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## Creation and the Creator in Islamic *Kalām* and Modern Cosmology

***M.B. Altaie***

### **Abstract**

The question of the eternity or temporality of the universe was thoroughly discussed by Muslim theologians. Most of them, principally those who were called Mutakallimūn, agreed on the notion of creation *ex nihilo*, i.e., creation out of nothing. On the other hand, some Muslim philosophers adopted the originally Greek notion of an eternal universe that has existed forever without a beginning. In modern times the Kalām cosmological argument was revived by William Craig to be utilized as a logical reason for the existence of God. In this paper I will try to elucidate the fundamental Islamic arguments brought up by Mutakallimūn in support of the principle of creation and I will concentrate my study on arguments proposed by two main thinkers: the well-known theologian Ibn Hazm Al-Zāhirī and the well-recognized thinker Abu Hamid Al-Ghazālī. I will then discuss some questions raised in connection with the philosophical implications of modern cosmology, including the role of the primary singularity and the possible avoidance of such a singularity through quantum effects. I will also touch upon the anthropic principle that is deemed necessary for the explanation of the delicacy of the present world, with mankind being the necessary observer, witnessing the unfolding reality of this world.

### **Keywords**

Anthropic principle, creation, cosmic singularity, eternity, Islam, Kalām, Mutakallimūn, temporality.

Once the ancients had developed the capacity to think philosophically, they posed a number of important questions, such as: what is the origin of the world and is it temporal or eternal?. Every nation on the globe had its own answers to such questions, and their answers often formed the framework for their religious beliefs. As we look back from the twenty-first century, we can analyze the sources of such beliefs and see what basic factors they had in common and in what respects they diverged or differed.

Different schools of thought had different starting points and different approaches to tackling the very same questions. This would eventually lead to different answers. From the prospect of the twenty-first century, with all our knowledge, ideas and methodologies, we are now free to choose from among those intellectual accomplishments the ones that will best serve the interests of humanity. However, it may not be an easy task to define what would best serve human interest, because different people have different interests and humanity in general, I feel, has not yet reached the level of a shared common understanding and community of interests. Human life is still characterized by greed, jealousy and selfishness, far removed from the wisdom that religions have preached for thousands of years.

The question as to whether the universe is temporal, or self-contained and eternal is a vital one today, because it is directly connected with the question and meaning of our existence. It is connected with our ethics and the source from which we draw such ethics, and therefore it would be vital for the definition of the whole structure of life and death in this world. Humankind has a highly developed level of comprehension that enables them to construct rational explanations for the occurrence of natural phenomena. Such reasoning formed the foundation for a general logic that controlled their thinking, and consequently the logic fed-back on their thinking in such a way as to direct to the result just by presenting the postulates. That is to say: the logic, which originally was devised out of the rational analysis of the phenomena, became so dominant that it dictates the structure of thought for comprehending the whole universe.

When discussing the question of the creation of the world (the universe) we should remember that we will be talking about two different areas: one is usually called metaphysics, and the other is usually called physics. In fact we have no proof of the former except through *a priori* reasoning and deductive extrapolation. Unfortunately our mental construction is set up and operates in such a way that our inductive modeling of the physical world is left with only a small role to play within metaphysics. Despite this, many people have thought that the observation and study of physical phenomena and events may be able to take us confidently into the world of metaphysics, up to the level that we can ‘prove’ the existence of God.

When we question the eternity and the temporality of the universe we have to define the terms we use. For example, we should differentiate between the term ‘creation’ and the term ‘origin’. Also it is important to define the term ‘God’ not only in respect of a personal creator or some global natural law or condition, but in respect of his entity in relation with the structure, rules and logic that may be anticipated by his existence. Much confusion may occur if we do not allow for a clear definition of the term ‘God’. Even on a theological level among theists, we find that different

people have different concepts of God. So when we say that atheists deny the existence of God, it is important to know which God they are denying, and when we say that theists believe in God it is important to know which God they are talking about. However, we should admit that the biggest problem stems from the fact that we cannot resort to anything other than our customary logic and our human comprehension.

Modern cosmology, developed during the twentieth century, and the astronomical discoveries that were achieved, clearly indicates that the universe originated some finite time ago from a primordial state. Since its beginning the universe is continuously changing and developing. This continued evolution by itself is but a continuing creation; every moment the universe is in the process of becoming. This was one basic idea that Mutakallimūn proposed long ago.

Mutakallimūn were a group of Muslim thinkers and theologians who appeared during the 8<sup>th</sup> century and continued to dominate Islamic thought until the 10<sup>th</sup> century. They developed the system of thought that was named Kalām. In Arabic Kalām means ‘speech’ or ‘dialogue’, but it also points to the system of thought that Mutakallimūn developed in order to counter the arguments of the philosophers and express the Islamic worldview.

Mutakallimūn argued that the universe is restless and is continuously developing; nothing in the universe would stay in a stationary state for more than one moment. This was contrary to the view that dominated Western thought, where the universe was considered as a highly organized, static, unchanging system; ‘The cosmological principle, according to which the universe is homogeneous and isotropic on a large scale, is sufficient to ensure that a Newtonian universe cannot be static, but must be either expanding or contracting. A philosophical predisposition in western societies towards an unchanging, regular cosmos apparently prevented scientists from drawing this conclusion until it was forced upon them by 20<sup>th</sup> century observations’ (Coles and Luccin 2004 , xii).

### **The creation of the world according to the Qur’an**

The Qur’an, the Holy book of Muslims and the main source of the Islamic creed, stipulates that the world was created within a finite time by Allah (God), the external omnipotent agent. Although the story of creation told by the Qur’an is not much different from that told by the Old Testament, the apparently minor differences between both scriptures reflect fundamental differences between the concepts of the Creator in the two books. The Creator in the Qur’an is much more abstract than that in the Old Testament; the Creator in the Qur’an does not get tired after creating the world, whereas, according to the Old Testament the Creator needed some rest after completing creation. Furthermore, although both scriptures tell us that God

created the world within six days, albeit not necessarily equivalent to our days, the Qur'an, unlike the Old Testament, does not give much detail. God in the Qur'an is the Creator and Sustainer of the world though his control over every bit and every change of his creation: 'Praise be to Allah, Who created the heavens and the earth, and made the Darkness and the Light' (5: 1). The Qur'an also stipulates that Allah is the Sustainer of the universe:

'Your Guardian-Lord is Allah, Who created the heavens and the earth in six Days, then He established Himself on the Throne (of authority): He draweth the night as a veil o'er the day, each seeking the other in rapid succession: He created the sun, the moon, and the stars, (all) governed by laws under His Command. Is it not His to create and to govern? Blessed be Allah, the Cherisher and Sustainer of the Worlds!' (The Qur'an 14: 19).

The Qur'an also indicates that Allah can create some form of intelligent beings other than humans: 'See thou not that Allah created the heavens and the earth in Truth? If He so will, He can remove you and put (in your place) a new Creation?' (The Qur'an 14: 19).

The Qur'an allows for the possibility that Allah can create other worlds anew with the same properties as ours: 'See they not that Allah, Who created the heavens and the earth, has power to create the like of them (anew)? Only He has decreed a term appointed, of which there is no doubt. But the unjust refuse (to receive it) except with ingratitude' (The Qur'an 17: 99).

The Qur'an clearly indicates that the universe is expanding since was first created: 'With power did We construct the Heaven: and We are extending it' (51: 47). The Qur'an explicitly stipulates that the universe (heavens) will collapse at its final stage: 'The Day that We roll up the heavens like a scroll rolled up for letters, even as We produced the first Creation, so shall We re-produce a new one: a promise We have undertaken: truly shall We fulfill it' (24: 104).

In respect to the creation of mankind the Qur'an stipulates that the human was created in stages from clay: 'We did create man from a dynasty from clay' (The Qur'an 23: 12). And we read: 'He Who has made everything which He has created Most Good: He began the creation of man with (nothing more than) clay' (The Qur'an 32: 7).

It is also stated in the Qur'an that Allah after creating man he blew some of the divine spirit into him, and at that stage he ordered the Angels to obey the human: 'When I have normalized him (in due properties) and breathed into him of My spirit, fall ye down in obeisance unto him' (15: 29).

The above verse concerning the creation of man indicates that he was created and pre-destined to be an advanced creature with special capabilities; thanks to the infusion of the divine spirit, which has become an essential part of his makeup. I believe that one manifestation of this divine infusion is the

ability to think conceptually and construct things to enable mankind to explore the world with such ingenuity. It is as if man has acquired, by that divine infusion, some of the divine attributes. This makes it possible to view building up his own understanding of the Creator through investigating the world as man's mission in this world.

As to the attributes of Allah, the Qur'an says that Allah is omniscient, wise, knowledgeable, creative, merciful, benevolent, and most powerful. He can hear and speak to his servants and enjoys all attributes that are found in humankind, however it is also mentioned that these attributes are rather the good names for Allah and are not meant to be taken literally.

### **The creation according to Muslim Thinkers**

Muslim thinkers were divided into philosophers and theologians. The theologians are divided into religious dogmatists and Mutakallimūn. Mutakallimūn are the natural theologians who tried to verify Islamic creed rationally, while at the same time keeping the Qur'anic revelations in the background of their thought, believing that the universe is temporal, having been originated from nothing. On the other hand, Muslim philosophers, mostly following the Greek tradition, gave utmost priority to rational deduction. They believed that the universe is eternal in essence, but nevertheless created in time (Averroes 2001).

Mutakallimūn considered the Qur'an to be the primary source for their knowledge of the world, and accordingly they sought to achieve an understanding of the world based on the stipulations of the Qur'an. Richard Walzer summarized this by saying that: 'Mutakallimūn followed a methodology that is distinct from that of the philosophers in that they take the truth of Islam as their starting point' (Walzer 1970, 648).

Mutakallimūn played a great role in developing Islamic theology and building the foundations of Islamic jurisprudence. However, due to continued clashes between different factions of Mutakallimūn in respect of a dogmatic argument related to the attributes of Allah, the Caliph had to abandon *Kalām* discussions, and the studies and teachings of it altogether.

*Kalām*, which is the discourse of Mutakallimūn, was divided into *Daqīq al- Kalām* which discussed the properties of nature, and *Jaleel al- Kalām*, which discussed the divine attributes and metaphysics (Altaie 1994, 7-18). Using Ian Barbour's terminology (Barbour 1998, 100), *Jaleel al- Kalām* would be called 'natural theology', whereas *Daqīq al- Kalām* is the 'theology of nature'.

Mutakallimūn, who represented the upper level of Muslim thinkers, believed that the creation of the world can be used as an argument for the existence of God. In essence this was based on the simple argument formulated by Al-Ghazālī; 'Every event which begins must have a cause, the

world is an event that began to exist; therefore, it must have a cause' (Al-Ghazali 1983, 19).

Many of the arguments for the creation of the world in the original Islamic literature are confused with arguments for the existence of God. However, it is not difficult to see that this mix-up occurs because of the nature of the argument itself, and is, in fact, related to the traditional Islamic approach to this problem. The problem of creation is normally the first problem that is discussed in most of the *Kalām* books.

The argument for the temporality of the world is part of a theory of natural philosophy that the Mutakallimūn tried to construct under the name of *Daqiq al-Kalām*. This theory was actually based on five principles that formed the structure of *Daqiq al-Kalām*, these are:

1. *Temporality*: the world is temporal, finite and limited and the creation took place *ex nihilo* i.e., out of nothing (Al-Alousi 1980, 59; Wolfson 1976, 359-372).
2. *Discreteness*: the structure of space, time, energy and matter and every associated property is discrete.
3. *Continual creation*:<sup>1</sup> the world has to be re-created every moment anew. A very good account of this principle can be found in the book named *al-shamil Fi Usul al-Deen* (Al-Juwayni 1969, 159). A modern analysis and discussion of this principle was given by Wolfson (Wolfson, 1976, 392-406).
4. *Indeterminism*: the laws of nature that we recognize are contingent and undetermined. A notion that resonates with the Copenhagen interpretation of quantum theory (see Jammer 1974, 259).
5. *Space-time integrity*: space has no meaning of its own and would exist only if a body existed, and time has no meaning of its own without an event taking place in space (Altaie 2005).

The arguments put forward by Muslim *philosophers* to prove the eternity of the universe and their theory of the existence of God were refuted by Abu Hamid Al-Ghazālī, a great thinker of the tenth century, in his book *Tabafut al-Falasifa (The Incoherence of the Philosophers)* (al-Ghazālī 2000). The aim of al-Ghazālī was directed at proving that philosophers are incompetent to suggest a coherent theistic theory of divine existence and action.

Mutakallimūn followed two distinct routes to tackle the question of creation (Al-Shahrastānī 14). The first was to prove that the world is temporal

<sup>1</sup> In the literature this principle is referred to as continuous recreation, but to be more accurate and consistent with the notion of discreteness I would prefer to use the word continual instead of continuous since the term continuous may refer to the infinitely divisible.

and created, and has a definite origin in a finite past. This was done through a series of arguments that assume that 'the world as a whole is composed of *jawāher* (substances) and *a'rādh* (accidents), and that no *Jawhar* is separated from one or several *a'rādh*. But all *a'rādh* are created in time, from which it must necessarily follow that the *Jawhar* which serves as their substratum, is likewise produced in time, for every thing that is conjoined with things produced in time and is inseparable from them is produced in time. Therefore, the world in its entirety is produced in time' (Maimonides 1969, 63). Maimonides also recognizes that the reason for assuming the re-creation of *a'rādh* was 'so that no one would claim that there exists some nature of things; and that it is the nature of this body which would require this or that kind of accidents. Instead they want to say that God has created these accidents without any natural mediation' (Maimonides 1969, 64).

The second route followed by Mutakallimūn is to refute the arguments that suggest that the world is eternal. Many of the Mutakallimūn follow the two routes in their presentations and discourse.

It is remarkable that the approach of Mutakallimūn to proving the temporality of the world and its constituents through their natural theology always stemmed from basic assumptions that can be summarized as follows:

1. The finiteness of the world, based on the philosophical assumption that an infinite extension is impossible.
2. The impossibility of events with infinite regress.
3. That the universe began to exist, and that both space and time have finite extension and that they both exist only from the moment this world came into existence.
4. That matter itself and by itself is impotent and not capable of effecting any change.
5. That God is a non-physical entity outside space and time.

Such assumptions are prominent in most of the argumentation presented by Mutakallimūn, with regards to their different approaches to the problem of the world's existence and its relation to God. When they feel their arguments need reinforcement they usually present logical reasons for adopting such an assumption. This logical approach changed *Kalam* into a prescribed framework of knowledge, and consequently, its arguments were articulated into a form of standard scholastic teaching.

It is of some importance to mention that all Mutakallimūn believed in creation *ex nihilo* (from nothing), but that they discussed the question whether the vacuum is absolute emptiness or something that has some characteristic realization. This dispute led the Mu'tazilites to suggest that the vacuum is a realizable character by definition. However this dispute had nothing to do with the stipulations of the Qur'an, as Wolfson seems to

think<sup>2</sup>, but rather with the concept of vacuum in its lingual context (Al-Juwayni 1969, 134-135).

Mutakallimūn tried to construct a theory of an evolving universe through the principles of discreteness and continuous creation (Al-Alousi 1965, 269-297). The accidents (*a'radh*) are radically contingent and had to be continually re-created by Allah in every successive instant (Macdonald 1927, 326-344). Consequently they find that Allah is not only the Creator of the universe but he is also its Sustainer. This notion of God the Sustainer is taken primarily from the Qur'an which states that Allah is a live Sustainer 'Allah! There is no god but He, the Living, the Self-subsisting, Eternal' (al-Qur'an 1: 255). This notion is so fundamental and basic in *Kalam* that nearly all factions and groups of Mutakallimūn would endorse it, and it has affected many of the views of *Kalam* in respect to nature and how it would develop. In fact, the concept of causality and the action of physical laws in the world are very much dependent on the notion of Allah the sustainer, without whom the world cannot run. So Allah is not only initiating the action of physical laws, but also sustaining its action, otherwise nature itself would not continue to run its course. However this concept has led some authors to claim that Mutakallimūn, and especially Al-Ghazālī, do not believe in causation, whereas, in fact, they did believe in causal relationships but denied that effects can be caused without the intervention of an external agent, i.e., Allah (Altaie 2006, 239-247).

### **Ibn Hazm Al-Zāhirī (933-1063 A.D)**

Ibn Hazm Al-Zāhirī was one of the early Muslim thinkers and theologians who compiled most of the Islamic *Kalam* arguments put forward by earlier Mutakallimūn. Although he was not considered to be one of the leaders of Mutakallimūn, he was certainly a renowned scholar of *Kalam*. Ibn Hazm based his argument for proving that the world is temporal on the following main assumptions:

1. An infinite cannot exist and events with infinite regress are impossible.
2. The world is denumerable.

<sup>2</sup> Harry Wolfson (1976:357) discussed at some length the *Kalam* dispute over whether the world was created out something pre existing or from absolute nothingness. He claimed that the position of the Qur'an on the meaning of creation is vague, bringing in the Qur'anic verse which tells that 'Then He (Allah) applied himself to the [creation of] heaven, and it was smoke'. In fact this is a misunderstanding that was created by the two words in the square brackets that were added by Wolfson himself, for if we go back to the Qur'an we can see that the notion of creation ex nihilo is clearly stipulated in several verses. So the Wolfson claim here is unfounded.

3. Space and time began to exist (i.e., were created) and are finite.

Ibn Hazm also presented arguments against those who claim that though the world has an origin; it is actually not created but is eternal. The serious arguments presented in supporting the case center around the origination of time and the denial that any absolute character can be attributed to time itself, a point which I have discussed and analyzed elsewhere (Altaie 2005).

### **Al-Ghazālī (1058-1111 A.D)**

Al-Ghazālī was one of the great thinkers of Islam. He tackled the problem of creation in his book *Tabajut al-Falasifa (The Incoherence of the Philosophers)* through the refutation of the arguments of philosophers. His arguments were postulated in a more advanced form than those of Ibn Hazm, although there are some similarities in the arguments of both thinkers. Again al-Ghazālī believed that space and time are inter-dependent, finite and do not have any absolute character. In the first discussion of his book, al-Ghazālī refutes the idea of the world's past eternity that the philosophers assumed. He refuted the need for preponderance, ascribing the creation of the world to the divine will, which is eternal and had existed in the absence of time.

As to the question of the existence of time before the creation of the universe, Al-Ghazālī denies such a state: 'According to us, duration and time are both created' (Al-Ghazālī 2000, 20), and both space and time were created once matter/energy was created and neither can have existed before the moment of creation. This he explains by saying: 'Time is originated and created, and before it there was no time at all. We mean by our statement that God is prior to the world and time that He was and there was no world and that then He was and with Him was the world' (Al-Ghazālī 2000, 31).

Al-Ghazālī carefully differentiates the divine will from the divine power; he says that the will is 'an attribute whose function is to differentiate a thing from another which is similar. If this were not its function, then power would be sufficient' (Al-Ghazālī 2000, 22). In this respect Al-Ghazālī remarks that the divine will and knowledge is different from human will and knowledge: 'God's knowledge differs from human knowledge in matters we have [already] established. Why, then, should the difference [between the divine and the human] in the case of the will be unlikely?' (Al-Ghazālī 2000, 23).

Al-Ghazālī discusses at length the question of the first moment of creation and shows that there was nothing before the moment of creation, apart from God who already existed before creating the world (Al-Ghazālī 2000, 30-36). It is amazing to read some of the arguments of Al-Ghazālī and feel as if he was refuting present day arguments like those of Adolf Grünbaum, who says that since there were no instants of time prior to the

big bang, it follows that the big bang cannot have a cause (Grünbaum 1991, 233-254).

On the other hand, deep consideration of this problem led Al-Ghazālī to conclude that space and time are similar; the absence of time before the creation of the world was correlated with the absence of space or void outside the world. He says:

‘All this is due to the inability of the imagination to comprehend an existence that has a beginning except by supposing a ‘before’ for it. This ‘before’, from which the imagination does not detach itself, is believed to be a thing realized, existing- namely, time. This is similar to the inability of the imagination to suppose the finitude of body overhead, for example, except in terms of a surface that has an above, thereby imagining that beyond the world there is no place, either filled or void. Thus, if it is said that there is no ‘above’ above the surface of the world and no distance more distant than it, the estimation holds back from acquiescing to it, just as if it is said that before the world’s existence there is no ‘before’ which is realized in existence, [and the imagination] shies away from accepting it’ (Al-Ghazālī 2000, 32).<sup>3</sup>

Furthermore, Al-Ghazālī discusses the possibility that the universe could have been larger or smaller in size, concluding that this should be possible, and therefore he suggests the possibility of an expanding universe (Al-Ghazālī 2000, 37-39).

Regarding the divine attributes, the widely divergent views of Mutakallimūn caused a lot of dogmatic problems, culminating later in mutual accusations of being Kafer (unbeliever in Islam), and at this point *Kalām* ceased to be a rational. This was the reason behind the abandonment of the study, discussion and teaching of *Kalām* by the end of the eleventh century. Since then we can say that no serious work has been done on *Kalām*.

### **The Kalām Cosmological Argument**

This is an argument of Kalām that was revived recently by William Craig, who posed the argument as follows: ‘Everything that begins to exist must have a cause of its existence, the universe began to exist, and therefore it has a cause of its existence’ (Craig 1979, 63).

The original argument was proposed by Al-Ghazālī as quoted above, in his book *al-Iqtisad fi al-I’tiqad*, which summarizes the basics of the Islamic creed. The revival of the argument benefits from the discoveries of modern cosmological research, which show that the universe is expanding, that it was

<sup>3</sup> In the original English translation of Marmura the word ‘estimation’ and ‘estimative [faculty]’ was used for the Arabic word ‘wahn’. I find that the better translation for this concept is ‘imagination’ or ‘vision’.

originated some finite time ago, and that the matter/energy content of the universe was created from the vacuum by violating the law of conservation of energy. These discoveries seem to indicate that the universe began to exist, and accordingly the proponents of the Kalām cosmological argument (KCA) claim that the universe must have a cause of its existence.

However, the question remains whether the cause of the existence of the universe is to be found within the universe and its physical content, or whether it is the result of some supernatural action that surpasses the laws of physics. Some opponents of the KCA do not accept that there is a cause for the existence of the universe. Some of them deny a supernatural cause from the start, since they do not seem to believe in anything beyond physics, mathematics and measurements. Other opponents of KCA do not see that the universe has ever *begun* to exist, despite the discoveries of the twentieth century. They engage in theoretical speculations, like those of Hawking and Hartle, that suggest that the universe could have existed indefinitely before the big bang in imaginary time. Others try to resort to the uncertainty principle and natural vacuum fluctuation to supply the energy needed for the universe to exist. For the universe to come to existence, they think that there would be no need for an external agent. All this brings us to investigate the problem of creation from the point of view of modern cosmology.

### **Creation in Modern cosmology**

According to the prevailing paradigm in modern cosmology, the universe began to exist about one Hubble time ago (Hubble time is the inverse of Hubble constant) ( $\sim 10^{10}$  year), space and time were created in that event, and so was all the matter/energy that exists in the universe. This event has been termed the big bang. Before the big bang there was nothing, no space, no time, and surely no matter or energy either. So it is correct to say that according to the big bang the creation of the universe took place *ex nihilo*.<sup>4</sup> Once space, time and matter/energy existed physics began, the universe went through a stage of very rapid expansion, and its temperature fell in inverse proportion to its radius. Consequently, material particles accumulated, and the electrons combined with protons to form the first hydrogen and helium atoms some 300,000 years since the origin of the universe. Accordingly, the early universe was mostly composed of hydrogen and helium nebulae. In these (these what?), nebulae stars were formed by accreting matter, and consequently the temperature rose to the level where a nuclear reaction started, by which hydrogen nuclei fused together to form heavier nuclei.

<sup>4</sup> I am tempted to say that the universe was created from vacuum, but unfortunately this is not accurate since physical vacuum does require space and time as a substratum, so *ex nihilo* is perhaps the best expression.

The scenario for the formation of light elements out of the particle soup at the early stages of the universe, was proposed by George Gamow and collaborators in the late forties of the last century. They anticipated the existence of a cosmic microwave background radiation, which at the present age should be at a temperature equivalent to about 3 Kelvin. In 1965 Arno Penzias and Robert Wilson were lucky enough to pick up the microwave signal which was called the Cosmic Microwave Background radiation (CMB). This radiation represents the relic of the big bang at the stage when electrons combined with nuclei, approximately 300,000 years after the big bang. This discovery was considered a success for the big bang theory of Gamow and his collaborators. Since then, detailed studies of this CMB have been initiated, and today much of the accurate information that we have about the universe has been deduced from the precise measurement of the CMB.

This big bang model, which became the standard model of modern cosmology, was found to suffer from some problems that were partially resolved through Inflation theory. However, no matter how many holes we find in the big bang model, no scientist has yet been able to deduce the natural abundance of light elements or predict the 3K CMB using an alternative model. The big bang model was considered by some authors to support the theistic assumption that the universe has a personal cause for its existence. Nevertheless, some philosophers continued to dispute this issue and will continue to do so.

### **The singularity**

The question of the singularity is a relevant one, since it is related to the initial conditions of the universe. In fact, since there was neither space nor time preceding the big bang, this event was unique. In the absence of space and time no physics is possible, and therefore we cannot ask what initial conditions preceded the big bang. Sometimes it is said that the universe started from a state of infinite density, pressure, and temperature, but this statement is problematic, since there is no physics available to define such a state. On the other hand, the cosmological models that are singular, i.e. those implying that the universe originated from a point with infinite density, pressure, and temperature, usually do not take into consideration quantum effects. Models that take quantum effects into consideration produce universes with non-singular beginnings (Altaie 2002; Altaie and Setari 2003).

The suggestion by Hawking and Hartle (Hawking and Hartle 1983, 2690) that the universe could have existed indefinitely in imaginary time before the big bang, implies that the universe did not exist physically; imaginary time is not a physically measurable quantity. So following Carroll (Carroll 2003) I would say that ‘in all honesty the entire proposal is very far from being well-formulated’. Moreover, despite being speculative, the

Hawking–Hartle suggestion would not help to provide us with an eternal universe operating without God.

Some theists may consider the existence of a singularity at the beginning of the universe as supporting evidence for the need for a creator. However, in my opinion, the existence of a primary singularity is more supportive of the atheistic argument than the theistic one. That is because the non-singular universe will need a personal creator to bring it into existence through the control of design probabilities. This may be explained as follows: a singular universe implies the choice between existing or not existing (0 or 1: 0 for non-existing and 1 for existing). Choosing either of these two possibilities will entail the other null and void. If the universe was created non-singular, then we should think not only (either 0 or 1) but also how to choose the initial parameters that characterize the small batch. Nonetheless, although a singular universe will not completely eliminate the role of God, it will make it much easier, because in that case God does not need to choose the characteristics of the initially created finite batch; if a choice of the initial conditions is to be made, then surely ‘design’ is implied, and therefore a ‘cause’ had to exist.

From the epistemological point of view, a singular universe is more deterministic than a nonsingular one. Infinitesimal (continuous) variations do not allow for tolerance, while finite (discrete) variations allow for uncertainties that are proportional to the range of the value. This is why whenever we introduce quantum effects that are indeterministic; we get a nonsingular universe, whereas ignoring such effects produces an initially singular universe.

Adolf Grünbaum (1989, 373-394; 1994, 225-236) considers the big bang to be a pseudo-event, since at  $t=0$  there was no time to define the start. Therefore, according to Grünbaum ‘the Big Bang does NOT qualify as a physical point-event of the space-time to which one would assign three spatial coordinates, and one time coordinate’. Obviously this is true, but this does not mean that there was no big bang, nor does it imply that the big bang is an uncaused event. However, I agree with Lovell (1961, 106) that this question is the subject of metaphysics. Indeed, in a physical world causal priority entails temporal priority, but if this applies to the big bang as well, this means that the big bang has some *non-physical* (I will not say *metaphysical*) cause. After all, our present physics may not be the ultimate physics that humankind will ever discover.

### **Creation Ex Nihilo without God**

It is sometimes said that a physical vacuum is not entirely empty: it is composed of virtual particle-antiparticle pairs that now and then pop in and out of physical existence. According to the Heisenberg uncertainty principle,

these states can live only for a very short time, so they cannot be measured, and thus they are called 'virtual'. The existence of such states was taken by some people as the source for a possible spontaneous creation of the universe without the need for any external intervention. Beside the fact that there is no rigorous theory that can explain such a process, it is important to point to the fact that actually, no *virtual* state can turn into *real* one without the existence of a strong external field of force. This is well known to physicists who are experts in this field, and this again brings us to the question of the source of such an external field, capable of turning virtual states of the vacuum preceding the existence of the universe into real states of energy and matter.

### **Causal priority and temporal priority**

The question about the relation between the causal priority and the temporal priority was raised by Grünbaum when he commented on William Craig, who suggested that causal priority does necessitate a temporal priority, he says 'The proponents of simultaneous asymmetric causation must give us a criterion for distinguishing one of two causally connected simultaneous events as the cause of the other. Clearly, for simultaneous events, temporal priority is unavailable to provide the required criterion for causal priority' (Grünbaum 1994, 225-236). A similar point was made at some length by Al-Ghazālī (2000, 30-32) and Al-Shahrāstānī (2004, 9-17) in the context of the refutation of an eternal world. The argument presented by Al-Shahrāstānī is more elaborate than that of Al-Ghazālī, but both begin by discussing the meaning and implications of causality, trying at the same time to differentiate between the *possible* and the *necessary*, and to differentiate between priority in time and priority in essence. In short, Al-Ghazālī and Al-Shahrāstānī find it necessary to accept the fact that there was neither space nor time before the universe existed, in order to be able to realize the meaning of creation as taking place without comparative priority.

### **The anthropic principle**

Recent cosmological discoveries have directed the attention of physicists to the fact that our universe, by accommodating intelligent and highly developed living organisms, appears to be 'fine tuned' to allow such a high level of complexity and organization to exist (for details on this argument see for example: Barrow and Tipler 1985). It is remarkable that the structure of the universe is very sensitive to the values of the fundamental physical constants. This fine tuning was interpreted by some physicists and philosophers to mean that the universe was pre-designed to accommodate humankind. Others think that our existence in such a universe may be understood to be mere luck (Davies 1982). The eminent physicist S. Weinberg discussed the question

of the anthropic principle and fine tuning on different levels of his works (Weinberg 2000). In a talk given at Conference of the American Association for the Advancement of Science in Washington, D.C. on Cosmic Design he argued against the belief that the universe is purposively designed or destined for any thing other than natural selection. He says: 'Above all, today we understand that even human beings are the result of natural selection acting over millions of years of breeding and eating' (Weinberg 1999).

It is disappointing that a scientist like Weinberg could not realize the fact that from both a logical and an epistemological point of view, the term natural selection is actually ambiguous: for nature to select it should have a will, and for nature to compose it should have the power to coordinate and that would mean that nature has a mind. But is this the same as the mind of God? This will be discussed below. It is also disappointing that Weinberg discourages a constructive dialogue between science and religion. In the closing statement Weinberg says: 'In an e-mail message from the American Association for the Advancement of Science I learned that the aim of this conference is to have a constructive dialogue between science and religion. I am all in favor of a dialogue between science and religion, but not a constructive dialogue. One of the great achievements of science has been, if not to make it impossible for intelligent people to be religious, then at least to make it possible for them not to be religious. We should not retreat from this accomplishment.'

### **The mind of God**

A final question is whether the laws of physics that we are devising or discovering reflect the mind of God. The answer is obtained once we answer the question whether scientific theories express facts and realities, or whether they are expressions of our mind and imagination? The history of modern science tells us that scientific theories change over time, and although a correspondence is established sometimes between the results of calculations based on new theories and the old ones, it is found that the concepts are liable to change. We now have two famous and well-studied examples: quantum theory versus classical radiation physics, and relativity theory versus Newtonian mechanics and gravitation theory. We have seen how the classical particle concept has changed and how the wave-particle duality concept replaced the old one and constitutes the substratum of quantum theory. Moreover, the determinism of classical physics was replaced by the indeterminism of quantum measurement. These new concepts completely changed the philosophy of the natural law. Determinism may not need God if the laws of nature operate independently, but indeterminism would surely need an external God to decide the result and coordinate the actions of different, sometimes conflicting laws. A deterministic law can enforce a kind

of self ruling; if the laws are deterministic, such that the entire universe can be run in a self-contained manner, then there is no need for an external agent to run it. On the contrary, if indeterminism underlays the structure of the laws of nature, then surely a need for an external ruler will be inevitable. That is why Einstein could not accept the notion that the Old One (God) plays dice.<sup>5</sup> Here reason conflicts with nature, which does not necessarily follow the laws that our mind has devised, but follows the laws that were devised by the Creator.

The physical laws of nature that we are said to discover are actually devised by our mind, the mind of Paul Davies for example, but not by the 'Mind of God'. So, we are discovering our mind and the way our mind, not the Mind of God, works. This fact may be easily recognized once we remember that people thought, for more than 200 years, that Newton's law of gravity was the law of God controlling the solar system. Then it turned out that neither the mathematical formulation of Newton's law, nor his concept of gravity were right, despite the fact that astronomers successfully used it to precisely calculate the orbits of the planets in the sky, and even to predict the existence of other planets, which were discovered later. And because of this fact, i.e., that the laws of physics are devised by our brains, no one can catch God at work, not even the great Einstein himself.<sup>6</sup>

Different conflicting and independent laws cannot by themselves act and produce the qualities of the organization and delicacy of nature. These laws need some coordinating mechanism, which would be, in essence, yet another law of nature. Otherwise, we have to resort to an external agent that does not abide by the characteristics of nature itself. There is no way we can find a *natural* law unifying all the laws in nature, simply because such a law would contain the mechanism and control necessary for the coordination of all the other laws in nature, and that is a self-defeating goal; because such a goal, in replicating itself ad infinitum, must ever elude us. Therefore the role of an external agent that does not follow nature is deemed necessary to resolve such a dilemma, an agent that acts outside of space and time and does not necessarily abide by our logic and comprehension.

Physicists and other scientists need to revise the way they think about God in order to be able to seriously comprehend the possibility of having an external power, will or wisdom, or whatever initiates, control and sustains the universe. God needs to be thought of as an abstract entity that exists, acts

<sup>5</sup> We should take into consideration that Einstein's understanding of God was very much related to the total order of the universe. Therefore his rejection of a God that plays dice is an outcry against indeterminism in nature.

<sup>6</sup> Einstein was quoted toward the end of his life saying 'I want to catch God at work'. Perhaps he had such a privilege but only at the very moment he died.

and is beyond physical space and time. Otherwise, if we think of God as an entity within and part of our physical world and characterize him according to our scientific standards, then surely we will be, as Sean Carroll puts it, 'led to conclude that adding God would just make things more complicated, and this hypothesis should be rejected by scientific standards' (Carroll 2003). God is not physical; if he were so he would be contained within the universe. He would then be subject to the laws of the universe and would need a supernatural power to coordinate his acts and sustain his will and power.

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