

HOLISTIC APPROACH TO SCIENTIFIC TRADITIONS

Alparslan Açıkgenç

There are at least two perspectives which must be taken into consideration when evaluating a scientific tradition; epistemological, because it is the result of an activity of acquiring knowledge, and sociological, because as a tradition it is the outcome of a community of scholars actively involved in acquiring that knowledge. If both of these perspectives are held together in all their aspects, then we shall have a holistic approach in evaluating a scientific tradition. Unfortunately, most explanations offered for the decline of science in the Muslim world neglect both of these perspectives. In this paper I attempt to explain from these perspectives that Islam has a viable relationship with science and secondly, offer my view concerning how these two perspectives solve the problem of revival of science in the Muslim world.

Keywords: Islam and science; sociology of science; epistemology of science; scientific community; scientific tradition; science and religion; scientific progress; scientific process; worldview; holistic approach; contextual causes.

Introduction

A perspective is the position of an investigator who views the subject under investigation from that particular position. As human beings we cannot be “perspectiveless”. Since it is also our perspective that provides us with a view to look at things and the fact that we cannot be “perspectiveless”, whatever activity we do, we will necessarily put it within that perspective. If our activity is scientific, for example, it will be from our own perspective that is gradually developed through our education, which in turn has a broader perspective of our past educational and scientific perspectives. This broader perspective can be called “scientific tradition” if it involves our scientific past and present. If we define our perspective with clear borders, then we draw a “framework”. Depending on the nature of our

Alparslan Açıkgenç is Professor of Philosophy, Fatih University, Buyukcekmece 34500
Istanbul, Turkey; Email: alpali@fatih.edu.tr

activity both our perspective and our framework can be abstract or concrete with varying degrees of intensity between these extremes. Since science is a conceptual activity, both perspective and framework will also be conceptual. From this theoretical background we can define a scientific tradition as that accumulation of scientific knowledge and practices, in its civilization, of the scholars and the practitioners of science from the perspective of its worldview but within the framework of its epistemology. On the basis of this definition, Western scientific tradition is, for example, the accumulated scientific knowledge and practices carried out through the epistemology of the Western worldview, together with a set of cultural values and mores that grew out through time among the network of scholars actively engaged in scientific activities in the West. The same is valid for Islamic scientific tradition and all other such traditions.

Two factors stand out in this definition: a perspective and an environment. The perspective is necessarily epistemological, and it *is*, in fact, epistemology of science; whereas the second is sociological that can also be expressed as sociology of science. Both of these factors have many intricate issues and phenomena involved in the complex structure of scientific activities. If we try at least to keep in view all these aspects, issues and phenomena in general then we can develop a holistic attitude in evaluating a scientific tradition. Any other evaluation is to be held only as a scholarly examination of an aspect of such a tradition and nothing more. In this brief attempt we shall try to offer here only certain aspects of the epistemology and the sociology of Islamic scientific tradition. This way we hope that we shall be treating Islamic scientific tradition with the holistic approach as defined above.

The Epistemological Framework

That mental framework which is followed naturally and/or actively by human activity can be defined as the 'epistemic ground' of that activity. Knowledge proceeds from a mental framework naturally, if it arises purely out of the capacities of our epistemological faculties; but it follows from that framework actively if it arises out of all kinds of experiences of the subject. Therefore, if an activity springs only naturally from the epistemic ground, then it depends totally on the general process of knowledge. If the activity arises actively, and/or naturally from experience as well, then it includes many social aspects.

In examination of the former aspect we can try to decipher Islamic epistemology on which scientific activities are based in that civilization. This epistemology is not a pure theory of knowledge, but only an aspect of

it as epistemology of science. Therefore, I need not dwell upon formulating a theory of knowledge, but rather concentrate on how to decipher the epistemology of science valid within an Islamic worldview. If the mental framework out of which a human activity follows is the ‘epistemic ground’ of that activity, then from the activity we may proceed toward the mental framework, which must be the epistemology of science we are looking for. The activity in question is *science* and not a daily activity such as sleeping, eating, or doing routine work. A scientific activity is a process of acquiring knowledge; as such it must have a mental foundation and like all other activities it must have an immediate mental foundation which is not difficult to identify. What kind of mental tools do we use when we are actively involved in doing science? These tools can easily and safely be identified as the immediate mental foundation of our scientific activities. Suppose that I am a physicist; what are the mental tools I use in my scientific activities in physics? I can clearly identify these as the concepts and basic physical notions developed through time in that science. The total network of these concepts forms a mental scheme in the mind of any physicist, as in mine, and as such can be termed “the specific scientific conceptual scheme”. It is then this conceptual scheme that is the immediate mental background of all scientific activity in any civilization. We do science primarily from this mental framework and thus we may usually be aware of it because it is directly attached to the activity as such. But if we examine our specific scientific conceptual scheme, we shall find out that as a mental framework it is not sufficient to support itself and ultimately our scientific activities. This scheme is derived from, and as such assumes, a broader framework which supports it conceptually. Thus, the framework which supports my specific scientific conceptual scheme may not be immediately relevant to my scientific activities as a physicist, but it is derived from my general scientific background and thus belongs to my general scientific training. This broader framework also forms a network of concepts that are relevant to science and scholarship in general. It thus includes in it general concepts and doctrines which I utilize in my mind to justify epistemologically my scientific activities in physics. Since it also forms a scheme in my mind we can term it “the general scientific conceptual scheme”. This scheme encompasses my understanding of scientific knowledge and such concepts as science, truth, method and theory. It is clear, I hope, from our analysis that besides these there cannot be any other mental framework that is deducible directly from our scientific activity. On the other hand, it is not difficult to follow that mental

frameworks cannot end at the general scientific conceptual scheme; there must be further mental background to support conceptually our scientific schemes. That framework can be identified as the knowledge structure¹ within the worldview of the scientist, and since there cannot be any broader mental framework than the worldview we can confidently identify it as the ultimate mental framework out of which all scientific activities follow.

Our brief summary of the general epistemology of science, then, posits three mental frameworks that are based on one another: (1) the most general framework or worldview; (2) within the worldview another mental framework supporting all our epistemological activities, called “knowledge structure”; (3) the general scientific conceptual scheme; and (4) the specific scientific conceptual scheme. Among these, worldview is the perspective from where we view science - so to speak, the knowledge structure determines our attitude towards science and as such it makes up the framework which is utilized in our perspective to carry out scientific activities. The rest of the schemes are also frameworks which primarily determine our understanding of science and how to carry out scientific activity. Epistemology resembles anatomy in that if there is one human anatomy then there is only one human epistemology. Hence, it cannot change from society to society. On the other hand, just like the fact that the anatomy of the human digestion system, for example, is universal, but the human culinary art exhibits a variety of forms, our epistemology of science is also universal but with varying forms of traditions in different societies. This compels us to apply our epistemology to different scientific traditions. Our essay is concerned with its application to the Islamic scientific tradition.

Epistemology of the Islamic Scientific Tradition

The most general framework of the Islamic scientific tradition is the Islamic worldview. It is possible to analyze this framework into four comprehensive structures, which are named according to their doctrinal concepts dominating the framework: (1) world structure, *Īmān*; (2) knowledge structure, *al-‘ilm*; (3) value structure, *al-fiqh*; and (4) human structure, *khalīfah*. As it is seen all structures are dominated by a doctrinal

1. For a detailed discussion of worldview and its analysis into structures, see Açıkgenç, Alparslan (2000), *Scientific Thought and its Burdens*, Fatih University Publications, Istanbul.

concept around which a network of integrated concepts and notions are formed. The world structure is the framework from which our conception of the universe and humankind in it arises. A person having such a mental framework in mind gives meaning to existence according to this structure. It is, as such, the most fundamental framework on which all other structures are built. It is clear from the Qur'ān that this structure has three fundamental elements: God, prophethood and the idea of a final judgment, all of which lead to an understanding of man, religion and knowledge, as such it constitutes the fundamental metaphysics of Islam. These fundamental concepts are integrally woven into the Islamic vision of reality and truth, which, as an architectonic mental unity, acts as the foundation of all human conduct, and as the general framework out of which follow all other frameworks. Thus comes next the knowledge structure as a fundamental element of the Islamic worldview. Since the activity at hand is science we need to examine only the frameworks established thus far. Therefore, I shall not discuss the *value* and *human* structures in this context.

The idea of God as represented in the world structure gives a dynamic character to all other mental attitudes and their reflection on life of the individual. God is the meaning of the whole existence; He is, for a believer, a person's closest companion, *walī*. God is known with illuminated knowledge that is revealed to Prophets, who are sent to humanity as 'the giver of good-tidings' of the bliss in the hereafter. But they are also the teachers of the fundamental truths which cannot be discovered with pure intellect. The Islamic worldview develops the idea of knowledge so closely to its concept of belief that it becomes an integral part of its world structure. That is why this concept, *ilm*, becomes a doctrinal structure out of which gradually emerged the Islamic scientific tradition in history. The Islamic worldview, therefore, poses religion and thus itself as the 'Reader' par excellence of the signs of God, *āyāt*, in the universe. Since the purpose of science is also to discover the true knowledge of the universe, the purpose of the Islamic worldview and science in this respect coalesce. This conceptual framework thus establishes an organic relationship between Islam and science. It is because of this fact that, right after the first

revelation in 610 C.E., only two hundred years elapsed until the emergence of an Islamic scientific tradition.²

We therefore express the relationship between Islam and science within the epistemological framework that developed as a result of the Islamic worldview. We can show this relationship also in the general Islamic scientific conceptual scheme which developed upon the Islamic worldview as it was unfolding with the revelation. The proof of this are the terms within that scheme, which are taken directly from the revealed sources, such as *‘ilm*, *uṣūl*, *ra’y*, *ijtihād*, *qiyās*, *fiqh*, *‘aql*, *qalb*, *idrāk*, *wahm*, *tadabbur*, *fikr*, *naẓar*, *ḥikmah*, *yaqīn*, *wahy*, *tafsīr*, *ta’wīl*, *‘ālam*, *kalām*, *nuṭq*, *ẓann*, *ḥaqq*, *bāṭil*, *ṣidq*, *kidhb*, *wujūd*, *‘adam*, *dahr*, *ṣamad*, *sarmad*, *azal*, *abad*, *khalq*, *khulq*, *firāsah*, *fīṭrah*, *ṭabī‘ah*, *ikhtiyār*, *kisb*, *khayr*, *sharr*, *ḥalāl*, *ḥarām*, *wājib*, *mumkin*, *amr*, *īmān* and *irādah*. After the development of this general scheme, a specific conceptual scheme developed in each science, which was also linked intimately to the Islamic worldview as the general framework of all scientific activities.

If we briefly look at the problem posed in the form of this question, we can also try to answer it: At the most practical level, how can the Muslim world come to terms with those demands of the twenty-first century which require science and technology without losing its spiritual foundations? The answer is in the epistemology of the Islamic scientific tradition. The spiritual foundation of Islam itself is the general framework of science in Islam, if we accept that foundation. But if we decide to do science from a different perspective by using a different framework, we cannot capture that spiritual foundation; we are, that is, bound to lose that spirituality. Someone who is performing the Islamic rites of prayers but doing science in the manner of another tradition cannot be a Muslim scientist, even though he may personally be a Muslim. These are fundamentally two different issues. A scientist that is actively involved in scientific activities within the epistemological framework thus far outlined is a scientist who has not lost the Islamic spirituality.

Sociology of the Islamic Scientific Tradition

We may now turn to the sociology of the Islamic scientific tradition, which

2. For a detailed discussion of this process in Islam see Açıkgöç, Alparslan (1997), “Emergence of Islamic Scientific Tradition” in *Proceedings of the XIIth World Congress of History of Science*, Liege, Belgium.

will reveal the answer for the question of the revival of scientific enterprise in the contemporary Muslim world. Even though we cannot adequately answer the “why” aspect of the decline, “how” can the contemporary Muslim world reinvigorate its intellectual tradition, of which the Islamic scientific tradition was but one aspect?

Our epistemology has already put forward a hypothesis that the emergence of a scientific conceptual scheme within a given society leads to a scientific tradition. But this is achieved through a process in which many factors are involved. The most significant among these is the emergence of a community of scholars. Therefore, the very concept of scientific tradition involves the assumption of a scientific community. Since the rise of a scientific tradition necessarily assumes the existence of a society it also demonstrates the mutual interplay between science and society, and as such it must make up an all-significant topic for the sociology of science. In this sense, the idea of scientific tradition, which is primarily based on a cognitive scheme, includes the achievements of generations of scientists within which scientific education is carried out and thus supplies a foundation for their further scientific practices. Sociology of science is concerned with the emergence of such a cognitive scheme within a culture. We shall, therefore, attempt here to outline a general theory concerning the emergence of a scientific tradition in Islam.

Obviously there must be some conditions at the social level, with all its aspects, for the rise of learning and science in a given society. Before we try to discover what these conditions are we must try to evaluate them in abstract terms in order to identify them so that we can apply our sociology of science to the Islamic case.³ Since these conditions are the causes for the rise of learning within a certain social and cultural context, they can be called “contextual causes” for the rise of science. It is possible to distinguish certain contextual causes as more rudimentary and hence, necessary for the emergence of any kind of scientific activity; we shall refer to such necessary elements as ‘nucleus contextual causes’. All other peripheral elements that help the nucleus contextual causes lead to the emergence of science and a scientific tradition can be termed ‘marginal contextual causes’. We must point out that all contextual causes are social and hence, they have little

3. For application of this sociology to other cases, such as the Western and Greek civilizations see Açıkgenç, A. (2000).

epistemological import though they may be based on a certain epistemological ground possessed by our faculties of knowledge.

A nucleus contextual cause is a dynamism which manifests itself at two levels: first is at the social level, which causes certain unrest and stirring within the society as if the whole structure of the society is re-shaping itself and thus every social institution is affected by this dynamism; but most importantly, the political and educational institutions are re-organized as a result of this unrest; second is at the level of learning and it is this dynamism which causes a lively exchange of ideas on scientific and intellectual subjects among the learned of the community. Therefore, we see right at the beginning of the rise of Islam how this dynamism was internally generated by the thought of the Qur'an through its dissemination within the first Muslim community.

Our exposition so far has distinguished two phenomena as corresponding to the nucleus contextual causes for the emergence of a scientific tradition: the first is moral dynamism; and the second is intellectual dynamism, both of which can be observed in the early Muslim community. There are, therefore, primarily two nucleus contextual causes: one is moral in character, the other is intellectual. With respect to moral dynamism it is possible to divide the members of a given society into three groups: morally sensitive people, the common masses and the selfish or immorally sensitive people. Among these three classes only the morally and immorally sensitive are dynamic, for the former class struggles to restore morality and good order in society, whereas the selfish remain indifferent to this end by spending their dynamism on their own ends. The masses, on the other hand, are driven to either side, which may lead to a struggle on behalf of both sides to defend their ends that may or may not result with intellectual dynamism. This is because the nucleus contextual cause is not the only cause of such a development; for this development can be attained only when all other conditions are also present. But if the morally sensitive class becomes victorious and draws the masses towards that end, then intellectual progress can take place once the second phenomenon of the nucleus contextual cause, i.e. intellectual dynamism, is present.

I believe that there is no need to explain the fact that all these took place in early Islamic history, which gradually led to the inherent intellectual dynamism. For Islam did not just attempt to bring a struggle between the good and the bad; rather it tried to reveal the meaning of life and thus the spiritual and material wealth these endeavors would bestow upon humanity if they are achieved. That is why the moral and the

intellectual or the ideal were going hand in hand in early Islam. That is why the early Muslims were so successful in establishing educational institutions in a very short time.⁴

The 'dynamism inherent within originality and novelty' (of ideas and doctrines) is what we call 'intellectual dynamism'. For, originality inherently possesses dynamism, and as such it can contribute essentially to the rise of intellectualism. In fact, originality is invigorating, fascinating and enlivening, it is just like the re-awakening of a land from the demise of winter, and this dynamism is reflected thereby to the society, which is then set into a process of scientific advancement provided that there are no impediments in the way of mutual companionship between science and its community. Thus originality alone may not lead to scientific progress but it is clear that without originality no intellectual development is ever possible. The reason for this is the other condition of the society, namely, moral dynamism, which must conform to the originality of intellectualism and thus enable it to flourish. Otherwise, intellectual progress will soon die out, which was the case of Greek intellectualism after Aristotle and Islamic intellectualism after its tenth century.

Contextual causes cannot exhaustively be enumerated for all societies. They may be, for example, ten such causes needed in the case of Greek civilization, but this number may be eighteen for another society. Hence, although the number of the nucleus contextual causes as necessary elements may be precise for all societies, the general number of contextual causes (i.e., the nucleus and the marginal contextual causes taken together) cannot be so determined in a decisive manner.

It is possible now for us to elucidate how moral and intellectual dynamism may take place as social phenomena. The moral unrest within a particular society demonstrates a struggle mainly between two classes of people; the morally sensitive and the selfish class. The masses remain as the middle class between the two. When the struggle is taking place, although it is only between the morally sensitive and the selfish, it is immediately passed on to the masses, which become the battleground of the good and evil forces. Some of the masses are thus won to the moral

4. The results of this dynamism are beautifully outlined by the late Professor Muhammad Hamidullah (1939), "Educational System in the Time of the Prophet" in *Islamic Culture*, p.13.

side, and yet others to the selfish front.⁵ When the morally sensitive people have the sufficient vigor, dynamism and energy, they win to their side an adequate number of the masses and thereby produce intellectual and social dynamism. When the moral struggle between the two groups continue with a victory of the moral class, the morally sensitive individuals either produce intellectuals or are themselves intellectuals who formulate original ideas, doctrines and systems by introducing fresh and novel definitions of key concepts that are moral and scientific or otherwise. This way a lively exchange of ideas and alternative views come into existence within the society; a phenomenon which is necessary to produce intellectual dynamism.

The moral struggle, which is essentially a strife between the good and evil, may either directly give rise to social dynamism, or to intellectual dynamism first, which in turn produces social dynamism. Hence, although in certain cases social dynamism may precede the intellectual one, it does not mean that social dynamism is a nucleus contextual cause for the emergence of a scientific tradition. Science has a cognitive nature; it is therefore still a marginal contextual cause with regard to the nature of the activity in question. But social dynamism usually leads to an overall activity within the society, which we call 'institutional dynamism'. Hence, there are primarily two marginal dynamisms, social and institutional. The nucleus contextual causes, i.e. moral and intellectual dynamism, must necessarily produce social dynamism once they are adequately successful. But social dynamism is necessarily preceded by the moral struggle between the morally sensitive and the selfish; but it is not necessarily preceded by the intellectual dynamism. On the other hand, all these various dynamisms are required for intellectual progress that eventually leads to the emergence of sciences. Since social dynamism is not found at this foundational level, it cannot be included among the nucleus contextual causes. All these three dynamisms, either together or one after another will yield what we have called 'institutional dynamism'. When the nucleus contextual forces are at work, a tremendous social mobility and dynamism begins. It is the dynamism of individuals working together to lead the society as a whole to a morally better situation that we call 'social dynamism', which in turn leads

5. We may here apply a Qur'ānic term to expresses this social fact: *sunnatullah*. See the following for examples: al-Isrā 17:77; al-Aḥzāb 33: 38, 62; Fāṭir 35: 43; al-Faṭḥ 48: 23.

to the re-organization and betterment of social institutions including the political and economic ones as well. It is this reformative and enlightened effort at the organizational level that we call 'institutional dynamism'. When all these contextual causes come together, then they lead the society to intellectual progress. But besides contextual causes different societies may exhibit some other different causes of intellectual progress; such is the case with Western philosophy which has Islamic influences also as a cause for the rise of Western intellectualism. Whereas in the Islamic case, the causes are found only within the society, although after the development of Islamic intellectualism in the first century of Islam (seventh century C.E.) it came under foreign influences, especially that of Greek philosophy and science, which further helped to improve its intellectualism.

The most significant institutional dynamism is in educational institutions, where major reform and re-organization is needed in accordance with the knowledge produced by the intellectual dynamism. Usually there seems to be a relation, although not a necessary one, between the political body and educational reform. Either the political body brings about the educational reform at the request and directions of the intellectuals; or intellectuals themselves take the initiative and produce educational dynamism, which may in turn lead to a re-organization of the political body and thus produce a significant political mobility within the political institutions. These activities which also include legal undertakings can be called 'political dynamism'. Among these institutional dynamisms we must mention also economic activities. Similar reformations take place in the economic institutions yielding thereby to improve the prosperity of that society and this activity can be called 'economic dynamism'. All these institutional dynamisms do not necessarily develop together within the same period of time and thus help each other become dynamic reciprocally; or following a different pattern of sequence in every intellectually progressed society.

The educational and political institutions, which also include legal activities and economic dynamisms, include within themselves with a varying degree of intensity all the nucleus contextual dynamisms explained above, and as such they are the ones that produce culture. If a culture retains its dynamisms long enough such that the culture no longer becomes restricted to one society and region, then it turns into a civilization. On the other hand, if the culture does not retain its dynamism within the sphere of the contextual causes, then a dynamism to the opposite direction begins to occur; first, the selfish gains, the majority of the masses and intellectuals

become corrupt, then the moral struggle gives in. The culture thus collapses and intellectual progress comes to a halt. Of course this can happen to civilizations as well - a phenomenon which can be observed in both Greek and Islamic civilizations.

Science in Community

Our holistic approach reveals that science is actually a civilizational phenomenon, and as such its structure is very complex and this structure cannot be analyzed by just paying attention to certain aspects of it. For example, some sociologists claim that science is a social institution, and as such there is an obvious need to study it from this perspective.⁶ It is this study which they term 'sociology of science'. In this sense, they argue that the sociology of science is concerned with the social structure of science in order to define the nature of scientific ideas and describe their relations both to other kinds of ideas, such as philosophical, theological and aesthetic, and to various institutional and personality factors.⁷ We argue, on the other hand, that science is not a social institution, and hence, sociology cannot deal with its essential nature. This is because, as a body of organized knowledge, science is primarily a cognitive activity and as such its real nature can be dealt with only in the epistemology of science. On the other hand, science does have a social character which is to be examined in sociology of science. In other words, the essential nature of any scientific activity is a knowledge acquisition process which renders it to be a cognitive activity. Merton notes that "the subject-matter of the sociology of science is the dynamic interdependence between science, as an ongoing social activity giving rise to cultural and civilizational products, and the environing social structure."⁸ We have already argued that science, as a discipline, is not a social activity but has a social aspect and we need to identify that aspect. Scientific activities of a community of scholars can be social, but its product, as a discipline can have only social aspects.

6. For example, Merton, Robert K. (1973), *The Sociology of Science*, ed. by N. W. Storer, University of Chicago Press, Chicago and London.

7. See Barber, Bernard (1972), "The Sociology of Science" in *International Encyclopedia of the Social Sciences* (1968, reprint ed. 1972), Volume 14, Macmillan Company and the Free press, New York, pp. 92-100.

8. Merton, Robert K. (1968), *Social Theory and Social Structure*, The Free Press, New York, p. 585.

If we can talk of a scientific tradition we must at the same time accept that there is a community (of scientists) who establish such a tradition. In that case, sociology of science must discuss primarily the nature and structure of such a community and how it can shape science. But at the same time we must state that sociology of science must take into account the epistemology involved in scientific activities. In this context, we can distinguish primarily two issues in relation to the sociology of the Islamic scientific tradition to answer our question concerning the revival of science in the Muslim world; the first is to understand and interpret the nature of scientific process through which science comes to emerge within a society, identified as “scientific process”; the second issue is to understand the nature and the social character of the group of scholars who are actively engaged in scientific activities, to which we shall appropriate the already existing term scientific community, known in Islamic scientific tradition as the ‘*ulamā*’.

Let us assume a society at a time in history when there is absolutely no science in that society. According to our theory of contextual causes, as a result of dynamic currents within that society, it is possible that at some point there may arise in that society a group of people who are simply interested in knowing certain problems in a way others do not know. Of course, there are many modes in which we can know things; but there is one way of knowing things, which is not only systematic and organized, but also it questions its own findings. In other words, this way of knowing is not satisfied by just having information about the subject of inquiry, it rather questions and analyzes its findings, if any; or else its own mode of handling the inquiry so that it can actually know the thing as it is. If in this way someone establishes him or herself, there usually grows around that person a group of interested disciples who are also interested knowing things the way the “master” knows things. As soon as this happens, then this group of people has a good chance of establishing a tradition of studying things in order to know them in a way that is different from the ordinary way of knowing things.

Let us suppose that this group of people who are interested in knowing things as they really are have established a tradition. Usually, the tradition thus established will be named because these groups of people are interested in knowing things in a way that is different from other types of knowing. In that case they will give a name to it, i.e., they will produce a concept expressing their activity so that they can distinguish it from other activities of knowing. We usually choose names, or concepts from the

related activity; since the activity is knowledge-acquisition, the best name for this tradition is “knowing”. That is why in the Greek tradition Aristotle gave the name *episteme* for science; in Islam first, the term *fiqh* (to grasp, comprehend, which still means ‘to know differently’), then *‘ilm* is used to name sciences; in the Western scientific tradition the Latin term *scientia*, also “knowing” is used for this purpose.

The time that passes in this naming of the activity varies from civilization to civilization. In the Islamic case, if we take the date of the first Revelation, 610 A.D., as the starting point, we can say that it took about 150-200 years until the term *fiqh* was used in this technical sense. This means that it takes not only a scientific community to establish science, but also the nature of our faculties of knowledge is required in this process. Therefore, the first master gathers students, and then some of these students also establish themselves as authorities in knowing. They may begin teaching their learning even when still their master is alive, and thus carry the characteristics of his circle to other newly emerging groups of people interested in knowing things as they are. Then, this process will obviously continue with the same epistemological background in such a way that always the newly emerging groups of people interested in knowing will carry the characteristics of their masters’ teachings. Let us assume that after the Ninth Master who came, say, 350 years after the first one, a tradition of learning emerged and it was named ‘scientific tradition’. Then, all the scholars involved in this process constitute the scientific community. They do not come together with the intention of establishing such a community; but rather it is in human nature that when we see certain common elements between our fellow human beings we try to be with them, a phenomenon which naturally leads to the establishment of a community. In this case the most striking elements are first our epistemological constitution; second our desire to know which now has been identified as knowing scientifically and third to help each other in this activity of knowing. The third element can be identified as social; for one significant factor in forming societies is the need for help from other fellow human beings.

In this conceptual formulation, we see a scientific process that exhibits certain stages. First, there is the pre-scientific stage where the contextual causes are at work; then there is what may be called the problematic stage where scattered knowledge arises as a result of the learned activities. Third, is what we term “disciplinary stage”. We must realize that the subjects investigated are scattered in the previous stages and, therefore, they do not constitute as yet one specific discipline. But after a long period of time,

these subjects accumulate in such a way that they cause many problems in handling them systematically. Since it is the nature of our mind to perceive things in a unity of a system, the scientists of a scientific community cannot continue their investigation unless they begin to organize, systematize and thus to classify the findings of their community. If they achieve this then they will see that each subject of study constitutes a specific *discipline*. If, however, they cannot achieve this, then no science will be established in that scientific tradition. Finally, there is a fourth stage, called by us “the stage of naming”, when a scientific tradition thus produces a classification of its subjects of investigation. Each subject is named in this classification and thus is identified as a specific discipline. When a body of knowledge acquires the status of a discipline in this way, it may also begin to accumulate theories formulated according to its method, and thus become a candidate to be called a science. It is this developmental stages of learned progress into a unified body of knowledge, and then into a science that we call ‘scientific process’.

This process can be taken as a social phenomenon, but not governed primarily by social regulations, rather by the scientific rules laid down by the community of the scientists involved. On the other hand, since it is also a process of acquiring knowledge, it is, in this sense, primarily governed by the human epistemological constitution. This means that scientific process will not take place in every society; it can take place only in those societies where the mental framework unfolded in our epistemology of science develops. Moreover, these frameworks arise in societies where contextual causes are at work in such a way that they eventually produce a congenial environment for such an enlightening process.

Conclusion

If we understand the nature of scientific process outlined and the epistemology laid down here, we can evaluate why and how scientific tradition in Islam declined. We need to examine this complex phenomenon from all its aspects outlined here: first, we must know on what epistemology science is established in Islamic scientific tradition; then, we must understand the contextual causes in the Islamic scientific process; finally we must understand the sociology of the Islamic scientific tradition in order to solve problems facing it. It is this attitude of mind that we call the “holistic approach” to the problem of scientific decline in the Muslim world. Once we understand these issues, then we can try to set the conditions for a reversal process.

Stressing the fact that scientific advancement is not social engineering, for learning must have a sincere intention of finding the truth, we may briefly outline our reply to the revival problem. First, the contextual causes must be dealt with from within the Muslim societies. Second, we must re-establish the dynamic structure of the Islamic worldview in the minds of individuals. Third, the knowledge-structure of that worldview must be re-established on the basis of its history in relation to the contemporary level of learning. Finally, educational institutions must be re-organized according to the resulting conceptual scheme. This way we hope that the scholars involved in this activity will gradually construct the general Islamic scientific conceptual scheme which will gradually lead to the further development of the existing specific scientific conceptual schemes. It is this process that may direct the Muslim civilization to its scientific course.