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Should Science Speak to Faith? (Extended version)

Two prominent defenders of science exchange their views on how scientists ought to approach religion and its followers

By Richard Dawkins and Lawrence M. Krauss

EDITORS’ INTRODUCTION

Although the authors are both on the side of science, they have not always agreed about the best ways to oppose religiously motivated threats to scientific practice or instruction. Krauss, a leading physicist, frequently steps into the public spotlight to argue in favor of retaining evolutionary theory in school science curricula and keeping pseudoscientific variants of creationism out of them. An open letter he sent to Pope Benedict XVI in 2005, urging the pontiff not to build new walls between science and faith, led the Vatican to reaffirm the Catholic Church’s acceptance of natural selection as a valid scientific theory. Dawkins, an evolutionary biologist, prolific author and lecturer, is also an eloquent critic of any attempt to undermine scientific reasoning. He has generally shown less interest than Krauss, however, in achieving a peaceful coexistence between science and faith. The title of Dawkins’s best-selling book The God Delusion perhaps best summarizes his opinion of religious belief. These two allies compared notes from the front lines during breaks at a conference devoted to discussing clashes between science and religion held at the Salk Institute for Biological Studies in San Diego late last year. In a dialogue they re-create here, the authors explained their respective tactics for engaging the enemy and tackled some of the questions that face all scientists when deciding whether and how to talk to the faithful about science: Is the goal to teach science or to discredit religion? Can the two worldviews ever enrich one another? Is religion inherently bad? And science can ever test the “God Hypothesis”? (An abridged version of this dialogue appeared in the July 2007 issue of Scientific American)

Krauss: You have cogently argued in The God Delusion that religion is bad science. I would argue, however, that this is particularly inappropriate, and in fact falls into the same trap fallen into by those who push Intelligent Design in science classrooms, as well as those who fund Templeton Foundation grants that attempt to foster scientific evidence for God. I have framed this issue in language that hearkens back to Carl Sagan, who said that absence of evidence is not the same as evidence of absence. Would a world without God necessarily look any different than the world we live in? Most scientists would say no, and thus claim we do not need the God Hypothesis to explain anything about nature. On the other hand one might also ask: Would a world with a God necessarily look any different than the world we live in? People of faith would argue no, and in so doing feel vindicated in their faith. The problem is that both groups are correct, and nothing either can say is likely to influence the other.

Dawkins: I have several times said that a universe with a God would be a very different kind of universe from one without. You have translated this into operational terms, and consequently arrived at the legitimate question of whether the two kinds of universe would look different. Not be different (my question) but look different (your question, where ‘look different’ can presumably mean any difference, detectable in any way by any of our sense organs or scientific instruments). I agree that yours is an important question, and I agree with you that it might be surprisingly hard to detect, by observation or experiment, whether we live in a god-free universe or a god-endowed one. Nevertheless, I still maintain that there is a cogent sense in which a scientist can discuss the question. There still is a sense in which we can have an interesting and illuminating scientific discussion about whether X is the case, even if we can't demonstrate it one way or the other by observation or experiment. How can I argue this and still claim to be doing science?

In The God Delusion, I made the distinction between two kinds of agnosticism. Permanent Agnosticism in Principle (PAP) is exemplified by that philosophical chestnut, “Do you see red the way I see red, or might your red be my green or some completely different hue (‘sky-blue-pink’) that I cannot imagine?” Temporary agnosticism in practice (TAP) refers to things that we cannot (or cannot yet) know in practice but nevertheless have a true scientific reality in a way that the ‘sky-blue-pink’ conundrum does not. Bertrand Russell’s hypothetical orbiting teapot might be an example. Some people think the question of God’s existence is equivalent to ‘sky-blue-pink’ (PAP), and they wrongly deduce that his existence and non-existence are equiprobable alternatives. I think we should be TAP agnostic about God, and I certainly don’t think the odds are 50/50.
Statements such as 'There are (or are not) intelligent aliens elsewhere in the universe' are clearly TAP statements insofar as we are talking about the observable universe this side of our event horizon. At any time, a flying saucer or a radio transmission could clinch the matter in one direction (it can never be clinched in the other). What, though, of statements about the existence of intelligent aliens in those parts of the universe that are beyond our event horizon, where the galaxies are receding from us so fast that information from them can never in principle reach us because of the finite speed of light? In this case, at least according to the physicists I have read, the aliens would forever be undetectable by any means whatever. On the face of it, therefore, we would have to be PAP agnostic about them, not just TAP agnostic.

Yet I would resent it as a scientist, not just as a person, if you tried to rule out any scientific discussion of aliens beyond our event horizon, on the grounds that it is beyond the reach of empirical test (PAP). Suppose we take the Drake equation for calculating the odds of alien intelligences existing, and apply it to the whole universe rather than just our galaxy. Clearly it will yield very different results, but however we hold the finite or infinite model of the universe. Those two models of the universe are discriminable by empirical evidence, and that empirical evidence would therefore have some bearing on the probability of alien life existing somewhere in the universe. Hence the probability of alien life is a question of TAP rather than PAP agnosticism, even though direct empirical experience of the aliens might be impossible. It is not obvious to me that gods are beyond such probability estimates, any more than aliens are. And a probability estimate is the limit of my aspiration.

Krauss: First, I have to say that I have nothing against trying to think about phenomena that might never be directly measurable. I do this all the time in my work in cosmology, where I consider the possibilities of other causally disconnected universes. Of course I do this to see if I can resolve outstanding puzzles in the physics of our universe. If this approach turns out not to work, then I find the issue less interesting. I also agree with you that probabilities are important, but I think your example of the Drake equation is quite relevant here, but perhaps not in the way you intended. First of all, the Drake Equation is really applied locally, within our galaxy. If the probabilities turn out to be small that there is more than one intelligent life form in our galaxy, I think most astrophysicists will not be particularly interested in worrying about the civilizations that might exist in other galaxies but which will be forever removed from us. But more important is that fact that the probabilities associated with the Drake equation are already really haven't driven much useful research. Varying each of the conditional probabilities in the equations by an order of magnitude or so, one can derive results that either argue strongly in favor of extraterrestrial intelligence, or strongly against it. The proof is likely to come from empirical searches. As bad as this is, I would argue it is far worse when attempting to quantify probabilities for the existence of divine intelligence or purpose in the universe.

Indeed, I have argued that questions of purpose in the universe are generally not a part of science, and the best example I know is that of Georges Lemaître, the Belgian priest who was also a physicist, and the first person to realize that Einstein's General Relativity implied there was a Big Bang origin to our universe (a claim initially much derided by Einstein). Following this realization Pope Pius XII issued a statement that said science had proved Genesis. Lemaître responded appropriately. He wrote to the Pope and urged him to stop saying that. The theory in question was a scientific theory whose predictions could be tested. What religious implications occurred from the theory depended upon one's metaphysical leanings. One could take it to validate Genesis, by implying that the Universe had a beginning—a revolutionary scientific claim at the time. But one could equally well take it to imply that there is no need for a God, that the laws of physics are all that are required to understand the universe right back to the beginning. The point is that the science is accurate in describing how the universe works, independent of the metaphysical implications one derives from it. The same is of course true for evolution, which happened and is happening, whether or not one chooses to believe in God.

Dawkins: Of course Lemaître was very wise (although I must add that I am left wondering why he remained a priest at all). As for the option that his physics might or might not be taken to support Genesis, why is it even an interesting question? There never was reason to expect that the writings of an unknown scribe, probably less than a millennium ago in Babylon, might have any special insight into the origin of the universe. If Genesis happened to get something right, why would that be anything but a trivial accident?

Krauss: Well, the key point that you are neglecting here is that there is a reason to believe it might capture some truth about the universe, but only if you believe in God. Presumably Lemaître did. Getting back to the issue I raised earlier, I do not mean to say, of course, that science could never provide positive evidence of design or purpose. If, for example, tonight the stars suddenly lined up in the sky and spelled out 'I am Here,' most astronomers would be willing to consider a supernatural cause. However, the absence of such evidence of design—in spite of what the con artists and misguided pseudoscientists who presently claim that living systems currently provide such evidence—does not logically rule out the possibility that our universe, and life within it, has some purpose.

Dawkins: I am perennially baffled as to why anybody thinks it is an important point that you can't logically rule out some possibility. There is an infinite number of possibilities that we can't logically rule out but which we nevertheless don't take seriously because we have no positive reason to do so. This was the original point of Russell's teapot.

Krauss: My point is that if you cannot rule out some possibilities, probably best not to dwell on them, other than saying that they may be unlikely. You have argued, and I agree, that the complete absence of direct empirical evidence for God does suggest that the existence of divine intelligence is unlikely. However I think that is as far as one can go.

Dawkins: How much farther could one want to go? Unlikely is unlikely is unlikely. It is not the same as impossible, but science is replete with estimates of likelihoods that fall short of the demonstrably impossible. Global warming is highly likely to be happening and caused by human activities, but the alternative cannot be ruled out. It is very probable, but not certain, that the dinosaurs were killed by a large object colliding with Earth. It is almost but not totally certain that humans are closer cousins to chimpanzees than to gorillas. Just about everything we know in biology is supported by statistical evidence and is not totally certain. If you agree with me that the existence of divine intelligence is statistically unlikely, that is all I would claim. But I would claim that this low estimate of likelihood that we both agree upon is a scientific estimate, not something that is in principle immune to scientific discussion.

Krauss: Yes, but I don't think the likeliness of God can be quantified in the same ways as dinosaurs, or global warming, and therefore it doesn't make sense to spend a lot of time trying. Why work so hard when inevitably it is too slippery a subject, and has been for some time? In this regard, arguing that detailed probabilistic arguments that have been used to suggest that life is a rare phenomenon imply at the same time mathematical support for the non-existence of God is something that I don't buy, since I cannot see how one can use physical arguments to restrict the possible existence of
something that, by definition, supersedes the laws of physics.

**Dawkins:** Theologians resort to this definitional argument as their only defense against the statistical argument that we both accept. But why should we allow them this remarkably convenient get-out? Why should theologians be allowed to call the shots and immunize God against scientific scrutiny by a sort of definitional prophylactic injection? Suppose I were to say that the bolide that killed the dinosaurs 65 million years ago was hurled by Zeus. The data (sodium layer in the rocks, crater in Yucatan, etc.) is equally compatible with both the Zeus theory and the meteorite theory. Theologians of the Olympian school are at liberty to interpret the scientific data in terms of Zeus (and theologians of the Valhallan school are at liberty to interpret the same data as manifestations of Thor's hammer). Those theological concerns are by definition beyond the reach of science. You don't really believe that, Lawrence. So why allow Judeo-Christian theologians to get away with evading the statistics issue in declaring, by definitional fiat, that their God is beyond the laws of physics?

**Krauss:** A valid point, but I think what most sensible theologians really argue is that the 'intentions' of God are beyond the laws of physics. Namely, if one could determine in detail the origin of the bolide that killed the dinosaurs, and demonstrate that it was in fact kicked out of its orbit around the Sun by the gravitational perturbation of the planet Jupiter, would this then demonstrate that there was no God, Zeus or otherwise? No, because God could have intended that life would evolve in an environment of random and rare catastrophes, that would help drive evolution forward.

**Dawkins:** That is strictly true, but I really do mean strictly. Why do you keep bending over backwards to be nice to superfluous and highly unparsimonious add-ons to science, when you would kick them out of the window if they were not protected by the label, "Religion. Handle with kid gloves for fear of giving offense"?

**Krauss:** For me it a matter of ignoring the add-ons rather than being nice to them, because I don't see any debate as being fruitful. In a more general sense, arguing that religion is bad science merely invites those who want to introduce religion into science classes to continue harder to try and do so. But I believe it is essential to intellectually separate science and religion upon reason, but this fact would only make it bad science if the claims of faith were in general falsifiable. As long as the tenets of faith go beyond reason, i.e. go beyond issues that can be settled by evidence or lack of evidence, faith lies in the realm of human activity that has little to do with reason. Going back to my earlier point, if this realm was restricted to religion alone one might have a good argument for trying to squeall religion. But, like it or not, it is a central facet of much of what it means to be a human. All of us share some characteristics with Lewis Carroll's Queen, who believed six impossible things before breakfast each day. For most people religion is one way of making sense of an irrational world, a world that is not fair, in which human justice is an afterthought.

**Dawkins:** If it is a central facet of what it means to be human, so much the worse for humans. The world is not irrational. The world may be unfair but it is not irrational. The rational response to an unfair world is to recognize that we have no right to expect it to be fair. If that sounds callous, I'm sorry, but it is the business of science to understand the way the world is, not to try to derive comfort from it. All we can do is take political and other human action to make fairer the small part of the world over which we have control. As it happens, I think there is a poetic consolation to be found in science, and I tried to give expression to it in Unweaving the Rainbow

**Krauss:** I was recently in Washington, D.C., where as member of the Board of Sponsors of the Bulletin of Atomic Scientists I unveiled the new Doomsday Clock, which reads five minutes to midnight. After spending time examining the national security policies of the major powers vis a vis nuclear weapons, I am hard pressed to ascribe the word 'rational' to any of it. The universe may be unfair, but there are a host of examples that I think suggest human society is also not governed by rationality at the present time.

In any case, the next topic I would like to discuss with you relates to what a scientist's primary goals should be when talking or writing about religion. Both you and I have devoted a substantial fraction of our time to trying to get people excited about science, while also attempting to explain the bases of our current respective scientific understandings of the universe. So it seems appropriate to ask which is more important: using the contrast between science and religion to teach about science or trying to put religion in its place? I suspect that I want to concentrate more on the first issue, and you want to concentrate more on the second.

I say this because if one is looking to teach people, then it seems clear to me that one needs to reach out to them, to understand where they are coming from, if one is going to seduce them into thinking about science. I often tell teachers, for example, that the biggest mistake any of them can make is to assume that their students are interested in what they are about to say. Teaching is seduction. Telling people, on the other hand, that their deepest beliefs are simply silly—even if they are—and that they should therefore listen to us to learn the truth ultimately defeats subsequent pedagogy. Having said that, if instead the primary purpose in discussing this subject is to put religion in its proper context, then perhaps it is useful to shock people into questioning their beliefs.

**Dawkins:** The fact that I think religion is bad science, whereas you think it is ancillary to science, is bound to bias us in at least slightly different directions. I agree with you that teaching is seduction, and it could well be bad strategy to alienate your audience before you even start. Maybe I could improve my seduction technique. But nobody admires a dishonest seducer, and I wonder how far you are prepared to go in 'reaching out.' Presumably you wouldn't reach out to a Flat Earther. Nor, perhaps, to a Young Earth Creationist who thinks the entire universe began after the Middle Stone Age. But perhaps you would reach out to an Old Earth Creationist who thinks God started the whole thing off and then intervened from time to time to help evolution over the difficult jumps. The difference between us is quantitative, only. You are prepared to reach out a little further than I am, but I suspect not all that much further.

**Krauss:** Let me make clearer what I mean by reaching out. I do not mean capitulating to misconceptions but rather finding a seductive way to demonstrate to people that these are indeed misconceptions. Let me give you one example. I have, on occasion, debated both creationists and alien abduction zealots. Both groups have similar misconceptions about the nature of explanation: they feel that unless you understand everything, you understand nothing. In debates, they pick some obscure claim, say, that in 1962 some set of people in Outer Mongolia all saw a flying saucer hovering above a church. Then they ask if I am familiar with this particular episode, and if I say no, they invariably say, "If you have not studied every such episode, then you cannot argue that alien abduction is unlikely to be happening."

I have found that I can get each group to think about what they are saying by using the other group as a foil. Namely, of the creationists I ask, "Do you believe in flying saucers?" They inevitably say, "No." Then I ask, "Why? Have you studied all of the claims?" Similarly, to the alien abduction people I ask, "Do you believe in Young Earth Creationism?" and they say "no;"
wanting to appear scientific. Then I ask, "Why? Have you studied every single counterclaim?" The point I try to make for each group is that it is quite plausible to base theoretical expectations on a huge quantity of existing evidence, without having studied absolutely every single obscure counterclaim. This "teaching" technique has worked in most cases, except those rare times when it has turned out that I was debating an alien abduction believer who was also a creationist!

Dawkins: I like your clarification of what you mean by reaching out. But let me warn you of how easy it is to be misunderstood. I once wrote in a New York Times book review, "It is absolutely safe to say that if you meet somebody who claims not to believe in evolution, that person is ignorant, stupid or insane (or wicked, but I'd rather not consider that)." That sentence has been quoted again and again in support of the view that I am a bigoted, intolerant, closed-minded, impertinere ranter. But just look at my sentence. It may not be crafted to seduce, but you, Lawrence, know in your heart that it is a simple and sober statement of fact. Ignorance is no crime. To call somebody ignorant is no insult. All of us are ignorant of most of what there is to know. I am completely ignorant of the world's 6,000 years old that he is ignorant, I am paying him the compliment of assuming that he is not stupid, insane or wicked.

Krauss: I have to say that I agree completely with you about this. To me, ignorance is often the problem, and, happily, ignorance is most easily addressed. It is not pejorative to suggest that someone is ignorant if they misunderstand scientific issues.

Dawkins: In exchange, I am happy to agree with you that I could, and probably should, have put it more tactfully. I should have reached out more seductively. But there are limits. You would stop short of the following extreme: 'Dear Young Earth Creationists, I would respect your credulity for the world is 8,000 years old. Nevertheless, I humbly and gently suggest that if you were to read a book on geology, or radioisotope dating, or cosmology, or archaeology, or history, or zoology, you might find it fascinating (along with the Bible of course), and you might begin to see why almost all educated people, including theologians, think the world's age is measured in billions of years, not thousands.'

Let me propose an alternative seduction strategy. Instead of pretending to respect dopey opinions, how about a little tough love? Dramatize to the Young Earth Creationist the sheer magnitude of the discrepancy between his beliefs and those of scientists: "6,000 years is not just a little bit different from 4.6 billion years. It is so different that, dear Young Earth Creationist, it is as though you were to claim that the distance from New York to San Francisco is not 3,400 miles but 7.8 yards. Of course, I respect your right to disagree with scientists, but perhaps it wouldn't hurt and offend you too much to be told—as a matter of deductive and indisputable arithmetic—the actual magnitude of the disagreement you've taken on.

Krauss: I don't think your suggestion is "tough love." In fact, it is precisely what I was advocating, namely, a creative and seductive way of driving home the magnitude and nature of such misconceptions. Some people will always remain deluded, in spite of facts, but surely those are not the ones we are trying to reach. Rather it is the vast bulk of the public who may have open minds about science but simply don't know much about it or have never been exposed to scientific evidence. In this regard, let me pose another question, about which you may feel even more strongly: Can science enrich faith, or must it always destroy it?

The question came to me because I was recently asked to speak at a Catholic college at a symposium on science and religion. I guess I was viewed as someone interested in reconciling the two. After agreeing to lecture, I discovered that I had been assigned the title Science Enriching Faith. In spite of my initial qualms, the more I thought about the title, the more I realized that I could reconcile the two. After agreeing to lecture, I discovered that I had been assigned the title Science Enriching Faith. In spite of my initial qualms, the more I thought about the title, the more I realized that I could reconcile the two. In my lecture to the Catholic group, for instance, I took guidance from your latest book and described how scientific evidence can be used to argue for the existence of a creator God. I hope this will be helpful to you.
evidence for faith, which is something that I believe science certainly does not do.

Yes, I love that sentiment of Sagan's, and I'm so glad you picked it out. I summed it up for the publishers of those lectures on the book jacket: "Was Carl Sagan a religious man? He was so much more. He left behind the Petty, parochial, medieval world of the conventionally religious; left the theologians, priests and mullahs wallowing in their small-minded spiritual poverty; He left them behind, because he had so much more to be religious about. They have their Bronze Age myths, medieval superstitions and childish wishful thinking. He had the universe." I don't think there is anything I can add in answering your question about whether science can enrich faith. It can, in the sense you and Sagan mean. But I'd hate to be misunderstood as endorsing faith.

Krauss: I want to close with an issue that I think is central to much of the current debate going on among scientists regarding religion: Is religion inherently bad? I confess here that my own views have evolved over the years, although you might argue that I have simply gone soft. There is certainly ample evidence that religion has been responsible for many atrocities, and I have often said, as have you, that no one would fly planes into tall buildings on purpose if it were not for a belief that God was on their side.

As a scientist, I feel that my role is to object when religious belief causes people to teach lies about the world. In this regard, I would argue that one should respect religious sensibilities no more or less than any other metaphysical inclinations, but in particular they should not be respected when they are wrong. By wrong, I mean beliefs that are manifestly in disagreement with empirical evidence. The earth is not 6,000 years old. The sun did not stand still in the sky. The Kennewick Man was not a Umatilla Indian. What we need to try to eradicate is not religious belief, or faith, it is ignorance. Only when faith is threatened by knowledge does it become the enemy.

Dawkins: I think we pretty much agree here. And although "lie" is too strong a word because it implies intention to deceive, I am not one of those who elevate moral arguments above the question of whether religious beliefs are true. I recently had a televised encounter with the veteran British politician Tony Benn, a former minister of technology who calls himself a Christian. It became very clear in the course of our discussion that he had not the slightest interest in whether Christian beliefs are true or not; his only concern was whether they are moral. He objected to science on the grounds that it gave no moral guidance. When I protested that moral guidance is not what science is about, he came close to asking what, then, was the use of science. A classic example of a syndrome the philosopher Daniel Dennett has called "belief in belief."

Other examples include those people who think that whether religious beliefs are true or false is less important than the power of religion to comfort and to give a purpose to life. I imagine you would agree with me that we have no objection to people drawing comfort from wherever they choose and no objection to strong moral compasses. But the question of the moral or consolation value of religion—one way or the other—must be kept separate in our minds from the truth value of religion. I regularly encounter difficulties in persuading religious people of this distinction, which suggests to me that we scientific seducers have an uphill struggle on our hands.

Krauss: Having found another place where we definitely agree, it is perhaps a good one to end the discussion for now.

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The official Richard Dawkins Web site: http://richarddawkins.net/

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