

Science Versus Religion

A Conflict Of Ideas Or A Clash Of Wills

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This paper was originally presented at the March, 1994 ITEST Workshop on Secularism vs Secularity . It is reprinted here in the hope of reminding the then-members of its existence and presenting it to the new membership. It is an excellent piece of work that deserves a better fate than merely sitting on a shelf.



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Ever since modern science made its first appearance in the seventeenth century, its relationship with religion has been uneasy and filled with tensions, to say the least. About one hundred years ago, in the generation immediately after Darwin, some went so far as to claim that there is a permanent and unavoidable state of warfare between the two, primarily because science's confidence in the progress of rational inquiry directly conflicts with religion's self-defensive denial of the freedom of thought. Today, only a few still argue for this strongly pessimistic point of view. Nevertheless, it can hardly be denied that significant tensions between science and religion continue to persist, even though today they may seem a bit less severe.

Why is this the case? Why do we find this continuing state of uneasiness and distrust? Is it because understandable bad feelings still linger among scientists after the dreadful way that Galileo was treated at the beginning of modern science? Is it due to generational rivalries, as it were, with the older custodians of religion, who were in the ascendancy during the medieval era, still feeling angered and upset over being displaced in power by the younger scientists and technologists who now dominate contemporary culture? Or is there perhaps something about the fundamental characteristics of science and religion themselves which tends to block communication and to create misunderstandings between them? It is this latter theme which we wish to explore here, although there are clearly many causes operating at many levels which have prolonged the tensions between science and religion.

Scientific Beliefs and Religious Beliefs

The issue before us requires that we undertake an analysis of the characteristics of scientific claims and religious beliefs. As a first uncontroversial step we can point out that most of the facts and laws of science have no impact whatsoever on the meaning and truth value of religious beliefs. Planck's constant is 6.625×10^{-34} erg.sec; chlorophyll is required for photosynthesis in green plants; the positron is the anti-particle of the electron: these scientific claims pose no threat at all to religious beliefs. On the other hand, most religious beliefs cannot even in principle be brought under scientific investigation; for example, the claims that God is immaterial, that there are three Persons in one God, that God forgives our sins and offers us salvation, that there is a life after death in which personal human identity is preserved. There is no way that such religious beliefs can be empirically either verified or falsified. So far we have no problems.

Tensions arise between science and religion only because there is also a third area of overlap between the two, which, although rather small, seems to be a scene particularly prone to incendiary reactions. Does the sun revolve around the earth, as the Bible explicitly says, or is it the other way around? Does the modern theory of evolution contradict the word of God in Genesis, which seems to say that present animal and plant species were created by God at the beginning of time in their adult forms? Galileo and Darwin each started a firestorm with their scientific answers to these questions.

This third area of overlap, where science and religion intersect, has been the subject of innumerable studies. The usual approach has been to identify a specific point of conflict, and then to argue that either science or religion is simply wrong on this point, or to mediate the conflict by showing that it is all based on some sort of a misunderstanding of the true meaning of either the scientific or the religious claim. For example, religious literalists have maintained, and still do, that the Genesis account shows that the theory of evolution must be false since it contradicts the word of God. On the other hand, most neo-Darwinian evolutionists, along with many others, have concluded that the first book of the Bible is only an old cultural tale which is not to be taken as literally true. Still others have attempted to mediate the dispute with careful and at times laborious qualifications about the meaning of evolution and/or the concept of creation to show that they are both true from their own specific perspective.

This latter approach appears, of course, to be the most promising. Yet even when it succeeds, it resolves only one issue at a time, leaving many others for dispute. And even then it almost always takes a great deal of time and effort to reach rather meager results. Despite a century or more of such attempts to resolve the dispute over

evolution, often at very sophisticated levels of discussion, the issue has still not been put to rest in our day. And it took over three hundred and fifty years before the Catholic Church formally acknowledged in 1992 that it was in error in the Galileo case.¹ Why are these issues so difficult to resolve?

Perhaps we can come to see why this happens if we change our focus away from points of dispute between science and religion, which carry such a great deal of emotional baggage, and look instead at points of agreement or near agreement within the area where they overlap. For when discussion of the relations between science and religion focus on their conflicts, this tends to limit the discourse to the level of their comparative world views. But if we focus on points of agreement or near agreement, then other and more basic levels of comparison come into view. So let us follow this method for the reason indicated, and see what emerges.

For example, consider the relation between the religious doctrine of creation and the presently widely accepted Big Bang account of the origin of our universe. Many theologians and philosophers of religion have interpreted the Big Bang as the moment of creation. Stephen Hawking reports² that even Pope John-Paul II suggested this at a scientific meeting at the Vatican in 1981. This could be taken to be a scientific verification or at least some sort of support for the religious belief in creation.

On the other side, several prominent cosmologists have interpreted the Big Bang account of the universe as implying a revival from within science of what looks very much like the older design argument for the existence of God. They speak of what has come to be known as the Anthropic Principle, which says in brief that the excessively fine tuning of the initial conditions and physical constants immediately after the Big Bang, which would be required for intelligent life to have evolved later in the history of the universe, points to a design in the cosmos. Or to put it in another way, since today as a matter of fact there are intelligent observers of the universe, namely ourselves, this universe in its initial state must have been designed to include the exceedingly rare possibility that cosmic evolution would later produce us as intelligent observers of the cosmos.

The Peircean concern as to whether either of these reactions to contemporary Big Bang theory in astrophysics will or will not be fully justified in the long run is not the question before us. Rather for our purposes what we apparently have here is a case of a reasonably good agreement, and not conflict, between science and religion. The question then is what does this tell us about the characteristics of scientific and religious beliefs?

First we can say that today both science and religion seem to agree that the physical universe which we see around us originally came into existence at some one moment in the past when time itself also began. This general statement immediately acquires, however, a fuller meaning when located within the context of either science or religion. Although these fuller meanings are different, they are not necessarily inconsistent.

For science our presently expanding universe is to be imagined to have been more and more compressed, when traced backwards through time, to a moment about fifteen billion years ago when it would be all reduced to a point. This state prior to the Big Bang is a singularity which cannot be discussed by science since at that point no known physical laws were as yet operative. Science begins its discussion only with the first and successive moments in which the enormous explosion of the Big Bang began to form the physical universe of space, time and energy.

For religion, God has eternally existed as an immaterial being before the physical universe began, and served as the cause of its coming into being from nothingness, but at a first moment of time usually taken to be much closer to the present. The notion of creation also envisions God as continuing his creative act by sustaining all material beings in existence at each moment of time. These and other differences between the full notions of the Big Bang and divine creation are not necessarily in conflict.

Second, very different degrees of permanence are associated with the two teachings on the origins of the universe. The traditional religious doctrine of a creation out of nothingness has been in place since the

beginning of Christianity, and has long been classified as an article of the Christian faith, as evidenced by its prominent position at the very beginning of the various Christian credal formulas over the centuries. It is quite unlikely to be changed in the future of religion. On the other hand, the Big Bang theory originated only in the 1950's. It may have a long history ahead of it. Yet it may also well be modified, or significantly changed, or even fully replaced in the foreseeable future perhaps by something like an alternating expanding and contracting model of the universe in which neither phase ever reaches a singularity. In short everyone now clearly recognizes the fallible character of all scientific claims, which is very much in contrast to the permanent or near permanent character claimed for many religious dogmas.

Third, the grounds for truth claims are very different in science and religion. In the former case all claims must be reduced ultimately to empirical evidence and to the rational interpretation of that evidence. No one scientist, of course, could ever personally encounter all this evidence and examine all the interpretations. But he believes that other scientists have done so, and that their work is dependable. Also the interpretations involved often result in extremely abstract and abstruse mathematical modeling, as for example is clear in Big Bang theorizing. But the scientist again believes that these procedures do not lose touch with the original empirical base, for example, Hubble's observations of the expansion of the universe. For science to be legitimate the touchstone for what is true and real must always be empirical evidence and its interpretation.

On the other hand, for religion the grounds for truth claims is the revelation given by the word of God. In most religions this revelation is understood to be embodied in a fixed set of sacred writings composed by the original recipients of the revelation. This does not exclude directly experienced personal revelations to religious believers over the later course of time, but that is usually thought to be the rare exception, not the rule. As a result, the average believer must start with the word spoken or written by another, which can then be traced back through time to the original revelation. In this case believing something precisely because it has been said or written by another, who is taken to be authoritative, is essential to ground religious truth.

At first sight this might seem like a flimsy or an insecure ground for truth. But only a moment's reflection is required to realize that most of the knowledge that each of us possesses is of this type, and that it is basically reliable. We all live in a very narrow slice of space-time, and essentially depend on the spoken or written word of others for much of our truthful knowledge. So, such authoritative truth is quite common. The main difference claimed for truth in religion, of course, is that it is much more reliable and secure because God himself is said to be the original authority behind such truth.

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As a result the Big Bang theory (based on interpreted empirical evidence) and the creation account (based on the revealed word of God) are very different precisely as to the character of the truth claims made, no matter how much they may agree and even support each other in regard to the scenario of the physical universe which they present. As we shall see, this ineradicable difference in the respective grounds for truth claims in science and religion is centrally important to understanding the persistence of the tension between the two domains.

Rule-Choices and Self-Commitment

A more fine-grained inspection of the methods and procedures used to arrive at the two types of truth claims distinguished above reveals an often overlooked dimension of how science and religion relate to each other. In both cases what we find, in short, is a contribution made by the human will. Neither science nor religion is purely rational in character; each contains a volitional component, albeit in quite different ways. Since this claim is central to our argument, it needs to be justified in some specific detail.

The easier case to grasp is what happens in science, largely because for the past half century or so philosophers of science have subjected scientific method to a detailed, and now rather widely accepted, analysis. The main factors in this traditional account which are germane to our considerations are the following. First empirical laws are formulated in science by the process of inductive generalization, which has been recognized since the time of Plato and Aristotle as being logically invalid. If something is true of part of a class, it does not follow that it is also true of the whole class. Despite innumerable efforts throughout the history of science to solve this problem of induction, no one to date has succeeded.

Second, general laws and theories, once formulated, are then put to empirical test in the process called verification. This also is invalid, basically for the same reasons that induction is invalid. If the consequences of an hypothesis are true, it does not follow that the hypothesis itself is true. The result could have been due to some other hypothesis. Nevertheless science uses induction and verification procedures regularly in the hope that they will give correct results more often than not. Karl Popper was so concerned about this that he tried to develop a model of science, called falsificationism, in which induction and verification are never employed. But he ultimately had to conclude that the genesis of scientific hypotheses is a non-rational process, and that we can only prove that these hypotheses are false, never that they are true. Once again the rules by which science operates are not fully rational, yet the scientist chooses to proceed.

Third, after the seminal work of Thomas Kuhn in the 1960's, it is now widely granted that the normal life of science occurs within an unexamined set of background assumptions about the world and our knowledge of it. These paradigms, as Kuhn called them, are uncritically accepted by normal science, and come under direct attention only when a science is in a state of revolutionary crisis caused by internal anomalies. Even then two rival paradigms cannot be directly compared and mutually evaluated without committing category mistakes. In short they are incommensurable to some degree, and the choice of one paradigm over another injects again a non-rational factor into science. This is the main message from Kuhn's now famous and widely accepted account of how science changes.

Lastly in recent generations science has drifted more and more in the direction of constructing abstract mathematical models of some part of the world, and then subjecting these models to detailed analysis and extension through computer simulations and calculations. A clear example of this is found in chaos theory. Such procedures involve placing a great deal of faith in the claim that a coordination of the abstract model with the actual physical world is maintained throughout the procedure. But such a rule is rarely justified on its own merits.

The net result of all this is that we find built into science a series of choices to adopt certain rules of procedure, for example, induction, verification, paradigm preference and model coordinations, which themselves are not fully justified on rational grounds. These rule choices contain an element of volition; that is, a contribution made by the human will, as mentioned above.

On the other hand religion also contains such a voluntary component, although it functions quite differently. This is not a new idea. It has had a long history in traditional theology as found in the explication of the personal act of religious faith. In short, an act of faith has traditionally been understood primarily as an act of reason or of knowledge; hence in an act of faith one has knowledge that something is true. But the distinctive characteristic of an act of faith is that the motive for assenting to something as true is not direct factual evidence or logical proof; rather, it is the knower's willingness to accept the authority of a witness. In the old classical terminology faith is an act of the intellect whose assent is determined by an act of the will.

This may sound somewhat mysterious, but is really quite straightforward. Most of our natural, common sense, non-religious beliefs are like this. For example, if I tell you that I have two sons, you now know something that you may not have known before from direct acquaintance with my family. You have acquired a new piece of knowledge. Why do you assent to that as true? Simply because you believe me, you trust me, you are

willing to accept my word on this as reliable. Of course, I may intend to mislead you, or in my old age I may have forgotten how many sons I have, or you may have misunderstood my remarks. There is no guarantee of infallible truth here; but the fact is that a very large part of the true natural knowledge in each of us is acquired in this way. The important point for our concerns is that such routine natural belief is based in part on an act of the will, that is, on a choice to accept the word of a witness as reliable.

The same is true of a religious belief, for example, that there is a life after death. If one believes this, one claims to know something, and not just to hope something, about the future. But the motive for assent is certainly not direct, factual experience. It is rather the acceptance of the authority or the word of others in the religious tradition, which in turn traces back ultimately to the original revelation reported in the Scriptures. In the classical view, God, of course, is the original authority behind religious belief. How that affects the truth value of religious claims is a very complex question, but fortunately is not our concern here. Our point rather is that religious belief involves an act of choice at its very core, that is, as the motive for truth. For science, on the other hand, the motive for truth is empirical fact and logical proof, which nevertheless also involve rule choices, as we have seen.

In summary, if this analysis is correct, both science and religion involve not only rational understanding but also complex volitional commitments, albeit in different ways. As we shall soon see, these voluntary aspects of science and religion become especially prominent when the two come into conflict.

The human will is involved in religion in another and quite different way which is also germane to our main theme. As we have seen, religious faith consists of a set of knowledge claims which are taken on authority by the believer to be true about God, the world, and the human person. However, the acquisition and contemplation of this fund of knowledge is not what religion is all about, nor is this even the primary purpose of religion. The main point rather is for the religious believer to make a personal commitment to live his or her life according to the norms and guidelines of the religious message, and to carry out that commitment. It is not just truth, but moral goodness, which is the goal. It is not abstract knowledge, but concrete action in the real world, which is the focus of religion. Religion does not just appeal to reason; it also makes demands upon the will.

Now, in order to make the move from contemplated understanding to committed action in the world, the religious believer must make a volitional choice to act out the religious life style described in the faith. In short, the religious person commits himself or herself to a life guided by faith. Such a self-commitment is a very heavy investment on the part of the believer. As a result, much more than merely an abstract debate is at issue if, at some later time, that self-commitment is threatened because it seems that it was based on one or more false beliefs.

In science this type of self-commitment does not seem to operate, or at least it seems not to be present in the same sense as in religion. There are, of course, many very highly committed scientists. But this usually, if not always, refers to their firm allegiance to the value of doing science, and to the value of the truths it establishes, perhaps even for some to the point of a sort of fanaticism akin to religious fanaticism. But such a self-commitment to science is not, at least in any usual sense, a commitment to a specific day-to-day life style or value system dictated by the content of the discipline itself, as is the case in religion. But we need not tarry on this point. If the reader is persuaded that the same type of personal self-commitment found in religion is also often found in science, then that would make our analysis to follow even more decisive.

The Consequences for Science and Religion

If the preceding analysis of the characteristics of scientific and religious beliefs is basically correct, then quite a number of important results follow concerning the relationship between science and religion.

First, that relationship is not static. It has always changed and evolved over time as each discipline changes.

Further science changes much faster than religion, for the reasons indicated earlier. Also science is much more fallibilistic in its claims than is religion. These two factors tend to put religion in a reactive, defensive and disadvantageous position in relation to science. In our day, most of the influence is from science into religion, rather than the reverse, which was also evident in the Galileo case.

Second, the interaction between science and religion occurs at two levels: (1) the intellectual level, dealing with how the world is conceptualized and whether such views are true; and (2) the volitional level, dealing with what personal choices and commitments are made by the scientist and the religious believer, and how these choices are to be evaluated. Agreement or consistency between science and religion at one of these levels does not automatically imply agreement on the other level. This fact tends to be concealed when science and religion are on good terms, but becomes apparent when they clash. Since this is central to our analysis, it needs to be developed in some detail.

Let us begin with the case where science and religion are in agreement, or very nearly in agreement, in regard to how they describe the world. The example used earlier for this case was the Big Bang theory in cosmology as compared to the religious doctrine of creation. For purposes of the present discussion let us assume for the moment that there is a full congruence between these two views. This would not mean, of course, that the relevant scientific ideas have become part of religion, or vice versa. Rather the assumption means that the two teachings complement each other without any stresses or strains and are able to fill in for each other at points where either science or religion has reached its limits.

For example, because physical laws were not yet operative, science cannot talk about the state of affairs in the singularity before the Big Bang. But religion can talk about some of the characteristics and properties of God who for religious believers existed still earlier and presumably caused the Big Bang to start. If one asks what God was doing before He created heaven and earth, we hopefully are not limited to St. Augustine's answer that He was preparing hell for people who ask questions like that. And, vice versa, science might present its notion of the Anthropic Principle to provide a more specific account of how God's teleology operated from the very beginning in a universe focused on the genesis of humans in time.

If we assume such a complete congruence, it would seem that the science-religion relationship would be totally unproblematic, and the two should never come into conflict. And by definition of our assumption, that would be true at the intellectual level, at the level of comparing ideas, at the level of the unified picture of the physical world which would result. But if our prior claim is true that both science and religion also involve distinctly different volitional elements, then this presumed full congruence will tend to mask over ineliminable points of difference. This in turn may lead to serious later complications, and even divorce, for this happy marriage between science and religion, as the originally given relationship begins to change and evolve with the passage of time.

To put this in another way, agreement between science and religion about what reality is like can create a false sense of security for both, in which the volitional commitments of the one imperceptibly begin to encroach upon, and to clash, with those of the other as time passes. In our reading of the history of the relations between science and religion, this has happened repeatedly, and it has had very unfortunate consequences.

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Let us look at one particularly clear example of this. There was a quite congenial relationship between science and religion during the approximately two hundred years between Newton and Darwin. Nevertheless this erupted immediately after Darwin into a bitter conflict which was largely due to the way in which the previous

peaceful era had been structured.

When Newton published his *Principia* in 1686, an era of enormous optimism began in which many thought that the new physics had provided a method of how to reconstruct all human knowledge across the board into a final and complete form. To be sure some charged Newton with atheism, since the new physics had no need to appeal to a transcendent God to account for things observed in the physical world. But most reacted positively, and especially the British divines and theologians. Newton's science was seen by them as limited to the mechanical aspects of the world; it had nothing to say about the teleology and design which also seem to be so evident in the world.

This latter aspect of the world was then to be accounted for by religion, which was thus seen as fully congruent with, and complementary to, the new science. Throughout both the eighteenth and nineteenth centuries innumerable treatises appeared, written by scientists and theologians alike, who claimed to prove both the existence of God and the justification of religion. These arguments were all based on close attention to the marvelous complexity and purposeful design in the natural world as showing the mind and hand of God at work in creation. One of the favorite exercises was to reflect with amazement on the anatomy and physiology of the human eye. The authors of these developments, which came to be called "physicotheology," were the ones who made the design arguments for God and religion so prominent immediately prior to Darwin. They explicitly intended their theology to be a consistent supplement to Newtonian mechanical science in an area where the latter remained silent.

This peaceful interlude lasted so long that the volitional commitments on each side gradually became over-extended during the era of confidence which we now call the Enlightenment. Fallible rule-choices made in science came to be seen as unqualifiedly reliable logical methods which gave reason extensive powers of explanation in all domains, including religion. On the other hand the new "natural theology" tried to reduce so much of traditional religion to rational proof and explanation that the personal self-commitment of religious belief came to be based more and more on what was seen to be "reasonable."

With the inexpensive wisdom of hindsight, it is easy now to see how a disaster was brewing. As long as both science and religion could maintain their separate and autonomous domains, domains which complemented each other by filling the gaps in the other discipline, peace could continue. But if the resources of science could enable it to account for the design in the world which previously had been the purview of religion, then the peace would be shattered. And, of course, that is precisely what happened. In Darwin's theory of evolution design in living things is accounted for as due to chance mutations and natural selection. No transcendent appeal to God was needed. In effect evolutionary theory, when accepted, had naturalized the very grounds which for almost two hundred years had been widely used to justify the existence of God and the credibility of religion. The "God of the gaps," as that approach has recently been named, became irrelevant, granted that evolutionary theory is true.

It is important to emphasize here that the religious crisis caused by Darwinism was not simply, nor even primarily, a dispute over whether the book of Genesis should be read literally or metaphorically. If that were all that was involved, the crisis should have been more easily resolved. Nor was that crisis due simply, or even primarily, to the need to judge whether the factual evidence for evolution was strong enough to enable one to conclude that that view of the history of life is correct. Rather, because of the way that science and religion had become related after Newton, the religious crisis of Darwinism consisted of a direct challenge to the volitional foundation of religious belief in the word of God and of the personal decision to commit one's self to live the life prescribed by that religious message. Why choose to accept this any more? Why choose to believe that the religious revelation is true in any sense, and why choose to live one's life accordingly? This is a much more basic and more important issue.

The persistence of the dispute between evolution and religion is now easier to understand. For it is much less

threatening to change one's mind than to change one's will. It was not simply a matter of judging ideas; it was a question of making choices. Rather than abandon one's religious commitments, which were understood to be based on the highly reliable word of God, why not instead simply reject the conclusions of evolution which, after all, are based on the clearly fallible rule-choices of science? When put this way, this is more a clash of wills than a conflict of ideas.

If we now turn our attention to the other extreme case, i.e., to a bitter conflict between science and religion rather than full congruence, then the distinction of the two levels at which science and religion interact will become even more evident. The classic case for this, of course, is Galileo's clash with the Catholic Church. And, as it turns out, even a rather superficial review of the Galileo case reveals that the clash occurred at both the intellectual and volitional levels.

The key point to note is that the Galileo case consisted of two different trials, which occurred seventeen years apart. At the first trial, which was held at the Holy Office in February of 1616, the issue was whether or not the heliocentric astronomy of Copernicus was true. It was an intellectual issue. Galileo was not personally on trial; rather an idea was. Both sides agreed that the astronomers of that day were not able to provide a scientific proof of the heliocentric theory. Galileo actively but unsuccessfully sought such a proof to the end of his life. Cardinal Bellarmine, on the other hand, explicitly said that he had never seen such a proof, but if and when this proof would be forthcoming, then, but not before then, the Church should say that the Bible needs re-interpretation, or at least that we do not understand the relevant passages of the Scriptures. Meanwhile preference should be given to the straightforward literal meaning of the Bible which speaks in many places of the sun revolving around the earth. With this in mind the Vatican's Congregation of the Index issued a Decree on March 5, 1616, which pronounced the judgment reached in the first trial. The heliocentric theory was declared to be "false and completely contrary to the divine Scriptures." Thus ended the first trial.

The details of this trial of heliocentrism are, of course, considerably more complex than this, both in regard to the scientific issues involved and in regard to the principles of biblical exegesis involved. Galileo and Bellarmine were each thoroughly acquainted with all these issues. Nevertheless a judgment of condemnation of an idea was issued. Whatever the wisdom or lack of wisdom behind this, it is overwhelmingly evident that the explicit focus of this first clash between Galileo and the Church was on the intellectual level.

One is tempted to ask why the Church did not simply suspend judgment on this case, in consideration of the possibility that the required scientific proof might eventually be produced? Scholars have disputed this question endlessly, but without resolution. Could it be that this happened because of a zealous over-reaction at the volitional level on the part of the custodians of religion, who were attempting to protect the safety of the Church as they saw it? They did not act out of ignorance; they simply made a bad decision.

When we look at the second trial in the Galileo case, which took place in the spring of 1633, we find a completely different atmosphere. Now Galileo's personal behavior is up for judgment, and not merely an idea. The question at hand is not the truth or falsity of heliocentrism. That had been settled seventeen years earlier, and the trial documents show no inclination to re-consider that decision. The question rather was Galileo's loyalty to that decision; and more specifically, had he disobeyed an injunction issued to him in 1616 forbidding him to publish anything further on heliocentrism. The legal status and the precise sense of that injunction has been debated ever since Galileo himself raised such challenges at his trial before the Holy Office. But that is not our concern at present. Rather what is abundantly clear for us is that Galileo's famous trial in 1633, the paradigm case of the clash between science and religion, did not revolve around the truth of heliocentrism but rather around issues of loyalty, obedience, and authority all matters located at the level of volition and not reason.

Our central conclusion from all this is that history clearly shows not only that science's interactions with religion fluctuate widely between near agreement and strong conflict, but also that throughout this spectrum

these interactions occur at two very different levels, the intellectual and the volitional. You may recall that the title question of this paper was “Science vs. Religion: A Conflict of Ideas or a Clash of Wills?” The answer we hope to have established is that the science-religion interaction occurs at both levels. If this be true, then much of the literature on the relations between science and religion is an exercise in over-intellectualization. Disputes over the relative truth and falsity of world views is, of course, a very big part of the picture. But volitional ingredients should not be overlooked, and when they are taken into account, our understanding of the interactions between science and religion takes on a significantly different and more realistic character.

Science and Secularism Today

If our discussion up to this point is granted, then we are in a helpful position to reflect on the present state of affairs in the changing relations between science and religion. What characterizes that relationship today, how did it come about and what can be done to improve the situation?

The hostile relationship between science and religion, which was ushered in in the late nineteenth century as a result of the disputes over Darwinism, has slowly evolved during the course of the twentieth century into a quite new situation in which religion has become increasingly more excluded as a participant in the debates over developments in science. This turn toward the secular, as we might call it, has resulted from the view of many scientists (but certainly not all of them) that the scientific mind-set not only does not appeal to the transcendent but more strongly that it can and should deny the transcendent altogether. By secularism here we mean the view that only the natural world is real and also that that world is adequately understood by natural reason alone, especially in its scientific mode.

The causes of this scientific turn toward the secular in recent times are, of course, extremely complex and cannot be delineated here. However, it is beyond doubt that today we live in a stage of human culture which is overwhelmingly dominated by a secularized science and technology. Physics became the centrally dominating science during the first half of this century and was followed by the ascendancy of microbiology, beginning with the discovery of the chemical structure of DNA in 1953. Technology has followed the same course, so that today its leading edge is defined by such things as recombinant DNA techniques, genetic manipulation in many plant and animal species and, most recently, the application of cloning techniques to human embryos. The secular turn of science shows up most dramatically in these latter areas, of course, because here we are not dealing simply with understanding living things but with the startling prospect of re-creating them, and that in a context where transcendent values have little impact.

The fading influence of religious values in the world of science has been replaced oddly enough by a distinctively contemporary sense that the pursuit of science is itself a morally uplifting enterprise, and this for two reasons. First knowledge in itself is seen as a good, and, second and more importantly, the practical fruits of scientific knowledge must and will contribute significantly to human betterment. Although this moral innocence was shattered by the atomic bomb almost half a century ago, it seems to have experienced a re-incarnation because of the personal and health benefits promised by contemporary biological and medical technologies. Even secularism needs an ethics, and some have found it in the benefits claimed for the human race from the pursuit of science in itself at the purely secular level. Of course, such an ethics finds room only for a fully secularized human person.

The main conclusion of this paper should by now be evident. In addition to their respective world views at the conceptual level, both science and religion also contain their own distinctive set of volitional commitments. We have delineated these commitments in detail earlier to justify the conclusion that, although clashes can and do occur at this level, that is not inevitable. A religious scientist or a scientific religious believer is not a contradiction in terms, as some might want to argue today. However, and this is the main point, there is also nothing to prevent an alliance between an acceptance of the volitional commitments required by science and a concomitant counter-choice to reject the values of religion.

The result is a peculiar form of anti-religious science which many scientists seem to advocate today. Its peculiarity arises from its denial, not so much of the conceptual claims, but of the volitional commitments central to religion. It thereby goes beyond mere disagreement with religion to the stronger claim that the latter is not even a relevant participant in the dialogue about developments in science. The long and changing history of the relations between science and religion thus has reached a distinctively new stage in our day. Its most visible intrusion into our consciousness is the widely expressed discomfort with many of the growing applications of genetic technologies to the human person conceived in such purely secular terms.

If our analysis is basically correct, what advice should be given on how to deal with this situation? The pessimistic response (which need not thereby be false) is that nothing can be done. Conflicts of ideas alone are difficult enough to resolve, but in such cases at least we have the tools of evidence and argumentation to help us. But resolutions of clashes of wills are beyond such appeals.

Another alternative would be coercion. That at least confronts the will. But this clearly will not do, given the sorry history of coercion. Coercion at best might produce short-term verbal agreement, but is certain to produce long-term animosity. As the Galileo case shows, religious inquisition against science resulted in disaster. A “scientific inquisition” against religion, if somehow that is what the future holds, will have the same consequences for science.

That leaves the use of persuasive rhetoric to respond to the present situation in which science and religion find themselves. Abstractly considered, that is probably the best approach, but concretely it has not worked very well. The reason, we think, is that very few of the custodians of religion know science from the inside, as it were, while at the same time too few scientists have a genuine sense for theology and religion. Indeed the way we now educate students in graduate schools in these fields seems almost purposely designed to produce and to perpetuate this state of affairs. Even the best of rhetoric has no effect on deaf ears.

Endnotes

1. We refer here to Pope John Paul II’s address to the Pontifical Academy of Sciences on 31 October 1992. For the text of his remarks, *Origins* , Vol. 22, No. 22 (12 November, 1992) 370-73.
2. Stephen Hawking, *A Brief History of Time* . (New York: Bantam Books, 1988) 115-16. Although this paragraph by Hawking has been widely quoted, it is apparently based on a misunderstanding of the Pope’s remarks, which were intended to distinguish the scientific question of the physical conditions needed to account for how this universe originated from the metaphysical-theological question of why the universe was created and is conserved in existence by God. See George V. Coyne, S. J., “Implicazioni filosofiche e teologiche delle nuove cosmologie,” *La Civiltà Cattolica* , 4 (1992) 343-52, especially footnote 7.3. For example, see J. D. Barrow and F. J. Tipler, *The Anthropic Cosmological Principle* (Oxford: Clarendon Press, 1986), and John Leslie, *Universes* (London: Routledge, 1989).