Islam and the Sciences of Nature: Some Fundamental Questions

MEHDI GOLSHANI

Introduction

The question as to what is truly meant by knowledge (*'ilm)* according to Islam has been around since the early days of Islam. Some scholars have limited the term to the specifically Islamic sciences. However, in the opinion of many Muslim scholars, the word is used in the Qur'ān in its generic sense and it includes a broad spectrum of sciences.

Viewed from a Islamic perspective, the criterion for the praiseworthiness of a field of knowledge is its usefulness, and this in turn means its having the capacity to lead one to God. Any field of knowledge which has this characteristic is praiseworthy and its acquisition is a kind of worship, and in this respect there is no difference between specifically religious sciences and the sciences of nature.

The broadness of the spectrum of praiseworthy sciences, from the Islamic point of view, can be seen from our Prophet's traditions like: "Seek knowledge by even going to China, for seeking knowledge is incumbent on every Muslim".[1] It is also narrated from Imām 'Alī that: "Knowledge is the lost property of a believer. Thus seek it even if it be with polytheists". [2]

It is obvious that these traditions do not refer to specifically religious sciences or else the Prophet (peace be on him) would have not recommended its acquisition from non-believers. Sayyid Quṭb, in his commentary on the Qur'ānic verse: "And certainly we gave knowledge to David and Solomon ..." (27: 15), confirms this view:

> In this verse the kind of knowledge and its subject matter are not specified, because it considers knowledge in its generic sense. There is also a hint that all kinds of knowledge are a gift from God and any possessor of knowledge is

[1] Jalāl al-Dīn 'Abd al-Raḥmān ibn Abī Bakr al-Suyūṭī, *al-Jāmi' al-Ṣaghīr min Ḥadīth al-Bashīr al-Nadhīr* (Damascus: Maktabat al-Habūnī, n.d.), 1: 143.

[2] Ibn Abd al-Birr, *Jāmi' Bayān al-'Ilm wa Faḍlih* (Beirut: Mu'assasat Kutub al-Thaqāfah, 1415 AH), 1: 122.

> supposed to recognize the source of his knowledge and should turn up to God and be thankful to Him. He should also utilize it for attaining the consent of God, who has granted him that knowledge ... The knowledge which causes separation between man's heart and God is nothing but aberration.[3]

In short, a praiseworthy knowledge is one that is symbolic of Imām 'Alī's words: "The fruit of knowledge is worship".[4]

This concept of knowledge was, in fact, prevalent among the distinguished scholars of the golden era of the Islamic civilization, and it was due to this understanding of the Qur'ān and the *Sunnah* that they acquired knowledge from other nations as well and added to it. In their worldview, the study of nature included both physical and metaphysical elements, and all fields of knowledge were considered the branches of a single tree whose root was Islamic metaphysics. Thus, according to the Islamic point of view, all fields of knowledge are important. Part of our knowledge is the revealed one and the other parts are gained through experimentation, observation, theoretical reasoning and intuition. But the word 'knowledge' is applicable to all of them, including the sciences of nature. Furthermore, no field of knowledge is undesirable intrinsically. It is due to some other reasons, e.g. its destructive application, etc., that a field of knowledge becomes undesirable.

The Muslim scholars of the time when Islamic civilization flourished emphasized that the motivation behind their seeking natural and mathematical sciences was to become acquainted with the signs of God in the universe. In their view, each of these sciences shows some dimension of God's creation, and all sciences are organically inter-connected. Thus, Muslim scholars did not separate the study of nature from their religious worldview, and they sought inclusive frameworks within which they could explain the whole nature. The idea of the unity of the Creator and the harmony of the creation is a fundamental principle which permeates all these sciences. The Islamic art shows the return of all multiplicity to unity and the Islamic science shows the unicity of design in nature.

In the Qur'ān, the word '*ilm* (knowledge) is used for both the sciences of nature and other kinds of sciences, and the study of nature is recommend for the sake of discovering the patterns of God in the universe and in order make use of the knowledge thus derived for the benefit of humanity.

According the Islamic worldview, everything revolves around God. God is the only one to be praised and worshipped. Other things are secondary and are praiseworthy if they lead us to God. In the words of the Qur'ān: "This is

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[3] Sayyid Quṭb, *Fī Ẓilāl al-Qur'ān* (Beirut: Dār al-'Iḥyā al-Turāth al-'Arabī, 1386 AH), 6: 262–263.
[4] 'Abd al-Wāḥid al-Āmidī al-Tamīmī, *Ghurur al-Ḥikam wa Durar al-Kalim* (Qum: Dār al-Kitāb al-Islāmī, 1410 AH), 326.

because God is the Truth and that what they call upon besides Him — that is the falsehood ..." (22: 62)

The search for this absolute Truth is our main task, and of course there are many ways to accomplish it. All of these are considered to be God's worship. The study of nature for the sake of revealing God's signs in nature is a kind of worship. This, because in the Qur'ān, God repeatedly refers to theses signs: "And one of His signs is the creation of the heavens and the earth and the diversity of your tongues and colours; surely, there are signs in this for the learned". (30: 22) Imām 'Alī considers the reflection on God's creation to be the best kind of worship: "There is no worship like reflection on God's creation".[5] Furthermore, it is mentioned in the Qur'ān that enough of God's signs in the nature and in our souls is going to be revealed to ensure the humans that God is the Truth: "We will soon show them Our signs in the universe [litrally, "horizons"] and in their own souls, so that it becomes clear unto them that He is indeed the Truth..." (41: 53)

According to the Qur'ān, the study of natural phenomena teaches us some important lessons about the following subjects:

♦ The origin and the evolution of the world:

> Say: travel in the earth and see how He made the first creation ... (29: 20)

♦ The presence of order and harmony in the universe:

> . . . Who created everything, then ordained for it a measure ... (25: 2)

♦ The presence of a telos to the universe:

> And We did not create the heaven and the earth and what is between them for sport. (21: 16)

♦ The significance of humanity: the Qur'ān honours humanity and talks about all kinds of possibilities provided for the humans in the heavens and the earth:

> And surely We have honoured the children of Adam, and We carry them in the land and sea, and We have given them of good things, and We have made them to excel over most of those whom We have created. (17: 70)
>
> And He has made subservient to you what is in the heavens and what is in the earth ... (45: 13)

[5] Muḥammad Rayshahrī, *Mīzān al-Ḥikmah* (Tehran: Dār al-Ḥadīth, 1416 AH), 3: 2465.

♦ The possibility of resurrection:

> God sends forth the winds which set the clouds in motion. We drive them on to some dead land and revive the soil after its death. Such is the Resurrection. (35: 9)

υ Argument on the unity of God from the unicity of nature.
The study of natural phenomena has shown the interrelatedness of different parts of nature, at last at a deeper level. This is shown to be a sign of the unicity of the creation. From the Qur'ānic point of view, this unicity of the creation is an indication of the unity of the Creator:

> If there had been in them [i.e. the heavens and the earth] any gods except God, they would both have certainly been in a state of disorder ... (21: 22)

The search for a unified picture of the universe has been an all-time endeavour. Newton tried to give a single description of the terrestrial and celestial motions. In our era, physicists have tried, through their grand unified theories, to reduce all of the fundamental forces of nature to one. But, according to Andre Linde, the well-known Russian cosmologist, this search for unification is rooted in the monotheistic religions:

> The whole of modern cosmology has been deeply influenced by the Western tradition of monotheism ... the idea that it is possible to understand the universe through one ultimate 'theory of everything' is an outgrowth of belief in one God.[6]

Some Fundamental Questions

We have noted that in the Qur'ānic vision, the study of natural phenomena can teach us about the nature of things, the presence of order in nature, etc. Now the question arises as to whether empirical knowledge can supply the response to these questions by itself or that it needs metaphysical reflection. The following questions elaborate on this point.

1. What is the Relation between Science and Religion in the Islamic worldview?

In the Islamic outlook, science and religion have the same metaphysical base, and the goal of both revealed and acquired knowledge is to discover God's signs and attributes. Thus, one can consider scientific activity as a part of the religious duty, with the qualification that it has its own methodology and language. We believe that the alleged inconsistency between science and

[6] Andre Linde, quoted by Jane Lampman, "In Search of the 'One Reality'", in *Christian Science Monitor* (May 9, 1998), B4.

religion, as claimed by some people in the past or in our own time, is either due to not recognising the limitations of science by some scientists or due to the improper interference of religious authorities in scientific matters. In the West, too, some eminent scholars have considered scientific activity as part of religious experience. In the words of Charles Townes, the Nobel laureate in physics: "I don't myself separate science and religion, but regard our exploration of the universe as part of religious experience". [7]

The Qur'ān, however, warns us that the study of nature can take one from the creation to the Creator only if one has already some faith in God: "Say: consider what is it that is in the heavens and the earth; and signs and warners do not avail a people who would not believe". (10: 101)

Thus, if a scientist approaches nature with faith in God, his faith may be fortified by his scientific activity. Otherwise, the study of nature by itself cannot necessarily lead to God. This is because scientific activity is always accompanied by metaphysical presuppositions of the scientist, though one may not be aware of them. Thus, it can lead one to God if one's metaphysical framework is sound.

On the other hand, religious faith can provide a good motivation for scientific work. In fact, this was the main motivation behind the work of the great scientists of the golden era of Islamic civilization. As the celebrated Muslim scientist al-Bīrūnī put it: "Sight connects what we see to be the signs of Divine wisdom in creation and deduces the existence of the Creator". [8] Levy explains the outlook of those Muslim scientists elegantly: "Apart from a small number of investigators inspired by Greek philosophic ideas, the Muslim who engaged in the pursuit of science did so ... in order to discover, in the wonders of nature, the signs or tokens of the glory of God". [9]

Another effect that religion can have on science is in the area of the applications of science. Religion can be helpful in orienting science in the direction of strengthening the spiritual capacities of humans and in the prevention of the use of science for destructive purposes.

2. What are the Ways of Understanding Nature?

From the Qur'ānic viewpoint, there are several avenues for getting information about the external world.

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[7] T. D. Singh and Ravi Gomatam, eds., *Synthesis of Science and Religion* (Bombay: The Bhaktivedanta Institute, 1987), 141.

[8] Al-Bīrūnī, *al-Jamāhir fī al-Jawāhir* (Tehran: Shirkat al-Nashr al-'Ilm wa al-Thaqāfah, 1374 AH), 77.

[9] R. Levy, *The Social Structure of Islam* (Cambridge: Cambridge University Press, 1967), 460.

(i) Sense Impressions

Here we mean those impressions that have been received by our senses through experimentation and observation: "Will they not then consider the camels, how they are created? And the heaven how it is reared aloft? And the mountains, how they are firmly fixed"? (88: 17–19)

(ii) Reasoning

According to the Qur'ān, experimentation and observation are necessary for acquiring knowledge about the external world, but they are not enough for the interpretation and correlation of the experimental data. In fact, what distinguishes humans from animals is not their external senses; rather, it is their reasoning and reflection on the empirical data: "... they have hearts with which they do not understand, and they have eyes with which they do not see, and they have ears with which they do not hear; they are as cattle, nay, they are in worse errors; these are the heedless ones". (7: 179) Furthermore, the Qur'ān emphasizes that besides the information rooted in sense impressions, there are many realities of the world that are not accessible through empirical data: "Glory be to Him Who created pairs of all things, of what the earth grows, and of their kind, and of what they do not know". (36: 36)

Thus, while the Qur'ān invites us to study nature empirically, it lays emphasis on intellection and reasoning. Therefore, we are not supposed to stop at the level of sensory data; rather, we should go beyond the observable part of nature and explore supra-sensible realities.

(iii) Intuition

In the Qur'ānic view, in addition to experimentation and intellection, there is another means for obtaining knowledge about the realities of the world.[10] This is intuition, which is not available to everybody and at all times. At the higher level, this is the revelation which is specific to the prophets, and at the lower levels it is inspiration which is at times seen in some scholars. The significance and role of intuition has been mentioned by some of the eminent scholars of our time.

3. Is the Universe, in its Totality, Comprehensible through Science?

Empiricists believe that sensory data are the only source of knowledge. Thus, science has got to get rid of metaphysical concepts because they are not rooted in sense experience.

[10] See, Mehdi Golshani, *The Qur'ān and the Sciences of Nature* (Binghamton, New York: Binghamton University and Brigham Young University, 1999), 157–169.

Since the second half of the nineteenth century, various forms of empiricism, such as positivism and operationalism, emerged. The common factor between all these schools of thought was their limitation of knowledge to sense-based data and their denial of metaphysics. In their view, sense-based knowledge is the only way to get to the truth, and truth is equivalent to what can be acquired through this source. This outlook affected all circles of the first half of the twentieth century and we still witness its influence in the academic circles. However, during the last several decades it has become increasingly more evident that the empiricists' outlook is a superficial one and is not confirmed by a detailed study of the history of science. [11]

In short, there are several points about the sensory data that have to be taken into account:

(i) According to the Qur'ān, Our knowledge about the external world is not restricted to the one rooted in sense-based data: "They know the outward of the world's life, but of the Hereafter they are absolutely heedless". (30: 7)

(ii) Human knowledge is very limited. As the Qur'ān says: "And they ask you about the soul. Say: The soul is one of the commandments of my Lord, and you are not given aught of knowledge but a little". (17: 85)
Thus, there are realities in the world that we are not aware of: "But nay! I swear by that which you see. And that which you do not see". (69: 38–39)

(iii) The Qur'ān also emphasises that we should believe in the existence of supra-sensible realities:
"This Book, there is no doubt in it, is a guide to those who fear God. Those who believe in the ghayb [the unseen] and keep up prayer and spend of what we have given them". (2: 2–3)

In fact, human beings are only aware of the surface of the world and are not aware of the hidden dimensions of the universe and its telos. This is because the natural world forms only a small part of the whole reality.

The progress in science in the last two centuries has led some people to claim that everything is expressible in terms of empirical science. As Edward Wilson, the well known contemporary sociobiologist, put it: "It may not be too much to say that sociology and the other social sciences, as well as the humanities are the last branches of biology to be included in the Modern Synthesis".[12] Wilson thinks that even morality can ultimately be explained by biology, which in turn is reducible to physics and chemistry, if one believes in

[11] For a full length exposition of this subject, see, Mehdi Golshani, *From Physics to Metaphysics* (Tehran: Institute of Humanities and Cultural Studies, 1997).
[12] Quoted in Mikael Stenmmark, "What is Scientism", *Religious Studies*, 33 (1997), 16.

strict reductionism.[13] The same idea is shared by Francis Crick: "Eventually one may hope to have the whole of biology 'explained' in terms of the level below it, and so on right down to the atomic level ... The knowledge we have already makes it highly unlikely that there is anything that cannot be explained by physics and chemistry". [14]

But during the last several decades many distinguished scholars have challenged the view that consciousness is explainable by the physical sciences. Kurt Gödel, one of the leading figures in mathematical logic, wrote in his 1971 letter to H. Wang:

> I don't think the brain came in the Darwinian manner. In fact, it is disprovable. Simple mechanisms can't yield the brain. I think the basic elements of the universe are simple. Life force is a primitive element of universe and it obeys certain laws of action. These laws are not simple and not mechanical. [15]

Wielder Penfield, the great Canadian brain surgeon, believes in the duality of mind and brain:

> Because it seems to me certain that it will always be impossible to explain the mind on the basis of neuronal action within the brain, and because it seems to me that the mind develops and matures independently throughout an individual's life as though it were a continuing element, and because a computer (which the brain is) must be programmed and operated by the agency capable of independent understanding, I am forced to choose the proposition that our being is to be explained on the basis of two fundamental elements ... mind and brain as two semi-independent elements.[16]

Eccles, the well-known British biologist, talks about the uniqueness of the brain: "The longer we go on understanding the performance of the human brain, the more remarkable does it become, the more unique are we from anything else in the material world". [17]

Likewise, Wigner, the Nobel Laureate in physics, believes that explanation of life is beyond the scope of the present day physics: "The question then arises: Are there other phenomena which are still outside of physics' interest? Some deny it, but it seems to me evident that life is not described by present-day physics". [18]

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[13] Ibid., 26.
[14] Ibid., 17.
[15] John Cornwell, ed., *Nature's Imagination* (Oxford: Oxford University Press, 1995), 173.
[16] T. D. Singh and Ravi Gomatam, eds., *Synthesis of Science and Religion*, 18.
[17] A. Varghese, ed., *The Intellectuals Speak out about God* (Chicago: Regenery Gateway, 1984), 50.
[18] T. D. Singh and Ravi Gomatam, eds., *Synthesis of Science and Religion*, 261.

Wigner also believes that consciousness is a non-physical entity and he adds that if physics is ever to be able to explain life, it must seek new concepts and new foundations.

4. What are the Limitations of Science?

With the rapid development of modern science and its consequent success in the applied domain, it virtually became the sole arbitrator of all matters pertaining to knowledge in the first half of the twentieth century. This led to the weakening of the metaphysical concern among scientists. The dominance of various schools of empiricism fortified this attitude, so that some people considered it to be Omnipotent, being able to respond to all questions of human concern.

The empiricists' outlook has been challenged in the last few decades on several grounds:

(i) The ability of science to answer humanity's ultimate questions has been disputed. In the words of Peter Medawar:

> That there is indeed a limit upon science is made very likely by the existence of questions that science cannot answer and that no conceivable advance of science would empower it to answer. These are the questions that children ask — the 'ultimate questions' of Karl Popper. I have in mind such questions as:
>
> How did everything begin?
>
> What are we all here for?
>
> What is the point of living?[19]

Medawar further observers: "It is not to science, therefore, but to metaphysics, imaginative literature or religion that we must turn for answers to questions having to do with first and last things".[20]

Anna Harrison, the former president of the American Association for the Advancement of Science, puts the matter very elegantly:

> It is my impression that sometime in the past, either the scientific community oversold or the public overbought science and technology. There are questions that science cannot address and things that science and technology cannot accomplish.[21]

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[19] Peter Medawar, *The Limits of Science* (Oxford: Oxford University Press, 1984), 66.
[20] Ibid., 60.
[21] Anna J. Harrison, "Reflections on Current Issues in Science and Technology", in *Science*, vol. 215 (26 February, 1982), 1062.

In short, questions about various kinds and different levels of existence are beyond the capacity of science. Similarly, response to questions about God, spirit, immortality of soul and human free will cannot be explained through science.

(ii) Science raises some questions that are relevant to its subject matter but whose explanations are beyond science's capacity. We would just cite a few examples:

- Where do the laws of physics come from?
- Why can we comprehend the laws of physics?
- Why should there be a universe in which such laws exist?

In short, the explanation of the foundations of science and the reasons for its success is to be sought outside of physics. In the words of Roger Trigg, the eminent British philosopher: "For science to explain everything, we need a reason for trusting science".[22]

According to the Islamic worldview, the world is designed by God and we can comprehend it because both the external world and our minds are made by the same Creator Who provided a concordance between them. In the Qur'ān it is mentioned that God is the Donor of knowledge to humans: "And He taught Adam all the names ..." (2: 31)

Further, God has gave them the capacity to understand the world: "And God has brought you forth from the wombs of your mothers — you did not know anything — and He gave you hearing, and the sight and the heart so that you may give thanks". (16: 78)

(iii) We never encounter the nature with empty minds; rather, our interpretation of the empirical data depends strongly on our metaphysical presuppositions which affect our theoretical analysis. For example, we do not infer the concept of causality from our sense experience. Our sensory impressions show only the succession of two events. The inference of causal relationship between two events is due to an intellectual activity.

(iv) Sometimes we make use of some concepts which are not deduced directly from experience (e.g. quarks). Strict empiricism forbids the use of such useful concepts.

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[22] Roger Trigg, *Rationality and Science: Can Science Explain Everything?* (Oxford: Blackwell, 1983), 9.

(v) The work of every scientist is implicitly or explicitly based on some general principles. These so-called 'guiding principles' or 'regulative principles' are metaphysical principles which provide the framework for the scientist's work. Dirac considered mathematical beauty as a criterion for the acceptability of a theory. Heisenberg considered mathematical simplicity as a guiding principle. In the Islamic outlook, the unicity of nature is a fundamental principle.

In fact, science cannot work without some ultra-scientific hypotheses. For example, the reliability of empirical data, or the capacity of human intellect for understanding the physical world is always assumed. This implies that science is not self-sufficient. Furthermore, the choice between scientific theories is dependent on the metaphysical or ideological biases or predilections of the scientist involved.

(vi) Some eminent scientists have confessed that their denial of metaphysical principles was based on a philosophical choice. For example, Max Born confessed, in 1926, that his rejection of determinism was a philosophical decision, rather than a physical one: "I myself am inclined to give up determinism in the world of atoms, but that is a philosophical question for which physical arguments alone are not decisive". [23]

(vii) According to Gödel's theorem, to show the consistency of an axiomatic system based on mathematics one has to go beyond that system. This theorem has important implications for the physical sciences where mathematics plays a fundamental role. Thus, to explain science and its success one has to go beyond science.

The well known physicist, Freeman Dyson, illustrates the limitation of our knowledge in an elegant way: "Every time we introduce a new tool, it always leads to new and unexpected discoveries, because Nature's imagination is richer than ours".[24]

(viii) Some of the philosophical foundations of modern science has come under attack and alternative views have been put forward. The reason for this change of attitude is the following:

- Some significant developments in science have challenged the mechanical worldview, i.e. the reduction of our whole knowledge about the world to

[23] Max Born, "On the Quantum Mechanics of Collisions", in J. A. Wheeler and W. H. Zurek, eds., *Quantum Theory and Measurement* (Princeton: Princeton University Press, 1983), 54.
[24] John Cornwell, ed., *Nature's Imagination*, 11.

mechanical categories. In the words of the Nobel Laureate in Medicine, Maurice H. Wilkins:

> The very complicated properties of nonliving matter begin to overlap with the properties of the simplest type of living material. But I don't agree with the molecular biologists who think that the whole nature of life can be comprehended in terms of molecular biology alone. I think that is a very simple minded, mechanistic way of life.[25]

- The establishment of a proper interaction between us and nature is necessitated by the ecological crisis of our time.
- Recent studies in the history of science have shed light on some of the past misunderstandings between scientists and religious authorities.
- Some new attitudes have emerged which emphasize holism, unification, etc. For example, some scholars have talked of the existence of various levels of knowledge and Bohm talked about hidden orders in nature.

(ix) Some scholars have suggested that while scientific knowledge can disclose some aspects of our universe, it cannot be taken as absolute knowledge. Other fields of knowledge can show other aspects of the universe. In the words of de Espanga, the eminent French physicist-philosopher: "It now seems plausible that approaches other than science (I mentioned music, painting and poetry) should also, concurrently with science, be capturing some undefinable something of the structure of independent reality".[26]

In fact, since the world is not a simple one-dimensional structure, one can make use of complementary descriptions of it. In an art gallery, different people get different impressions. A mathematician enjoys the symmetries he notices in various paintings, whereas a chemist is attracted to the chemical components of the paintings. All of these perspectives are valid and they are consistent with each other and refer to different aspect of the same thing. Thus, the present day science has to be framed within a suitable metaphysical matrix which can accommodate all levels of human knowledge and experience. As George Ellis put it: "We should use broad criteria that take into account the whole range of human experience, and not just that part which can be scientifically described".[27]

It is significant that this kind of outlook was prevalent among the eminent scientists of the glorious era of Islamic civilization and it was rooted in Islamic teachings.

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[25] T. D. Sing and Ravi Gomatam, eds., *Synthesis of Science and Religion,* 33.

[26] Bernard d'Espagnat, "Veiled Reality", in P. Lahti and P. Mittelstaedt, eds., *Symposium on the Foundations of Modern Physics* (Singapore: World Scientific, 1987), 160.

[27] George Ellis, *Before the Beginning* (London: Boyars Bowerdeam, 1993), 86.

(x) Belief in God requires belief in a reality infinitely greater than the physical universe. The acceptance of a spiritual dimension for the reality brings in the role of non-material factors. That is, for the complete understanding of nature one has to recognize both material and non-material causes. The neglect of non-material causes and the emphasis on material ones alone leaves many questions unanswered. Of course material causes are themselves dependent on non-material causes. Without non-material causes, which are sometimes called vertical causes, material causes (horizontal causes) would not exist. These two kind of causes find their proper relation in the Islamic worldview which has a holistic approach to causes.

5. What is 'Islamic Science'?

The idea of Islamic science has been around for the last thirty years. The usual argument against this concept is that science is free of values and ideological considerations. Thus it makes no sense to talk of 'Islamic science' or 'Christian science'. This argument, however, neglects the fact that all theories of science, especially all fundamental theories, involve some metaphysical presuppositions, and these are rooted in the scientists' worldviews. Recent work in the philosophy and sociology of science supports this claim. Thus, one can define 'Islamic science' as the kind of science in which our knowledge about the physical world is embedded in the Islamic worldview. [28]

There is another area where the difference between religious science and secular science appears: it is in the domain of the practical applications of science. The Islamic worldview orients, as do other theistic religions, the applications of science in the direction of securing the spiritual welfare of humanity and prevents its use for destructive purposes.

Conclusion

In the Qur'ānic view, the study of nature is really the study of the signs of God. Therefore, scientific work is to be considered some kind of religious activity.

The scientific study of nature, in an Islamic context, has the following characteristics:

(i) Such a study should be pursued within the framework of the Islamic worldview. This worldview is characterised by a holistic approach and is premised on the unicity of nature, which is an indication of the unity of the nature's Creator. The idea of unity of the Creator is the fundamental principle of Islam and overrules all other ideas.

[28] Mehdi Golshani, "How to make sense of Islamic Science", *American Journal of Islamic Social Sciences*, vol. 17, no. 3 (Fall 2000).

(ii) The aim of studying nature, in the Islamic view, is to lead humans to God, and to highlight His attributes.

(iii) The physical and biological sciences do not reveal to us all aspects of nature. With the net of these sciences, only certain things could be hunted. More delicate objects are beyond this net. Sir Arthur Eddington likened science to casting a net into the sea. A three-centimetre net is ineffective in catching creatures in the sea smaller than three centimetres.[29] In fact, there are many ways to look at the world, and each perspective shows certain aspects of the world. Science studies nature, and religion deals with the question of whether there is anything beyond nature or not. It is not logical to attempt to determine through science, i.e. the study of nature, whether there is anything beyond nature or not.

Scientific knowledge should be embedded in a metaphysical framework in which the higher levels of knowledge are recognized and the task of science in bringing us closer to God is accomplished.

(iv) Modern science has neglected teleology. Some scholars believe that the world has no purpose. Other scholars consider teleology useless. Also, there are scientists who consider teleology harmful to scientific activity. In the Qur'ānic view, however, the world has a telos and we are warned about neglecting teleological considerations: "Do they no reflect within themselves: God did not create the heavens and the earth and what is between them but with truth, and (for) an appointed term? And most of the people are deniers of the meeting of their Lord". (30: 8)

(v) In the Islamic outlook, there exists a hierarchy of knowledge, and reductionism, in the sense of reducing everything to matter or every piece of knowledge to sense data, has no room.

(vi) In our time, human sciences like psychology, sociology, etc., are under the influence of physical and natural sciences and their methodology. In fact, our scientific societies do not see any fundamental difference between the human sciences and the physical and biological sciences. Some scholars reduce morality to a social phenomenon, and in describing human beings they limit themselves to physical motivations, sexual instincts, abnormal behaviours, etc. But the subject of human sciences is not an inanimate object which is indifferent to the attitudes and behaviours of the observing agent. Humans can hide their real personality from the one who is investigating them. What most of the contemporary scholars of psychology and sociology neglect is the fact that not all of information about human behaviour is obtainable by our senses, and that it is not possible to reduce moral or spiritual dimensions of human life to its material manifestations. In fact, the contemporary schools in sociology and psychology try to understand human beings and societies through the same tools that are used for the understanding of inanimate matter. But it is not possible to extend the results of our findings about inanimate matter to the whole of reality.

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[29] Michael Poole, *Beliefs and Values in Science Education* (Buckingham: Open University Press, 1995), 91.

(vii) Science in the Islamic outlook is supposed to show the interrelatedness of all part of the universe. Of course, when one is about to gather empirical data, one has to pay attention to details and this necessitates the division of knowledge into various disciplines. But one is not supposed to forget the whole at the expense of the parts. Therefore, the eminent Muslim scholars of the past always paid sufficient attention to the synthetic aspect of their knowledge, rather than being content merely with the analytical aspects.

Today scientists are completely occupied with their specializations and are satisfied with the prevalent fragmentation of human knowledge. This, however, has come under severe criticism of some of the giants of the contemporary science. Thus Heisenberg, for instance, complains that excessive specialization has deprived us of the ability to have a unified picture of the nature:

> To-day the scientist's pride is love of detail, the discovery and systematizing of the smallest revelations of nature within a narrowly circumscribed field. This is naturally accompanied by a higher esteem for the craftsman in a special subject, the 'virtuoso', at the expense of an appreciation of the value of interrelations on a larger scale. During this period one can hardly speak of a unified scientific view of nature, at least not as far as content is concerned. The world of the individual scientists is that narrow section of nature to which he devotes his life's work. [30]

But he adds that the hope that it will be possible to comprehend the interrelated whole is the driving force for our work too:

> Thus we are no longer in the happy position of Kepler, who saw the interrelations of the world as a whole as the will of its creator, and who believed himself, with his knowledge of the harmonies of the spheres, to be on the threshold of understanding the Plan of Creation. But the hope for a great interconnected whole which we can penetrate further and further remains the driving force of research for us too.[31]

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[30] W. Heisenberg , *Philosophical Problems of Quantum Physics* (Woodbridge, Connecticut: Oxbow Press, 1979), 80.
[31] Ibid., 94.