
RETHINKING RELIGIOUS UNDER-REPRESENTATION IN SCIENCE

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Abstract

The unusually low number of religious affiliates in science has been a perplexing phenomenon ever since James Leuba originally reported his findings on the religiosity of scientists in 1914. It has been traditionally assumed that low religious turnout in science is a consequence of epistemological conflicts between religion and science dissuading religious affiliates from pursuing scientific careers. The potential contribution of the scientific institution itself (and its social practices), however, has been seldom questioned as a contributing factor. Herein I hypothesize and argue that several socio-psychological mechanisms of social bias potentiate discrimination within the scientific institution, favouring non-religious candidates in recruitment into the scientific role as well as during subsequent career advancement. These mechanisms include: (1) Boundary posturing and identity formation psychology; (2) Implicit association psychology and (3) Stereotype anxiety psychology. For reasons discussed, differences in educational attainment rates between religious affiliates and disaffiliates, differences in natural inclinations towards science and scientific topics, and socialization processes in academia towards secularism, are all unlikely explanations for the low number of religious affiliates in science. Discrimination against religious scientists, if present, should be made clearly recognized through study and ameliorated through educational and/or institutional policies if we are to both safeguard human dignity and foster a robust scientific enterprise necessary for the 21st century global economy.

Keywords: science and religion, religious scientists, social psychology, discrimination

1. Introduction

The question of religious belief among scientists remains contentious. James Leuba's well-publicized survey in 1914 revealed that 58% of American scientists doubted the existence of God, and among 'greater' scientists the percentage was even higher [1]. Similar surveys conducted in 1934 and 1996 vindicated Leuba's original findings, or revealed even greater religious differences between American scientists and the general public [1]. Although the religiosity of Nobel laureates is difficult to assess, secular pundits such as Oxford biologist Richard Dawkins has popularized single-digit estimates [2].

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The paucity of religious scientists has often been used as supporting evidence of a ‘secularization thesis’, however unfounded, that trumpets the inevitable demise of religion under the weight of education and modernity [3]. Indeed, Leuba, a proponent of this thesis, attributed greater disbelief among eminent scientists to their “superior knowledge, understanding, and experience” [1]. Although clergy and scientists alike have made efforts to bridge the social gap between religion and science, it remains a nearly unquestioned assumption that the scientific institution itself remains blameless in the poor recruitment of religious affiliates into the scientific role. Indeed, popular writings (e.g. Dawkins [2]) dismiss such notions, pointing instead to irreconcilable epistemological conflicts dissuading religious adherents away from scientific endeavours.

Herein I both hypothesize and argue that plausible modes of bias exist within the scientific world favouring non-religious candidates during both recruitment and career advancement. Although education, and particularly the inculcation of scientific thinking within the public, will be pivotal in encouraging religious individuals to pursue scientific careers, the present paper focuses exclusively on the role of the scientific institution in forming this bias.

2. Dispelling popular assumptions on the causes of religious under-representation in Science

It must first be argued what is *unlikely* to be causing poor religious representation in science, including false notions of differences in educational attainment rates, differences in interest or propensities to science, and secularization processes in academia.

2.1. Religion and educational attainment

In measures of college attendance and completion rates, there are scant differences in the educational outcomes of religiously affiliated and disaffiliated individuals that could adequately explain the religious under-representation in science. Several meta-analyses and literature reviews have concluded that religious affiliation often contributes positively to educational outcomes, that attending college does not invariably lead to apostasy, and that college may instead preserve religious identities among some students [4-6]. The assumption of an inverse relationship was grossly over-popularized by a meta-analysis published by Paul Bell in *Mensa Magazine* and later praised by Dawkins in 2006 [2]. Bell relied on out-dated sociological studies, some as old as 1927, failing to take into account social transitions within this past century that have dramatically changed how religiosity and educational outcomes are related [7]. Specifically, individuals born before 1940 possessing a persistent non-religious identity were the most likely of any group to complete college. But by post-1960 birth years, this group became the *least likely* as persistent affiliates and adult converts made impressive gains in educational attainment rates [7]. Skipping church and disaffiliating from religion are presently behaviours most

associated with those who *do not attend* college [8], and three times as many college students report experiencing a strengthening of their religious convictions than those whose convictions are weakened [9].

2.2. Religion and interest in science

Low religious representation in science is also unlikely to be caused by a lack of interest in science. Religious affiliates do not differ from their non-religious contemporaries in their propensities to seek out scientific knowledge [10]. Cross-national polling has also revealed that countries with higher rates of religious adherence place greater trust in science [11]. The United States continues to have the greatest proportion of scientists in the total work force and produces 40 percent of all scientific and technical articles in the world [12]. In the wake of American religious revivals, U.S. public expenditures for research and development grew by 300 percent (inflation-adjusted) between 1955 and 1980 [12]. Even Biblical creationists, despite their opposition to the evolutionary explanation for the origin of species, generally hold favourable opinions of science and of the scientific process [10, 13]. When there are (rare) disputes with scientific claims, the opposition is grounded in moral terms, or under the suspicion that scientists are pursuing a secular agenda [10, 13]. Ordinary religious conservatives do not need to be educated about the scientific method or how scientific institutions produce true knowledge – they already trust the epistemological foundation of scientific discovery [10, 13]. The traditional ‘conflict thesis’ between science and religion, espoused by early sociologists of religion, continues to erode in light of the latest sociological findings [10, 13].

2.3. Religion and academic socialization

Religious under-representation in academia is also unlikely to be caused by socialization processes that erode religious identities over time. In contrast to secularization theorists such as Leuba who speculated on the effects of academic secularization, Elaine Ecklund and Christopher Scheitle [14], through their recent study of the transformation of religious individuals into scientists, have instead come to the sobering conclusion that such an idea is grossly over-generalized. As the authors have observed, at least “part of the difference in religiosity between scientists and the general population is likely due simply to religious upbringing rather than scientific training or institutional pressures to be irreligious” [14, p. 302] and that “the idea that scientists simply drop their religious identities upon professional training... is not strongly supported by these data” [14, p. 303]. Regarding the 1996 survey results on the religiosity of scientists, Oxford scientist Peter Atkins commented that “you can clearly be a scientist and have religious beliefs. But I don’t think you can be a real scientist in the deepest sense of the word because they are such alien categories of knowledge” [1]. Opinions such as these are evidently false: Interviews with scientists across all fields have revealed that religious scientists do not segregate

their religious outlooks from their scientific ones, trading one ‘category of knowledge’ for the other when they go home for the evening, but construct coherent worldviews moulding elements of both into a unified belief system [15, 16]. Notably, although few scientists attend religious services regularly, the majority (68%) of American scientists consider themselves spiritual [16].

3. Plausible causes of poor religious recruitment into Science

Why are religious ‘nones’ more likely to enter scientific careers, and why are irreligious scientists more often present among the academic elite? Herein three plausible causes are argued, but are by no means limited to these: Boundary posturing and identity formation psychology, implicit association psychology, and stereotype threat psychology.

3.1. Boundary posturing and identity formation

Scientists often display non-conventionality on a variety of matters besides religion (e.g. political orientations), and this tendency has been theorized to be a ‘boundary-posturing mechanism’ [12] that allows scientists to establish academic provinces distinct from the public realm. As Princeton sociologist Robert Wuthnow explains, the “more successfully scientists can extricate themselves from the realm of everyday reality, of which conventional religion is an important aspect (at least in the United States), the more likely they are to make the transition successfully into the scientific role” [12, p. 197]. On related terms, atheism is a ‘rejection identity’ [17], socializing non-believers into a bound community through distinguishing themselves from a normative religious culture of which atheists cannot physically escape. This identity formation often begets, in at least some non-believers, a dichotomous conceptualization associating out-groups (most religious adherents) with illogic, ignorance, and moral hypocrisy, and in-group members (most religious disaffiliates) with reason and logic. The non-conformity of academia, and the private realm academics have constructed, is logical refuge for one seeking to distinguish oneself from such a normative culture.

Harmful forms of boundary posturing ensues when such dichotomous narratives are threatened by religious trespassers who exemplify by personal example the scientific and rationalistic ethos. Although the majority of scientists, including most non-religious scientists, hold such exemplars of the unification of science and religion in high esteem [15, 16], there nonetheless exists a scientific subculture of hostility directed against these patrons of reconciliation. This is evident, for example, in the critical articles written by atheist social commentators when Francis Collins, an evangelical Christian who had published on his marriage of science and faith [18], was elected director of the American National Institute of Health (NIH). For example, atheist neuroscientist Sam Harris, in a 2009 New York Times article and in his personal blog, compared Collins’ so-called marriage of faith and science to the relationship between

marriage and infidelity: Just because the two can coincide does not mean the relationship is not perfectly disharmonious [19]. “It can be difficult”, writes Harris, “to think like a scientist. But few things makes thinking like a scientist more difficult than religion” [19]. Despite Harris’ admission that the credentials of this double-doctorate medical geneticist and former head of the Human Genome Project were ‘impeccable’, Harris believes that Collins’ worldview threatens American scientific progress. “Must we really entrust the future of biomedical research in the United States to a man who sincerely believes that a scientific understanding of human nature is impossible?” Harris asks [19]. It is evident that secularity and irreligion, through its own marriage with the scientific spirit, endorses what David Long would describe as particular ‘epistemological commitments’ [20] proscribing the scientific identity. When atheist blogger and biologist P.Z. Myers, at the 2012 Freethought Festival in Madison (Wisconsin) began his presentation with the words – “Scientists! If you’re not an atheist, you aren’t doing science right!” – could it be any more obvious that atheism is a mark of academic legitimacy in the eyes of at least *some* scientists?

Ecklund and Scheitle have suggested that poor religious representation in science may be the partial consequence of institutional biases (such as cultural norms of anti-religiosity) that may serve to haemorrhage religious individuals from scientific programs [14]. It is plausible, Ecklund and Scheitle note, that religious individuals might “select into science graduate programs equally but that the graduate programs and scientific environments themselves have strong anti-religious messages and reward structures, either passive or active, such that some abandon their faith in the process and others leave programs” [14, p. 303]. When the atheist rejection identity places religious affirmation as synonymous to the repudiation of the spirit of scientific inquiry, this endangers the academic emancipation of religious scientists and potentially corrupts meritocratic career progression. How do these (sometimes not so subtle) attitudes influence hiring and promotion decisions, knowing that, to quote P.Z. Myers, some candidates are ‘not doing science right?’ And how does such boundary posturing influence the decision of young prospects to pursue scientific careers knowing that some of their future colleagues will silently, if not openly, deem them incredulous because of their religious beliefs? Scientists have expressed in personal interviews that they keep their religious beliefs private for fear of career implications, and their colleagues rarely ask about the beliefs of others for fear of creating problems [15]. Must we scientists practice our own form of ‘Don’t ask, don’t tell?’

3.2. *Implicit Associations*

Subtle, even subconscious, biases may exist that may cause well-intending peer-reviewers to disenfranchise suitably qualified religious scientists from promotions and recognitions during the course of their scientific careers. Fictional female candidates applying for a laboratory managerial position were

recently shown to be seen as less worthy of hire, and were offered lower starting salaries than identically qualified male applicants [21]. This study supported the conclusions of an earlier Swedish study that reviewed actual hiring decisions for post-doctoral positions, revealing a strong bias in favour of men despite the average qualification level of male and female applicants being identical [22]. It is remarkable that in the former study, *both men and women* deemed women less suitable for scientific work, suggesting that this was not merely sexism in the form of one gender discriminating against the other, but of pervasive gender stereotypes inculcated within the public psyche that manifests in subtle ways to change how we perceive the capabilities of women. Implicit Association Tests have shown that, despite one's consciously stated values, most people have subconscious sexist and racist tendencies, including the victims of sexism and racism themselves [23, 24]. Known as 'Implicit Associations', they encourage negative outcomes in a variety of social interactions, changing in subtle ways how we interact with people, judge others, and do business [25].

For example, one study revealed that dealers at new-car dealerships quoted significantly lower prices to white males than to identically-scripted black and female shoppers [26]. Tallness is a physical characteristic that is also often implicitly associated with positive features such as dominance, authority, persuasiveness, and leadership capabilities. Judge and Cable [27] have estimated that, as compared to a shorter, identically qualified person, each additional inch of height is worth an additional 800 dollars in annual income. The influence of implicit stereotypes on explicit judgements can be aptly illustrated by Higham's and Carment's [28] appropriately entitled study, 'The rise and fall of politicians': Public surveys conducted before and after a Canadian federal election revealed that the public perceived the winning political candidate as physical taller after the election, whereas the average height estimate for all losing candidates decreased. Adida and colleagues [29] have demonstrated that equivalently qualified Muslim applicants in France are hired half as often as Christian applicants, and Bertrand & Mullainathan [30] have concluded that "Emily and Greg are more employable than Lakisha and Jamal". Is there any surprise that Blacks and Muslims remain disproportionately unemployed and poor? Why, therefore, should it be any more surprising that religious affiliates are grossly under-represented in science when a 'conflict thesis' placing science and religion in fundamental opposition has been a persistent motif within Western culture for centuries? Few scientists are intentionally sexist; yet, Wenneras & Wold, in their study of Swedish gender discrimination were forced to conclude that "peer reviewers cannot judge scientific merit independent of gender" [22]. Why should we assume that we can judge scientific merit independent of religion? Like religious adherents, few women are scientists, and even fewer are members of the National Academy of Sciences (NAS) or recipients of the Nobel Prize [L. Hoopes, *National Academy of Sciences picks few women again* (Nature Scitable Forum), accessed 14 June 2013, <http://www.nature.com/scitable/forums/women-in-science/national-academy-of-sciences-picks-few-women-19909665>]. Yet, female under-representation in

science is generously accorded dozens of studies and is now fashionably regarded as a problem of discrimination within the academic world (and rightfully so). The opposite is generally true when religious under-representation is considered – if at all. The lack of research on implicit associations against religious scientists remains a lacuna in the scientific study of religion.

3.3. Stereotype threat

People are judged accordingly to the stereotypes of their social groups of which they belong, of which these groups may be delineated in terms of race, gender, age, religious affiliation, political affiliation, physical attributes, or other characteristics. Stereotyping places cognitive strains upon stereotyped individuals because of the anxiety suffered by possibly confirming negative stereotypes. Ironically, this anxiety harms one's ability to optimally perform in stereotyped fields [31, 32]. For example, elderly study participants who are told that they are being assessed on memory exhibit a decrement in memory performance as compared to a control group who were not informed the test was designed to assess memory [33]. In an experiment involving golf, Blacks outperformed Whites when the test was characterized as an assessment of natural athletic ability, whereas Whites outperformed Blacks when the golf challenge was instead presented in intellectual terms [34]. Men perform worse than women when they are aware assignments determine social sensitivity [35], whereas female chess players experience a decrement in performance when playing with men [36]. On a study of Black performance on intelligence tests, Steele and Aronson [37] intentionally activated negative stereotype anxieties by informing Black participants that the exam there are to write assesses intellectual prowess. A control group was given an identical exam, but participants were instead informed that the test was simply a laboratory problem-solving task that was non-diagnostic in nature. Black performance was significantly worse than White performance within the test group, whereas performance between races was equal in the control group [37].

Stereotype threat remains a particularly important subject in social psychology because it explains, at least in part, why there are significant racial and gender gaps in both academic performance as well as representation in math and science-related careers [38]. The larger social consequence of repeated reinforcement of stereotyping, coupled with diminished performance incurred under stereotype anxiety, is the formation of a vicious circle of diminished self-confidence, performance, and the eventual loss of interest in the subject outright. Hence, it is well recognized that in addition to affecting school or job performance, stereotype anxiety is a guiding force for individuals choosing careers and aspirations [38, 39]. On stereotype threat and Black students, Steele and Aronson provide the following illuminating point: “As this threat persists over time, it may have the further effect of pressuring these students to protectively dis-identify with achievement in school and related intellectual domains. That is, it may pressure the person to define or redefine the self-

concept such that school achievement in neither a basis of self-evaluation nor a personal identity. This protects the person against the self-evaluation threat posed by the stereotypes but may have the by-product of diminishing interest, motivation, and ultimately, achievement in the domain.” [37]

We may immediately recognize the analogous consequences of stereotype threat, placed against religious adherents, impeding scientific career progress through decrements of performance; or alternatively, discouraging religious adherents away choosing scientific careers to begin. It is notable that this effect has already been well observed with women in science. Extensive research has revealed that stereotype threat is a principle cause of female under-performance in math and the sciences, and a contributing factor to the under-representation of women in scientific and mathematical fields [40-44]. Indeed, stereotyping is so influential in determining educational and career outcomes that cross-national studies in gender-science relations have correlated stereotyping prevalence with national sex differences in math and science fields [45]. It is therefore plausible that some form of stereotype threat, caused by the prevalent ‘conflict thesis’ in Western culture, is responsible for reduced religious representation within the scientific world. Reversely, it is also possible that stereotype threat would explain, at least in part, why irreligious individuals are so often found among the ranks of the scientific elite: Their professional performance would not be hindered by stereotype anxieties otherwise experienced by their religious colleagues. Notably, in highly educated professional fields where religious adherents are infrequently victimized by such anxieties, such as medicine, religious representation among American physicians approaches 90 percent [46].

4. Concluding remarks

Although religious socialization processes and conflicting modes of thinking (e.g. epistemological absolutism) have been suggested as explanations for religious under-representation in science, this paper has focused exclusively on causes originating from the scientific institution itself and social practices therein. The role of academia in poor religious recruitment into math and science fields is a subject that has been very poorly explored in the sociological literature thus far. For example, I have found that literature searches on implicit associations between religious affiliates and Science have failed to reveal even one relevant study on the matter, showing instead, at best, academic research on implicit associations between religiosity and negative social measures such as attitudes on homosexuality and foreigners. It is my opinion that there is a ‘blind-spot’ in Sociology concerning research in what I have just illustrated to be very plausible causes of religious under-representation in the sciences by means of well-documented socio-psychological phenomena. Though most probably not malicious or intentional in design, this oversight may be due, again, to subtle biases in the scientific world. It is notable that psychologists have already documented examples of biases in socio-psychological research regarding what is investigated in the scientific study of religion, and how data is collected [47].

In summary, we need data on a broad set of individuals within the scientific role, including graduate students, post-doctoral fellows, researchers, and academic faculty, ideally collected throughout their developing scientific careers. Such studies would guide future educational policies ameliorating this social disparity. If not for reasons of fairness and social progress, the impetus may also be described in economic terms: Within the United States alone it has been estimated that training American scientists and engineers at present rates will result in a deficit of one million skilled workers by the end of this decade [President's Council of Advisors on Science and Technology, *Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics*, 2012, accessed 14 June 2013, http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-executive-report-final_2-13-12.pdf]. No doubt other countries also anticipate shortages in professional workers as the world progresses into this new technological millennium. Even marginal gains in recruitment from the religious majority would result in thousands of additional scientists and engineers needed to meet such future work-force demands, pivotal for keeping a country competitive in what is becoming an increasingly integrated global economy. I therefore humbly ask social scientists to study the barriers that impede religious recruitment and progression in scientific careers - studies that will no doubt guide future policy decisions to resolve the problem and restore dignity to the men and women who *faithfully* serve the scientific enterprise.

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