Table 3, termed the “difference” model, excludes the separate measures of respondent confidence in religion and confidence in science and replaces these variables with a variable which is the difference between the respondent’s score on the confidence in science variable and confidence in religion variable. I regard this as a measure of the extent to which a respondent perceives a conflict between religion and science.

When the variable is included in the logistic regression model it is again the case that the effects of the variables in the baseline model are not substantively affected. The effects of the difference variable (scirel) are nearly statistically significant ($p=.063$), but again are very weak. The change in predicted probability is again just under 4 percent.

Adding scirel, the difference term to the baseline model, does not improve the predictive power of the model at all. The Pseudo R^2 for the difference model is identical to the Pseudo R^2 associated with the baseline model. The proportional reduction in error (PRE) is less than 1 percent stronger than that associated with the baseline model, and percent predicted correctly is (very) slightly worse than for baseline model.

The results of the multivariate analyses show that religious variables are most important in accounting for attitudes towards human evolution. Confidence in science, whether measured independently or in conjunction with confidence in religion does not substantially affect our ability to explain or predict attitudes toward evolution. The effects of attitudes toward science attain or approach statistical significance, but are not significant in a substantive sense.

Conclusion

This paper confirms the findings of previous research which suggests that religious variables are most important in accounting for attitudes toward human evolution. The omission of variables measuring attitudes toward science in these studies does not seem to have distorted our understanding of the source of these attitudes. Religious attitudes, affiliations and participation, not attitudes toward science, are the primary determinant with attitudes toward evolution.

Why should this be so? There are several possibilities. The first of these is methodological in nature and is focused on the possibility of measurement error. Both the dependent and main variables could perhaps be better measured. The 2006 GSS survey measure of attitudes toward evolution only contains two possible values; the “true” option likely combines belief in theistic evolution (evolution as a process guided by God) and atheistic evolution. This may reduce the relationship between the dependent variable and other variables. Similarly, it might be possible to ask more detailed questions about respondent attitudes toward science than simply asking about the respondent’s level of confidence. To illustrate, the difference measure used in this study involves an assumption that respondents with extreme scores perceive conflict between science and religion. It would be desirable to ask questions measuring more directly the perception of conflict. For example, one might pose respondents with a Likert item reading, “There is no conflict between scientific knowledge and religious belief.” Such a question might measure more directly the perception of conflict.

Another possibility is substantive; at the activist level, opponents of evolution have often used the language of science in posing alternatives to evolutionary theory. Such activists have promoted alternatives such as “creation science” or “intelligent design,” and have presented

these as alternative scientific theories. It is possible that some disbelievers in evolution regard their opposition as based on science.

However, these possibilities seem implausible, because of the robust results reported in Table 2. The bivariate relationships between the confidence variables and attitudes toward human evolution are relatively strong, significant and in the expected direction. Therefore, respondents seem to understand the questions being asked. The effects of the variables involving confidence in science are apparent in bivariate analyses; these effects exist, but are reduced to very small levels with the imposition of multivariate controls.

The most likely explanation for the findings is that the relationship between attitudes toward science and attitudes toward human evolution is spurious. It seems likely that both attitudes are affected by various aspects of religious beliefs and practices; and that religion has an independent impact on attitudes toward science and evolution. In other words, Evangelicals, biblical literalists, and frequent church attendees are likely to learn to oppose evolutionary theory. Such respondents are also likely to be socialized to be skeptical of scientific knowledge.

Future research in this area should emphasize more detailed measurement of attitudes to science and attitudes toward evolution as described above. Surveys should include questions about different aspects of science, and should measure attitudes about different aspects of evolution. Such continued research into this area seems well worthwhile. It seems clear that the controversy surrounding evolution seems likely to continue, as will research into attitudes of the public on this issue.

Table 1:
Frequency Distribution of Attitudes Toward Evolution

Human beings, as we know them today, developed from earlier species of animals.

	Frequency	Percent
True	779	49.6
False	791	50.4
(N)	(1570)	(1570)

**Table 2:
Cross Tabulation of Confidence in Science, Confidence in Religion Net Confidence Variable(s) and
Attitudes Toward Evolution**

How humans evolved?

		True %	False %	N
Confidence In Science	Great Deal	63.2%	36.8	650
	Only Some	43.2	56.8	748
	Hardly Any	27.8	72.2	108
	tau-c=.238 p=..000			
Confidence In Religion	Great Deal	37.1	62.9	394
	Only Some	50.6	49.4	793
	Hardly Any	63.1	36.9	339
	tau-c =-1.90 p= .000			
Confidence in Science - (minus) Confidence in Religion	High Science/ Low Religion -2	79.5	20.5	156
	-1	60.7	39.3	435
	0	46.0	54.0	646
	1	27.6	72.4	210
	High Religion/ Low Science	24.0	76.0	25
	tau-c=.314 p= .000			

Table 3:
Multivariate Models of Attitudes Toward Evolution
(Logistic Regression)

	Baseline Model		Simple Model		Difference Model	
	Coefficient	Prob. Δ	Coefficient	Prob. Δ	Coefficient	Prob. Δ
Mainline	-.507** (.172)	-0.1261	-.4817** (.177)	-0.1197	-.4998** (.176)	-0.1241
Catholic	-.841*** (.186)	-0.2064	-.8385*** (.190)	-0.2047	-.8546*** (.190)	-0.2083
Jewish	-1.228* (.506)	-0.2840	-1.557** (.601)	-0.3346	-1.599** (.603)	-0.3407
None	-.787*** (.220)	-0.1934	-.7944*** (.299)	-0.1941	-.7856*** (.229)	-0.1919
Black	.049 (.199)	0.0121	-.0017 (.204)	-0.0004	.0192 (.202)	0.0048
Sex	.244 (.132)	0.0606	.1896 (.136)	0.0471	.1950 (.136)	0.0484
Education	-.169*** (.026)	-0.1177	-.1621*** (.027)	-0.1136	-.1655*** (.026)	-0.1160
Bible	1.272*** (.157)	.3065	1.176*** (.162)	.2856	1.169*** (.162)	.2840
Church Attendance	.231*** (.028)	0.1625	.2264*** (.029)	0.1583	.2226*** (.028)	0.1557
Consci		---	.2521* (.116)	0.0386	---	---
Conclerg		---	-.0772 (.108)	-0.0134	---	---
Scirel		---	---	---	.1568@ (.084)	0.0357
Constant	1.181* (.488)		.9706* (.584)		1.3161** (.507)	
Log Likelihood	I,4: 718.64524		I,4: -679.19291		I,4: -679.90587	
LR chi2	(9) 470.53***		(11) 446.56***		(10) 445.13***	
Pseudo R ²	.2466		.2474		.2466	
PRE	48.8		50.2		50.07	
Predicted % Correct (N)	75.16 (1377)		75.19 (1302)		75.12 (1302)	

***p ≤ .001, **p ≤ .01, *p ≤ .05, @ ≤ .10.

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