Conflict Between Religion and Science Among Academic Scientists?

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*Using new survey data (*N = *1,646), we examine the attitudes academic scientists at 21 elite U.S. research universities have about the perceived conflict between religion and science. In contrast to public opinion and scholarly discourse, most scientists do* not *perceive a conflict between science and religion. Different from what other studies would indicate, this belief does not vary between social and natural scientists. We argue that maintaining plausibility frameworks for religion is an important correlate of whether scientists will reject the conflict paradigm, with such frameworks taking surprising forms. When scientists do not attend religious services they are more likely to accept the conflict paradigm. When scientists think their peers have a positive view of religion, they are less likely to agree there is a conflict between science and religion. Religious upbringing is associated with scientists adopting the conflict paradigm. Spirituality is much more important in this population than other research would lead us to believe. Results reformulate widely cited earlier research, offer new insights about how scientists view the connection between religion and science, and expand public discussion about religious challenges to science.*

There is constant public debate about the connection between religion and science (Bartlett 2005, 2006; Scott 2000). There are debates over whether intelligent design should be taught alongside evolution in public schools, scientific advocacy of and religious opposition to stem cell research, and a host of other issues connected to the perceived conflict between religion and science (Balter 2007; Barlett 2006). Although we are sympathetic to scholarly views that urge movement away from a totalizing epistemological conflict paradigm (Evans and Evans 2008), many among the media, general public, and scientists themselves continue to hold the view that there is an entrenched conflict between the domains of religion and science (Dawkins 2006; Harris 2004). Perceptions that religion and science are in conflict are not new and are rooted in a historical context, as exemplified by Andrew Dickson White's (1896) landmark volume, *A History of the Warfare of Science with Theology in Christendom* (Brooke 1991; Brown 2003; Draper 1874; Granger and Price 2007; Leuba 1912, 1916; Nielsen and Fultz 1995; Rioux and Barresi 1997; Sappington 1991).

Historic and present day discussions make it important to add empirical evidence to conjecture. Using newly released survey data on the attitudes and practices of religion and spirituality among natural and social scientists at elite research universities, we ask a question not adequately addressed in other research: What factors are associated with adherence to the conflict paradigm among elite academic scientists? We find that the majority of academic scientists, those in the natural and social sciences as well as those who do not actually practice a religion, perceive there to be no conflict between science and religion. Further, some analyses show that when scientists do not partake in religious practices or were raised in homes where religion was not important, they are more likely to accept the conflict paradigm. These factors may most strongly threaten the plausibility structure of religion. Further, lacking interest in spirituality also contributes to

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scientists rejecting the conflict paradigm, even when religiosity is held constant. These results show the surprising salience and potentially different role that spirituality plays for this population of scientists. In the conclusion, we return to a discussion of why these findings are important to the public acceptance of science as well as theoretical development in scientists' understanding of science and religion as knowledge categories.

Conflict Between Religion and Science for Scientists

Two streams of social science research have developed for understanding how scientists view the relationship between religion and science, both of which hinge on the conflict paradigm. One examines the religious commitments of elite scientists compared to the general population. In the early 20th century, the psychologist James Leuba hypothesized that because religion and science are in conflict, as scientists increased in elite status they would reject religion (Leuba 1912, 1916, 1934). Using traditional indicators of religious commitment, such as belief in God, church attendance, and belief in an afterlife, Leuba examined adherence to religion among those taken from Cattell's *American Men of Science* (1905). Leuba found that elite scientists were indeed much less religious than the general population, reasoning from this that eminent scientists' superior knowledge of science made them less likely to believe. Later researchers confirmed Leuba's findings (Larson and Witham 1997, 1998). Missing from such discussions is evidence of how scientists actually respond when presented with the conflict paradigm as well as how diverse religious indicators—such as spiritual identity, for example—relate to the conflict paradigm. (Because there is no publicly accessible data set where members of the general public were asked whether or not they perceive science and religion to be in conflict, we are not able to study how the views of scientists at elite universities compare to the general public.)

Field-Specific Differences as an Explanation of Conflict

A second stream of research examined interdisciplinary differences in religious commitments in an effort to challenge the conflict paradigm. In the 1960s, the Carnegie Commission did a large study of American university faculty.[1] They found that social scientists were actually less religious than natural scientists, a finding oft-quoted in secondary research (Stark 2003; Stark and Finke 2000).[2] Researchers have argued that, because those in the natural sciences—perceived as more "scientific" than the social sciences—tend to be more traditionally religious, there is *not* an irreconcilable conflict between religion and science (Lehman 1974; Lehman and Shriver 1968; Wuthnow 1985).

Other researchers contend that there is something about the academy, and particular disciplines, which lead to low levels of religious belief and practice. This led Lehman and Shriver (1968) to think that members of disciplines ought to be compared with one another according to dimensions of "scholarly distance from religion" rather than comparing academics to the general population. They explain that natural scientists are more religious than members of other disciplines because their specific subject matter and methods do not examine religion itself. In comparison, social scientists often examine religion. Scholars in these disciplines are then forced to place religion on the same "attitude structure" as other objects of study, leading to a forced cognitive differentiation and consequent rejection of religion (Lehman and Shriver 1968).

[1] In 1984, the Carnegie Commission did another study of all American faculty, which included few indicators of religious belief.

[2] Rodney Stark (2003) makes assertions about interfield differences in religiosity between natural and social scientists based on the 1969 Carnegie Commission study of American faculty. See also Stark and Finke (2000), which makes a similar assertion based on the same data.

Hypothesis 1: *Consequently, we hypothesize that social scientists will be more likely than natural scientists to see science and religion as in conflict.*

Measures of Religious Socialization, Identity, and Practice

We also explore additional hypotheses that examine various aspects of what Gerhard Lenski (1961) has called the "religious factor"—measures of religious socialization, identity, and practice—as specific predictors of the conflict paradigm (Lenski 1961).

Religious Socialization and Switching

Theorists of religious socialization contend that the importance of religious belief as a child is an important predictor of religious belief as an adult. Earlier researchers specifically examined this predictor as related to later faith commitments among academic populations, finding that higher education in the sciences acted as a mitigating factor overriding earlier religious socialization (Vaughn, Smith, and Sjoberg 1966). Because previous scholars link religious belief with acceptance or rejection of the conflict paradigm, here we test the extent to which religious socialization will act as a predictor of accepting the conflict paradigm.

Hypothesis 2: *Those raised in homes where religion was not important will see religion and science as in conflict.*

Trajectories into and out of religious belief over the life course might be proxies for a religious plausibility structure and related to perceptions of conflict between religion and science. For example, scientists who were raised in a religious home and rejected religion as an adult might be even more likely to perceive a conflict than those who were raised without a religion and remained irreligious. If scientists remain religious we would assume that they have found a way to reconcile the relationship between religion and science *or* see the two as nonoverlapping magisteria (Gould 1997), in compartmentalized spheres. Our third hypothesis describes the conditions we most expect to mitigate conflict.

Hypothesis 3: *Those who were raised in a religious home and are still religious will not be likely to see religion and science in conflict and those who were raised in a nonreligious home and became religious will be unlikely to see a conflict between science and religion.*

Our fourth hypothesis describes the condition we most expect to produce conflict. Given what we know about religious socialization (or lack thereof) and religious plausibility structures, we would expect that:

Hypothesis 4: *Those who were raised with a religion and switched to being irreligious would be more likely to see a conflict between religion and science than those who were raised without religion and remained irreligious.*

Religious and Spiritual Identity and Belief

We conceptualize religious identity as a respondent identifying with a specific religious tradition in addition to degree of religious conservatism or religious liberalism.

Hypothesis 5: *Specifically, we hypothesize that academic scientists who are religiously liberal will be less likely to perceive conflict (because religious liberals are less likely to have views about earth origins that directly conflict with accepted scientific theory) when compared to those who identify themselves as religious conservatives.*

We also examine the influence of spiritual identity on acceptance of the conflict paradigm. Spirituality is increasingly important in the general population, leading to a recent rise in

scholarship on spirituality in America (Roof 1993, 1999; Schmidt 2005; Wuthnow 1998). Some researchers argue that current expressions of U.S. spirituality are highly individual and do not necessitate adherence to any specific community (Bloch 1998; Dillon, Wink, and Fay 2003), although others recognize that, for some, spirituality is rooted in particular forms of community (Kripal 2008). If we see spirituality as more of an individual pursuit when compared to religion *and* it is the community aspects of religion that uphold its plausibility, then having a spiritual identity by itself may not be enough to withstand the conflict paradigm.

Hypothesis 6: *For this reason, we hypothesize that lack of spiritual identity will not have an influence on whether or not scientists accept the conflict paradigm.*

Scholars have also argued that religious belief stands alongside religious identity and practice as an important indicator of religious salience (Lenski 1961). Specific beliefs are the content of a religious identity. For example, the early 20th-century psychologist Leuba (1916, 1934) thought that erosion of religious belief (specifically belief in God) was a key way that science replaced religion. Here we use ideas about God and views of the Bible as measures of religious belief and hypothesize that:

Hypothesis 7: *Individuals who do not believe in God will be more likely to adopt the conflict paradigm.*
Hypothesis 8: *Individuals who believe the Bible is a book of fables will be more likely to adopt the conflict paradigm.*

Religious and Spiritual Practice

Religious practice is one of—if not *the*—most important predictors of religious adherence. Peter Berger explains that human beings are constantly faced with the choice of how to interact with the world. An individual's social reality, argues Berger, is produced by his or her interaction with social structures (Berger 1967; Berger and Luckman 1966). Religion is always at risk of losing its plausibility in the midst of a social world that appears ordinary, mundane, and devoid of the supernatural in the day-to-day experience. Hence, Berger thinks that religion requires a way of upholding its unique symbols and doctrines, what he calls a *plausibility structure* or an alternative social community, that is less likely to question than support the norms and doctrines of the religion. If more scientists are irreligious than religious, then it is particularly necessary for the religious scientist to be part of a community of other believers in order to uphold the plausibility structure of the scientist's faith. We hypothesize then that:

Hypothesis 9: *Lack of religious attendance will be the most important factor associated with perceiving religion and science in conflict.*

Researchers who examine spirituality find there is a much wider variety of practices Americans all conceive of as spiritual, when compared to a more limited number of practices conceived of as religious. Survey researchers use several indicators to represent spiritual practice (Armstrong 1996; Wuthnow 1994). Three of these included in our survey are yoga, meditation, and relaxation techniques. One distinction that we make between religious and spiritual practices is that important religious practices—such as attendance—are often linked to participation in a community of like-minded others. In comparison, spiritual practices—such as yoga or meditation—may be more individual in orientation, not requiring a plausibility structure upheld by like-minded others.

Hypothesis 10: *We hypothesize that spiritual practice will have no significant influence on adopting the conflict paradigm.*

Current Social Support for Religion in the Academy

Elite scientists in particular devote a major part of their lives to the scientific enterprise *and* science is highly collaborative, meaning that scientists' main community may be that shared with other scientists (Ecklund, Park, and Veliz 2008). It stands to reason then that how one's peers in the academy view religion would be an important part of a person's religious plausibility structure, perhaps as important as religious attendance itself. Differences among disciplines in how those within a discipline view religion may be a central aspect of attitudes toward religion (Lehman and Shriver 1968). If one's peer scientists do not view religion positively, then such views may weaken an individual scientist's religious plausibility structure.

Hypothesis 11: *We hypothesize that scientists who think their colleagues have a positive view toward religion will be less likely to see religion and science as in conflict.*

Addressing Theoretical and Empirical Weaknesses

The hypotheses examined here help us address several core theoretical and empirical weaknesses in the literature. Examining religion among scientists according to indicators of personal religious commitment does not address the core issues of how scientists view religion and science as knowledge categories when they are placed side-by-side and to what extent scientists themselves uphold the conflict paradigm (Gieryn 1999).[3] Further, research that examines religion among scientists does so only through the lens of narrow indicators of faith commitment, such as religious attendance or belief in God, or an afterlife. Recent scholars of religion argue that much of faith—both institutionalized and noninstitutionalized forms—is better described by a rediscovery of traditional forms or an appropriation of new forms of spirituality (Schmidt 2005; Wuthnow 1998). Considering spirituality and its relationship to acceptance or rejection of the conflict paradigm may be especially salient for this population because many academic scientists are part of the baby-boomer generation, a generation that sociologist Wade Clark Roof describes as the harbingers of syncretistic forms of spirituality (Roof 1993, 1999).[4]

Scholars who examine interfield differences in *personal* religious practice and identity as a way of addressing whether or not scientists think there is a conflict do not use the best approach for understanding how scientists view the conflict paradigm. Such analyses theoretically side-step an exploration of the underlying correlates of whether or not scientists believe there is a conflict between religion and science. For example, on one hand, it is possible for a scientist *not* to practice any particular religion personally, yet still have a way of viewing the connection between religion and science such that these two categories are not in conflict. On the other, it is possible for a scientist to be highly religious, and still think that religion and science are in conflict—this individual would have found a way to compartmentalize or to live his or her professional life with the seeming cognitive dissonance resulting from being a religious adherent and a scientist, while seeing a conflict between the two. In light of current controversy, analyzing what factors are associated with scientists adopting the conflict paradigm contributes to developing dialogue within and outside the academy. Such analyses also provide new theoretical insight to broader sociological concerns about the relationship between the knowledge categories of religion and of science.

[3] Although Gieryn does not specifically examine religion as a knowledge category, we borrow here from his work and other sociologists of science who argue that science is not only "fact" but also socially constructed (see also Latour 1987). One of the ways science has been historically constructed is through its opposition to religion. See, for example, Gieryn (1983).

[4] The demographics of the RAAS population are discussed extensively in another article (Ecklund and Scheitle 2007).

METHODS

The study of Religion Among Academic Scientists (RAAS) was completed over a three-year period from 2005 through 2007. It began with a random sample survey of faculty from 21 elite U.S. research universities. The Appendix provides a list of these universities. In this understudied topic, an examination of academic scientists at elite institutions was initiated because elites are more likely to have an impact on their disciplines and more broadly (Beyerlein 2003; Lindsay 2007; Rado 1987). For example, Randall Collins claims that top scholars are a kind of elite who contribute to knowledge creation in the broader society (Collins 1998). If scientists at elite universities are more likely to have an impact on knowledge creation, studying their views broadens understanding of issues related to changes in the institution of the academy.

Building on other research, RAAS consists of an interdisciplinary comparison of a random sample of tenured (full and associate) and tenure-track (assistant) professors from seven different disciplines (natural science: biology, chemistry, and physics, as well as social science: sociology, economics, psychology, and political science). Faculty members for inclusion in the study were randomly selected from these seven natural and social science disciplines at universities that appear on the University of Florida's annual report of the "Top American Research Universities." The University of Florida ranks elite institutions according to nine different measures, which include: total research funding, federal research funding, endowment assets, annual giving, number of national academy members, faculty awards, doctorates granted, postdoctoral appointees, and median SAT scores for undergraduates. Universities were ranked and selected according to the number of times they appeared in the top 25 for each of these nine indicators. These measures are similar to those used in other studies that have examined elite universities, such as those sponsored by the Carnegie Commission (Bowen and Bok 1998; Ladd and Lipset 1972). Faculty were asked to fill out a 15-minute survey, either over the phone or on the Web (6.5 percent responded to the survey over the phone and 93.5 percent filled the survey out over the Web). A total of 2,198 faculty members were surveyed and the study achieved a 75 percent response rate or 1,646 faculty members from these seven different disciplines, an extremely high response rate for a study of this sort. The Carnegie Study of American Faculty, in comparison, achieved a response rate of 58 percent (Ladd and Lipset 1972).

Although faculty were randomly selected, oversampling occurred in the smaller fields and undersampling in the larger fields. For example, a little over 62 percent of all sociologists in the sampling frame were selected, while only 29 percent of physicists and biologists were selected, reflecting the greater numerical presence of physicists and biologists at these universities when compared to sociologists. To account for these discrepancies, data were weighted according to discipline.[5]

Main Variables

The main dependent variable consisted of responses to the question: Thinking now about your faith or spiritual perspective and your professional life, please indicate if you "strongly agree," "somewhat agree," "have no opinion," "somewhat disagree," or "strongly disagree" with the statement, "there is an irreconcilable conflict between religious knowledge and scientific knowledge." For the purposes of these analyses, this measure was collapsed into a dichotomous variable where 1 = "agree" and 0 = "not agree."

We utilized several sets of independent variables to measure religious commitment and change plus controls for gender and social science concentration. To account for greater secularity

[5] A table providing particularities of the weighting scheme has been published elsewhere and is available upon request (Ecklund and Scheitle 2007).

among academic scientists, meaning very small numbers for some categories of religious belief and practice, we reverse coded all of the religion variables into dichotomous measures, where 1 refers to the absence of the behavior and 0 to the presence of the behavior. The first set of measures was for religious socialization and change, including measures of religious switching and "self-reported importance of religion at age 16." Our coding for religious switching was generated from cross-tabs to indicate the religious switches that occurred most often. Because the number of scientists who switched between specific denomination (evangelical Protestant to Catholic, for example) or even between larger tradition categories (Christian to Buddhist, for example) were too small for analysis, we collapsed the categories to "Raised affiliated with a religious tradition, became unaffiliated," "Raised unaffiliated with a religious tradition, became affiliated," and "Raised affiliated with a religious tradition, remained affiliated." Similarly we dichotomized the Likert scale of religious salience at age 16 where 1 = "not at all important" and 0 = "all other responses." The second set included measures of religious identity. These variables were "no religious affiliation" and "religious orientation." Religious orientation was the respondent's understanding of his or her own religious views compared to other Americans, ranging from "extremely liberal" to "extremely conservative." Respondents were also given the option of selecting "I do not hold religious views." We collapsed the orientation scale into three categories: "religious liberal," "no religious view," and all other responses as the comparison group.[6] "Self-reported spirituality" was based on a four-point scale ranging from "very spiritual" to "not at all spiritual." The spirituality categories were collapsed to 1 = "not at all spiritual" and 0 = "spiritual to some degree."

We also considered respondent religious and spiritual practice, measuring this in several ways. Respondents were asked whether they had engaged in yoga, private meditation, relaxation techniques, private prayer, or reading a sacred text in the past six months. Additionally, we included religious worship attendance, which was measured on a seven-point scale ranging from "more than once a week" to "not at all last year."

Religious beliefs were measured using dichotomized and reverse coded variables for biblical literalism and views of God. The former was measured with three categories, including "The Bible is a book of ancient myths and fables" and "don't know," responses that were both compared against other views of the Bible. The latter was measured using two categories, including "I do not believe in God" compared to all other responses.

Last, we included responses to the question: "In general, I feel that the scholars in my field have a positive attitude toward religion." Answer choices ranged from "strongly agree" to "strongly disagree," and this measure was reduced dichotomously where 1 = "agree" and 0 = "not agree."

In the results section, we provide descriptive statistics for the scientist respondents, followed by a comparison of religious characteristics between academic scientists and the highly educated who responded to the General Social Survey (2006), the general population that is most educationally comparable to the scientists at elite universities. The purpose of this comparison is to address research that examines the conflict paradigm by arguing that more education leads to less religiosity. Researchers have argued that higher education—which includes exposure to an overall hermeneutic of suspicion and reason—leads to lessening of religious belief (Leuba 1916).[7] Finally, we conducted a series of logistic regressions to test hypotheses about the various religious influences that are associated with the likelihood of agreeing there is a conflict between science and religion. Tests for multicollinearity among the various religious measures did not reveal any problematic relationships between independent variables, and no significant differences in the

[6] Religious conservatism was measured using similar categories to religious liberalism, but the very low percentages led us to collapse all three categories into one.

[7] We are indebted to an anonymous reviewer for this insight.

results appeared between the final sample without any missing data ($N = 1{,}382$) and the original sample ($N = 1{,}646$), which includes respondents who answered only part of the survey.[8]

FINDINGS

In response to previous studies we first present comparative descriptive statistics based on survey responses. Our initial assessment suggests that elite scientists either lack religion or are religiously liberal. Most important, only a minority think that conflict exists between religion and science. The slight majority, at 58 percent, were raised in homes where religion was important. Less than 30 percent are involved in any one of the spiritual practices, and nearly half (about 49 percent) labeled themselves as religious liberals of some form. Only a minority of faculty (23 percent) in the natural and social sciences think that their colleagues have a positive view toward religion, while only 37 percent agreed that a conflict exists between science and religion.

In the second table, we present a comparative look at the religious characteristics of this sample of academic scientists and a national sample of highly educated adults from the 2006 General Social Survey (GSS). The separate comparison of those respondents in the GSS who reported receiving more than 16 years of education is included to examine whether the differences between natural and social scientists and other adults might be a factor mainly of education. There were too few individuals in the GSS who reported receiving more than 20 years of education to make an adequate comparison between scientists and those in the general population with a comparable level of education (those who hold a Ph.D.). In order to address previous research on field differences in levels of religiosity, we provide separate percentages for natural and social scientists.

Our findings from Table 2 show that scientists who work at elite academic institutions are more secular than the highly educated in the general population. While a majority of elite scientists were raised in some religious tradition, 14 percent were raised with no religion at all—a significantly higher percentage than the 9 percent among the highly educated in the GSS who indicated no religious upbringing. While 21 percent in the GSS highly educated sample reported no religious affiliation, over 51 percent of scientist respondents reported no religious affiliation, natural scientists more so than social scientists (55 percent vs. 48 percent, respectively). There are not vast differences between natural and social scientists in religious adherence.

[8] In earlier analyses, we also accounted for race, age, and faculty rank and none of these were significant. For the sake of parsimony these variables were left out in the final models. These analyses are available upon request. Our original starting sample was $N = 1{,}646$. In this subset, 5.4 percent did not answer the conflict question. This in turn reduced our sample to 1,558. We compared the distribution of responses between this sample and the sample that we used, where we removed respondents with missing information on: discipline, faculty rank, gender, race, religion at 16, and current religion ($N = 264$). Seventeen percent of those who answered the conflict question were missing information on at least one of these other measures.

The distribution is as follows:

	Valid%	Valid%
Strongly agree	17	17.1
Somewhat agree	19.4	19.5
No opinion	6.6	6.4
Somewhat disagree	23.6	23.8
Strongly disagree	33.4	33.1
	1,558	1,382

We found little variation in the dependent variable when we account for missing cases compared to the relevant subset that originally answered the dependent variable question. For this reason our reduced sample remains an accurate reflection of the original.

Table 1: Religious characteristics, elite academic scientists (RAAS Survey 2005)

	N	%		*N*	%
Social science	644	46.6	Religious orientation		
			Extreme religious liberal	275	20.2
Importance of religion at 16			Religious liberal	397	29.2
Very important	295	21.4	Lean religious liberal	101	7.5
Somewhat important	503	36.5	Moderate	97	7.1
Not very important	334	24.2	Conservative	66	4.9
Not at all important	247	17.9	Holds no religious views	423	31.1
Spiritual practices in past 6 mo.			Peers view religion positively		
Yoga	198	14.3	Strongly agree	33	2.5
Meditation	364	26.3	Somewhat agree	268	20.1
Relaxation	400	28.9	No opinion	431	32.4
Sacred text reading	329	23.8	Somewhat disagree	429	32.3
			Strongly disagree	169	12.7
			Agree that there is conflict between religious and scientific knowledge	506	36.6

Even though a majority of academic scientists are not strongly religious (see Table 2), the majority also does not see religion and science as in conflict (Table 1). It is particularly surprising that a much higher proportion of the highly educated individuals in the GSS saw themselves as very spiritual (29 percent vs. 8 percent) compared to elite academic scientists. A high proportion of the academic scientists are Jewish, when compared to the general population, with 16 percent of the RAAS respondents identifying as Jewish (18 percent for social scientists and 13 percent for natural scientists), compared to only 3 percent in the highly educated general adult sample. This suggests that there may be both self-selection as well as facets in the scientific enterprise itself that generate lower levels of religious and of spiritual commitment among scientists.

Field-Specific Differences

Table 3 shows the odds-ratios when we test the likelihood that different religious factors are associated with whether elite academics in the natural and social sciences will see science and religion as in conflict. In view of the greater degree of secularity among elite scientists, we coded most of our measures such that the comparison group indicated religious identity, belief, or attendance; Table 3 shows the facets of *secularity* that are associated with agreement with the conflict paradigm. Lower or less engagement with religion should be associated with a greater degree of perceived tension between science and religion.

We argued in our first hypothesis that social scientists will be more likely than natural scientists to adopt the conflict paradigm. As shown in Table 2 there were no major field-specific differences in religious adherence, challenging scholarship that has argued characteristics of scientific fields were primarily responsible for the way academics view the perceived conflict between religion and science (Stark and Finke 2000; Thalheimer 1973). Table 3 reveals that field-specific differences are not significantly associated with adopting the conflict paradigm.

Table 2: Religious characteristics of elite academic scientists (RAAS 2005) compared to General Social Survey highly educated subsample (2006)

		RAAS 2005 ($N = 1{,}386$)	Graduate Degree ($N = 375$)	Social Science ($N = 761$)	Natural Science ($N = 627$)
Religion at age 16[a]	Black Protestant	1.1	4.8***	1.5	.6
	Evangelical Protestant	7.6	13.1***	8.4	6.7
	Mainline Protestant	29.2	24.8	28.7	29.9
	Catholic	22.2	35.5***	21.2	23.4
	Jewish	18.5	4.3***	20.9	15.5**
	Hindu	1.5	2.4	1.2	1.9
	Buddhist	.4	1.9**	.1	.8
	Muslim	.6	.8	.8	.5
	Other faith	4.5	3.5	5.0	3.8
	Nonaffiliated	14.4	9.1**	12.4	16.8*
Religious tradition currently	Black Protestant	.2	5.0***	.4	.0
	Evangelical Protestant	1.7	15.2***	1.9	1.6
	Mainline Protestant	14.1	18.7*	13.5	14.9
	Catholic	9.0	27.9***	9.1	8.8
	Jewish	15.9	3.3***	18.4	12.8**
	Hindu	1.0	1.1	.9	1.1
	Buddhist	1.7	1.5	2.1	1.3
	Muslim	.5	.9	.8	.2
	Other faith	4.6	5.0	5.2	3.9
	Nonaffiliated	51.2	21.4***	47.8	55.4**
Consider self spiritual	Very spiritual	8.1	29.0***	7.3	8.9
	Moderate spiritual	27.8	43.8***	29.4	25.8
	Slightly spiritual	31.8	19.7***	31.9	31.6
	Not spiritual at all	32.4	7.4***	31.4	33.6
Confidence in the existence of God	I do not believe in God	33.5	3.8***	30.9	36.6*
	I do not know if there is a God and there is no way to find out	30.2	8.4***	31.3	28.9
	I believe in a higher power, but it is not God	8.0	17.9***	7.2	8.9
	I believe in God sometimes	5.0	3.3	5.3	4.7
	I have some doubts but I believe in God	14.5	19.2*	15.7	12.9
	I have no doubts about God's existence	8.8	47.3***	9.6	7.9
Bible view	Bible is literal word	.2	14.6***	.0	.4
	Bible is inspired but not literal	23.8	56.9***	25.8	21.5
	Bible is ancient book of fables	76.0	28.6***	74.2	78.2

(Continued)

Table 2 (continued)

		RAAS 2005 ($N = 1{,}386$)	Graduate Degree ($N = 375$)	Social Science ($N = 761$)	Natural Science ($N = 627$)
Religious attendance[b]	More than weekly	1.4	5.3***	1.6	1.3
	Nearly weekly to weekly	7.1	30.2***	7.3	6.9
	2–3 × per month	6.2	8.7	6.2	6.2
	Once a month	4.0	5.3	4.4	3.5
	Several times/yr to less than once a month	29.9	31.1	31.0	28.6
	Never	51.3	19.4***	49.6	53.4
Prayer[c]	Mentioned (RAAS)/at least once a week (GSS)	27.6	82.1***	30.8	23.8**

*$p < .05$; **$p < .01$; ***$p < .001$; chi-square tests between RAAS and GSS respondents with a graduate degree as well as between RAAS social and natural scientists.

[a]A subset of the GSS respondents was asked about their religious affiliation at age 16. $N = 2{,}853$.

[b]Religious service attendance was measured slightly differently in some of the categories between the RAAS and GSS. The RAAS divides yearly attendance into two categories (6–11 times per year and less than six times a year), whereas the GSS uses two alternative categories that cover either "less than once a year" and "several times per year." Given this disparity the GSS categories were collapsed to approximate the RAAS categories.

[c]To create parity in the frequency of prayer, the GSS responses were collapsed from the 6-point ordinal scale (ranging from "several times a day" to "never") such that 1 = "once a week or more" and 0 = "less than once a week or less." This was the closest approximation to the RAAS question that asks whether the respondent prayed at all in the past six months. Adjusting the categories does not significantly alter the sizeable difference between the general population and academic scientists.

Religious Socialization, Identity, and Switching

In Hypotheses 2, we argued that being raised in a home where religion was not important would increase the likelihood of adopting the conflict paradigm. A significant portion of elite scientists were raised in homes where religion was not very important or not at all important (about 42 percent, see Table 1). Being raised in a home where religion was not important increased the likelihood of adopting the conflict paradigm. We argued in Hypothesis 3 that remaining religious or switching to being religious will lead to disagreement that there is a conflict between religion and science. More interesting, we also hypothesized that switching from being religious to rejecting religion—a pronounced weakening of the religious plausibility structure—would have the most impact on adopting the conflict perspective, even when compared to those who were raised without a religion and remained irreligious. Model 2 of our analysis reveals that becoming unaffiliated increased the likelihood of perceiving religion and science in conflict, although this result was not statistically significant. In Model 3, we tested the importance of being a religious liberal, arguing that religious liberals will be less likely to perceive conflict when compared to those who identify themselves as religious conservatives. We found that being a religious liberal (when compared to being conservative) actually increased the likelihood of adopting the conflict model), leading us to reject our hypothesis. Scientists who are religious conservatives may have unique ways of reconciling the connections between religion and science.

Table 3: Odds-ratios predicting agreement that conflict exists between science and religion (RAAS Survey 2005)

	1		2		3		4		5		6		7		8	
	Odds	*SE*	Odds	*SE*	Odds	*SE*	Odds	*SE*	Odds	*SE*	Odds	*SE*	Odds	*SE*	Odds	*SE*
Social science[a]	.829	.112													.924	.127
Religious change																
Affiliated to unaffiliated[b]			1.115	.201											.929	.213
Unaffiliated to affiliated			.209***	.459											.453	.496
Remained affiliated			.390***	.213											.859	.242
Nonimportance of religion at 16			1.237***	.069											1.079	.075
Religious affiliation & identities																
Religious liberal[c]					2.084***	.217									.778	.260
No religious view					4.785***	.224									.772	.285
Self-reported nonspirituality							3.495***	.119							1.646***	.147
Nonattendance									2.131**	.100					1.538***	.116
No yoga									1.541*	.185					1.417	.192
No meditation									1.357	.158					1.150	.168
No relaxation									.853	.146					.829	.153
No prayer									1.769**	.181					.845	.215
No sacred text reading									1.377	.191					1.230	.201
Bible fablism[d]											3.672***	.270			2.579***	.289
Bible view unknown											1.342	.316			1.142	.332
Disbelief in God[e]											1.449***	.055			1.249***	.064
Peers view religion positively													.680**	.141	.752	.157
N	1,382		1,368		1,383		1,382		1,376		1,382		1,382		1,363	
Nagelkerke R^2	.003		.114		.073		.109		.191		.210		.008		.262	

*$p < .05$; ** $p < .01$; *** $p < .001$.

[a]Comparison group is natural scientist respondents.

[b]Comparison group is "raised unaffiliated and remained unaffiliated."

[c]Comparison group is "moderate" and "conservative" religious views.

[d]Comparison group: "Bible is the literal or inspired word of God."

[e]Comparison group: all responses from "Belief in God" to "I don't know if there is a God."

Based on previous research about spirituality, we argued in Hypothesis 6 that lacking a spiritual identity would not be significantly associated with adopting the conflict paradigm. From Table 2 we see that, in terms of self-reported spirituality, academic scientists were somewhat less spiritual than respondents in the national adult sample. For example, more than 36 percent of the scientists reported they were moderately or very spiritual, social scientists slightly more so than natural scientists (37 vs. 35 percent, respectively). In a similar question asked on the GSS, 44 percent among the highly educated reported moderate interest in spirituality, and an additional 29 percent considered themselves "very spiritual."

A group of researchers argue that seeing oneself as "spiritual" is amorphous, not tied to a central community, and not leading to the same kind of plausibility structures as does adherence to a traditional religion (Bellah et al. 1985; Dillon, Wink, and Fay 2003). Our analyses showed, however, that when scientists did *not* view themselves as spiritual they were *more* likely to see religion and science as in conflict. Although we do not have the data to compare scientists to the general population, these results indicate that spiritual identity for scientists may mean something different—and be potentially more salient—for some groups in the general population.

Hypotheses 7 and 8 dealt with belief in God and views about the Bible. Looking at Table 2 we see that 34 percent of the scientists do not believe in God compared to 4 percent of those among the highly educated who responded to the GSS. And 76 percent of scientists think that the "Bible is an ancient book of fables" compared to 29 percent of the GSS respondents. Table 3 shows that in both the initial model and in the final model not believing in God and believing the Bible is a book of fables were significantly associated with scientists accepting the conflict paradigm.

Spiritual and Religious Practice

Hypotheses 9 and 10 dealt with religious and spiritual practices, respectively. Data gleaned from Table 2 suggest that elite academic scientists participate in religious communities far less than those in the general population. Fifty-one percent of academic scientist respondents did not attend any place of worship in the past year, compared to about 19 percent among the highly educated in the GSS sample. Viewed in the opposite way, only about 9 percent of academic scientists attended a house of worship once a week or more when compared to nearly 36 percent of the highly educated general population. Similarly, between 14 and 29 percent of scientists reported practicing yoga, relaxation techniques, or meditation. Extrapolating from the literature on spirituality, we had originally hypothesized that lacking spiritual practices would not make a difference in whether or not scientists adopted a conflict paradigm. Models 5 and 8 in Table 3 showed mixed results regarding these practices. Not attending religious services is positively associated with adopting the conflict paradigm. While not engaging in prayer or yoga was positively associated with perceiving religion and science as in conflict in the basic model, these practices were not significant when controlling for other factors.

Peers' View of Religion

Hypothesis 11 predicted that scientists who think their colleagues have a positive view toward religion will be less likely to see religion and science in conflict. Based on Table 1 we see that only 23 percent of the RAAS respondents agreed that colleagues in their academic field have a positive view toward religion. (About 32 percent had no opinion on this topic while another 45 percent disagreed that their colleagues were positive toward religion.) When examining Table 3, Model 7, where we specifically test the influence of peer attitudes toward religion, scientists who thought their peers had a positive view of religion were significantly less likely to agree there

is a conflict between science and religion. When examining the full model, (Table 3, Model 8), however, this measure was not significant.

Discussion and Conclusions

Our results show that lack of affiliations, practices, and beliefs of all kinds (both traditionally religious and spiritual) make a difference in how this population understands the relationship between religion and science. These findings challenge the small amount of previous and outdated research on scientists' perceptions of religion and adoption of the conflict paradigm. Instead of implicitly assuming that having no religious identity is the same thing as agreeing that there is a conflict between religion and science, thereby leaving the mechanisms by which religious identity and the conflict paradigm are connected, we have to some extent opened the black box, finding in the end that lacking a religious identity is not a salient predictor of adopting the conflict paradigm. It may be, for example, that most scientists do not see conflict between religion and science because of the popularity of views such as Stephen Jay Gould's nonoverlapping magisteria concept (Gould 1997), the idea that religion and science are in completely different spheres. Further, in contrast to research that has argued there is not an actual conflict between the knowledge framework of religion and that of science, on the basis that social scientists are less religious than natural scientists, we have shown that such differences are not a significant predictor of whether or not scientists will perceive conflict.

Importance of Spirituality Among Scientists

Moving beyond addressing previous research our findings indicate the importance of what is perceived as an individually negotiated and often private phenomenon (spirituality) as well as the importance of what is a public affirmation of religious commitment (religious attendance). At least among academic scientists—where there is much less traditional faith (over 50 percent report having no religious identity) when compared to spirituality (68 percent report they are spiritual to some degree)—spiritual identity may replace religious identity as a correlate with views about other public issues. Researchers often argue that spirituality among those in the general population leads mainly to an inward focus on self-improvement when compared to religious identities that have greater salience for other life factors (Bloch 1998). Among scientists—in contrast—even those with religious identities may have identities that are not publicly expressed. (For example, over 50 percent have not attended a religious service in the past year.) Instead, strength of spirituality may be the more salient correlate of scientists' other attitudes and behaviors. This finding should lead other researchers to examine the content of spirituality for academic scientists and how their spirituality might differ from that found in the general population.

Plausibility Structures

The important facet of religious commitment positively associated with adopting the conflict paradigm may actually be the extent to which that identity is publicly expressed through religious attendance. Participation in religious services requires being part of a community of others who uphold the plausibility framework both of a given religion as well as the possibility that there is not a conflict between religion and science. Lack of attendance then may be the most important religiously based threat to the plausibility structure of religion, particularly if an individual previously attended (although these data do not allow us to test whether scientists attended and then switched to not attending). Further, we should note that—while not significant in the final model—in individual models whether or not scientists thought their colleagues were positive about religion was also correlated with adopting the conflict paradigm. Taken together, such

results show that plausibility structures for religion may be more complicated than the facile assumption that as scientists learn more about science they come to think religion and science are in conflict. Rather, the strength of religiosity in the home in which a scientist was raised, current religious attendance, and—within the scientific enterprise—peers' attitudes toward religion, all seem to have an impact on whether or not scientists see religion and science as in conflict. Future researchers who study this population might collect survey data among a much larger population of scientists, making it possible to test more specific religious/spiritual typologies and their connection to acceptance or rejection of the conflict paradigm. We might examine, for example, whether being a Buddhist, meditating regularly, and being raised in a nonreligious home is more strongly correlated with rejecting the conflict paradigm when compared to being raised in a religious home, attending church regularly, and identifying as an evangelical Protestant.[9]

Public Relevance

Given current public debate, this research is the beginning of an important agenda that ought to systematically examine the place of religion in the academy as well as the intersection of religion and science from the point of view of scientists themselves. Our results showing that scientists do not see religion and science as in conflict may help religious members of the general public adopt a more positive attitude toward science and scientists. This finding is particularly important because the population of scientists studied here work at top universities; they are likely to be thought leaders and have an influence on the public acceptance of science through the students that they teach and—for some—their role as public spokespersons for science.

Our results that scientists who are religious liberals are actually more likely to think there is a conflict between religion and science (when compared to religious conservatives) may indicate that scientists who are religious conservatives may have a special role in convincing the American public that science and religion do not have to be in conflict because the most religiously based opposition to science seems to come from religious conservatives. Future work should delve into the particular narratives religious scientists have for rejecting the conflict paradigm as well as the fuller range of ways scientists perceive the connection between the knowledge categories of science and religion.

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[9] We are indebted to an anonymous reviewer for this insight.

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Appendix
Universities in Sample

Columbia University
Cornell University
Duke University
Harvard University
Johns Hopkins University
Massachusetts Institute of Technology
Princeton University
Stanford University
University of Pennsylvania
University of California at Berkeley
University of California, Los Angeles
University of Chicago
University of Illinois, Urbana Champaign
University of Michigan, Ann Arbor
University of Minnesota, Twin Cities
University of North Carolina, Chapel Hill
University of Washington, Seattle
University of Wisconsin, Madison
University of Southern California
Washington University
Yale University