The Spiritual Foundations of Science

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Abstract

This paper examines some characteristic features of a Baha'i approach to science. In contrast to popular modem western accounts of science which often attempt to reduce it to methods of logic and experiment, the Baha'i reference point for the nature of science is the spiritual nature of man. The experience of some outstanding scientists of the past is cited to support the Baha'i view.

1. Introduction

Many critics of modem western thought have commented on its fragmentation into two separate realms. The philosopher and mathematician Alfred Whitehead has described this division in terms of a bifurcation of nature'1, where he states modem western thinking to be split into a quantitative world of science, and a qualitative world of human emotions and values.

The writer C. P. Snow has described this division in terms of a 'clash between two cultures'2, a conflict between the scientific and humanistic (the artistic, religious and so on) in our society. He states that science is another 'culture' which has its own language, metaphors and view of the world. The clash between science and art is portrayed in terms of the misunderstandings and rivalries that exist between different nations.

A. N. Whitehead, "The concept of Nature", p26-4S, Cambridge, Cambridge University Press, 1964
see the book by C.P. Snow, "The Two Cultures: a second look", Cambridge, Cambridge University Press, 1969

The psychologist Floyd Matson has described the fragmentation of modern thinking in tarns of a 'broken image'3, where the traditional picture of man being made in God's image is shattered. He links these divisions in modern thought to the rise of a mechanistic world view of the universe, and refers to

it
as the 'modern dogma of scientism'4.

All these critics of modern thought link its divisions to a popular misconception of science. One of the most common ways of picturing science in the modern mind is to see it in terms of a collection of "facts and numbers".
Science is conceived of as an objective method of observation, hypothesis and experiment. This view of science is generally classed as a "positivist" conception of science. The positivist representation of science portrays it as a
method which is dominated by empirical measurements, either in observation or experiment, and hypotheses which are constructed according to rigorous methods of logic, whether they be deductive or inductive. Such a description of science, as is well known, was explicitly formulated by the logical positivists in the early part of this century5. It is one however, which still tends
to dominate our view of science today, even amongst scientists themselves. The positivist conception of science is based upon understanding science in terms of explicit verification procedures which are thought to be objective: that
is independent of spiritual values and purposes.

Positivist science tacitly assumes that other spheres of human activity such as religion, or art, do not have a 'scientific* method Science is thought to contain
verification tests of truth which other human activities do not have. The famous verification principle of logical positivism was an example of such a test bang used to distinguish science from other spheres of human activity6. Others have preferred to use the truth-criterion of "falsifiability" to capture the
nature of scientific investigation7. All these representations of science assume
that it can be adequately described by formal methods of procedure, whether

F. W. Matson, "The Broken Image", pv-vi, NY, Anchor Books, 1966
ibid, p6
see for instance the book by Ayer A.J., "Language, Truth and Logic", Penguin Books,
1971
ibid., p l 6
Popper K.R., "The Logic of Scientific Discovery", p40-41, Uwin Hyman, London, 1990

in observation, hypothesis or experiment. It is this view of science that still dominates the modern mind.

2. Examples of methods identified with science by empiricist philosophers

Francis Bacon: Science as a collection of facts

Collection of Facts, encyclopedia of data

Valid scientific theories, confirmed by more facts

Francis Bacon (16th century) thought that science was largely about gathering facts. He thought that theories automatically emerge from trends or patterns from the facts, and that they are turned into a scientific law by the process of induction. Theories are tested by gathering more facts. Valid theories are the ones which are supported by the facts.

Hume's Fork: Scientific test for a meaningful proposition

Proposition

mathematical

empirical

Does it contain abstract reasoning concerning quantity or number?

Does it contain any experimental reasoning concerning matter of fact or existence?

'Commit it then to the flames: for it can contain nothing but sophistry illusion!"

David Hume (18th century) was influenced by what he understood to be Newton's experimental method. Hume thought that Newton's scientific success was mainly due to his experimental work. Hume attempted to extend this approach into a scientific method which could describe human nature and philosophy. His method was based upon giving priority to propositions that could be directly related to information gathered by the senses. Hume's fork is a typical example of him attempting to arrive at a method for distinguishing sciencefromnon-science. His philosophy was typically directed against the metaphysics of the scholastic tradition in Western philosophy.

Bertrand Russell

Bertrand Russell (early 20th century) believed that progress in science is based upon the facts, both in observation and experiment. He thought that mathematics was a subset of logic - a tautology containing such statements as "all bachelors are men", and that it could be reduced to identifiable axioms and explicit rules of logic.

Logical Positivists: Empirical science/logic as a method to determine meaning

The Verification Test

í 4--

Proposition

Logic

Empirical Science

Domain of Logic?

Factual content?

(Tautological statements)

Meaningless propositions
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The touchstone of truth for the logical positivists (early 20th century) like Hume, was empirical science. They were concerned with "decontaminating" science from metaphysics, theology and ethics. Through the verification principle, they attempted to arrive at a "scientific" definition of meaning. The verification principle has many similarities with Hume's Fork.

Scientific methods discussed by 17th century scientists

René Descartes

Complex phenomenon	Step by step reduction	Self-evident truths	
Mechanical - system (clock)	Part by part — decomposition	-•	Extension, mass, time

René Descartes articulated a scientific method based upon proceeding in a logical step by step analysis of complicated phenomena, simplifying them into simple irreducible parts. His method is similar to that of a geometric proof, which by relying on only a few simple axioms is able to proceed in clear steps of deductive logic to arrive at powerful conclusions.

Isaac Newton

Isaac Newton did not present a scientific method, but he did present general maxims that guided his scientific work. They are as follows: look for the simplest explanation, the one with the lowest number of postulated causes; assume that the same effects arise from the same causes; properties of bodies found through experiment and observation are generalised to become universal properties; proceed by general induction

from phenomena to propositions (theories). Here it is clear that Newton combines a method of induction articulated by Francis Bacon with the deductive method advocated by René Descartes.

Using inductive and deductive logic in scientific research does not necessarily constitute a "scientific method", and it is quite likely that Newton and Descartes did not conceive of them as a list of rules which could be mechanically applied to create science.

3. A Baha'i approach

There is much written about the nature of science in the Bahái writings. In fact the Baha'i faith is one of the few world religions to mention science explicitly within the orbit of its sacred scripture. But one of the most striking

features about the Baha'i writings on the subject of science is that procechires
of observation, the role of experiment, or the processes of logic are scarcely mentioned.

On several occasions in his western tour between the years 1911-13, 'Abdul-Bahá based his public talks on the nature of science8. On all these occasions he never spoke about the 'methods' of science. To some of his western audience it must have seemed that instead of speaking about science, 'Abdul-Bahá spoke about man. This is also true of the Baha'i writings as a whole. Instead of finding a description of the nature of science in terms of special methods that are unique to science, that set it apart from all other forms of human activity, it is the special characteristics of the mind of man that are described, which set him apart from all other forms of life.

From the Baha'i point of view, one cannot understand the nature of science without first understanding human nature. They are inextricably linked. Human nature from the Baha'i perspective, is not reducible to the processes of nature. One special characteristic of man, which is not found within nature, is said to be his intellectual capacity. 'Abddl-Bahá states that:

see for instance: Abdu'l-Bahá,"Paris Talks", pl41-146, The Baha'i Publishing Trust,
1911, llt'h ed., London, 1969, or "The Promulgation of Universal Peace", p29-31 and
p348-352, The BaháT Publishing Trust, Wilmette niinois, 2nd edition, 1982

"Man is endowed with ideal virtues - for example, intellection, volition, faith, confession and acknowledgement of God - while nature is devoid of all these. The ideal faculties of man, including the capacity for scientific acquisition, are beyond nature's ken. These are powers whereby man is differentiated and distinguished from all other forms of life"9.

Science is possible, according to this view, only because human nature is fundamentally different to the world of nature. Human nature is seen to have characteristics not found elsewhere, such as consciousness, free-will and memory. Without the special qualities of human nature such as consciousness andfree-will,no science would be possible.

Since from the Baha'i view point, the character of science essentially derives from special non-natural powers of the mind, it is not artificially separated from other creative spheres of human activity such as the arts and crafts. Science is frequently mentioned in the Baha'i writings in the same context as the arts and crafts. Baha'ullah states that the "arts, crafts and sciences uplift
the world of being", and uses the general term "knowledge" to refer to them all10. 'Abdul-Bahá, in the context of discussing science, states that one must

put effort in striving to acquire, "science and the arts"11. From the Baha'i perspective, since arts and crafts are also founded on unique creative powers of the mind, they share a natural unity with science. There is no definite boundary between the arts, crafts and sciences within the Baha'i faith. All are regarded as important forms of knowledge which Baháis have a spiritual obligation to learn.

The importance given to science within the Bahái writings cannot be over emphasised. Science is described as "the first emanation of God to man", "a means by which manfindsa pathway to God", and as God's "love of reality in man"12. Baha'ullah states that: "Art, crafts and sciences uplift the world of
'Abdu'1-Bahá, "Promulgation of Universal Peace*. p51
Baha'ullah, "The Writings of Baha'ullah", p316, a compilation, The Baha'i Publishing Trust, New Delhi, 1st ed.,1986
'Abdu'1-Bahá, "Promulgation of Universal Peace", p50
'Abdu'1-Bahá, "Promulgation of Universal Peace", p49

being, and are conducive to its exaltatioa Knowledge is as wings to man's life, and a ladder for his ascent. Its acquisition is incumbent upon everyone.....Great indeed is the claim of scientists and craftsmen on the peoples of the world.."13. 'Abdul-Bahá stressing the importance of science, states that: "Therefore, you should put forward your most earnest efforts toward the acquisition of science and arts. The greater your attainment, the higher your standard in the divine purpose"14. In another passage, 'Abdul-Bahá states that: "The greatest attainment in the world of humanity has ever been scientific in nature.....the highest praise is due to men who devote their energies to science.."15. Elsewhere in the Baha'i writings, the Baha'i faith is described as, "scientific in its method"16.

Another important feature of the Baha'i conception of science is that science is
believed to reflect the existence of profound cosmological mysteries. Science is
stated to be a revelation from God. The universe, from the Baha'i perspective, is seen to be filled with the knowledge and signs of God. Each atom is said to contain within it, profound cosmological mysteries. The unity and order of the cosmos, a belief which underlies all scientific investigation, is given special emphasis within the Baha'i conception of science, and is ultimately looked upon as a sign of divine purpose and design in the universe. It is stated in the
Baha'i writings that the universe is regulated by laws which operate from the atomic to astronomical level. 'Abddl-Bahá states that:

"This Nature is subjected to an absolute organisation, to
determined laws, to a complete order and a finished design,
from which it will never depart; to such a degree, indeed,
that if you look carefully and with keen insight, from the
smallest invisible atom up to such large bodies of the world

of existence as the globe of the sun or other great stars and luminous spheres, whether you regard their arrangement, their composition, their form or their movement, you will

"Writings of Baha'ullah", p316
'AbduT-Bahá, "Promulgation of Universal Peace", p50
'AbduT-Bahá, "Promulgation of Universal Peace", p348
Shoghi Effendi, "The World Order of Baha'ullah", pxi, Baha'i Publishing Committee,
New York, 1938

find that all are in the highest degree o f organisation and are under one law from which they will never depart".17

The nature of science is ultimately impossible to capture or describe since this
knowledge, embedded within the universe, is regarded as infinite. Human science, is understood to be empowered to capture a portion of this knowledge. Bahá'uTláh states that:

"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 o f that M ost Great L ight Methinks, but for the potency of that revelation, no being could ever exist. How resplendent the luminaries of knowledge that shine in an atom, and how vast the oceans o f wisdom that surge within a drop! To a supreme degree is this true of man, who, among all created things, hath been invested with the robe of such gifts, and hath been singled out for the glory of such a distinctioa For in him are potentially revealed all the attributes and names of God to a degree that no created being hath excelled or passed.”18

The BaM 'f conception of science is thus inseparable from mystery, and that science is inherently limitless. It is founded on cosmological mysteries: the unity and order of the cosmos, which is understood to be a sign o f God in the world of nature, and the creative power of the human mind, which is regarded as the greatest of all signs of G odin the universe. The nature of science is seen
to be unfathomable, because the mysteries that underlie it are believed to be unfathomable. Bahá'u'lláh states the human soul to be a "mystery among His mysteries". Bahá'uUáh states that: "Every created thing in the whole universe

17 ‘Abdu’l-Bahá, "Some Answered Questions". p3. The Bahá'í Publishing Trust,
Wilmette Illinois, pocket size ed., 1990
18 Bahá’u’lláh, "Gleanings from the Writings of Baháulláh", The

Baha’i Publishing
Trust, London, 1978, XC, pl76-7

is but a door leading into His knowledge....Verily I say, the human soul is, in its essence, one of the signs of God, a mystery among His mysteries"19.

Speaking of the rational faculty of man, Baha'ullah states that:

"Wert thou to ponder in thine heart, from now until the end that hath no end, and with all concentrated intelligence and understanding...this divinely ordained and subtle Reality, this sign of the revelation of the All-abiding, All-Glorious God, thou wilt fail to comprehend its mystery or appraise its virtue"20.

The very recognition of such a mystery bdng unfathomable, is in itsdf regarded by Baha'ullah as the "acme of human understanding":

"This confession of hdplessness which mature contemplation must eventually impd every mind to make is in itself the acme of human understanding, and marketh the culmination of man's development"21.

The recognition of the essential mystery lying behind the power of the rational faculty of man, the foundation upon which scientific investigation is made, from the Baha'i point of view, is essential to understanding the nature of science. According to this view, as science makes more and more progress, the cosmological truths that make this progress possible, appear in greater mystery. Contrary to modern popular conceptions of science, scientific progress is believed to enhance mystery, not to diminish it.
The notion of science being objective in an impersonal sense, without reference to human minds, convictions and values, is not found within the writings of the Baha'i faith. The preconditions necessary to acquire truth, including scientific truth, are believed to lie in cultivating certain spiritual
characteristics on the part of the enquirer. Scientific facts are not set in opposition to religious ideals. The ability to acquire knowledge, from the Baha'i point of view, depends upon having certain moral prerequisites.

"Gleanings from the Writings of Baha'ullah", LXXXII, p. 160
"Gleanings from the Writings of Baha'ullah", LXXXm, pl64-165
"Gleanings from the Writings of Baha'ullah", LXXXm, pl65

One of the most important of all these preconditions is the obligation to think for oneself and rely on one's own reasoning. The spirit of Baha'i enquiry entails taking the responsibility to carry out one's own investigations where possible, and to minimise the passive absorption of information from others. Blind imitation of other people's views is seen to be the main source of propagating prejudices. 'Abdul-Bahá states:

"Furthermore, know ye that God has created in man the power of reason whereby man is enabled to investigate reality. God has not intended man to imitate blindly his fathers and ancestors. He has endowed him with mind, or the faculty of reasoning, by the exercise of which he is to investigate and discover the truth, and that which he finds real and true he must accept He must not be an imitator or blind follower of any soul. He must not rely implicitly upon the opinion of any man without investigation; nay, each soul must seek intelligently and independently, arriving at a real conclusion and bound only that reality. The greatest cause of bereavement and disheartening in the world of humanity is ignorance based upon blind imitation"22.

Other spiritual prerequisites include being open-minded, striving to minimise prejudice, and being humble in one's investigations 23.
The Baha'i faith can only be considered to be "scientific in its method" in terms of its reliance on using one's own unique powers of mind, as opposed to the passive absorption of information from others. Only in this sense can the Baha'i faith said to be "scientific in its method"24. This phrase captures an important attitude of mind which characterises the Baha'i approach. The unique powers of mind upon which science is founded: its ability for creative abstraction, its truth-seeking nature, its ability to reason, its ability to be independent of social prejudices, its ability to perform courageous leaps of faith, and many more, are all seen to be just as indispensable to the progress of
religion, as they are to the progress of science. The individual Baha'i has an

'AbduT-Bahá, "Promulgation of Universal Peace", p291
'AbduTBahá, "Paris Talks", pl35-7
Shoghi Effendi, "World Order of Baha'uUah", pxi

obligation to use the same creative qualities of mind which underlie scientific investigation, in his or ha- study of religioa

'Abdul-Bahá states that:

"Consider what it is that singles man out from among created beings, and makes of him a creature apart. Is it not his reasoning power, his intelligence? Shall he not make use of these in his study of religion? I say unto you: weigh carefully in the balance of reason and science everything that is presented to you as religioa If it passes this test, then accept it, for it is truth! If, however, it does not conform, then reject it, for it is ignorance!"25.

Another important element within the Baha'i view of science is that science must in some way save society. Science is not separable from its effects in society. Baha'ullah warns of avoiding sciences that "begin in mere words and

end in mere words", and encourages the acquisition of "such arts and sciences, however, as are productive of good results, and bring forth their fruit acceptable before God"26. 'Abdul-Bahá after having given a discourse on the nature of science, states that: "How shall we utilize these gifts and expend these bounties? By directing our efforts toward the unification of the human race. We must use these powers in establishing the oneness of the world of humanity..."27. Science from this perspective, cannot be separated from its social consequences. Man has a special responsibility to use his creative powers of mind towards serving humanity. Without this end purpose in mind, developments in science are stated to endanger civilisation. Baha'ullah warned that "The civilisation, so often vaunted by the learned exponents of arts and sciences, will, if allowed to overleap the bounds of moderation, bring great evil upon mea...If carried to excess, civilisation will prove as prolific a source of evil as it had been of goodness when kept within the restraints of moderation"28. 'Abdul-Bahá echoes the same theme when he

'Abdul-Bahá, "Paris Talks", pl44
"Writings of Baha'ullah", p313

AbduT-Bahá, "The Promulgation of Universal Peace", p51
"Gleanings from the Writings of Baha'ullah", CLXHI, p341-2

stated that: "material progress alone does not tend to uplift man. On the contrary, the more he becomes immersed in material progress, the mere does his spirituality become obscured only if material progress goes hand in hand with spirituality can any real progress come about"29.
From the Baha'i perspective, the unity between science and religion can be understood on many different levels. Religion provides the scientist with faith in the unity of Nature, a belief in the rationality of Nature's laws. Religion also directs scientific discoveries to the service of mankind. It provides a moral framework for the application of scientific discovery. Science on the other hand can protect religion from falling into superstitious beliefs by always distinguishing the primary irreducible truths of religion from its secondary aspects, ones that are relative to the time and place in which it comes. Science for instance demonstrated that the belief of the earth to be 6000 years old, justified by some Christians from a literal interpretation of biblical text, was in fact mistaken. By doing so, science performed an invaluable service to Christianity. It showed that such a belief was not central to Christian doctrine, and forced Christians to redirect their attention to the irreducible truths of their religion, such as their belief in the power of humility, love, justice etc.

The Bahái view is often presented in terms of an image given by 'Abdul-Bahá, where he describes science and religion to be the two wings of a bird30.

With only the wing of science, he states that the bird of the Tiuman soul' will fall into the 'slough of materialism'. With only the wing of religion, he states
that humanity will fall into the 'quagmire of superstition'.

Science here is presented as a multi-level activity which has spiritual foundations. One way of approaching science might be to liken it to an iceberg. The tip of an iceberg is the only part visible above water level. The mountain of ice upon which the tip sits is not apparent from observation of the tip alone. In fact, there is no indication above the surface that the iceberg consists of a vast mass of ice which is expanding in size as it penetrates deeper
into the sea. Likewise, it is easy to underestimate the spiritual depth to science
and reduce it to visible and tangible parts. At a deeper level, science consists
of intellectual engagement, which involves problem solving and putting something to the test. Beyond the intellectual level, science involves moral

'AbduT-Bahá, "Paris Talks", pl07
'AbduT-Bahá, "Paris Talks", pl43

obligations and commitments, which include commitments to not falsifying one's results, an openess to criticism, and relying upon truth as the ultimate source of authority. Beyond this level and very much related to it, there is the
level of metaphysical involvement, bringing in intuitions about our place in the
cosmos, feelings of wonder and mystery, and faith in the power of our minds to understand Nature. The diagram below indicates some of the less visible but deeper aspects to science.

4. The Experience of Scientists

The positivist conception of science only partially captures the nature of scientific investigation. Formal methods erf logical reasoning and emparical tests, as attested by the great scientists of the past and many philosophers this
century, only capture surface layers of the true nature of science. Science is built upon spiritual foundations, and not empirical-mathematical ones. Some statements about the nature of science from scientists themselves can be used

to demonstrate this point. From the many examples which can be listed, only a few will suffice here.
The way in which Isaac Newton for instance looked upon his own lifetime's work in physics demonstrates that he considered science to be founded on an ocean of spiritual truths:

I do not know what I may appear to the world, but to myself
I seem to have been only a boy playing on a seashore, and
diverting myself in now and thai finding a smoother pebble
or a prettier shell than the ordinary, whilst the great ocean of
truth lay all undiscovered before me.31

Newton's view of his science is characteristic of pre-modern conceptions of science. Every scientific advance was seen to be washed up from out of an ocean of spiritual truths. Every scientific fact indicates the presence of deeper
truths beyond it. The nature of science according to this image is seen to be unfathomable. Empirical tests and observations, rational hypotheses, are likened to be "pebbles" on the shoreline of scientific truth, whose reality is intuitively believed to extend infinitely far beyond them.

Another indication that the nature of science penetrates far beyond formal procedures of logic and empirical observation was given by Neils Bohr. The revolution of quantum theory in physics necessitated a much mere profound view of science than the positivist one. Perhaps the greatest philosophical lesson of quantum theory is that absolute objectivity is unattainable in science.
When one inherently affects what one sees, absolute objectivity is impossible to maintaia An observation will always contain an inherent amount of uncertainty associated with it, generated by the "subject" influencing the "object". The mere the subject shares with the object, the greater the uncertainty produced. Under such circumstances, Neils Bohr states that we can only make progress in terms of "images and parables":

Quantum theory thus provides us with a striking illustration
of the fact that we can fully understand a connection though
we can only speak of it in images and parables. In this case,

Quoted on p207 of "Physics and Beyond", Werner Heisenberg, Harper and Row. 1971

the images and parables are by and large the classical
concepts, ie, 'wave* and 'corpuscle'. They do not fully
describe the real world and are, moreover, complementary
in part, and hence contradictory. For all that, since we can
only describe natural phenomena with our everyday
language, we can only hope to grasp the real facts by means
of these images. This is probably true of all general
philosophical problems and particularly of metaphysics. We
are forced to speak in images and parables which do not
express precisely what we mean. Nor can we avoid
occasional contradictions; nevertheless, the images help us
draw nearer to the real facts. Their existence no one should
deny. Truth dwells in the deeps'.32

Neils Bohr captures important characteristics of scientific investigation in the
above citatioa He expresses the belief that scientific investigation contains much more than can be expressed in explicit formal terms: "truth dwells in the deeps". It is a vision of science which understands human knowledge to only capture imperfect glimpses of the reality of the universe, and has obvious parallels in religion. Neils Bohr referring to the ban with which positivist philosophy would place on scientific investigation, stated that: "this ban would
prevent our understanding of quantum theory".33

Science is founded on an intuition of unity in the universe. It is based cm a conviction of the rationality of the universe, which cannot be demonstrated to be completely true. It requires faith. One can always be sceptical about such a faith, as Hume's philosophy clearly showed34.

All great advances in the history of science have brought our vision of the universe into a greater unity. This was demonstrated in ancient Greece, where the Ionian philosophers looked for the "One bdiind the Many", or in the science of Pythagoras, by his discovery of an equivalence principle between musical intervals and the numerical ratios of the length of a musical
instrument ,
Ibidp210 |
Ibidp208
see the book by Hume D., "A Treatise of Human Nature", Penguin Classics, 19S4

It is also evident in Netwon's physics when he showed that the same laws of motion which applied to projectiles on the surface of the earth also regulated planetary motion: the motion of a falling apple and moon were united together. Similarly in the middle of the 19th century James Clerk Maxwell showed that the Electric force and Magnetic force were in fact one single force -the electromagnetic force.

The equivalence principles discovered by Einstein also brought a vision of the universe in greater unity: of the unity between energy and mass or the unity between inertial and gravitational acceleration. All these discoveries in the history of science serve to demonstrate the same point: that progress in science
advances by integrating our vision of the universe into a wider scheme of unity. Scientific investigation is founded upon the conviction that the universe
is intelligible to us. Einstein for instance stated that: "The most incomprehensible thing about the universe is that it is comprehensible"35. The spirit of science is characterised by a search for universal truths. Science is based upon the value we place upon such a search. Scientific investigation entails the search for deeper and deeper meaning in the universe. Science is thus founded upon spiritual values: a search for meaning, a faith in the rationality and unity of the universe, and the search to acquire universal

truths.
Einstein expressed these spiritual characteristics in the following way:

> But science can only be created by those who are thoroughly imbued with the aspiration towards truth and understanding. This source of feeling, however, springs from the sphere of religion To this there also belongs the faith in the possibility that the regulations valid for the world of existence are rational, that is, comprehensible to reason I cannot conceive of a genuine scientist without that profound faith. The situation may be expressed by an image: Science without religion is lame, religion without science is blind36

Holton G. and Elkana Y., "Albert Einstein". p242, Princeton University Press. New
Jersey, 1982
Albert Einstein, "Out of My Later Years", p26. The Citadel Press, 1956

Science and religion find common ground in their search for universal truths. Universal truths cannot be compartmentalised From this perspective, if a scientist genuinely searches for universal truths, he or she will be naturally led
to religion, and correspondingly, a sincere member of a religious faith will be open to the results of scientific investigation.

Both science and religion also require a precondition of reverence. Science requires a respect within the subject for the object under study: an obligation to purge oneself of ego-centric prejudices. Likewise, religion also requires reverence. The scientist-philosopher Micheal Polanyi stated that: "we need reverence to perceive greatness, even as we need a telescope to observe spiritual nebulae"37. Both science and religion require a feeling of child-like humility. Newton pictured himself as a boy play on the shore of truth, while only those "born again", are said to be able to enter the "Kingdom of Heaven". There are obviously many more examples which can be given to show that there are parallels between science and rdigioa The main point here is that science is founded on spiritual values, and not on an impersonal method of logic or observation. Science is not independent of spiritual values, but it is rather founded upon them.

The principle of complementarity between science and religion may be likened to the union of the magnetic and electric force in dectromagnetism. James Clerk Maxwell discovered that the seemingly separate forces of electricity and magnetism were in fact one, and that light consisted of electromagnetic waves. The electromagnetic force, although embracing both the electric and magnetic force, is at the same time, something completely different. The unity of the electric and magnetic force is a creative form of unity, in the sense that their

union produces a new dimension, an effect which could not have been predicted from either force alone: two static forms of energy by coming together give rise to a dynamic form of energy which is able to propagate information throughout space. Electromagnetic energy is now constantly encircling the earth in the form of radio signals, satellite signals, television
signals etc and putting peqple from all nations into closer contact with one another.

Micheal Polanyi, "The Study of Man", p96, Routledge and Kegan Paul, London, 1958

Science and religion are at the moment considered by most modern western people to be two separate forces in human culture that have little to do with each other. But from the Baha'i perspective, they are both different aspects of a single deeper force, a force which drives us to uncover universal truths, a force which impels man to search for God, the force which will build the 'Kingdom of Heaven on earth'. 'Abdul-Bahá states that when the two forces of science and religion come together, there will be 'a great unifying, cleansing force in the world which will sweep before it all wars, disagreements, discords and struggles - and then will mankind be united in the power of the Love of God'38. Like the union of the electric and magnetic force, the outcome of bringing science and religion together will have far reaching consequences. A new dimension to human culture is prophesied to emerge, one which will encircle the earth with a lasting peace, a kind of peace not yet witnessed before.

'AbduT-Bahá, "Paris Talks", pl46