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The Faith of Science and the Method of Religion: The View of an Experimentalist

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Abstract

A fundamental teaching of the Bahá'í Faith is that science and religion are harmonious and complementary. Two themes are presented. First, religious faith, in its best form, is shaped by a process of critical inquiry instead of being defended against such a process. By comparison, science does not operate by logical deduction alone but also by a process of generalization. That is, the validation of a scientific theory involves a process of gaining confidence in its predictive power based on its consistency with a limited set of experimental observations. This confidence is the scientific analogue of religious faith. Second, the limitations of science should be acknowledged and questions beyond its scope must be addressed in order to build a just, peaceful, and humanitarian society. Science must be used to aid the quest for and the implementation of appropriate human values.

Introduction

The past 150 years have seen triumphs in many fields of science: the rise of modern physics, the discovery of the periodic table of the elements and the subsequent clarification of the physical basis of chemistry, the theory of evolution, the deciphering of the genetic code, the explanation of the chemistry of living cells, and the development of electronics, communication, and computers. This dramatic progress suggests that the present time is a turning point in history at which humanity is attaining a new level of civilization, provided that its cultural maturation can keep pace with its technological maturation. To some, the arms race and the other serious problems that plague the planet cast doubt that our species can rise to the occasion.

Adherents of the Bahá'í Faith believe that a fundamental renewal of society is taking place. The writings of Bahá'u'lláh (1817–1892), Prophet-Founder of this religion, state that a new world order is being built, one characterized by the unification of the planet into one commonwealth. He writes:

> The world's equilibrium hath been upset through the vibrating influence of this most great, this new World Order. Mankind's ordered life hath been revolutionized through the agency of this unique, this wondrous System—the like of which mortal eyes have never witnessed. (*Bahá'í World Faith* 35)

Bahá'ís believe that the building of such an order coincides with the collapse of the old order under the weight of its own inadequacy, and they see the upheavals of the present day as symptoms of such a decay process. The inadequacy of the old order lies in its failure to uphold spiritual values, and a spiritual renewal is a prerequisite to global unity. The purposes of the Bahá'í Faith are to bring about that renewal and also to build up the institutions of the future world commonwealth.

These insights motivate a study of the relationship between religion and science: the technological progress of the past century is exactly what has made a global commonwealth logistically possible. In particular, the ties of communication and transportation have shrunk the earth into a global village. But in order for a global culture to evolve, there must be an inner transformation of the individual, a change of heart, in order to change prejudice and greed into a spirit of universal love and dedication to service. It is religion, defined as the connection between humanity and God, which produces this inner change.

The Bahá'í Faith teaches that science and religion are harmonious and complementary—"the two wings upon which the human soul can progress." ('Abdu'l-Bahá, *Paris Talks* 143). To reject reason and suppress critical inquiry in the name of religion is superstition and is harmful to human progress. To deny the necessity of spiritual values in the name of science is materialism and leads to corruption.

The following discussion focuses on several aspects of the harmony of religion and science that are illuminated in the Bahá'í writings, and illustrated and confirmed by an understanding of science. This paper is primarily intended for readers who are Bahá'ís or others who wish to explore what the Bahá'í Faith teaches about this subject. Therefore, I do not specifically cite the growing body of literature on science and religion by non-Bahá'í scholars.

Religion as a Scientific Method

Only three-and-a-half centuries ago, Galileo was subjected to house arrest. He had committed the crime of contradicting Catholic Church doctrine. He had peered through a telescope of his own making and had seen the moons of Jupiter orbiting the giant planet. The Book of Genesis states that the earth was created first and that the lights of the heavenly firmament were placed there by God to divide day from night. Therefore, the Church taught,

everything moves around the earth. Galileo had dared to suggest otherwise by embracing the Copernican theory of the solar system.

There are many other historical examples of the suppression of free critical inquiry by ecclesiastical authority. Because of this, the word "faith" has become an anathema to many modern people who value rational investigation. People have also been justifiably disillusioned by the atrocities that have been performed in the name of God. The result is that many reject any system of belief that relies upon the acceptance of assertions without logical proof or empirical verification. Religion is often categorized as such a belief system. Bertrand Russell wrote:

> The harm that is done by religion is of two sorts, the one depending on the kind of belief which it is thought ought to be given it and the other upon the particular tenets believed. As regards the kind of belief: it is thought virtuous to have Faith—that is to say, to have a conviction which cannot be shaken by contrary evidence. Or, if contrary evidence might induce doubt, it is held that contrary evidence must be suppressed....The conviction that it is important to believe this or that, even if a free inquiry would not support the belief, is one which is common to almost all religions and which inspires all systems of state education. The consequence is that the minds of the young are stunted and are filled with fanatical hostility both to those who have other fanaticisms and, even more virulently, to those who object to all fanaticisms. A habit of basing convictions upon evidence, and of giving to them only that degree of certainty which the evidence warrants, would, if it became general, cure most of the ills from which the world is suffering....I should wish to see a world in which education is aimed at mental freedom rather than at imprisoning the minds of the young in a rigid armor of dogma calculated to protect them through life against the shafts of impartial evidence. The world needs open hearts and open minds, and it is not through rigid systems, whether old or new, that these can be derived. (*Why I Am Not a Christian*, preface)

On the other side of the coin, science is often thought to command a flawless logical rigor in its methods of verification, involving no trace of "faith." This notion is reflected in questions such as, "How can one scientifically prove the existence of God?" "Science" and "proof" are often juxtaposed in this manner.

To understand why religion can be based on critical inquiry instead of being opposed to it, the myth that science involves only pure logic must first be exploded. As an illustration of the scientific method, consider the parable of a farm boy named Luke. Luke has always been trained to milk his father's cows from their right-hand sides, and he does so out of habit. One day he wonders why this is necessary and tries to milk several cows from the left. Each time, the cow becomes agitated and refuses to cooperate. Luke then formulates his first "law of nature": cows will only tolerate being milked from the right-hand side. Sometime later Luke spends a summer on his uncle's farm, which is several hundred miles away. On his first day of work he tries to milk a cow from the right-hand side; the cow gets upset and nearly kicks him. When Luke milks from the left, everything proceeds peacefully. All his uncle's cows seem to have the same prejudice. Luke's first law of nature has been violated, and he must formulate his second law: cows will only tolerate being milked from the customary side. It turns out that his uncle had always milked them from the left, and they are used to this. At school in the fall, Luke asks his classmates about their experiences with dairy cows, and they report the same pattern of habituation.

This story illustrates some essential elements of scientific inquiry, particularly the role of experimentation. Science attempts to understand the observable behavior of the universe—not why it behaves in a certain way from a metaphysical standpoint, rather, just what the behavior is. The process of gaining this understanding relies on consistent patterns in the observations that are made. These patterns are characterized by two attributes, which I label predictability and objectivity for the sake of convenient reference. Predictability refers to predictable aspects of the observed behavior of nature. I notice that the sun always rises in the east every morning and sets in the west every evening, for example, rather than appearing in the sky at random times and places. Objectivity refers to the fact that others can repeat such observations and reproduce the results. This assures me, for example, that my statement about the sun is not based on a purely subjective experience.

Once there is predictability and objectivity, serious cooperative efforts can be undertaken to formulate a model of the behavior of nature. A model is a conceptual framework with elements corresponding to the elements of the observed phenomena. The model must describe or mimic the phenomena that have been observed and hopefully predict phenomena that have not yet been observed. The vaster the range of observations described by the model, the better the model. Two models that describe the known phenomena equally well are equally good; neither can be judged "truer" than the other, even if they make different predictions about yet-to-be-observed situations. Atoms, for example, are not a physical reality, but a conceptual model of physical reality, and if an alternative model fits our observations just as well, it is just as good. In my own opinion, two models that are incapable of differing in their predictions are really the same model. For example, one does not really change the atomic model by imagining the electron to be a tiny squirrel, unless this "squirrelness" is measurable in the laboratory.

The progress of science involves experiments that expand the range of observations and the formulation or refinement of models that either accommodate or predict the observations. For the purposes of this discussion, the experimentation process is not viewed as passive observation but rather involves the application of what I term a "stimulus" to the system under study and the observation of the response. I use the term "stimulus" very broadly. For a particle physicist, the stimulus is quite intrusive, as it involves accelerating and smashing particles of matter. For an astronomer, the stimulus is gentle and indirect, as he merely points a telescope in the right direction.

Figure 1 shows the process involved in systematic scientific inquiry, and the farm boy followed the steps shown.

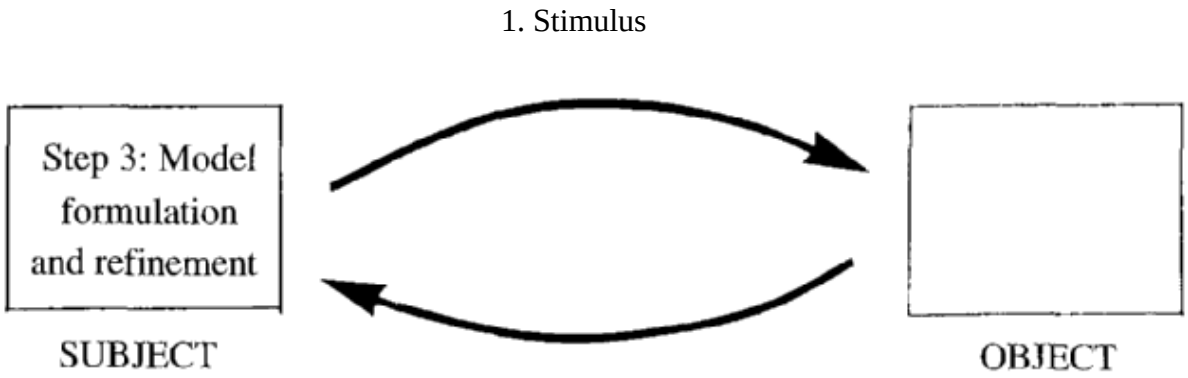

Figure 1: The Scientific Method

In the farm parable, Luke first applied a stimulus to the system by milking his father's cows on both sides. Second, he observed a predictable pattern of response: the cows resisted left-hand milking. Third, he formulated a model, that cows only wish to be milked from the right. Then, repeating the loop shown in Figure 1, he applied a new set of stimuli to expand the range of his observations by milking his uncle's cows, thus testing the predictions of his first model. Outside the confines of his father's farm, the first model broke down, so Luke refined the model to accommodate the new data: cows only wish to be milked from the habitual side. The experiments reported by his classmates further confirm the new model. The new model, therefore, extends to many farms, and Luke can have a degree of confidence in it.

Figure 1 shows the stimulus as the first step, but this is not necessarily the case in science, because patterns are sometimes observed before a conscious investigation begins. Furthermore, the farm parable strongly emphasizes the role of experiments. However, many of the greatest breakthroughs in science are made by theorists who are concerned with discovering theories that are mathematically and conceptually elegant. Einstein, for example, sought to unify the structure of physical law, not just to explain existing experimental data. Indeed, not only did his theory of relativity explain old experiments but it also predicted observations which had previously not even been contemplated by experimentalists.

The farm parable yields some important lessons. First, the theories and models of science gain acceptance by a process that is not logical deduction but is, in a sense, a logical fallacy. The validation of a model involves a process of gaining confidence in its predictive power based on a limited set of experimental observations. This confidence is the scientific analogue of religious faith. (By this I mean not "blind faith" but a reasonable form of faith based on critical inquiry). In the parable, no logical argument or empirical observation can prove the nonexistence of a farm where the cows demand to alternate sides on a daily basis.

Second, Luke's second model is only "better" or "more plausible" than his first one in the sense that its descriptive validity extends to a wider range of situations. Within the limits of his father's farm, one model is just as good as the other. Furthermore, the second model implies the first model as a special case when the range of observation is appropriately restricted. The models are not "true" or "false"; rather, they are useful tools of description or prediction over a wider or narrower range of circumstances.

Third, the OBJECT box in Figure 1 is empty to emphasize the fact that science only describes observable attributes of nature, not essences. We do not know what matter is, only what it does to our senses in the context of experiments.

Fourth, a crucial reinforcement of Luke's second model was the agreement of his classmates that he was not just hallucinating. This is important because it allows science to become a communal consensus-building effort rather than a purely personal, subjective search. Every scientist builds on the achievements of past scientists, and this makes long-term advancement possible.

Fifth, Luke's understanding can be practically applied to the problem of increasing milk production. Once he gains confidence in his model of cow psychology, he suspends his skepticism in order to get a good yield of milk.

He is then acting on the basis of a reasonable form of faith in his model. This confident application of a scientific model to solve practical problems is, broadly speaking, technology.

The term *faith*, in its best sense, can be broadly defined as an empirically developed confidence in a model, and this is as much a part of science as the "faith-free" process of logical deduction. The role that reason plays in science

is in judging the internal consistency of models and their consistency with the observed data. Properly balanced, the empirical and rational elements of science play complementary roles in the quest for understanding.

What are the differences and parallels between religion and science? The most important difference between religion and science is that they deal with different questions. Science seeks a description of the phenomenal world, whereas religion seeks an appropriate response strategy to it. Religion deals with the purpose of life and how to best fulfill this purpose. Science strives for a descriptive model, while religion strives for a value system.

For the individual, the process of formulating and refining a value system is, however, very analogous to the scientific method and can be outlined in terms of the diagram in Figure 1. In this case, the SUBJECT is the individual. The stimulus includes all the actions and words of the individual, and these influence the OBJECT, which includes other individuals, the society at large, and the physical environment. The subject observes the responses and other behavior patterns of the object. In addition, the subject learns of the experiences of others, some of which are found in historical data. As this stream of experience progresses, it provides the opportunity for successive refinement of the subject's value system. This system must be self-consistent and must provide a sensible interpretation of experience. An additional test of value systems is the test of workability. That is, the value system must provide for the well-being of both the individual and society. The above process can also be undertaken by communities, so the SUBJECT could be a community as well as an individual.

In a broad sense, then, there seems to exist a method of proposing, refining, and applying personal and communal value systems that is analogous to the scientific method. Both methods seek a cohesive conceptual framework to "make sense" of experience. Both should refine this framework as new experience accumulates. Both deal with observable responses rather than essences. Neither can claim to prove any assertions absolutely but rely on experiential confidence in those assertions that have worked well so far.

Before developing this parallel any further, however, a crop of difficulties must be addressed. First, in the formulation of personal and communal value systems, the series of "stimulus-response" experiments is different in each and every case, both in terms of the actions performed and in terms of which sectors of the OBJECT are most directly affected and observed. Second, the perception of what makes one ethical system more valid than another is often conditioned by emotional responses to experience rather than by purely descriptive validity. Therefore, there is no standard by which the value system can be judged to have a global validity. Third, one cannot perform repeated "stimulus-response" experiments under controlled conditions in the search for a value system. Do people really observe consistent or repeatable patterns? To a certain extent, they probably do. However, people display an inertia toward modification of their value systems. Once a system is adopted, it is internalized, and evidence that reinforces it is given more weight than evidence that does not. Thus, the consistent patterns observed may be partially a result of ignoring undesirable deviations. In short, the objectivity of science seems to be lacking, yet there must be universally accepted values in a society to prevent disintegration and anarchy.

The Bahá'í Faith addresses this "subjectivity problem" and, in three particular respects, vindicates the legitimacy of religion as a form of objective and testable knowledge. First, its writings unfold not only a system of moral values for individuals and communities but also a comprehensive model of the spiritual and social evolution of humanity. This model has the same quality of elegant synthesis that characterizes the revolutionary models of science. The Bahá'í writings are inherently worthy of the claim that they embody a divinely inspired set of teachings.

It is interesting to note that Bahá'u'lláh's teaching of progressive revelation and Einstein's theory of relativity display striking parallels. Einstein unfolded a new understanding of the universality of physical law and the relative nature of certain observations made from different frames of reference. Bahá'u'lláh unfolded a new understanding of the universality of the spiritual link between humans and God, and the relative nature of its expression and development in different phases of history. The Bahá'í writings make unprecedented predictions about mankind's future while reconciling the apparent conflicts among the religions of the past and showing their underlying unity, again playing a role analogous to that of relativity.

Second, the Bahá'í Faith and, to a lesser extent, the religions of the past embody a set of historical events that are open to objective scrutiny. Examination of this data plays an important role in the validation of the Bahá'í Faith, because the Bahá'í Faith claims that religion is a process instigated by God and views human history in this light. Such a claim must be tested by an individual through historical retrospection rather than through direct, short-term observation of his immediate social and physical environment. As Josh McDowell (*More Than a Carpenter* 38) has pointed out, the situation calls for "legal-historical" verification rather than scientific verification.

In the case of the Bahá'í Faith, there is a wealth of observables by which to judge its validity. Bahá'u'lláh's life is a recent historical event that is well documented. Furthermore, there are over a hundred volumes of his authenticated writings. This constitutes a body of data that is open to examination. So the data—what Bahá'u'lláh wrote, what He did, and what He suffered—is abundant. Furthermore, we also have a good sense of what Moses, Christ, Muhammad, and other founders of religions have taught, although there is certainly much less information about historical details.

Third, the Bahá'í writings explicitly speak to the methods a seeker should use to test the legitimacy of the Bahá'í Faith or of any set of religious beliefs. The Bahá'í writings invite a critical, fair-minded scrutiny of the evidence. Bahá'u'lláh repeatedly exhorts his readers to "judge His Cause with fairness," (*Tablets* 85) to "examine Our Cause, inquire into the things that have befallen Us, and decide justly between Us and Our enemies...." (qtd. in *Bahá'í World Faith* 41). One is a Bahá'í if and only if one has reached a conviction that Bahá'u'lláh's claim of being a divine spokesman is valid. 'Abdu'l-Bahá states:

> Another new principle revealed by His Holiness Bahá'u'lláh is the injunction to investigate truth; that is to say, no man should blindly follow his ancestors and forefathers. Nay, each must see with his own eyes, hear with his own ears and investigate the truth himself in order that he may follow the truth instead of blind acquiescence and imitation of ancestral beliefs. (qtd. in *Bahá'í World Faith* 246)

He also writes:

> God has endowed man with intelligence and reason whereby he is required to determine the verity of questions and propositions. If religious beliefs and opinions are found contrary to the standards of science they are mere superstitions and imaginations; for the antithesis of knowledge is ignorance, and the child of ignorance is superstition. Unquestionably there must be agreement between true religion and science. If a question be found contrary to reason, faith and belief in it are impossible and there is no outcome but wavering and vacillation. (240)

Bemoaning the fanaticism of Persian clergymen and political leaders, Bahá'u'lláh writes, "But where are to be found earnest seekers and inquiring minds? Whither are gone the equitable and the fair-minded?" (*Tablets* 90). 'Abdu'l-Bahá spoke of the "signs" of Bahá'u'lláh—the volume and profundity of his writings, the wisdom and knowledge He possessed despite his lack of formal education, his unwavering love for humanity through forty years of hardship at the hands of unjust oppressors, the prophecies fulfilled by his appearance, and his impeccable conduct. 'Abdu'l-Bahá writes, "Verily this is a matter deserving the scrutiny of those who ponder the signs and tokens of God....This thing is plain as day to whoever will regard it with the eye of justice" (*Selections* 15). In short, a critical, fair-minded scrutiny of the observables pertaining to the Bahá'í Faith is a prerequisite to any confidence in its legitimacy.

However, 'Abdu'l-Bahá's words also imply that such a fair-minded scrutiny must lead to this confidence. In other words, the value system presented in the Bahá'í writings (including its claims and spiritual teachings) has objective validity. Then why is it possible for "seekers" to investigate the Bahá'í Faith and reject it?

To address this question, consider once again the nature of scientific investigation. Surveys (McCloskey, "Intuitive Physics") revealed that many nonscientists, including students who have taken college physics, have erroneous intuitive ideas about the motion of objects. When asked to draw the trajectory of a ball that has rolled off the edge of a cliff, for example, they give answers that are qualitatively wrong. Thus, although most people have been observing such physical motions all their lives, very few possess the intellectual skills and disciplines to model them correctly. The high degree of agreement among scientists about the observed patterns and about how they should be interpreted to judge among competing models, is a result of common skills and training.

Bahá'u'lláh specifies an analogous set of spiritual skills and disciplines that are needed to bring objectivity to the search for a value system. He admonishes the seeker to "cleanse his heart...from the obscuring dust of all acquired knowledge," and to let go of all "shadowy and ephemeral attachments." He advises the seeker to "cleanse his heart that no remnant of either love or hate may linger therein, lest that love blindly incline him to error, or that hate repel him away from the truth." He further states that the true seeker "must wash away from the tablet of his heart every trace of pride and vainglory" (qtd. in *Bahá'í World Faith* 105).

Perhaps Bahá'u'lláh is suggesting that even among "seekers," very few marshal enough openness and humility to let go of the vested interests they have in their current beliefs and biases. At some point in the search for truth, consciously or unconsciously, self-centered ulterior motives interfere with the evaluation. Some seekers reject the Bahá'í Faith because they are unwilling to make the apparent sacrifices that Bahá'u'lláh calls for, or because the ego resists the idea of obedience. When the spiritual skills referred to by Bahá'u'lláh are exercised, it can be painful because the seeker may have to sacrifice his or her dearest illusions.

The Bahá'í writings refer to an innate human capacity for recognizing and appreciating the divine qualities reflected in other people, especially in the great spiritual luminaries of history who are God's chosen spokesmen. This capacity of recognition is referred to as the "heart," a term usually used to connote subjective emotionalism rather than a faculty that perceives objective realities. In the Tablet of Ahmad, Bahá'u'lláh comments on the difference between the true "heart" of man and that which obscures its vision.

> For the people are wandering in the paths of delusion, bereft of discernment to see God with their own eyes, or hear His Melody with their own ears. Thus have We found them, as thou also dost witness.
> Thus have their superstitions become veils between them and their own hearts and kept them from the path of God, the Exalted, the Great. (*Bahá'í Prayers* 211-12)

That is, the "heart," a faculty of objective spiritual discernment, is prevented from functioning by the same barrier that interferes with science: superstition. In the Persia of Bahá'u'lláh's time this superstition took the form of an irrational attachment to the forms, traditions, and power structures of Islam. The implication, however, extends to whatever "household idols" each of us carries within himself.

In short, the Bahá'í Faith teaches that God is revealed to humanity through a historical process and that the spiritual truths and value systems conveyed to humanity through this process are testable. Their validation, however, requires the use of spiritual capacities rather than just physical and intellectual ones.

This does not mean that the personal quest for a better value system ends when one recognizes this historical process and becomes a Bahá'í as a result. Indeed, it has begun anew, because one's understanding continues to deepen through reflective study of the Bahá'í writings and the practical application of Bahá'í teachings in daily life.

This application of a value system is the religious analogue of technology. This is where a particular form of resistance to the modification of value systems is necessary and appropriate. Once the Bahá'í value system is validated, its application to daily living requires commitment and sacrifice, and this can only be motivated by a strong confidence in the value system. Bahá'u'lláh admonishes Ahmad to "be not of those who doubt" (*Prayers* 211-12). This does *not* mean "never question your faith; be rigid, irrational, and fanatical." Questioning is a part of the growth of one's understanding and makes faith a dynamic process. However, rational skepticism should not be so dominant that it prevents one from living a purposeful life based on one's current understanding. Rather, the individual must be able to act with courage and selflessness based on moral convictions. Faith, therefore, is not an absolute certainty, but it is a relative certainty.

There is also an analogous value in science. The development of technology requires time, effort, and expenditure. Without a strong feeling of confidence (i.e., faith) in the current models of nature, human beings would not risk so much time and money building machines, devices, and entire industries based on these models. If the inventors of the transistor had allowed themselves to be paralyzed by continual skepticism about the permanence and universality of physical laws that make the transistor work, the invention and all its benefits would not have been realized.

What philosophers such as Bertrand Russell abhor is not faith per se, but fanaticism. Fanaticism frequently occurs in a religion when the spirit of its original teachings fades into the past, but the laws and ossified cultural traditions remain. Many modern thinkers express disillusionment with religion because of the social atrocities performed in its name. Often, however, they erroneously conclude that faith itself is the culprit. They also fail to distinguish between the spark of revelation that gives birth to a religion and the subsequent response of human beings. They dismiss the phenomenon of religion as a ritualistic implementation of man-made social laws and customs.

The Bahá'í teachings condemn fanaticism, whether religious, political, or nationalistic. 'Abdu'l-Bahá states that when religion causes discord, hostility, and conflict, its absence in the world is preferable (qtd. in *Bahá'í World Faith* 247). Bahá'u'lláh exhorts Bahá'ís to consort with the followers of all religions in a spirit of fellowship and love (*Tablets* 22).

However, the rigid rationalism that Russell and others have embraced has serious weaknesses. It does not eliminate faith, rather, it simply chooses a particular kind: faith in our own ability to predict the social effectiveness of a given ethic by means of a "reasoning" process. In this case, since the ultimate source of guidance is ourselves, this philosophy allows a subtle arrogance to creep into our perspective, and this does not engender objectivity. Many rationalists display a dogmatic bigotry against the idea of a "faith bias," while unconsciously exempting their own faith bias because it is a fashionable one. Ironically, they pride themselves on having embraced a "rational" or "scientific" ethic. Humility is the only true basis of either openness or tolerance. Bahá'u'lláh makes the striking assertion that a "confession of helplessness which mature contemplation must eventually impel every mind to make is in itself the acme of human understanding, and marketh the culmination of man's development" (*Gleanings* 165–66). It is not surprising that the Guardian equated secularism with "haughty intellectualism."

The rationalistic philosophy exalts "reasoning" as the ultimate tool in the quest for understanding. Reasoning, however, is a process that operates on assumptions but cannot provide them. Therefore, reason, in and of itself, cannot provide a value system, let alone one with universally recognized validity. This engenders conflict between those who have "reasoned" to incompatible conclusions. Even Russell advocates the value of knowledge and love as the basis of a good life; these are his ethical assumptions. In particular, rationalism provides no motivation to make sacrifices for one's values, because there is no focus of purpose that transcends the selfish vested interests that divide humanity. Rationalism provides no accountability for one's conduct during this life, and therefore its proponents will find "reasoning" to justify whatever they wish to do.

The Bahá'í Faith offers an eminently sensible compromise between the extremes of rigid fundamentalism and smug rationalism. Humans are not omniscient, but neither are they totally incompetent. Instead of regarding reason and faith as mutually exclusive, the Bahá'í teachings suggest that humanity progresses through a robust interplay between the two. God reveals Himself through the medium of human language and within a dynamic cultural and

historical context. People respond to this revelation and grapple to achieve a clearer understanding of it in the light of new experiences. In this way, the divine guidance of one age becomes the obvious social moral standard of the next. The Guardian states that by obeying the laws of Bahá'u'lláh, Bahá'ís "demonstrate their usefulness and efficacy" (*The World Order* 199). This is an elegant and cohesive explanation of religious history: God and humanity partake in a Teacher-student relationship in which the student plays an active and dynamic role, providing tests of God's teachings in the laboratory of history.

Science as a Means of Spiritual Growth

Religion and science are complementary in their purposes. Science deals with the characterization of the physical universe, whereas religion deals with the spiritual nature of the human being, that is, with an essence that transcends physical nature. Therefore, to understand the harmony of religion and science as a Bahá'í teaching, one must study the statements in the Bahá'í writings about the relationship between the physical and spiritual natures.

Bahá'u'lláh teaches that God created "man...to enable him to know his Creator and to attain His Presence" (*Gleanings* 70). Yet in another passage He states that "all men have been created to carry forward an ever-advancing civilization" (215). The first statement concerns a spiritual matter, whereas the second refers to conditions of earthly existence. What is the relationship between spiritual growth and cultural advancement?

'Abdu'l-Bahá portrays earthly life as a sort of gestation period for the development of spiritual attributes that are needed after physical death, much as a fetus in the womb develops sensory and motor organs needed after physical birth (qtd. in *Bahá'í World Faith* 312). Bahá'u'lláh writes, "Out of the wastes of nothingness, with the clay of My command I made thee to appear, and have *ordained for thy training* every atom in existence and the essence of all created things" [Emphasis added.] (*Hidden Words* 32). Thus, humans achieve and reflect closeness to God by living and acting in the context of physical existence. Bahá'u'lláh teaches the avoidance of two extremes: hedonism on the one hand and asceticism or monasticism on the other. The first extreme attaches exclusive importance to material pleasures, which are transitory, and neglects the transcendent, eternal aspect of the human being. The second extreme, however, deprives the individual of the "real-world" tests and trials that are needed to build a spiritual character.

As an example, consider money. On the one hand, Bahá'u'lláh writes:

> Know ye in truth that wealth is a mighty barrier between the seeker and his desire, the lover and his beloved. The rich, but for a few, shall in no wise attain the court of His presence nor enter the city of content and resignation. (*Hidden* 41)

On the other hand, He writes:

> The best of men are they that earn a livelihood by their calling and spend upon themselves and upon their kindred for the love of God, the Lord of all worlds. (51)

This third alternative to hedonism and asceticism is called detachment in the Bahá'í writings. Bahá'u'lláh writes, "Whoso hath known Him [God] shall soar in the immensity of His love, and shall be detached from the world and all that is therein. Nothing on earth shall deflect him from his course..." (qtd. in *Bahá'í World Faith* 132). Detachment is not to be confused with self-deprivation or puritanism. Rather, it is a spiritual sense of priorities, manifested in practical deeds. Bahá'u'lláh states, "Eat ye, O people, of the good things which God hath allowed you, and deprive not yourselves from His wondrous bounties" (qtd. in Shoghi Effendi, *Advent of Divine Justice* 33). The qualification is, in 'Abdu'l-Bahá's words, that these things

> should not be allowed to monopolize all the thoughts and aspirations of a human being. The heart's ambition should ascend to a more glorious goal, mental activity should rise to higher levels. Men should hold in their souls the vision of celestial perfection, and there prepare a dwelling place for the inexhaustible bounty of the divine spirit. (*The Reality of Man* 15)

He further states that saints

> live in the world but are not of it, their thoughts being continually in the world of the spirit. Their lives are spent in holiness, and their deeds show forth love, justice, and godliness. (24)

So in the life of an individual, money and material pleasures can either be the means of spiritual growth or barriers to it, depending on how and why they are used.

Science is an individual and a collective effort whose direct concern is with material phenomena. The exalted station accorded to science in the Bahá'í writings is quite striking. 'Abdu'l-Bahá states:

> The virtues of humanity are many, but science is the most noble of them all. The distinction which man enjoys above and beyond the station of the animal is due to this paramount virtue. It is a bestowal of God; it is not material; it is divine. Science is an effulgence of the Sun of Reality, the power of investigating and discovering the verities of the universe, *the means by which man finds a pathway to God*.... [Emphasis added] Science is the first emanation from God toward man. (*Promulgation* 49)

'Abdu'l-Bahá also states that "the unshakeable foundation is the teaching of sciences and arts" (*Selections* 134), and that "the acquisition of sciences and the perfection of arts are considered *acts of worship*" [Emphasis added.] (144).

Like other material pursuits, however, the high station of science is conditioned on how and why it is used. 'Abdu'l-Bahá points out that God gave humans an intellect "that it might be used for the advancement of civilization, for the good of humanity, to increase love and concord and peace" (*The Reality of Man* 11) Bahá'u'lláh writes:

> Knowledge is as wings to man's life, and a ladder for his ascent. Its acquisition is incumbent upon everyone. The knowledge of such sciences, however, should be acquired as can profit the peoples of the earth, and not those which begin with words and end with words. (*Tablets* 51–52)

> Frequently, humans engage in useless or even destructive applications of their intelligence, using it "to destroy instead of to build, for injustice and oppression, for hatred and discord and devastation, for the destruction of his fellow-creatures..." ('Abdu'l-Bahá, *Reality* 11).

Furthermore, science should be a tool in humanity's spiritual quest to know and love God, and a means of inspiring humility and reverence for the Master Architect of creation. `Abdu'l-Bahá writes:

> If, then, the pursuit of knowledge lead to the beauty of Him Who is the Object of all Knowledge, how excellent that goal; but if not, a mere drop will perhaps shut a man off from flooding grace, for with learning cometh arrogance and pride, and it bringeth on error and indifference to God. (*Selections* 110)

> Every kind of knowledge, every science, is as a tree: if the fruit of it be the love of God, then is it a blessed tree, but if not, that tree is but dried-up wood, and shall only feed the fire. (181)

Many great scientists displayed a certain awe, humility, and reverence, even if this was not couched in orthodox theological ideas. Galileo devoutly believed in God, and felt that reading the "Book of Nature" through scientific investigation is as valid a path to the knowledge of God as reading the biblical text. Kepler spent his entire life searching for a nonexistent geometrical pattern in the orbits of the planets because he felt that the universe should manifest the perfection of God's mind.

Often, however, God is barricaded out in the name of "science." Disillusionment with the dogmatism of religion, combined with intellectual pride, leads many to commit a logical fallacy in the name of rationality: "Testable" is equated with "tangible," and it is therefore assumed that it is irrational to make any assertions that cannot be tested by physical measurement. This is a logical fallacy because it treats absence of direct sensory evidence as evidence of absence. Furthermore, it does not eliminate faith but simply chooses a particular kind. Sensory input is trusted as the ultimate source of knowledge about reality. 'Abdu'l-Bahá comments on the irony of this with a touch of humor:

> All the animals are materialists. They are deniers of God and without realization of a transcendent power in the universe. They have no knowledge of the divine Prophets and Holy Books—mere captives of nature and the sense world. In reality they are like the great philosophers of this day who are not in touch with God and the Holy Spirit—deniers of the Prophets, ignorant of spiritual susceptibilities, deprived of the heavenly bounties and without belief in the supernatural power. The animal lives this kind of life blissfully and untroubled, whereas the material philosophers labor and study for ten or twenty years in schools and colleges, denying God, the Holy Spirit and divine inspirations. The animal is even a greater philosopher, for it attains the ability to do this without labor and study.... (*Promulgation* 311–12)

> Then why should we go to the colleges? Let us go to the cow. (361)

In short, science, when properly used, is conducive to both spiritual advancement and social progress. Improperly used, it leads to great social harm and a narrow-minded atheism.

The Bahá'í writings teach that science should be used as a means to find a path to God. Indeed, this aspect of science is difficult for any sensitive person to ignore. The grandeur, beauty, and complexity of nature certainly evoke a sense of wonder. The laws of physics and statistics have mandated the development of conscious, intelligent beings. It can be argued that these are evidences of the existence of the Creator.

This is a very old argument for the existence of God, which Bertrand Russell terms the "argument from design." Russell argues that Darwin destroyed the validity of this argument, because natural selection and evolution work through a series of genetic accidents whose beneficiaries produce more offspring. What Russell overlooks is that even Darwinian evolution relies on certain laws of physics and probability. These laws allow "animate" beings to evolve from "inanimate" matter; the fact that this process relies on statistical phenomena does not warrant the conclusion that "the whole thing is just a big accident." Evolution can be regarded as a mechanism of continuous creation, and in fact shows great design ingenuity.

Russell also argues that it is just as logically self-consistent to assume that creation has always existed as it is to assume that Someone created it. This is true, but a value system must meet other tests besides internal consistency. It must also incorporate a sensible interpretation of the totality of experience and one that produces constructive results. Science must also look beyond logical consistency to find truth. If a radio dish received a transmission from space encoded with a well-known mathematical formula or sequence, the scientific community would declare this to be irrefutable evidence of an intelligent sender. No scientist would seriously try to convince his colleagues that it is just as logical to presume that the radio waves carrying the message had always existed.

Bahá'u'lláh commented extensively on nature as a reflector of the attributes of God:

> Nature in its essence is the embodiment of My Name, the Maker, the Creator. Its manifestations are diversified by varying causes, and in this diversity there are signs for men of discernment. Nature is God's Will and is its expression in and through the contingent world. It is a dispensation of Providence ordained by the Ordainer, the All-Wise. Were anyone to affirm that it is the Will of God as manifested in the world of being, no one should question this assertion. It is endowed with a power whose reality men of learning fail to grasp. Indeed a man of insight can perceive naught therein save the effulgent splendour of Our Name, the Creator. Say: This is an existence which knoweth no decay, and Nature itself is lost in bewilderment before its revelations, its compelling evidences and its effulgent glory which have encompassed the universe. (*Tablets* 142)

> How all-encompassing are the wonders of His [God's] boundless grace! Behold how they have pervaded the whole of creation. Such is their virtue that not a single atom in the entire universe can be found which doth not declare the evidences of His might, which doth not glorify His holy Name, or is not expressive of the effulgent light of His unity. So perfect and comprehensive is His creation that no mind nor heart, however keen or pure, can ever grasp the nature of the most insignificant of His creatures; much less fathom the mystery of Him Who is the Day Star of Truth, Who is the invisible and unknowable Essence. (*Gleanings* 62)

> Upon the inmost reality of each and every created thing He [God] hath shed the light of one of His names, and made it a recipient of the glory of one of His attributes. Upon the reality of man, however, He hath focused the radiance of all of His names and attributes, and made it a mirror of His own Self. (65)

> Every created thing in the whole universe is but a door leading into His knowledge, a sign of His sovereignty, a revelation of His names, a symbol of His majesty, a token of His power, a means of admittance into His straight Path.... (160)

> Whatever is in the heavens and whatever is on the earth is a direct evidence of the revelation within it of the attributes and names of God, inasmuch as within every atom are enshrined the signs that bear eloquent testimony to the revelation of that Most Great Light....How resplendent the luminaries of knowledge that shine in an atom, and how vast the oceans of wisdom that surge within a drop! (177)

'Abdu'l-Bahá also states:

> When, however, thou dost contemplate the innermost essence of all things, and the individuality of each, thou wilt behold the signs of thy Lord's mercy in every created thing, and see the spreading rays of His Names and Attributes throughout all the realm of being, with evidences which none will deny save the froward and the unaware. Then wilt thou observe that the universe is a scroll that discloseth His hidden secrets, which are preserved in the well-guarded Tablet. And not an atom of all the atoms in existence, not a creature from amongst the creatures but speaketh His praise and telleth of His attributes and names, revealeth the glory of His might and guideth to His oneness and His mercy: and none will gainsay this who hath ears to hear, eyes to see, and a mind that is sound. (*Selections* 41)

There is much more to these statements than a romantic assertion that nature is awe-inspiring and therefore reminds us of God. There seems to be an implication that physical phenomena can actually teach us about spiritual reality. John Hatcher, (*Metaphorical Nature* 31) for example, explores the ways in which physical realities serve as metaphors for the understanding of spiritual realities. The study of the sciences cannot but lead the sensitive person to reflection about philosophical, moral, and social issues.

Conclusion

In this essay, I have presented science and religion as complementary aspects of human experience. Science and religion use some parallel methods but serve different purposes. Science strives for facts, religion for values. Each studies a reality but also operates within the limits of an imperfect perception or understanding of that reality. Furthermore, each should influence the operation of the other. The discovery of facts must contribute to the context of the search for values. Conversely, values must guide the search for facts and their practical applications.

A disjointed view of human life, which attempts to divorce faith and reason, is a condition that currently afflicts humanity. Its symptoms are the corruption of values and the misapplication of facts. It is my hope that this work has contributed in some measure to the healing of this sickness and the reintegration of the human self.

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