CHAPTER 2

The Question of Methodology in Islamic Science

In any attempt to revive the Islamic scientific tradition in the contemporary world, or to create a science of the natural world that is at once new and traditional[1], one of the central questions that call for our special attention and that need to be thoroughly treated and resolved is the question of *methodology*. Why is this question of central importance to us? It is because, in reality, there are fundamental differences between the conception of methodology of science in Islam, or for that matter in every other traditional civilization, such as the Chinese or Indian civilization, and the conception of methodology in modern science.

In our customary way of thinking, however, we have been entertaining ourselves to a very different idea altogether. For so long we have succumbed to the notion that modern science has been created by means of a single methodology only, the famous

1. Traditional science is that science which, while being organized and orderly knowledge of an objective order, is also of a religious character since it is based upon the application of the Divine Principle to the domain of study in question. On the meaning and significance of the traditional sciences in the contemporary world, see Nasr, "The Role of the Traditional Sciences in the Encounter of Religion and Science – An Oriental Perspective," *The Wiegand Lecture* delivered at the University of Toronto in October 1983, and published under the same title in *Religious Studies*, 20 (1984), 519-541.

so-called *Scientific Method*[2]. The idea of only one type of science of nature being possible, through the use of the *Scientific Method*, greatly influenced our whole way of looking at the pre-modern sciences, including Islamic science. The degree of application of the *Scientific Method* became the universal yardstick of the scholarly community in determining the degree of scientific creativity and 'purity' of pre-modern minds.

With very few exceptions[3], the usual Muslim response to the above modern assertion about scientific methodology has been to seek to demonstrate that Islamic civilization preceded the modern West in the application of the *Scientific Method*, and that it exerted a great influence upon the latter civilization in the domain of scientific thought. That the *Scientific Method* was widely practiced in Islamic science is now a well-established fact in the pages of the history of science, as we have already mentioned in the previous chapter. But we also know that this is by no means the only method employed by Muslim scientists even in their creation of that element of Islamic science, which best corresponds to the current meaning of the term 'science'.

One of the most important findings established by Professor Nasr's pioneering works on Islamic science, viewed as an independent scientific and intellectual tradition, is that there is no single method which is used in that science to the exclusion of other methods. On the contrary, Islamic science has always

2. A Nobel prize winner for Medicine writes, "Unfortunately, we in England have been brought up to believe that scientific discovery turns upon the use of a method analogous to and of the same logical stature as deduction, namely the method of *Induction* – a logically mechanised process of thought which, starting from simple declarations of fact arising out of the evidence of the senses, can lead us with certainty to the truth of general laws. This would be an intellectually disabling belief if anyone actually believed it . . .". See P. Medawar, *Pluto's Republic* (Oxford University Press, 1982), p. 33.
3. On this exceptional response, which seeks to present Islamic science as having a methodology of its own, see the various works of Professor Seyyed Hossein Nasr on Islamic science. In particular, see *Science and Civilization in Islam*; *An Introduction to Islamic Cosmological Doctrines* (Cambridge, MA: Harvard University Press, 1964) and (London: Thames & Hudson, 1978); *Islamic Science*, "Reflections on Methodology in the Islamic Sciences" in *Hamdard Islamicus*, 3:3 (1980), 3-13.

sought to apply different methods in accordance with the nature of the subject in question and modes of understanding that subject. Muslim scientists, in their cultivation and development of the various sciences, have relied upon every avenue of knowledge open to man, from ratiocination and interpretation of sacred Scriptures to observation and experimentation.

Even in modern science itself, the idea of a single methodology alone as being responsible for its creation has been demolished by numerous works on methodology of science, which have appeared over the last decade or so. Instead, the idea of a pluralistic methodology has now gained wide currency among contemporary historians and philosophers of science. Some of them have gone to the extent of even accepting sacred Scriptures as an integral component of this pluralistic methodology[4]. Similarly, a number of professional scientists, mostly physicists, from R. Oppenheimer and E. Schrödinger to Fritjof Capra, have turned to Oriental doctrines in the hope of finding solutions to certain dilemmas and problems encountered at the frontier of modern physics[5].

Viewed as a whole, it can be said that one of the most interesting and significant developments to have taken place in modern science is the realization that the creative process which has produced that science is far more complex than what has been popularized as the *Scientific Method*. But does this new awareness and acceptance of a pluralistic methodology in the creative process of modern science now mean that the fundamental differences between the Islamic conception of methodology of science and the modern one have disappeared? To this question, we say in the affirmative that fundamental differences remain.

Where do the differences lie? The methodology of science in Islam is based on an epistemology that is fundamentally different

4. See P. Feyerabend, *Against Method*, verso Edition (1982), p. 30.
5. See E. Schrödinger, *My View of the World* (Cambridge, 1964); Fritjof Capra, *The Tao of Physics* (Boulder: Shambhala, 1975) and *The Turning Point: Science, Society and the Rising Culture* (Bantam edition, 1983), Chap. 9.

from the dominant epistemology of modern science, which so far has remained largely unaffected by this new intellectual development, although an increasing number of scientists, historians and philosophers of science have spoken of the need for a new epistemological paradigm that can provide a coherent view of the world revealed by modern science[6]. It is true to say that, as an empirical way of knowing things, the *scientific method* of modern science is hardly distinguishable from the *scientific method* of Islamic science. Philosophically speaking, however, it is not looked at in the same way in the two sciences in relation to their respective epistemologies. Similarly, the problem of the creative process is viewed differently in the two sciences. It can be said that it is one thing to admit the reality of a pluralistic methodology and to entertain its desirability; it is another to possess a unified vision of that pluralistic methodology.

It is because of the lack of a unified vision in contemporary philosophy of science that all the positive intellectual gains that can possibly accrue from the new realization of what the creative process in modern science is, or is not, appear to have been lost in all sorts of philosophical interpretations. In one such interpretation, a pluralistic methodology is construed as a kind of theoretical anarchism which nevertheless possesses a value of its own within the epistemological scheme and in the advancement of scientific progress[7]. Others deny altogether the possibility of us

6. For example, see Morris Berman, *The Reenchantment of the World* (Cornell University Press, 1981); Kurt Hubner, *Critique of Scientific Reason* (The University of Chicago Press, 1983). For those works which argue strongly for an epistemological paradigm that is rooted in the traditional worldview, see Huston Smith, *Beyond the Post-Modern mind* (New York: Crossroad, 1982) and an updated and revised edn. (Wheaton, Ill.: The Theosophical Publishing House, 1989); also his *Forgotten Truth: The Primordial Tradition* (Harper & Row, 1976); F.F. Schumacher, *A Guide for The Perplexed* (Harper & Row, 1977); Nasr, *Man and Nature: The Spiritual Crisis of Modern Man* (Kuala Lumpur: Foundation for Traditional Studies, 1989).

7. P. Feyerabend, *op. cit.* The whole book, as it itself says, is an anarchistic theory of knowledge. Its introduction summarizes the book's contents as follows: "Science is an essentially anarchistic enterprise: theoretical anarchism is more humanitarian and more likely to encourage progress than its law-and-order alternatives".

ever knowing the true nature and reality of man's intellectual creativity while at the same time acknowledging its special position in scientific methodology[8].

Also, the pluralistic methodology currently accepted by certain segments of the scientific community does not encompass the totality of methodologies of Islamic science. Modern science cannot at one and the same time retain its present epistemological foundation, and adopt revealed sacred Scriptures and intellectual intuition, as this term is traditionally understood, as part and parcel of its methodology, without falling into philosophical contradictions. How can it do so when its very epistemology was itself the product of a conscious rebellion against, and rejection of the idea of revelation and all that it implies. In truth, the acceptance of one necessarily implies the rejection of the other.

If certain contemporary philosophers of science speak of incorporating sacred Scriptures into the modern methodology of science, they do not mean to accord them the same epistemological status as given by the traditional sciences. Were modern science to do just precisely that, it would cease to be modern science as it is presently understood and cultivated. It would imply a spiritual transformation or rebirth of modern man[9]. This only goes to show that, in the traditional view, the question of methodology is conceptually inseparable from the ultimate purpose of human cognition, which has to do with the question of the spiritual destiny of man.

In the case of epistemological paradigm of Islamic science, based as it is upon the idea of Unity *(Tawḥīd)*, it does possess a unified and coherent vision of what the multiplicity of methodologies means. These methodologies, in fact, issue forth ultimately from the Quranic view of Reality and of man's place in that Reality. More generally, Professor Nasr has clearly shown that an organic relation exists between Islam and the Islamic sciences.

8. For a discussion on this topic, see, for example, P. Medawar, *op. cit.*, Chap. entitled *Introduction and Intuition in Scientific Thought.*

9. For a profound treatment of this theme, see Nasr, *Man and Nature.*

Specifically, this organic relation can clearly be seen in that aspect of Islamic science, which pertains to its methodology.

It is the aim of this chapter to discuss the principles underlying this relationship. In the light of these principles, it then becomes transparent why in Islamic science all of these different methods are considered as valid ways and means of knowing Nature within their respective domains of applicability. These methods are not contradictory, but rather complementary means of realizing the final goal of the Islamic sciences, namely, the Unicity of Nature, which is itself derived from the twin source of *Revelation and Intellectual intuition*[10]. Consequently, the different sciences based on these different methods of knowing are also seen to be in complete harmony with each other, and not as conflicting disciplines with rival claims to truth. If this organic relation between Islam and the methodology of Islamic science is always born in mind, then we may assert that no science developed by present-day Muslims can claim itself as being totally Islamic in form and character so long as the methodology employed remains embedded in the epistemological paradigm of modern science, even though all the different methods and techniques of study and research that are associated with that methodology are also accepted as important elements of the methodology of Islamic science.

In this discussion of the principles of methodology in Islamic science, we have drawn much of the material from Professor Nasr's numerous published works on various facets of Islamic science, which we strongly believe could provide the necessary point of departure for all current attempts by Muslim scientists at creating once again that science in the contemporary world. Admittedly, on the question of methodology alone, for example, there is so much that remains to be studied of Islamic science.

10. The Unicity of Nature, which is the goal as well as the basis of the Islamic sciences, is derived from the application of the principle of *al-Tawḥīd* (Unity) contained in the first Shahadah, *Lā ilāha illa'Llāh*, to the domain of Nature. It is understood to mean the interrelatedness of all things that exist. See Nasr, *Islamic Cosmological Doctrines*, pp. 4-5.

Such a study would of course be of great help to today's scientists to understand better the dynamics of the creative process that has produced Islamic science in the past. Still, what has been written so far on the subject has more than just provided a preparatory ground work for further research. It has also enabled us to have the first clear glimpse of traditional Muslim scientific minds at work and of the inner reality underlying their intellectual creativity, which is so central to our understanding of the conception of methodology in Islamic science.

Principles of Methodology in Islamic Science

To speak of methodology is to speak of ways or methods by means of which man can gain knowledge of Reality, either in its partial or total aspects. Therefore to speak of methodology is first of all to speak of man who is the subjective pole of knowledge, that is to say, the subject that knows. This pole consists of all the faculties and powers of knowing within man, which are hierarchic in nature. In other words, man is capable of having multiple levels of consciousness. Next, to speak of methodology is to speak of the Universe, which is the objective pole of knowledge, that is to say, the object that is knowable, and which is also hierarchical. In other words, the Universe has multiple levels of being or existence. Islamic methodology of knowledge *(al-'ilm)* deals precisely with the essential relationship between this hierarchy of man's faculties of knowing and the hierarchy of the Universe, and with principles governing that relationship.

From Islamic intellectual history, we inherit a vast amount of literature dealing with the question of methodology of knowledge. All the different intellectual schools in Islam, such as those of *kalām*, the *mashshā'ī* (Peripatetic), the *ishrāqī* (Illuminationist) and the *al-ḥikmat al-muta'āliyah* (transcendent theosophy) schools of Islamic philosophy, as well as those of *ma'rifah* (gnosis), which are mainly identified with the Sufis, have touched upon the same subject matter, but from different perspectives, and with different points of emphasis and ends in view, as well as with varying

degrees of intellectual profundity, sophistication and rigor[11]. The terminologies employed and the detailed picture conceptualized of the dynamics of man's acts of knowing may vary from one school to the other, but all of them are categorical and united in their view in asserting the hierarchic nature of both man's faculties of knowledge and the Universe. In this chapter, we will make occasional references to the views of some of these intellectual schools on the specific points under discussion.

It is now the assertion of many present-day historians and philosophers of science that the set of phenomena chosen to be studied by a particular scientific collectivity is actually determined by a particular view of reality, which has been accepted *a priori* by that collectivity[12]. In the case of modern science, the reality with which it is solely concerned is the Cartesian reality that has become reduced to mind and matter, viewed as two totally distinct and separate substances[13], which for the mainstream of that science, and for modern western philosophy in general, became an accepted fact. In the case of Islamic science, the whole cosmos with which it is concerned displays a far great-

11. On these various intellectual schools, see Nasr, *Islamic Life and Thought* (Albany: SUNY Press, 1981); Majid Fakhry, *A History of Islamic Philosophy* (New York: Columbia University Press, 1983). As for the views of these schools on the question of the methodology of knowledge, see Nasr, "Intellect and Intuition: Their Relationship from the Islamic Perspective" in S. Azzam (ed.), *Islam and Contemporary Society* (Islamic Council of Europe, 1982), pp. 36-46.
12. See T. S. Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1970); Michael Polanyi, "The Growth of Science in Society" in *Knowing and Being* (1969), pp. 73-86. K. Hubner writes in his *Critique of Scientific Reason*, "Factual assertions and fundamental principles are entirely to the contrary, merely parts of theories: they are given within the framework of a theory; they are chosen and valid within this framework; and subsequently they are dependent upon it. This holds for all empirical sciences – for the natural sciences as well as those pertaining to history", p. 106.
13. This Cartesian dualism is now being challenged by a number of physicists. See, for example, D. Bohm, *Wholeness and the Implicate Order* (Routledge & Kegan Paul, 1980), in which he develops a theory of quantum physics that treats the whole of existence, including matter and consciousness as an unbroken whole.

er qualitative richness of reality than the modern or
the latter's pride in claiming itself as being an infinite

The anatomy of this Islamic cosmos, in its multi
and states, is based on the data furnished by the Islan
tion itself. It is therefore the Islamic Revelation which c
whole domain of study to which the Islamic sciences
directed. The Muslim mind which accepts such a v
cosmos has, prior to that, already accepted Revelation as the highest source of knowledge. The Muslims' conception of Revelation has important consequences for the methodology of science in Islam, as we shall see later.

The traditional cosmos, that is to say, the whole of God's created order consists of three fundamental states: the *material or corporeal* state; the *psychic* or *animistic* state; and, the *spiritual* or *angelic* state. In Sufi terminology, these three states are respectively called *nāsūt*, *malakūt* and *jabarūt*[14]. The material world, also called the *gross* world, is immediately enclosed and dominated by the psychic domain, also referred to as the subtle world. These two worlds together form the domain of 'nature'. And it is the angelic world which governs all natural laws in both the subtle and gross domains (See Fig. 1).

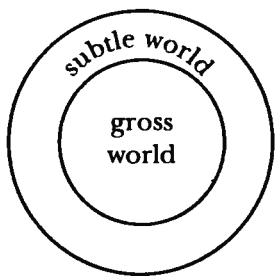


Fig. 1
The World of Nature

14. See F. Schuon, *Dimensions of Islam* (London: Allen & Unwin, 1970), p. 144.

The Sufis, basing their idea on the data provided by the Quran, formulated the doctrine of the "five Divine Presences" *(al-ḥaḍarāt al-ilāhiyyat al-khams)* to depict the hierarchy of the whole of Reality[15] (see Fig. 2). The above three states – the material, subtle and spiritual – in that order, are also the first three "Presences" in ascending order. The next higher level of reality or "Presence" in this hierarchy is the realm of the Divine Qualities *(asmā' ṣifātiyyah)*, that is to say, the Qualities of God, for example, those Qualities which refer to Him as Creator and Revealer. This fourth state, designated as *lāhūt*, is thus identifiable with the Creative Principle or Being. It is the ontological principle of the whole cosmos, and is therefore the Absolute with respect to the whole of creation. The next and the highest "Presence" is the Divine Essence *(al-dhāt)*. This "degree", termed *hāhūt*, is the infinite and Supreme Self, Beyond-Being which is the "non-qualified" and "non-determined" Principle, and is therefore the Pure Absolute[16].

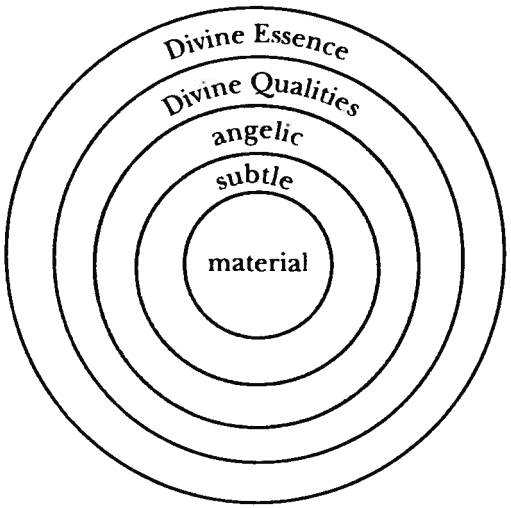


Fig. 2
Hierarchy of Reality

15. On the Quranic premises of the doctrine, see *ibid*, pp. 146-147.
16. *Hāhūt* is from *huwa* meaning He; thus, it may be translated as Quiddity or Ipseity. See *ibid*, p. 144.

The structure of Reality that is outlined above has been dealt with by Muslim philosophers, theologians and especially the Sufis. It is a generally accepted structure, although, in its detailed divisions and in the terminologies used, there are indeed differences not only between these distinct intellectual schools but even within the same school, as for instance among the Sufis. With these differences we are not concerned here. In the context of our present discussion the point which we wish to emphasize, however, is the fact that the above Islamic vision of Reality was very much present and operative in the minds of Muslim men of science, like Ibn Sīnā, al-Bīrūnī, Ikhwān al-Ṣafā', and so many others, in the course of their cultivating and developing the various sciences.

The cosmic reality thus envisaged, which represents the objective pole of Islamic epistemology, is always viewed in relation to its ontological principle, namely, the Divine Intellect or Pure Being. In fact, as asserted by Ibn Sīnā, *true science* is that science which seeks the knowledge of the essences of things in relation to their Divine Origin[17]. This is the knowledge of noumena, that which relates phenomena to their true Origin which is the source of all existence. Therefore it is only in the light of an awareness of such an hierarchy of Reality that true science is possible.

How is the essential relationship between the heirarchy of the subjective pole and that of the objective pole of knowledge envisaged? The relationship envisaged is one that involves the idea of a one-to-one correspondence between the two poles. Every level of cosmic existence has its corresponding existence in man. There is nothing in the macrocosm that does not derive from the metacosm, meaning the Divine Principle, and which is

17. Ibn Sīnā discusses true science or the real purpose of studying Nature in his *Ishārāt wa'l-tanbīhāt*. His conception of true science is aptly expressed by a contemporary author, F. Brunner, "La science véritable suspend la connaissance du monde a la connaissance de Dieu pour le monde dans son intégrale réalité et pour constituer l'expression légitime, au niveau du monde, de l'intellection transcendante qui est la fin de l'homme". See his *Science et réalité* (Paris, 1954), p. 13.

not to be found again in the microcosm[18]. Corresponding to the tripartite structure of the corporeal, the subtle, and the spiritual worlds of the traditional cosmos is the tripartite structure of body *(corpus)*, soul *(anima, psyche)*, and spirit *(spiritus)* of the traditional human microcosm (see Fig. 3). In Islamic terminology, these essential constituents of the microcosm are respectively called *jism*, *nafs* and *'aql*[19].

Viewed from the perspective of knowledge or consciousness *(shuhūd)*, *'aql* refers to the human intellect which is man's highest faculty of knowledge, and which may be identified with the eye of the heart *('ayn al-qalb)* for, in the language of the Holy Quran and prophetic ḥadīths, the heart means essentially the seat of knowledge, or the instrument for the attainment of knowledge. A knowledge of what the intellect is and does, that is to say, a knowledge of its nature, powers and functions, is the key to the understanding of the problem of the creative process, of the creation of ideas, concepts, and theories in man's scientific enterprise. Accordingly, we will deal with this important topic, albeit briefly.

The human intellect is of a spiritual substance whose source or principle is the Divine Intellect or the *Logos*, which is also the Principle of the macrocosmic Universe, and the source of the sacred Book, the Quran, which is the basis of religion[20]. As generally maintained by Muslims, the uncreated reality of the Holy Quran resides in the Divine Intellect. The fact that the individual human intellect, the macrocosmic Universe, and the Holy Quran all have the same metaphysical basis or source possesses an immediate significance for the methodology of

18. F. Schuon, *Esoterism as Principle and as Way* (Middlesex: Perennial Books, 1981), pp. 17-18.
19. Another possible set of Islamic terminology is *jism*, *khayal* and *rūḥ*.
20. According to many *ḥadīths*, God 'wrote' by the Pen *(qalam)* the inner reality of all things on the Guarded Tablet *(al-lawḥ al-mahfūz)* before the creation of the world. The Pen symbolizes the Universal Intellect, the Logos or the Word, "by which all things are made'. It is also by the Pen that God 'wrote' the eternal Quran upon the Tablet. Thus, metaphysically, the Quran contains the prototype of all creation.

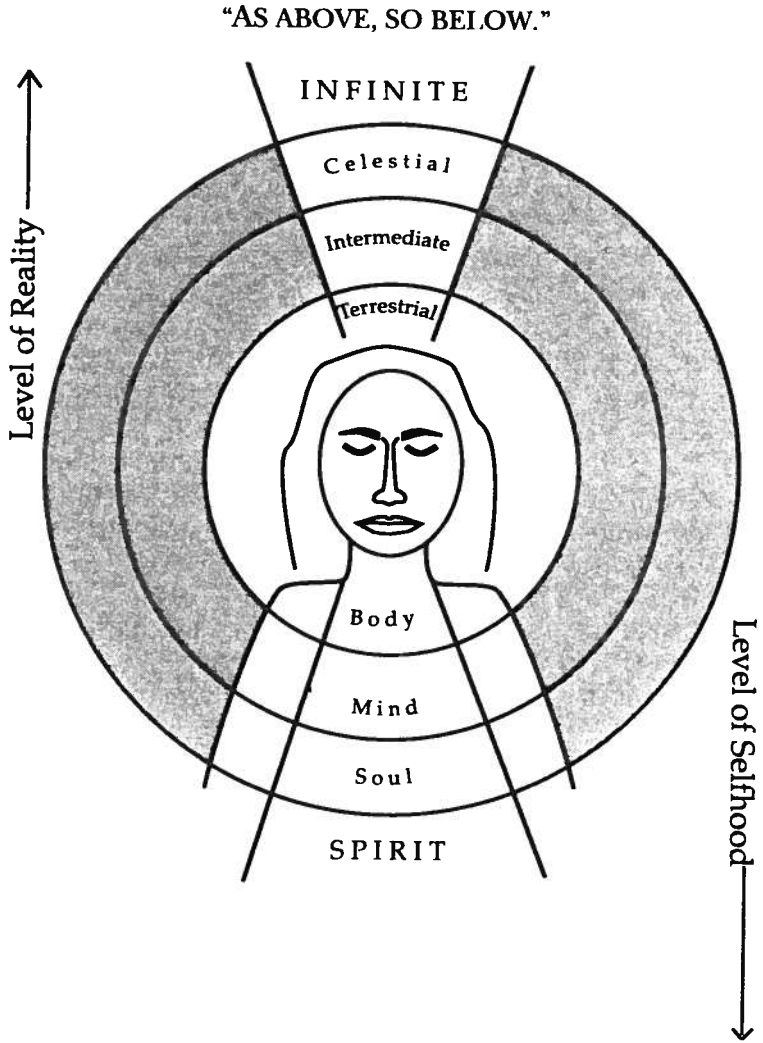


Fig. 3 Macrocosm and microcosm in one-to-one correspondence (this figure is reproduced from Huston Smith's *Forgotten Truth*).

science in Islam. In contrast to the motive that leads certain contemporary philosophers of science to consider sacred Scriptures as a possible source of scientific reference, there are profound metaphysical and intellectual reasons for the adoption of sacred Books by Muslim scientists and philosophers as an .egral part of their overall methodology. In the latter case, it is question of being in conformity with the nature of Reality as .ch.

The human intellect, the macrocosmic Universe, and the evealed Quran constitute three fundamental elements or as-ects in the comprehensive idea of revelation in Islam. They are ll integrally related to the central thesis in Islam, namely, that, by His nature, God creates and reveals[21]. According to one sacred ḥadīth *(ḥadīth qudsī)*, God desires to be known, so He creates the Universe. This implies that God's Creation is also His revelation, for otherwise it would not be possible for Him to be known through His Creation. The central being in this created Universe is man who, by virtue of the supernatural character of his intellect and its cognitive powers, and by virtue of being a universe in miniature[22], is in a position to know the Universe completely as well as to know its uncreated Principle. Thus the human intellect has often been referred to as the subjective, partial or particular revelation of God *(al-waḥy al-juz'ī)*.

By way of contrast, the Holy Quran, which is the basis of Islam, is referred to as God's objective and universal revelation *(al-waḥy al-kullī)*. Similarly, the created Universe is described as a cosmic revelation and a book of God, whose uncreated reality has been called *al-Qur'ān al-takwīnī* (meaning the Quran of creation). It is again the principle of *tawḥīd* which integrates these three forms

21. See Schuon, *Understanding Islam* (London: Allen & Unwin,1972), p. 13.
22. Man possesses within himself the complex faculties of the various souls: the mineral soul *(al-rūḥ al-'aqdiyyah)*, the vegetative soul *(al-nafs al-nabātiyyah)*, the animal soul *(al-nafs al-ḥayawāniyyah)*, and the rational soul *(al-nafs al-nāṭiqah)*. Through a complete knowledge, essentially speaking, of himself as the microcosm, he therefore knows the Universe the macrocosm. See Ibn Sīnā's treatment of this theme in Nasr, *Islamic Cosmological Doctrines*, Chap. 14.

of divine revelation into a total unity that is at once comprehensive and coherent.

How can the human intellect know completely the whole of the created order as well as know the uncreated Self? This knowledge is made possible through the actualization of all the possibilities latent within the intellect. But this actualization itself is possible only if the intellect, the subjective revelation in man, were to submit itself to the sacred Book, the objective revelation. Ibn Sīnā, for example, says that every human being possesses intelligence in a latent form, called material or potential intelligence *(bi'l-quwwah)*[23]. The process of actualizing all the possibilities of the intellect passes through several stages which represent different degrees of intellectual attainment.

The first stage is the attainment of habitual intelligence *(bi'l-malakah)*. A person acquires this intelligence when the first intelligible forms are present in his or her soul. The second stage is reached after full actualization of the intelligibles has taken place in the mind, and the corresponding intellect is called the actual intellect *(bi'l-fi'l)*. The third stage is the complete realization of this actual intellect, and this state of the intellect is called acquired intelligence *(mustafād)*. Then there is that supra-individual intellect which transcends this highest level of human intellect, and which renders this whole process of intellectual actualization possible. It is called by Ibn Sīnā the Active Intellect *(al-'aql al-fa"āl)*. The illumination, at various levels, of man's rational soul *(al-nafs al-nāṭiqah)* by the Active Intellect enables the various faculties and powers of knowing of the soul to be fully functional and receptive to "ideas" coming from the intelligible and spiritual worlds.

This doctrine concerning the intellect, expounded in detail by the school of philosopher-scientists in Islam, of which Ibn Sīnā is generally considered the greatest representative, but which we have presented here only in its main outlines, has important implications for all those who are genuinely concerned with the

23. See Nasr, "Intellect and Intuition," p. 39.

cultivation of the scientific mind, as this term is understood in its most universal sense. The problem of the creative process in scientific enterprise has been posed and debated rather extensively in contemporary philosophy of science. We have alluded earlier to this point at some stage of our discussion.

Questions have been asked whether creativity, that is to say, the question of the origin of ideas, concepts, and theories, is analyzable and reducible to any well-defined, step-by-step method, and whether creativity is something that is cultivable or not. Professor Nasr has posed the first question for Islamic science. He asks[24]: By what method did Muslim scientists arrive at their original ideas, concepts, and theories which were later tested against facts or the rigor of logical analysis? How did Ibn Sīnā arrive at his impetus theory, or Naṣīr al-Dīn al-Ṭūsī at his new model for planetary motion, or Ibn al-Haytham at the concept of momentum, one of the most fundamental concepts of modern physics, or Shihāb al-Dīn al-Suhrawardī at his theory of corporeal objects as being degrees of light? Professor Nasr affirms the view that such creativity, whether in the case of Muslim scientists or their modern counterparts, cannot be reduced to any well-defined, step-by-step method, but always involves an intuition, a jump of a creative nature.

Even though the above view is now widely shared by many modern scientists, the fact remains that the perspective in which the question of creativity or intuition is viewed in Islamic thought differs profoundly from that in which modern science seeks to understand the problem. The modern search for solutions to the problem of "origins", whether of ideas or otherwise, has remained a horizontal search bound to the terrestrial domain, for the perspective adopted is one that ignores or denies higher orders of reality beyond the world of matter and mind. The problem of the origin of ideas is sought to be resolved mostly at the level of the physics and chemistry of the human brain or consciousness. In such a perspective, the divine origin of man's creative ideas is denied, and in its place modern man invents

24. Nasr, "Reflections on Methodology . . .", p.8.

and popularizes the idea of human genius, a concept which is of minor importance to traditional civilizations.

Similarly, to the problem of how creativity or the intuitive dimension of man's thought processes may possibly be stimulated and enhanced, in true conformity to this secular and materialistic spirit of viewing the reality of human consciousness, the prescriptions sought are confined to those of the purely physical and psychological order. Sir Peter Medawar, British Nobel Prize winner for Medicine in 1960, provides a representative sample of this prevailing view of the problem when he says:

> That 'creativity' is beyond analysis is a romantic illusion we must now outgrow. It cannot be learned perhaps, but it can be encouraged and abetted. We can put ourselves in the way of having ideas, by reading and discussion and by acquiring the habit of reflection, guided by the familiar principle that we are not likely to find answers to questions not yet formulated in the mind. I am not offended by the idea that drugs may help us to formulate hypotheses, but I know of none which improves their quality ,and I should hesitate to use a drug which did not enhance the critical faculty in proportion to the rate of accession of ideas[25].

From the traditional point of view, the realm of creative or intuitive ideas to which modern scientific mind seeks to be receptive, as the above view so well illustrates, is not the same world of intellectual intuition as understood in Islamic science. The latter embraces a much wider realm, for it includes the world of the Spirit. That there are degrees of intuition has been amply demonstrated by Schuon, the greatest representative and exponent of the traditional perspective in the West today, in his numerous works[26]. The modern realm of intuitive ideas does

25. P. Medawar, *op. cit.*, pp. 109-110.

26. Examples of his works in which the question of intuition is dealt with in its various aspects are *Logic and Transcendence*, *Stations of Wisdom* (Middlesex: Perennial Books, 1980); *From the Divine to the Human* (Bloomington:World Wisdom Books, 1981).

known as the imaginal world, the Latin *mundus imaginalis* of the Islamic *'ālam al-khayāl*, an objective reality that stands between the physical and spiritual realms of existence[27]. We are not here denying the fact that creative and intuitive ideas that are the concern of modern mind have a practical import of their own in the scientific enterprise.

But we are also fully aware that modern science is currently wrestling with many problems of such an order that it is only through being receptive to ideas of higher levels of reality that true solutions to these problems can be found. We have in mind such problems as the question of the origin of life in the biological sciences, the ultimate reality of matter in physics, or the question of the origin of the physical universe in modern cosmology. However, as rationally argued by Ibn Sīnā, reception of these "higher" ideas is possible only if the mind is illuminated by the Active Intellect, but to be so illuminated, the intellect must be already illuminated by the light of faith, and touched by the grace issuing from revelation, for "the Spirit bloweth where it listeth". Intellectual intuition, says Schuon, demands the submission of all the powers of the soul to the pure Spirit which is identified, ontologically, with the fundamental dogma of Revelation[28].

If, in modern science, the problem of creativity and intuition is reduced to that of the human genius and sought to be formulated in terms of biological categories alone, traditional science, on the contrary, seeks to formulate the problem in terms of divine origin and the actualization, through the aid of divine agencies, of all the potentialities of the human intellect as conceived in the Divine Plan. This does not mean that, in the traditional formulation of the problem, human factors, both natural (biological and psychological) and cultural, are denied of their legitimate roles and importance. On the contrary, in the

27. See H. Corbin, *Creative Imagination in the Sufism of Ibn 'Arabi* (Princeton,1969) and also his *Spiritual Body and Celestial Earth: from Mazdean Iran to Shi'ite Iran*, (Princeton, 1977).
28. Schuon, *Dimensions of Islam*, p. 76.

the creation of the kind of total environment – physical, social and cultural, intellectual and spiritual – which is most conducive to such an actualization. In the case of Islam, this total environment is defined by the whole of its religious and spiritual universe which flows directly from the Quran, that objective and universal revelation which is the indispensable link between man and the Universe.

Faith in the Quranic revelation unveils all the possibilities that lie before the human intellect. Submission to revelation at all levels enables the intellect to actualize these possibilities to the extent grace from revelation makes it possible. The cultivation of the Muslim intellect is based upon a complete awareness of this principle. Within this perspective, it is a meaningul thing for a scientist of the stature of Ibn Sīnā, certainly one of the best scientific minds in the whole history of mankind, to often resort to prayer to seek God's help in solving his philosophical and scientific problems[29]. And it is also perfectly understandable why the purification of the soul is considered an integral part of the methodology of knowledge.

We all know too well that the central concern of Islam is with the protection and correct functioning of the human intelligence. Islam's obsession with intellectual health has to do with the fact that it has made intelligence the point of departure for man's salvation[30]. Earlier, we made the remark that the Quran, as God's objective revelation, enables man to realize the full potentiality of his intellect. This remark needs further comments. The religious and spiritual universe created out of the Quran at once removes impediments to the proper and full growth of the intellect and sustains all the nourishments necessary for its wholesomeness and healthy *(salīm)* growth, and, thus, its correct functioning. This Quranic universe provides a constant reminder to man of the divine origin

29. Nasr, *Islamic Cosmological Doctrines*, p. 181.
30. On this theme, see Schuon, *Understanding Islam*; and Nasr, *Ideals and Realities of Islam* (London: Allen & Unwin, 1971).

ground for reflection, meditation and contemplation, therefore prepares the intellect to be very receptive to ideas from the world of the Spirit. Islamic science, in fact, with all its methodologies and technological applications, has been conceived within the womb of the Quranic universe, although its historical ingredients, especially during the initial phase of its growth and development, may have been supplied from diverse sources.

After Nature itself, which is already Islamic, the first level of the religious and spiritual universe of Islam is that of the *Sharī'ah* which, all jurists agree, has as one of its highest objectives the protection and the healthy growth of the intellect. Since the *Sharī'ah*, which pertains to both thought (*īmān*) and action (*'amal*), does not exhaust the total meanings of the Quran, there must be other levels of submission to this objective revelation. The *Sharī'ah* is extracted out of the Quranic reality by applying the method of *tafsīr*. However, the domain of *tafsīr* does not extend beyond the external (*ẓāhir*) meanings of the revealed Book. The aspect of the *'aql* that is operative in the method of *tafsīr* is the rational faculty (reason), which is its reflection or outward projection onto the mental plane. The power of the rational faculty is analysis or ratiocination, and its instrument is logic. However, the extensive use of the rational faculty in the *tafsīr* of the Holy Book by *fuqahā'* (jurists), *mutakallimūn* (theologians), and the *falāsifah* (philosophers) did not lead to the kind of rationalism rampant in the modern world.

Rationalism is false not because it seeks to express reality in rational mode, so far as this is possible, but because it seeks to embrace the whole of reality in the realm of reason, as if the latter coincides with the very principle of things[31]. In *tafsīr*, the rational faculty is placed at the disposal of faith or revelation in the sense that it is called upon to present and expound the contents of Revelation in a rational manner to the best degree possible, whereas in modern thought it has been used to rebel against truth claims which lie outside its cognitive competence.

31. Schoun, *Stations of Wisdom*, p. 36.

does not depend on the epistemic status or truth-value of its premises, the "prior knowledge" which this demonstration aims at communicating. Rather, it depends on the correctness of its syllogistic reasoning. A possible role for revelation in the method of *tafsīr* is in furnishing data which might serve as the premises of rational or logical arguments, or as the criteria to judge the truth-value of conclusions established in such kinds of arguments.

The method of *tafsīr* is equally applicable to Nature, the cosmic text. In an analogous way, sciences of nature developed exclusively through this method necessarily remain at the level of external and literal meanings of the cosmic text, and as such cannot exhaust the reality of the cosmos, let alone the whole of Reality. In general, modern science, ever since its birth, has always been such a kind of science. Islam too had developed a science of the natural world based on a methodology which may be collectively referred to as *tafsīr*. But it developed this science alongside other sciences, which are based on some other methodologies. Moreover, limitations inherent in the methodology of *tafsīr* are duly recognized. As for modern science, it claims itself to be *the* science of nature, its methodology *the* methodology of knowledge, and, further, it harbors the illusion that, sooner or latter, through its very method of inquiry, nature will reveal its ultimate secrets to man, perhaps in the form of some mathematical formulae.

The methodology of *tafsīr* of the Holy Book, as it has been developed traditionally, including the method of linguistic analysis, must constitute an integral component of the overall methodology of Islamic science, which is sought to be revived in the modern world. The integration of *tafsīr* methodology into Islamic science is justified on the ground that the Book of Nature is the macrocosmic counterpart of the Holy Quran. The 8th/

32. On this question, see *ibid*, Chap. 1.

15th century Sufi master, 'Azīz al-Nasafī , in his *Kashf al-ḥaqā'iq*, compares Nature to the Quran in such a way that each genus in Nature corresponds to a *sūrah*, each species to a verse, and each particular being to a letter[33]. A *tafsīr* of the Holy Book necessarily involves a *tafsīr* of the phenomena of Nature itself.

The Quran contains many verses which lie beyond the competence of the method of *tafsīr* to reveal their meanings. In the same way, Nature presents before man many phenomena which cannot simply be reduced to categories of formal logic with which rationalism has been identified. At the frontiers of modern science today, we encounter numerous examples of such phenomena. In modern physics, there is a breakdown of logic when it comes to the question of the nature of light. The nature of light as being both continuous and discontinuous, that is, existing as both waves and corpuscles, is indeed a paradox of modern physics. Then, we have the phenomena of nothingness in atomic physics, the birth and death of symmetrical particles from "nothing" and to "nothing"[34], and the behavior observed of the electron, which suggests that it possesses a kind of intelligence. These phenomena have led a number of physicists to turn to oriental mysticism to seek a meaningful explanation to the problem. In so doing, they get entangled in issues which can no longer be considered scientific as this term is currently understood, but rather in issues of a religious and philosophical nature. There is no doubt that modern physics has encountered a new level of reality, namely, natural phenomena of a supra-logical and supra-rational order, which call for the application of another kind of methodology.

As applied to the Holy Book itself, the method of *tafsīr* must at some point give way to the method of *ta'wīl*. *Ta'wīl* or hermeneutic interpretation refers to the knowledge of the inner meaning of a sacred text. It is therefore concerned with the esoteric dimension of the Quranic revelation. In Islamic spiritual

33. See F. Meier, "Nature in the Monism of Islam" in Joseph Campbell (ed.), *Spirit and Nature* (Princeton, 1982), pp. 202-203.
34. Nasr, *Knowledge and the Sacred* (New York: Crossroad, 1981), p. 115.

tradition, this dimension has generally been identified with *tasawwuf* (Sufism), which may be defined as submission to God's objective revelation at the level of *iḥsān*, with respect to both thought (*īmān*) and action (*'amal*)[35]. As regards thought, *ta'wīl* is concerned with the intellectual dimension of *tasawwuf*, namely, the science of Reality whose central doctrine is the same principle of *tawḥīd* that is dealt with by *tafsīr*, but which is now understood and formulated at a higher level of meaning.

As regards action, *ta'wīl* is concerned with the spiritual dimension of *tasawwuf*, that is, a science of the soul or spiritual realization in which the ritual acts are basically the same as those prescribed and performed at the level of the *Sharī'ah*, but are sought to be interiorized at the deepest level possible. This is the level of submission of all the powers of the soul to the Pure Spirit. Traditional cosmology and traditional psychology[36], which are intimately related to each other, and which admit of various conceptual schemes, are formulated on the basis of this inner dimension of the Quranic revelation through the application of the method of *ta'wīl*.

The method of *ta'wīl* is employed not only in *tasawwuf*, but also in *fiqh* (jurisprudence) and *kalām* (theology) although with somewhat different connotations. As far as discussion of methodology of science is concerned, it is the method of *ta'wīl* as understood and applied in Sufism which is of particular interest to us. As it is understood in Sufism, *ta'wīl* is not opposed to *tafsīr*, but rather is an intensive form of the latter[37]. If the operational component of the *'aql* in the method of *tafsīr* is the rational faculty which exercises an analytical function by means of logic, then its component which is operative in the method of *ta'wīl* is

35. On the Quranic roots of *tasawwuf*, see Nasr, *Ideal and Realities of Islam*.
36. Huston Smith prefers to use the term 'pneumatology' for the science of the soul since the word 'psychology' as currently used denotes at best half the ground covered by traditional psychology. See his *Forgotten Truth*, p. 60.
37. For a treatment of *ta'wīl*, see, for example, al-Attas, S.M.N., *The Concept of Education in Islam* (Kuala Lumpur: ABIM, 1980); and Nasr, *Ideals and Realities of Islam*, pp. 58-61.

the intuitive faculty whose function is synthesis and unification, and whose chief instrument is symbolism. In the Sufi science of *ta'wīl* a symbol is distinguished from an allegory. A symbol is the "reflection", in a lower order of existence, of a reality belonging to a higher ontological status, a "reflection" which in essence is unified to that which is symbolized, while allegory is a more or less "artificial figuration" by an individual, having no universal existence of its own[38].

The dual aspects of the intellect, one rational, the other intuitive, are said to have manifested themselves at the level of the structure of the physical brain as well. Modern brain research has revealed a distinct separation or lateralization of cortical functions giving rise to an area of scientific investigation popularly known as "right and left mindedness". Carl Sagan describes this distinct separation as follows:

> The left hemisphere processes information sequentially, the right hemisphere simultaneously, accessing several inputs at once. The left hemisphere works in series; the right is parallel. The left hemisphere is something like a digital computer; the right like an analog computer[39].

The localization of intuitive aspects of thought in the right hemisphere of the brain is itself of great symbolic significance. It symbolizes the primacy of intellectual intuition over ratiocination. The famous French Egyptologist, Schwaller de Lubics, contends that intuitive vision was a major aspect of ancient science. Just as logical training can sharpen the mind, so can the cultivation of symbolic attitude sharpen intuitive vision. In several of his works on ancient Egyptian science, Schwaller de

38. In the words of al-Ghazzālī, there is not a single thing in this world of sense that is not a symbol of something in the higher world. It is through the science and method of symbolism, says he, that we comprehend the inner nature of the correspondence between the symbol and the symbolized. See his *Mishkāt al-anwār*, Englis trans. by W.H.T. Gairdner (Lahore: Muhammad Ashraf), pp. 121-125.
39. Carl Sagan, *The Dragons of Eden*, New York, p. 169.

Lubics shows that the ancient Egyptians, through their symbolic attitude, were able to cultivate the intellect to the extent of perceiving all of the phenomena of nature as a symbolic writing, revealing the forces and laws governing the physical as well as the spiritual aspects of our universe[40]. Islam, however, true to its manifestation as a religion of the middle way, was able to create within its civilization sciences of nature which extensively employed both the rational and intuitive faculties in a balanced manner and within a unified worldview.

We may speak of *ta'wīl* as an esoteric methodology which is inseparable from the question of spiritual transformation of man. The *ta'wīl* of the Holy Book, and correspondingly the *ta'wīl* of the cosmic text, both are linked to the *ta'wīl* of the human soul. The soul cannot return either text to its true, inner meaning unless the soul too returns to its transcendent source *(ḥaqīqah)*. What is implied here is a spiritual travail, the return of the soul to its Divine Origin. This doctrine served as the basis of purification of the soul, which is an integral part of the methodology of knowledge in Islam. This particular methodology has often been described as a higher kind of empiricism[41].

At this higher level of "empirical experience" the objects of observation and "experimentation" are no longer the external things, but the soul of the experimenter itself. What is now sought to be dominated and conquered is the animal nature within him. The experimentation consists of cleansing the rational soul from the impurities of nature and bodily forms, through asceticism and piety, until it becomes a pure substance. The soul then becomes illuminated and its highest faculty, the intellect, becomes functional. The intellect is then set to experience what we call intellectual intuition through which it perceives truth directly in the same manner the physical eye per-

40. Schwaller de Lubics, *Symbol and the Symbolic: Ancient Egypt, Science and the Evolution of Consciousness* (New York: Inner Traditions Int.,1978).
41. See al-Attas, S.M.N., *The Positive Aspects of Tasawwuf: Preliminary Thoughts on An Islamic Philosophy of Science* (Kuala Lumpur: Islamic Academy of Science, 1981), p. 6.