Surveying the Relationship between Views of Scripture and Attitudes toward Science

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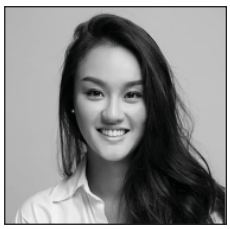

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The relationship between science and religion has too often been characterized in the United States by heated debates and strong accusations. The public is given a perspective of conflict between these two domains and is swayed to support either science or religion. This study aims to evaluate this relationship based on archival data from the National Opinion Research Center. It was found that participants who viewed the Bible as the Word of God in a literal sense earned lower test scores in objective science tests and were less interested in taking science courses than those who did not hold this view. This is a conflict between a way of interpreting scripture and science, rather than a conflict between Christianity and science per se. Efforts should be devoted to helping Christians develop positive ways to engage science and promote working within scientific fields of inquiry.

Particularly of late, the relationship between science and religion has often led to heated discussions, inflexible belief systems, and strong accusations. The public is given a perspective of conflict between these two disciplines, which often leaves only two options: to support science or to support religion. Media portrayals of science educators such as Bill Nye, and of Christian fundamentalists such as Ken Ham, heighten interest in this topic as well as underlining the concerns of each discipline regarding the other.[1]

Bill Nye[2] and theoretical physicist Lawrence Krauss[3] question whether religious education is at odds with science education since religiosity might lead to an antiscience mentality. They argued that the United States needs more scientists and engineers in this era of globalization, and that religiosity is a stumbling block to science education.

On the other hand, there are Christian apologists who argue that Christianity is compatible with science and that Christian theology can actually inform science in some cases.[4] However, very often the concepts in this type of debate are conflated or not specific enough. In these debates, it is not always clear whether the perceived conflict between Christianity and science is about the tension between faith and science, or between specific doctrines/theology and science, or between certain religious institutions and science. As Vincent Smiles pointed out,

> Faith is not the same as belief. Belief has to do with doctrines and creeds that are particular to individuals and traditions. Faith is a more universal aspect of human experience.[5]

In this sense, the conflict between faith and science is a false dichotomy, since faith does not always rest on scientific evidence. However, belief in certain doctrines and interpretations of scripture, which does result from rational inquiry, could potentially be in conflict with science. Moreover, science could mean different things to different people. The alleged conflict between Christianity and science could mean that certain doctrines are incompatible with certain scientific

theories (e.g., recent creation vs. evolution, young earth theory vs. modern geology). Or, it could also mean that, in a general sense, religious attitudes either hinder people from thinking reflectively and logically or discourage people from studying science.

Often the assertions on both sides of the Christianity vs. science debate are theoretical, and the debate could benefit from more empirical evidence that demonstrates how beliefs shape attitudes toward science. Empirical evidence is necessary and helpful when opinions begin to lead the debate. Hence, in this study, multiple statistical methods are utilized to examine multiple indicators related to biblical interpretation and attitudes toward science. Data is sourced from the independent research organization National Opinion Research Center (NORC) at the University of Chicago (UC). NORC and the UC jointly staff seven collaborative Academic Research Centers located at UC. The mission of NORC is to provide researchers with reliable data and rigorous analysis for decision support in the areas of economics, education, global development, health, and public affairs.[6]

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We selected religion-related variables from NORC that represent different aspects of Christianity: belief in interpretations of the Bible, faith (confidence in God, born-again experience, belief in afterlife), religious institutions (strength of religious affiliation, confidence in organized religion), religious activities (convincing others to accept Jesus), and self-perceptions of religiosity and spirituality (considerations of the self as religious or considerations of the self as a spiritual person). Similarly, variables reflecting different aspects of science are chosen from the NORC database; these include "Having overall interest in science" (affective), "Having an objective knowledge of science" (cognitive), and "Having taken science courses" (behavioral). Our theoretical conjecture is that not every aspect of religion is necessarily at odds with every aspect of science. We believe it is more likely that a literal interpretation of the Bible conflicts with the affective, cognitive, and behavioral aspects of science.

Conflicts between science and Christianity often arise when scientific conclusions are seen to be at odds with "prevailing modes of biblical interpretation," as Alister McGrath notes.[7] Some notable examples here are Copernicus (when proponents of a literal reading of scripture argued for a geocentric view of the solar system) and Darwin (when proponents of a literal view of scripture argued that humanity was created suddenly as full human beings).

Prior Studies on the Relationship between Religion, Intelligence, and Science

International assessments have shown that the science literacy in the United States is significantly lower than that in other developed countries/regions, specifically in West European and East Asian nations.[8] Researchers have begun to investigate the reasons why this is the case and how religion might play a part. Several studies are pertinent to the discussion here; they have specifically explored the relationship between low scientific literacy/science education and things such as religion, intelligence, and cognitive style. Darren Sherkat found that, in the United States, religious influence has contributed to a low level of scientific literacy.[9] He explained that this contribution is more significant than gender, race, and income. Jerry Coyne stated that religion is the primary culprit that keeps evolution from being

accepted by the majority of Americans.[10] He claimed that resistance to evolution becomes resistance to science as a whole, and that this resistance contributes to the low rate of scientific literacy in the United States.

Further, some studies indicate that there is a negative association between religiosity in general (not specific to Christianity) and intelligence in terms of standardized IQ tests.[11] The causal mechanism in this association is open to debate; thus, it is uncertain which of the mentioned factors is a cause (i.e., an independent variable), which factor is an effect (i.e., a dependent variable), and whether the indicated relationship is bidirectional. Indeed, conflicting explanations underlie this effect. One of the most well-established arguments is that people who lack critical thinking skills tend to depend more on belief systems which offer final answers, while individuals who are intelligent gravitate toward more rational systems.[12] Specifically, based on experimental data, Shenhav, Rand, and Greene suggest that one's belief may be influenced by one's cognitive style. People who think intuitively are also likely to believe in God, but people who think reflectively tend to be less religious and tend to have higher cognitive abilities (IQ). In this example, cognitive style and abilities are independent variables.[13] In short, people with high IQs prefer employing rational and empirical approaches to understanding and guiding their lives rather than employing supernatural and intuitive thinking.[14]

According to one longitudinal analysis on changes of religiosity, those who are intelligent gradually turn less religious over time.[15] As a result, these people are less likely to adopt religious dogmas that are inconsistent, even in the presence of a predominantly religious society. This approach advocates that religious beliefs are "irrational, not anchored in science, not testable, and therefore, unappealing to intelligent people who know better."[16] Others approach the issue with an evolutionary perspective that views scientific knowledge as the novel capacity to adapt and survive, and religious belief as an evolutionary asset in ancient times.[17] These evolutionarily novel preferences may refer to liberalism and atheism. This claim posits that religiosity and intelligence may be functionally equivalent, as some of the functions of religion—such as compensatory control, self-regulation, self-enhancement, and secure attachment—can also be conferred by heightened intelligence.

Another intriguing argument points out the secluded tendencies of some religious groups; these tendencies may hinder religious individuals from obtaining higher education, particularly analytic and purely scientific knowledge that works against these individuals' religious values.[18] For example, some conservative Christians tend to disdain secular education, and thus maintain homogeneous social networks.[19] Interestingly, lower levels of IQ have been strongly associated with higher levels of fundamentalism,[20] and information-processing ability—one of the components of intelligence—has been inversely related to literal interpretations of sectarianism of a particular religious group, as well as with literal interpretations of religious scriptures.[21] Membership in a sectarian religious denomination or fundamentalist belief can result in avoidance of or opposition to the scientific findings that are inconsistent with one's religious dogmas (e.g., embryology based on evolution, geology based on radiometric dating). In this sense, religious individuals may be less likely to be interested in or have lower access to educational attainment; this outcome may, in turn, result in achievement of lower scores on related subjects.

Last, but not least, a recent study indicates that people who subscribe to Judeo-Christian traditions are less concerned about environmental protection when compared with their nonreligious peers.[22] It would be easy for religious people to take a defensive stance on this subject. However, exploratory and data-driven research is necessary in order to achieve open discussion of this topic and to determine the extent to which religion influences scientific knowledge and literacy. If research indicates that religion hinders the progress of scientific literacy, then it is time for a change in perspective on the parts of religious individuals. Using exploratory analysis and letting the data speak for themselves would allow researchers to reflect openly on the changes that are necessary within religious institutions.

Method

Data source and variables

The data for this project were sourced from the General Social Survey (GSS) administered by NORC. Since 1972, GSS has been used to research attitudes and behaviors of the US population regarding social matters.[23] The original sample size was 2,538, but

after excluding missing values, the effective sample size was reduced to 1,238. NORC collected data via the web, mobile devices, telephone, mail, and in-person interviews. To reduce sampling bias, NORC recruited participants from numerous populations and subpopulations. To achieve high response rates which would enhance the quality of the data, NORC used differing data-collection methods.[24] Responses to selected survey questions in 2014 relating to education, religiosity, and science were extracted (table 1). The continuous variables are on a four-point Likert scale, and thus no extreme scores affected the analysis. Other variables, such as the scores of scientific knowledge, have a wider range of responses, but no outliers were detected.

Table 1. Dependent and Independent Variables

Variable	Original scale	Converted scale
Dependent variables		
Overall interest in science	Ordinal	Composite and continuous
Scientific knowledge	Ordinal	Composite and continuous
Taken science courses	Mixed	Composite and continuous
Independent variables		
Belief	Nominal	Collapsed to three categories: None, Non-Christian religion, Christian
Strength of religious affiliation	Ordinal	Continuous
Belief in life after death	Ordinal	Continuous
Feelings about the Bible	Nominal	
Confidence in the existence of God	Ordinal	Continuous
Ever had a "born again" experience	Ordinal	Dichotomous (1 or 0)
Tried to convince others to accept Jesus	Ordinal	Dichotomous (1 or 0)
Consider myself a religious person	Ordinal	Continuous
Consider myself a spiritual person	Ordinal	Continuous
Confidence in organized religion	Ordinal	Continuous

It is important to note that there are multiple variables in the NORC data set that can indicate how fundamentalist a participant is. They include "How fundamentalist are you currently?" and "Christian denomination." Of the options for variables, this research team selected the variable "Feelings about the Bible." The reasons for this were as follows. First, "How fundamentalist are you currently?" is of a highly subjective nature. Without a given context, the meaning of this question is subjective. Second, "Christian denomination" might not be a strong indicator of one's fundamentalism. At first glance, the larger denominational beliefs could be used to generalize the fundamentalism of its members. However, even within a single denomination, there can be a variety of beliefs regarding prevalent issues and stark differences in the approaches to those issues. For example, some Christians who attend a conservative church are quite open minded. Someone may belong to a fundamentalist church simply because of the influence of a spouse or other family members.

In contrast, the variable, "Feelings about the Bible" can provide a direct indicator of aspects of one's theology. Excluding responses of "Don't know," "No answer," and "Other," there are three remaining options in the statement as follows: (1) The Bible is the actual word of God and is to be taken literally, word for word; (2) The Bible is the inspired word of God, but not everything in it should be taken literally, word for word; and (3) The Bible is an ancient book of fables, legends, history, and moral precepts recorded by men. The first position exemplifies a fundamentalist interpretation.

For modeling efficiency, most variables were converted, and some were combined. For example, "Overall interest in science" is a composite variable derived from these variables: "Interest in new scientific discoveries," "Interest in technologies," "Interest in medical discoveries," and "Interest in space exploration." The original scale is ordinal in nature: "Very interested," "Moderately interested," and "Not at all interested." For data reduction, numbers "2," "1," and "0" were mapped into these three response categories, respectively, after which the average of the three variables was transformed into a new variable named, "Overall interest in science."

"Scientific knowledge" is also a composite variable. It was derived from the average of the scores of the following thirteen questions and statements:

1. The center of the earth is very hot.
2. All radioactivity is man-made.
3. Father gene decides sex of baby.
4. Lasers work by focusing sound waves.
5. Electrons are smaller than atoms.

6. Antibiotics kill viruses as well as bacteria.
7. The universe began with a huge explosion.
8. The continents have been moving.
9. The earth goes around the sun.
10. How long does it take the earth to go around the sun?
11. A doctor tells a couple that their genetic makeup means that they have a one in four chance of having a child with an inherited illness. Does this mean that if their first child has the illness, the next three will not have the illness?
12. Does this mean that each of the couple's children will have the same risk of suffering from the illness?
13. Two scientists want to know if a certain drug is effective against developing high blood pressure. The first scientist wants to give the drug to one thousand people with high blood pressure and to see how many of them experience lower levels of blood pressure. The second scientist wants to give the drug to five hundred people with high blood pressure, to not give the drug to another five hundred people with high blood pressure, and to see how many people in both groups experience lower levels of blood pressure. Which is the better way to test this drug? Why?

Similarly, "Have taken science courses" is also a composite score. This score is derived from three questions relating to science classes; the questions yield dichotomous (i.e., 1 = "yes"; 0 = "no") answers: "Have you ever taken a high school physics course?" "Have you ever taken a high school chemistry course?" and "Have you ever taken a high school biology course?"

Another question yields continuous-scaled data: "Number of college-level science courses taken." The distribution of the last variable was extremely skewed, and all transformation methods failed to normalize this variable. Furthermore, its measurement scale was incompatible with the first three questions. As a remedy, this variable was converted to a dichotomous scale (i.e., 1 = "yes"; 0 = "never"). When the composite score was created, the weight of the first three variables became "1," whereas the weight of the last one became "2." The rationale for this was that college-level science courses are more challenging than high-school-level science courses.

In sum, "Overall interest in science," "Scientific knowledge," "Highest degree," and "Have taken science courses" were chosen for this study because they represented three different domains: how much participants like science (i.e., subjective interest), what participants know about science (i.e., objective knowledge), and what participants do about science (i.e., behavior: Have taken science classes).

There are many religion-related variables in the survey. However, some are too specific (e.g., "Do you agree that the Pope is infallible on matters of faith and morals?" "… that anti-religious materials should be banned?" "… that professional athletes should give thanks to God?" and "… that religious extremists should be allowed to hold public meetings to express views?"). These questions are not highly relevant to the objective of this study, and therefore only general items such as "Feelings about the Bible," "Confidence in the existence of God," and "Strength of religious affiliation" were included.

Data analysis

When a single statistical procedure examines a pair composed of a dependent variable and an independent variable only, there is a risk that the finding is nothing more than a capitalization on chance. As a remedy to this problem, multiple indicators were extracted from the database (as described above), and two different methods were used for triangulation. When a sample size is very large, as it was in this study (i.e., n = 1,238), conventional statistical procedures are inappropriate; the reason is that over-powered tests tend to yield significant results regardless of data patterns. On the other hand, authentic significant variables might be undetected by conventional procedures, due to multicollinearity among independent variables. Furthermore, the variable, "Christian denomination," has many missing values, because only those attending church provided answers to this question.

To rectify these shortcomings, the bootstrap-forest approach was used. It is capable of constructing a predictive model based on the merged predictive values from many exploratory decision-tree models, by randomly selecting independent variables and observations. Variable selection by means of shuffling the variables could address the issue of multicollinearity, whereas subsetting the sample by resampling could counteract inflating statistical

power. In addition, this approach is immune against outliers and missing values.

In each bootstrap forest, both the number of splits and the sum of squares (SS) were used to determine which predictor should be retained. One of the features of the bootstrap forest is its capability of avoiding model complexity; as such, the simplest explanation tends to be adopted. After bootstrap forests had identified significant predictors, decision trees and Mosaic plots were utilized to illustrate the relationships between the dependent and independent variables.

Last, to comprehend the "big picture" by data reduction, the partial least squares (PLS) approach was employed. PLS aims to extract several latent factors and responses from several dependent and independent variables, respectively. The philosophy behind PLS is vastly different from variable selection methods, such as the bootstrap forest. In PLS, not every "redundant" variable is excluded; rather, they are retained and combined to form latent factors. It is believed that a construct should be an open concept, triangulated by multiple indicators, rather than by a single measure.[25] In this sense, redundancy enhances the reliability of measurement, resulting in a better model.

Although PLS modeling can accept both categorical and continuous data, every level of a categorical variable in PLS is treated as a factor, resulting in a more complicated model. Hence, in PLS, the variable "Belief in God" is converted into a numeric value. In the conversion process, a reference point was chosen for coding. For example, "Belief in God" was coded as "1" and all the rest were coded as "0." This involved mapping "1" to "Yes" and "0" to "No." It is important to point out that this coding scheme does not imply any value judgment.

The PLS analysis is composed of three stages. First, all potential predictors were included in the first PLS, which performed the initial screening; this was done to determine the optimal number of principal components. At the same time, the most significant predictors were selected, based on the variable importance plot (VIP) scores. A VIP score is a measure of a variable's predictive power; it is determined by taking all dependent and independent variables into account. If both the coefficient and the VIP score of a predictor are small, then this predictor is removed from the model. The cut-off for VIP is 0.8.[26] The next step involves the running of another PLS, using the remaining predictors. The interrelationships among these variables were examined in the loading plot in order to determine which variable belonged to which principal component. Last, a principal component regression was run in order to determine whether the reduced set of religious variables could well predict the criterion variables.

Results

Demographics

The demographic information of this sample is as follows: the average age of the respondents is 48.98 years with a standard deviation of 17.39. The age range is between 18 and 89. The sample is composed of 544 females (43.94%) and 694 males (56.05%). Among these participants, 922 are White (74.48%); 179, Black (14.46%); and the rest (137), self-identified as "other" (11.07%—NORC did not specify Hispanics, Asians, and Native Americans). The education level of the majority (800) is high school or lower (64.62%). Three hundred and two participants are classified as "undergraduate" (24.39%), and 131 had earned graduate or professional degrees, including Master's degree, PhD, MD, and JD (10.58%). Only five respondents reported "other" (0.40%). The denomination information is presented in table 2.

Table 2. Christian Denomination of NORC Participants

Denomination	N	(%)
Baptist	188	15.19
Episcopal	24	1.94
Lutheran	38	3.07
Methodist	70	5.65
Presbyterian	24	1.94
No denomination	151	12.20
Other	124	10.02
No report	619	50.00

Overall interest in science

Table 3 shows the result of a bootstrap forest using "Overall interest in science and technology" as a dependent variable. According to the criteria of the number of splits and the SS, the most important predictor was "Feelings about the Bible." As indicated by the bars in table 3, there was a sharp drop off in SS, which occurred after the first variable. In this situation the decision based on a sharp drop is

analogous to the decision of keeping the number of constructs in factor analysis using a scree plot, as well as the decision of keeping the number of clusters in hierarchical cluster analysis using a dendrogram. Although this operates on subjective decisions, prior research based on this type of visual pattern recognition yielded fruitful and valid results.[27] Nonetheless, the authors realize the limitation that disagreement might exist between different researchers given the same data.

The decision tree in figure 1 illustrates the relationship between "Overall interest in science" and "Feelings about the Bible." If participants perceived the Bible as the literal Word of God, their mean score for "Overall interest in science" was 1.1; this value was significantly lower than that for those who accepted the Bible as inspired word or as fables (m = 1.32). It is important to point out that lumping the categories, "Scripture as inspired word" and "Scripture as a book of fables," was not a decision made by the authors. Rather, the recursive partition tree algorithm detected a common response pattern of these two groups, with relation to "Overall interest in science" and a distinct response pattern of the group "Word of God." The recursive partition tree, as the name implies, uses pattern recognition to partition data.

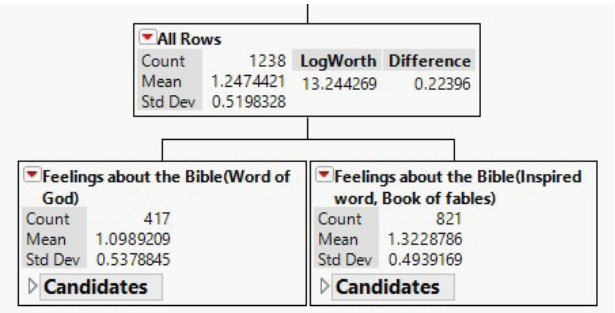

Figure 1. Decision Tree of Overall Interest in Science and Technology

Scientific knowledge

Another bootstrap forest was created using "scientific knowledge" as the outcome measure (table 4). Once again, "Feelings about the Bible" stood out as the most important predictor, based on the number of splits and on the SS. Furthermore, there was a sharp drop in SS, between the top variable and the rest of the variables.

The decision tree in figure 2 indicates that participants with beliefs in the inerrancy of the Bible were more likely to have a lower mean value in scientific knowledge, when compared with those who viewed the Bible as a set of God-inspired words or as a book of fables.

Table 3. Bootstrap Forest of Overall Interest in Science and Technology

Term	Number of Splits	Sum of Squares (SS)
Feelings about the Bible	190	3.87135046
Beliefs	132	2.67426894
Confidence in the existence of God	178	2.22923067
Strength of religious affiliation	195	1.67001140
Consider myself a spiritual person	214	1.39284729
Consider myself a religious person	211	1.30786922
Confidence in organized religion	191	1.30775836
Belief in life after death	159	0.82028824
Tried to convince others to accept Jesus	140	0.65619992
Ever had a "born again" experience	131	0.39167255

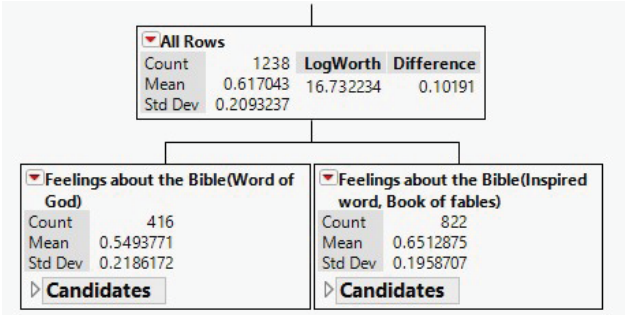

Figure 2. Decision Tree of Scientific Knowledge

This interesting phenomenon necessitates further scrutiny. Figure 3 is a Mosaic plot indicating the portion of different answers to "The earth goes around the sun" by "Feelings about the Bible." As shown in figure 3, more than 10% of respondents associated with a misbelief that "the sun goes around earth." Surprisingly, nearly one fifth of respondents who viewed the Bible as inspired words reported the incorrect answer, which is higher than what is expected. Nevertheless, a substantially larger percent of people who believe the Bible is literally the Word of God asserted that the sun goes around the earth (27.16%) when compared with those who view scripture as fables (13.00%) or inspired word (18.16%). Both a Chi-square test (X^2 = 38.66, p < .0001) and a Fisher's exact test (p < .0001) indicated that this discrepancy between groups of different perspectives toward science was significant. Consequently, the error rate was highest among respondents with the belief in biblical inerrancy and lowest among those with the belief in the fictional nature of the Bible.

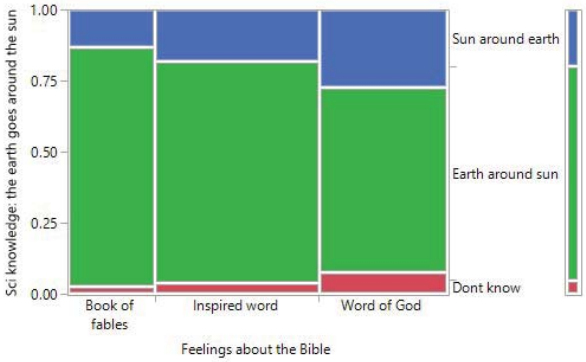

Figure 3. Mosaic Plot of "The earth goes around the sun" and "Feelings about the Bible"

A similar pattern could be observed in the question "How long does it take the earth to go around the sun?" (fig. 4). Only 62.84% of participants who perceived the Bible as the literal Word of God could correctly answer the question, compared with those viewing the Bible as fables (76.50%) or as inspired word (71.25%). The orange area of figure 4 shows the percentage of the right answer (one year) by attitudes toward the Bible. A Chi-square test indicated that this difference was significant (X^2 = 15.33, p = 0.0178), and a Fisher's exact test provided further support

Table 4. Bootstrap Forest of Scientific Knowledge

Term	Number of Splits	Sum of Squares (SS)	
Feelings about the Bible	312	1.15961425	
Confidence in the existence of God	243	0.58560112	
Consider myself a religious person	311	0.35657313	
Consider myself a spiritual person	290	0.29113425	
Confidence in organized religion	287	0.26364798	
Strength of religious affiliation	270	0.22868984	
Beliefs	183	0.21576889	
Ever had a "born again" experience	181	0.16698924	
Tried to convince others to accept Jesus	222	0.12133396	
Belief in life after death	200	0.10656636	

for this conclusion (p = 0.176). These two items (i.e., "The earth goes around the sun" and "How long does it take the sun to go around the earth?") were singled out for further examination, because—relative to more difficult questions (e.g., "Father gene decides sex of baby," "The continents have been moving")—these two items are generally considered as common knowledge. As such, it is alarming that a large percentage of participants failed to answer these questions correctly.

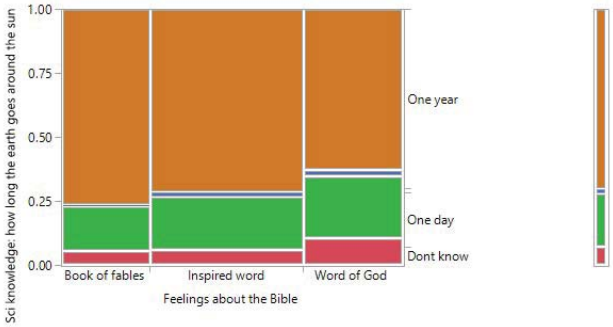

Figure 4. Mosaic Plot of "How long does it take the earth to go around the sun?" and "Feelings about the Bible"

Taken science courses

For the dependent variable "Taken science courses," the bootstrap forest (table 5) shows that "Feelings about the Bible" is again the greatest predictor.

The decision tree in figure 5 shows that if the participants believed that the Bible was the Word of God, then the expected score of "Taken science courses" was 1.897. If the Bible was taken as either fables or inspired word, the expected score was 2.699.

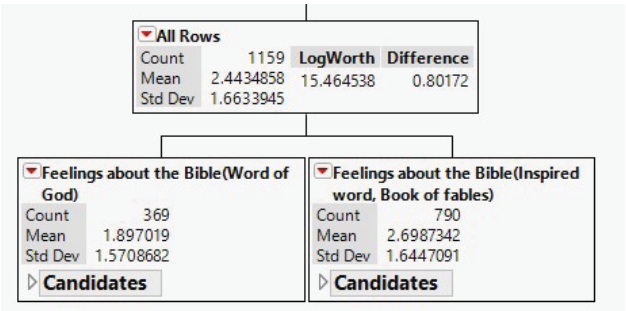

Figure 5. Decision Tree of "Taken science courses"

Partial least squares

Although the preceding bootstrap approach consistently indicates that one's perception of scripture is the most important predictor of all dependent measures, this indication cannot be extended to suggest that other religion-related variables have no contribution to measured outcomes. In a similar vein to the bootstrapping approach, a preliminary partial least squares (PLS) analysis was employed to identify the most powerful predictors. However, unlike the method in the bootstrapping approach, PLS takes

Table 5. Bootstrap Forest of Taken Science Courses

Term	Number of Splits	Sum of Squares (SS)	
Feelings about the Bible	242	54.0479782	
Confidence in the existence of God	215	21.8126617	
Consider myself a spiritual person	234	17.1031395	
Consider myself a religious person	232	15.8546498	
Beliefs	163	14.9132990	
Strength of religious affiliation	224	14.4932626	
Confidence in organized religion	212	12.2354652	
Tried to convince others to accept Jesus	176	8.54974659	
Belief in life after death	152	6.99398268	
Ever had a "born again" experience	153	6.28336062	

all three dependent measures into account simultaneously. Table 6 indicates that five variables might be retained, based on the criterion of VIP score > 0.8.

Table 6. VIP Scores of All Potential Predictors

Variables	VIP
Feelings about the Bible	**1.9262**
Consider myself a spiritual person	**1.1584**
Confidence in the existence of God	**1.1561**
Beliefs	**0.8775**
Strength of religious affiliation	**0.8411**
Belief in life after death	0.7491
Consider myself a religious person	0.6935
Confidence in organized religion	0.6391
Tried to convince others to accept Jesus	0.6137
Ever had a "born again" experience	0.5539

Note: Variables with high variable importance are bolded

In figure 6, the X-Y score plots suggest a two-factor solution. When a one-factor solution is forced into the model, the observations show no pattern, as is indicated in the first X-Y plot. An ellipse is formed in a two-factor solution, as shown in the second graph. However, when the solution goes beyond two factors, the ellipse disappears.

A second PLS model was run, using the five variables with the highest VIP scores. Figure 7 shows the clustering pattern of the dependent variables (Ys) whereas figure 8 presents the grouping pattern of the independent variables (Xs). Apparently, the dependent variables "Scientific knowledge" and "Taken science courses" go together as a group, whereas "Overall interest in science and technology" is a stand-alone outcome. The loading plot of Xs indicates an interesting clustering pattern (fig. 8). "Feelings about the Bible" appears to be a distinct

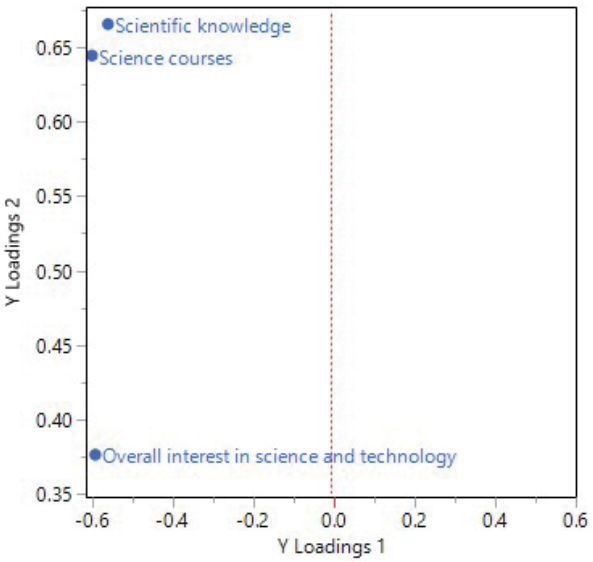

Figure 7. Loading Plot of Dependent Variables

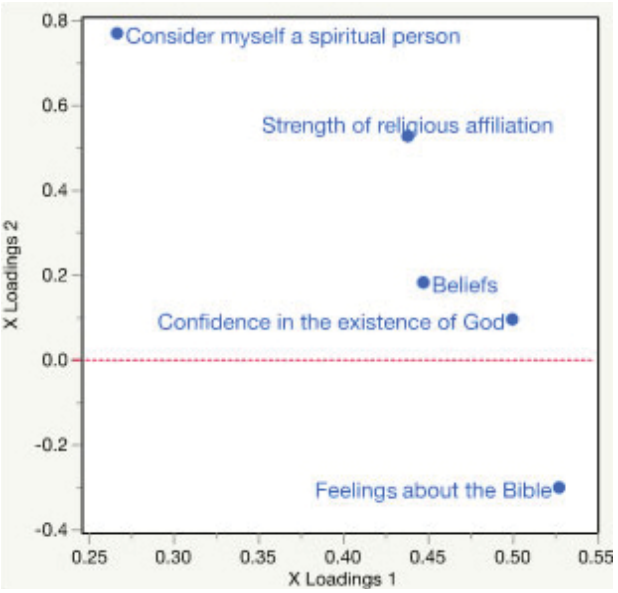

Figure 8. Loading Plot of Independent Variables

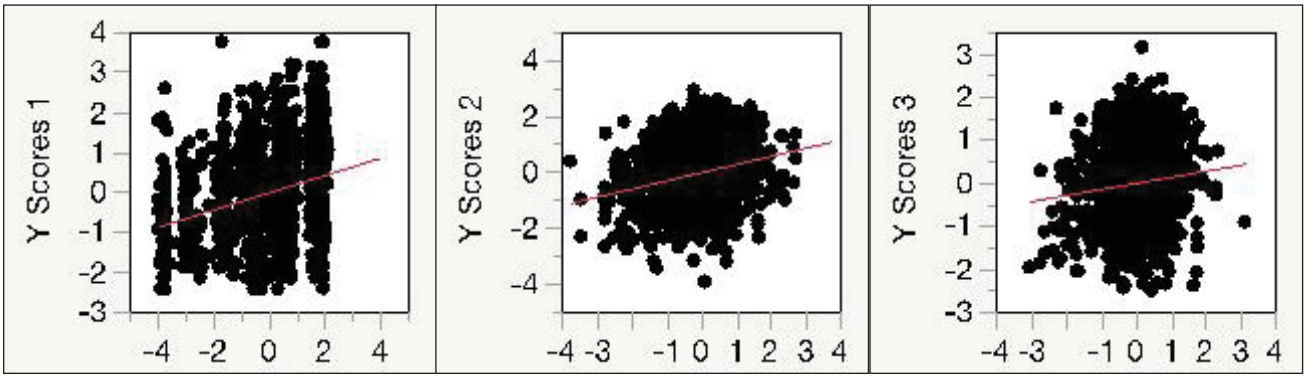

Figure 6. X-Y Score Plots

independent variable, whereas all the other variables can be lumped together as one factor. This result is in alignment with that of the bootstrap analysis, in which "Feelings about the Bible," by itself, was a substantial factor.

In the light of these findings, a new component consisting of "Science knowledge" and "Taken science courses" was created, while five religion-related variables were loaded onto another element named "Religious component." A regression analysis indicated that the religious segment was a significant predictor of science knowledge and courses with a negative association (b = -0.11, p = 0.0048). The same inverse relationship is also observed between "Overall interest in science/technology" and "Religious component" (b = -0.09, p = 0.0001).

Conclusion

Discussion

This study demonstrates a strong relationship between "Feelings about the Bible," "Scientific knowledge," and "Taken science courses." Multiple data analyses revealed that "Feelings about the Bible" alone is a strong predictor of all variables regarding attitudes toward science. Results of the bootstrap-forest approach indicate that this variable trumps all other religion-related variables, while results of the PLS approach indicate that "Feelings about the Bible" is also a stand-alone predictor. While other religion-related variables (i.e., "I consider myself a religious person" and "Strength of religious affiliation") are also predictors of one's level of scientific knowledge, "Feelings about the Bible" is the strongest predictor of scientific knowledge. Moreover, when a few other religion-related variables were grouped together by PLS as a component (in addition to "Feelings about the Bible"), these items together also played a role in predicting the outcome of one's scientific knowledge and overall interest in science and technology.

Since "Feelings about the Bible" is the strongest predictor of overall attitudes toward science, more discussion about how one's perception of scripture influences interest in science is warranted. Those who responded that the Bible is the actual word of God and is to be taken literally (i.e., word for word) reported having the lowest degrees of scientific knowledge and interest in science. Conversely, those who had the highest level of interest in science were also those who did not believe that scripture was inspired (as measured by the variable, "The Bible is an ancient book of fables, legends, history, and moral precepts recorded by men"). Among those who were Christian and had the highest degree of scientific knowledge were those who understood scripture as inspired, but did not believe that scripture should be taken literally.

A cursory glance at this data set might result in the assumption that religious persons are less competent in the sciences. The NORC data do, in fact, indicate the tendency for Christians holding a more literal interpretation of scripture to be less interested in science and technology, less competent in scientific knowledge, and less likely to take science courses. A cursory examination of this data set might also cause one to conclude that religion or Christianity is an obstacle to science education, or that Christianity is antiscience (as some New Atheists argue). However, it would be premature to draw such conclusions from this data set. Here it is essential to note that the most significant and major roadblock to positive attitudes toward science is not Christianity per se, but how scripture is to be understood or interpreted. This perspective demonstrates the centrality of scriptural interpretation in the discussion, and more broadly, the centrality of scriptural interpretation in the contemporary science/religion dialogue for Christians.

One way to begin to make sense of the data represented here is to see these results as residual elements of historical events that occurred within the United States, regarding the inspiration and authority of scripture. While a comprehensive survey of inerrancy, inspiration, and fundamentalism falls outside the scope of this article, it will be helpful to highlight several historical features that relate to literal interpretations of scripture and science in the United States.

The late nineteenth century presented significant challenges to Bible-believing Christians in the United States. With the rise of the modern sciences and the growing use of biblical criticism by liberal Protestant theologians, the authority of the Bible seemed to be threatened for many Anglo-American evangelicals. Fundamentalism can best be understood as a movement that was unique to the American scene, and which was thought to be a reaction against modern ideas (such as the theory of evolution and historical critical approaches to scripture).[28] As Martin Marty

notes, "Fundamentalism was the product of people who encountered modernity, did not like what they saw and regrouped or refashioned their faith."[29]

During this latter part of the nineteenth century, evangelical Christians in America rallied together to identify the "fundamental" and essential elements of Christianity in order to prevent the deterioration of the Christian faith by elements of modern thought and liberalism. These five central doctrines were the authority of scripture, the virgin birth, substitutionary atonement, bodily resurrection, and Christ's divinity. Sometimes the second coming was also added to this list.[30]

Moreover, since the historical reliability of scripture was being called into question (particularly through the theory of evolution), American fundamentalism reacted by attempting to safeguard the authority of scripture. One of the results was an emphasis on the authority of scripture that promoted the Bible's accuracy regarding facts about the physical world. While the authority of scripture was defended in previous centuries, particularly in the Protestant Reformation, a strict understanding of inerrancy did not appear until the modern time period. During this period, it assumed a unique flavor among early-twentieth-century American fundamentalists, with theologians such as A. A. Hodge and B. B. Warfield contributing to the establishment of such views.[31] By emphasizing the authority of scripture, a plain-sense literalism, and scripture's inerrancy (i.e., scripture is free from error), the fundamentalist movement attempted to establish a sure foundation that knowledge could be built upon.[32] This literal reading of the text offered an almost "scientific" view of the Bible, since scripture could be read literally and the facts of the Bible could be made clear to any person who could read the scripture.[33] George Marsden noted that pietistic American evangelical revivalism in the late nineteenth and early twentieth century further strengthened the idea that any intellectual activity or reading outside of the Bible was to be used as a "resource" to "get in touch with people" and lead them to faith in Christ.[34] Additionally, strict literalist and inerrant readings of scripture grew in popularity among Christians, since such readings seemed to combat new scientific ideas that appeared to contradict biblical "data."

As the question of the authority of scripture continued to be hotly contested on the American scene, new variations emerged, relating to how authoritative the text could be in giving factual information about the natural world. "Inspiration" is the theological term that denotes God's Spirit working through prophetic messengers to author scripture, while "authority of scripture" primarily refers to an acknowledgment that the Triune God is behind the authorship of the biblical text and that scripture is trustworthy in the matters that it speaks of. While evangelical groups agreed that scripture had "authority" and was "inspired," differences arose regarding whether scripture was trustworthy in its depictions of the natural world, or whether scripture was only authoritative in its explanations of matters of faith and salvation. These differences can be seen in the development of the terms "strict inerrancy" and "limited inerrancy."

Evangelicals in the mid-twentieth century, such as Carl Henry and Harold Ockenga (the first president of Fuller Theological Seminary), promoted a movement called "new" evangelicalism (or neo-evangelicalism) that agreed on the theological importance of the core fundamentals of the faith, while disagreeing with fundamentalism's separatist stance toward culture. This "new" evangelicalism was interested in engaging in dialogue with science and advocated a softer stance toward inerrancy that was more accommodating toward science. The term "limited" inerrancy (scripture is authoritative in matters of faith and salvation) became associated with this group of evangelicals, while fundamentalists continued to promote more literal renderings of the text advocating "full" or "strict" inerrancy, a view which was often skeptical of science. The fundamentalist notion of "full" or "strict" inerrancy understood that scripture is without error when it speaks on any subject (including history, geography, and science) and promoted a more literal interpretation of the text.[35] For fundamentalists, if scripture is without error, then it could also serve as the foundation for understanding the natural world, and could be authoritative in determining matters of history and science. Advocates of strict inerrancy argued that any error in scripture calls into question the trustworthiness of the entire Bible.[36]

Advocates of moderate or limited inerrancy insisted that scripture is free from error in matters of faith and salvation, whereas other matters related to science are outside the Bible's primary goal.[37] Evangelical

Christians involved in science in the mid-twentieth century also popularized the use of the terms "concordist" and "accommodation"; these terms refer to how much one can assume that scripture is accurate in matters related to science. Concordism posits that there should be a "concord" or agreement between what scripture speaks of and what science says—that is, that scientific claims about the world made by scripture must be true. The "accommodation" position recognizes that biblical writers used an ancient worldview and "phenomenological language" (e.g., the sky appears to be a blue dome containing water) to explain the physical realm—which might not necessarily coincide on all accounts with the current scientific view of created reality. The terms "concordist" and "accommodation" also coincide with basic understandings of "strict inerrancy" and "limited inerrancy," respectively. In the 1950s, theologians such as Bernard Ramm popularized the use of these terms among neo-evangelicals and within groups such as the American Scientific Affiliation.[38]

Moving into the new millennium, literal interpretations of scripture continue to influence one's degree of openness to the age of the earth, particularly shaped by one's interpretation of Genesis. Young earth creationists interpret the Bible in a literalist fashion by claiming that God created the cosmos and life in six 24-hour days, about 6,000 years ago; this view is the least compatible with the contemporary scientific consensus. Progressive creation and evolutionary creation rely on models of the authority of scripture that move away from literalism. Progressive creationists claim that God created life in sequential stages in 4.5 billion years. This school of thought is also known as "old earth creation" and "day-age theory." This theory accepts micro-evolution (i.e., the occurrence of changes within the same species) but rejects macro-evolution (i.e., the turning of one species into another). Evolutionary creation, as its name implies, asserts that creation operates upon an evolutionary process which was designed by God. This theory is also known as theistic evolution.[39]

During the 1990s, the Presbyterian Church of America (PCA) published a report in an attempt to answer a seeming incompatibility between a modern scientific theory of the origin of the universe, and the creation account in Genesis. According to the PCA report, there are at least four ways to interpret the word "day" in Genesis 1. These include (1) Calendar day: a day consists of 24 hours; (2) Day-age: six days are six consecutive ages; (3) Framework: the creation week is a metaphor for the creative act of God; and finally, (4) Analogical day: days in Genesis do not have any specified length. The PCA committee emphasized that all these views are compatible with orthodox Christianity.[40] However, while all these views are compatible with orthodox Christianity, some of the views are more amenable to the science/faith dialogue than are others. Current media trends and "New Atheists" typically conflate the complexity of views within the Christian faith regarding scriptural interpretation.

What began in the late nineteenth century as a well-intentioned move toward affirming key doctrines of the Christian faith, resulted in a heightened literalist interpretation of scripture within the United States. This new level of literalism was pushed to a higher degree than had occurred in previous centuries. Such a literalist interpretation of the Bible is by no means a long-standing tradition. Rather, as described above, strict "inerrant" views of the text are a fairly recent phenomenon. Already in the fifth century, for example, St. Augustine had warned that the first chapter of Genesis should not be taken literally, because the Holy Spirit did not care about "the form and shape of the heavens" and did not want to teach things that were irrelevant to salvation. In a similar vein, Galileo said, "The intention of the Holy Spirit is to teach us how one goes to heaven, not how heaven goes."[41]

While the results of our study show the association between literal interpretations of the Bible and a lack of knowledge in science, this study does not confirm that these historical events are the only cause of the data results. However, given the history of literal interpretations of the Bible associated with fundamentalism, as well as a degree of skepticism toward science which is often associated with fundamentalism, it seems amiss not to make such observations and historical connections. It is important to note that the desire to read the Bible literally will naturally produce interpretations that are in conflict with science. Strict literalist interpretations of scripture promote conflict with aspects of science. Given this historical backdrop, perhaps it should not come as too much of a surprise that those less interested in science are those who also adhere to more literal readings of the biblical text.

Recommendations and Further Research

For those interested in the current religion/science dialogue within the United States, the NORC data present sobering reminders about the current state of Christianity's interaction with science. While those who read scripture more literally show the least amount of interest in science, there is also less interest in science among those who hold a nonliteral approach to scripture, when compared with those who do not believe in the inspiration of scripture at all. Furthermore, earlier study highlighted a negative influence of one's fundamentalist orientation on educational attainment, including post-secondary education and graduate study.[42] This general ethos has the potential to discourage Christian youth from participating in science or higher education, while also contributing to Christian scholars feeling ostracized in their fields. Whether there is a negative relationship between the Christian faith and performance in social sciences and the humanities awaits further research. Overall, there is more work to be done to help Christian churches and communities develop positive ways to engage science and promote working within scientific fields of inquiry. That being said, we propose three recommendations for furthering the science and faith dialogue among Christians.

First, faith-learning integration should be (and should continue to be) the area of focus in Christian universities and churches. Faith-learning integration is defined as "a scholarly project whose goal is to ascertain and to develop integral relationships which exist between the Christian faith and human knowledge, particularly as expressed in the various academic disciplines."[43] This solution aims to be a bridge that initiates dialogue between science and religion rather than a battle or barrier between the two disciplines. The task of faith-learning integration is critical to Christians, as it assists believers in finding a balance between science and religion, as well as promoting the development of more efficient and high-quality researchers. The core to this task lies in understanding the unified nature of truth, although there may be various ways of revealing, perceiving, and interpreting this truth.[44] As Alister McGrath notes, both scripture and science are viewed as tools to facilitate the study of the natural world, as well as the nature of humanity (or human condition).[45] In this case, both religion and science are equally important, as each discipline represents part of the circle. Faith integration can complete the circle by providing in-depth education in both disciplines, and brings a sense of wholeness to our understanding of reality.[46] Other than helping scholars to understand the importance of each tool or how to utilize each resource in finding the truth, faith-learning integration is also known to provide a platform for personal growth. Through this process, an individual will become more aware of his or her own strength and weakness, which often leads to self-introspection that is reflected in one's research work. In this way, a researcher is less likely to be manipulated by human heuristics. That allows more openness to critiques from the outside world or other disciplines.

The task of integration does not rely on a sole or fixed model to educate Christians, but rather aims to equip scholars to recognize "the privilege of participating in the work of revelation by engaging in research."[47] In general, faith-learning integration wishes to aid Christians to be more open to the scientific world rather than making people feel as if they are forced to choose between science and religion. As J. D. Guy wrote, "This process will regard controversy and diversity as catalysts for growth, bring excitement and joy rather than fear and defensiveness."[48] This unified approach to knowledge is significant for scholars to bring a holistic approach to research.

Second, within Christian universities and churches, it is important to stress the contributions of Christians to science. Many prominent scientists who contributed to major breakthroughs in science were Christians; these included Isaac Newton, Michael Faraday, James Maxwell, and Lord Kelvin. For these scientists, Christian belief was not a hindrance to scientific exploration; rather, these scientists were motivated to reveal the glory of God by showing the order of the universe via science.[49] T. F. Torrance argues that Christianity's belief that the universe is orderly contributed to the birth and development of modern science.[50] Similarly, Japanese scholar Naoki Komuro asserted that the root of science in the modern sense could be traced to the Judeo-Christian heritage.[51] According to Komuro, deities of other earlier religions are members of nature or the universe rather than creators of the natural order. However, the Hebrew God is unique, because the cosmic order arises from Yahweh. More importantly, as the Bible documents wrestling and debates between God and humans, Komuro argues that the debating of Jews

and Christians paved the way to logical reasoning, an element that is critical to scientific thinking. In short, the story of how Christians have interacted with science is a story that needs to be told, as well as one that is worth hearing.

Third, in addition to advocating faith learning, and telling the story of Christian interaction with science, particular efforts should focus on providing Christians with better nuanced explanations of how one might read and understand scripture. This recommendation, while overlapping with faith learning, focuses specifically on the importance of hermeneutics within the science/faith dialogue for Christians. As the NORC data have revealed, the strong predictor in levels of interest in science and scientific knowledge is one's feelings about the Bible and how scripture is interpreted. Again, given the history of conservative evangelicalism and fundamentalism's emphasis on more-literal readings of the scripture in US history, especially in dialogue with science, this should not come as a surprise. Since this data set clearly indicates that one's method of reading scripture correlates with how one understands and engages science, faith-learning integration should demonstrate sensitivity and instruction devoted to how one reads scripture.

The data here highlight that interpretive tools are needed to understand scripture and to make sense of the narrative of the world, as told by science. Hermeneutics is an activity that takes place within a community of readers (and hearers) and is an element of Christian spiritual formation.[52] Understanding the church as an interpretive community offers much room for individual, spiritual, and professional growth, by stressing the idea that biblical data and scientific evidence are not in conflict. Consequently, when science and faith appear to be in conflict, one's view of biblical interpretation may require revisitation. Understanding churches as communities of interpretation, particularly around science and faith, is critical—both for the growth of persons interacting critically with science and for the growth of researchers and scientists themselves. ✯

Notes

[1]"Bill Nye vs. Ken Ham Debate," YouTube, 2014, https://www.youtube.com/watch?v=z6kgvhG3AkI.

[2]Bill Nye, *Undeniable: Evolution and the Science of Creation* (New York: St. Martin's Press, 2014).

[3]L. Krauss, "Teaching Creationism Is Child Abuse," YouTube, 2013, https://www.youtube.com/watch?v=UTedvV6oZjo.

[4]A. Plantinga, *Where the Conflict Really Lies: Science, Religion, and Naturalism* (New York: Oxford University Press, 2011); H. Ross, *A Matter of Days: Resolving a Creation Controversy* (Covina, CA: Reasons to Believe Press, 2015); ____, *Hidden Treasures in the Book of Job: How the Oldest Book in the Bible Answers Today's Scientific Questions* (Covina, CA: Reasons to Believe Press, 2014); ____, *Navigating Genesis: A Scientist's Journey through Genesis 1–11* (Covina, CA: Reasons to Believe Press, 2014).

[5]V. Smiles, *The Bible and Science: Longing for God in a Science-Dominated World* (Collegeville, MN: A Michael Glazier Book published by Liturgical Press, 2011).

[6]National Opinion Research Center, "About NORC," University of Chicago, http://www.norc.org/About/Pages/what-we-do.aspx (accessed June 10, 2017).

[7]Alister E. McGrath, *A Scientific Theology: Nature,* vol. 1 (Edinburgh: T&T Clark, 2006), 15.

[8]J. G. Cromley, "Reading Achievement and Science Proficiency: International Comparisons from the Programme on International Student Assessment," *Reading Psychology* 30, no. 2 (2009): 89–118, https://doi.org/10.1080/02702710802274903; C. H. Yu, "Examining the Relationships among Academic Self-Concept, Instrumental Motivation, and TIMSS 2007 Science Scores: A Cross-Cultural Comparison of Five East Asian Countries/Regions and the United States," *Educational Research and Evaluation* 18, no. 8 (2012): 713–31, https://doi.org/10.1080/13803611.2012.718511; C. H. Yu et al., "A Data Mining Approach to Compare American and Canadian Grade 10 Students in PISA 2006 Science Test Performance," *Journal of Data Science* 10 (2012): 441–64, http://www.creative-wisdom.com/pub/mirror/JDS-1064.pdf.

[9]D. E. Sherkat, "Religion and Scientific Literacy in the United States," *Social Science Quarterly* 92, no. 5 (2011): 1134–50, https://doi.org/10.1111/j.1540-6237.2011.00811.x.

[10]J. A. Coyne, "Science, Religion, and Society: The Problem of Evolution in America," *Evolution*: *International Journal of Organic Evolution* 66, no. 8 (2012): 2654–63, https://doi.org/10.1111/j.1558-5646.2012.01664.x.

[11]S. Bertsch and B. J. Pesta, "The Wonderlic Personnel Test and Elementary Cognitive Tasks as Predictors of Religious Sectarianism, Scriptural Acceptance and Religious Questioning," *Intelligence* 37, no. 3 (2009): 231–37, https://doi.org/10.1016/j.intell.2008.10.003; H. Nyborg, "The Intelligence–Religiosity Nexus: A Representative Study of White Adolescent Americans," *Intelligence* 37, no. 1 (2009): 81−93, https://doi.org/10.1016/j.intell.2008.08.003.

[12]Bertsch and Pesta, "The Wonderlic Personnel Test and Elementary Cognitive Tasks."

[13]A. Shenhav, D. Rand, and J. D. Greene, "Divine Intuition: Cognitive Style Influences Belief in God," *Journal of Experimental Psychology: General* 141, no. 3 (2012): 423–28, http://dx.doi.org/10.1037/a0025391.

[14]Nyborg, "The Intelligence–Religiosity Nexus."

[15]Y. Ganzach, S. Ellis, and C. Gotlibovski, "On Intelligence Education and Religious Beliefs," *Intelligence* 41, no. 2 (2013): 121–28, https://doi.org/10.1016/j.intell.2013.01.001.

[16]M. Zuckerman, J. Silberman, and J. A. Hall, "The Relation between Intelligence and Religiosity: A Meta-Analysis and Some Proposed Explanations," *Personality and Social Psychology Review* 17, no. 4 (2013): 325–54, https://doi.org/10.1177/1088868313497266.

[17]S. Kanazawa, "Why Liberals and Atheists Are More Intelligent," *Social Psychology Quarterly* 73, no. 1 (2010): 33–57, https://doi.org/10.1177/0190272510361602.
[18]G. J. Lewis, S. J. Ritchie, and T. C. Bates, "The Relationship between Intelligence and Multiple Domains of Religious Belief: Evidence from a Large Adult US Sample," *Intelligence* 39, no. 6 (2011): 468–72, https://doi.org/10.1016/j.intell.2011.08.002.
[19]Nyborg, "The Intelligence–Religiosity Nexus"; Sherkat, "Religion and Scientific Literacy in the United States."
[20]Lewis, Ritchie, and Bates, "The Relationship between Intelligence and Multiple Domains of Religious Belief."
[21]Bertsch and Pesta, "The Wonderlic Personnel Test and Elementary Cognitive Tasks."
[22]M. B. Arbuckle and D. M. Konisky, "The Role of Religion in Environmental Attitudes," *Social Science Quarterly* 96, no. 5 (2015): 1244–63, https://doi.org/10.1111/ssqu.12213.
[23]Patricia White and Paul Ciccantell, "The General Social Survey (GSS) The Next Decade and Beyond," National Science Foundation, Workshop on Planning for the Future of the GSS, May 2–3, 2007, Arlington, VA, https://www.nsf.gov/sbe/ses/soc/GSSWorkshopReport2007.pdf.
[24]NORC, "Survey Data Collection," University of Chicago, http://www.norc.org/Research/Capabilities/Pages/data-collection-and-management/survey-data-collection.aspx.
[25]S. Salvucci et al., *Measurement Error Studies at the National Center for Education Statistics* (Washington, DC: US Department of Education, 1997).
[26]L. Eriksson et al., *Multi- and Megavariate Data Analysis: Basic Principles and Applications* (Malmö, Sweden: Umetrics Academy, 2006).
[27]Mary A. Kane and William Trochim, *Concept Mapping for Planning and Evaluation* (Thousand Oaks, CA: Sage, 2006).
[28]Robert Karl Gnuse, *The Authority of the Bible: Theories of Inspiration, Revelation, and the Canon of Scripture* (New York: Paulist Press, 1985), 9.
[29]Martin E. Marty, "Modern Fundamentalism," *America* (September 27, 1986): 133–35.
[30]Paul Gifford, *Oxford Companion to Christian Thought* (Oxford, UK: Oxford University Press, 2000), s.v. "Fundamentalism."
[31]Nancey Murphy, *Anglo-American Postmodernity: Philosophical Perspectives on Science, Religion, and Ethics* (Boulder, CO: Westview Press, 1997), 91.
[32]William Yarchin, "Biblical Interpretation in the Light of the Interpretation of Nature: 1650–1900," in *Nature and Scripture in the Abrahamic Religions*, vol. 37, ed. Scott Mandelbrote and Jitse M. van der Meer (Boston, MA: Brill Publishers, 2008), 41.
[33]Gifford, *Oxford Companion to Christian Thought*, s.v. "Fundamentalism."
[34]George M. Marsden, *Fundamentalism and American Culture* (New York: Oxford University Press, 2006), 130.
[35]Daniel Treier, "Scripture and Hermeneutics," in *The Cambridge Companion to Evangelical Theology,* ed. Timothy Larsen and Daniel J. Treier (Cambridge, UK: Cambridge University Press, 2007), 35–49.
[36]Donald G. Bloesch, *Holy Scripture: Revelation, Inspiration & Interpretation* (Downers Grove, IL: InterVarsity Press, 2006).
[37]Stanley J. Grenz, *Theology for the Community of God* (Grand Rapids, MI: Eerdmans, 1994), 400–403. Note that the term "infallibility" also became associated with limited inerrancy, since advocates argued that scripture did not have to be accurate in all matters regarding modern science, but that scripture could not fail regarding God's ultimate purpose and aim—salvation.
[38]Joseph L. Spradley, "Changing Views of Science and Scripture: Bernard Ramm and the ASA," *Perspectives on Science and Christian Faith* 44, no. 1 (1992): 2–9; Clark H. Pinnock, "Bernard Ramm: Postfundamentalist Coming to Terms with Modernity," *Perspectives in Religious Studies* 17, no. 4 (1990): 15–26. See also Bernard Ramm, *The Christian View of Science and Scripture* (Grand Rapids, MI: Eerdmans, 1954); Matthew Barrett and Ardel B. Caneday, eds., *Four Views on the Historical Adam* (Grand Rapids, MI: Zondervan, 2013).
[39]Denis Lamoureux, *I Love Jesus and I Accept Evolution* (Eugene, OR: Wipf & Stock, 2009).
[40]Ross, *A Matter of Days: Resolving a Creation Controversy.*
[41]I. G. Barbour, *When Science Meets Religion: Enemies, Strangers, or Partners*? (New York: Harper, 2000).
[42]Alfred Darnell and Darren E. Sherkat, "The Impact of Protestant Fundamentalism on Educational Attainment," *American Sociological Review* 62, no. 2 (1997): 306–15, https://doi.org/10.2307/2657306.
[43]W. Hasker, "Faith-Learning Integration: An Overview," *Christian Scholar's Review* 21, no. 3 (1992): 234–48, https://www.apu.edu/live_data/files/219/faith_learning_integration_an_overview.pdf.
[44]J. D. Guy, "The Search for Truth in the Task of Integration," *Journal of Psychology and Theology* 8, no. 1 (1980): 27–32, http://journals.biola.edu/jpt/volumes/8/issues/1/articles/27.
[45]McGrath, *A Scientific Theology,* vol. 1.
[46]S. C. Kim, "Religion and Science in Dialogue: An Asian Christian View," *Zygon* 51, no. 1 (2016): 63–70, https://doi.org/10.1111/zygo.12236.
[47]J. S. Ripley and C. Dwiwardani, "Integration of Christianity in Research and Statistics Courses," *Journal of Psychology and Theology* 42, no. 2 (2014): 220–27, http://journals.biola.edu/jpt/volumes/42/issues/2/articles/220.
[48]Guy, "The Search for Truth in the Task of Integration."
[49]G. Cantor, *Michael Faraday: Sandemanian and Scientist* (London, UK: Macmillan, 1991); James C. Peterson, *Genetic Turning Points* (Grand Rapids, MI: Eerdmans, 2001), 23–37.
[50]T. Torrance, *Reality and Scientific Theology* (Edinburgh, UK: Scottish Academic Press, 1985).
[51]N. Komuro, *To Those People Who Hate Math* (Taipei, Taiwan: Morning Star Publishing, 2001).
[52]Scott Mandelbrote, "Biblical Hermeneutics and the Sciences 1700–1900: An Overview," in *Nature and Scripture in the Abrahamic Religions*, vol. 37, ed. Mandelbrote and van der Meer, 30.

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