The Anthropic Principle and the Logos in Modern Cosmology

Alex Kee-Wing Mok

Abstract: This article investigates the meaning of the anthropic principle in modern cosmology. It is shown that the anthropic principle, which has raised imperative dialogue between science and religion, is compatible with the theology of the Logos.

Key Words: Anthropic Principle; early universe; cosmic evolution; cosmos as creation; Logos Christology; human fulfilment; theology-science dialogue

"The heavens are telling the glory of God; and the firmament proclaims his handiwork" (Ps 19:1).

"Ever since the creation of the world his invisible nature, namely, his eternal power and deity, has been clearly perceived in the things that have been made. So they are without excuse" (Rom 1:20).

Although Christian theology is necessarily founded on historical revelation and religious experience, many scholars hold that it should be consistent with the physical reality discovered by scientists. The universe is a creation of God and what we find in nature should reflect the wisdom and the beauty of the same God who communicates with us through the incarnate Logos. In this article, we will first investigate the basic ideas in the anthropic cosmological principle, a seemingly new design argument for the existence of God, and explore its implications for the theology of creation. We will then show that the anthropic principle is coherent with the doctrine of the Logos.

The Anthropic Cosmological Principle

In contemporary cosmology, the Big Bang is the most firmly founded model that describes the evolution of the cosmos from its early history to the present observable universe. In this model, the universe began about 14 billion years ago with a gargantuan explosion, from which all matter, energy, space and time came into being. Today scientists do not yet know how this explosion occurred. The scientific explanation of the Big Bang itself might require a complete marriage of the two most fundamental physical theories – general relativity and quantum mechanics. The unification of these two theories has actually

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1 The anthropic principle was first proposed by astrophysicist Brandon Carter in Poland in 1973, during a special meeting commemorating Copernicus’s 500th birthday.
2 According to the latest astronomical findings, the universe is 13.6 ± 0.2 billion years old: Science News 166 (July 31, 2004): 69.
3 Still, scientists cannot answer the limit questions: Why is there a Big Bang? Or why does the universe exist?
4 Currently, the most promising unified theory is the superstring theory, in which the most fundamental ingredients of the universe are vibrating strands of energy, known as strings, which make up all the
been the final dream of many physicists since three quarters of a century ago. Without a complete theory, scientists can only give us some details about the evolving universe after it was about 10^{-43} seconds old. In the Big Bang scenario, the universe has been expanding and its temperature has been falling ever since the extremely hot primordial explosion. One of the consequences of the cooling process is that matter was formed out of the hot radiation. Some of this matter later evolved into galaxies, stars, planets and even life and consciousness that we observe today in compliance with the laws of nature.

For a long time, many great thinkers such as Thomas Aquinas (1227-1274) with his "Five Ways" have been trying to demonstrate the existence of God in a rational way. Surprisingly, modern cosmology points to an apparently new teleological argument and offers a great deal of evidence indicating that the universe has to be "fine-tuned" in order that life and consciousness may exist. The evolution of life depends on the laws of nature as well as the fundamental physical constants governing the interactions in the cosmos. Over the past few decades, scientists have discovered that the existence of life and consciousness is extremely sensitive to the delicate balance of these natural laws and physical constants. A slight change in the properties of elementary particles and the laws of nature would result in a lifeless universe. Therefore there is an intimate link between the nature of the universe and our own existence. This so-called anthropic principle certainly has a profound philosophical implication for the biblical creation ideas.

The most frequently discussed scientific explanation for the many remarkable coincidences in the universe leading to the evolution of intelligent life is the multiple-universes idea, in which many universes could exist simultaneously or successively with different laws of nature and values for the physical constants. Most of these universes are uninhabitable because of the inappropriate laws or physical constants. But a few out of many of them might harbor life because of the appropriate conditions. So it is not very surprising that we find our universe having some very special laws and physical constants because our universe is just the one with the favorable conditions, out of the many constituents of nature including all the force carriers such as gravitons and photons, and all the elementary particles such as electrons and quarks.

5 For example, Stephen Hawking and Albert Einstein. Einstein, however, did not like quantum mechanics owing to its statistical nature. His unsuccessful unified theory only incorporated the gravitational force and the electromagnetic force and did not take into account the two nuclear forces, namely, the weak force and the strong force.

6 This is a ten-million-billion-billion-billion-billionth of a second from the beginning.


8 There are about a dozen physical constants whose values have to be determined from experiments. For example, the electron mass is equal to 9.1093826(16) x 10^{-31} kg.

9 For example, if the ratio of proton to electron mass (1.836 x 10^{3}) were very slightly varied, DNA replication would become impossible.

10 As stated by Barrow and Tipler, there are three primary versions of the anthropic principle: (1) Weak Anthropic Principle (WAP): "The observed values of all physical and cosmological quantities are not equally probable but they take on values restricted by the requirement that there exist sites where carbon-based life can evolve and by the requirements that the Universe be old enough for it to have already done so." (2) Strong Anthropic Principle (SAP): "The Universe must have those properties which allow life to develop within it at some stage in its history." (3) Final Anthropic Principle (FAP): "Intelligent information-processing must come into existence in the Universe, and, once it comes into existence, it will never die out." Barrow and Tipler, The Anthropic Cosmological Principle, 15-23. In this article, we will focus on WAP which is the most acceptable version.
unsuccessful ones. There could still be a winner for the next lottery although the odds are extremely small. Nevertheless, I maintain that one might still imagine the existence of numerous universes, all of which have no life at all because there could be an infinite number of possible sets of physical laws and constants that are hostile to the existence of life. Large number of universes might not guarantee the existence of life. There could indeed be no winner for the next lottery if the odds approach zero. Furthermore, as argued by John Leslie, the many-universes hypotheses are highly speculative and without any scientific evidence. In fact, the major philosophical problem about the multiverse idea is that all these other universes are in principle unverifiable and hence non-falsifiable. The multiverse is indeed as elusive as God.

It seems more appealing to believe in a universe designed by a supreme creator whose existence is palpably supported by the religious experience in the human history. Does it follow that the anthropic principle provides evidence for the existence of God? This is not necessarily so. Our belief is not based on any scientific proof, but it is based on the revelation of God, as the New Testament emphasizes. However, one can contend that the new cosmology is consistent with the theistic worldview. Modern science shows that not only our universe is contingent, but also it has a high degree of rationality. Einstein said it well: “the most incomprehensible thing about the world is that it is comprehensible.”

The New Cosmology and the Logos

It is worth noting here that the Scriptures were written with an old cosmological conception. In fact, the cosmological view of the biblical authors was more influenced by their theological thinking than the natural observations in their times. The earth itself was already the whole static material universe. Above it were the stars and the heaven governed by God and below it were the abysses and the hell resided by the devils. In the age of science and technology, however, we should reformulate some of the theological contents in the Scriptures in light of the new scientific understandings about the cosmos. Biblical themes such as the creation, the providence and the salvation of God should be correlated with modern cosmological ideas that may bring new theological insights.

Contrary to the seven-day creation story in the Old Testament (Gen 1.1-2.3), cosmologists tell us that our solar system was formed out of the solar nebula about 4.6 billion years ago. The most primitive life on earth appeared about 3.5 billion years ago and later evolved into the diversity of life that we observe today. Homo sapiens were latecomers and first appeared about 400,000 years ago, following the Homo erectus that had their origins in Africa about two million years ago. Molecular biology and fossil discoveries have found that human beings and the modern African apes share 99% of their DNA, indicating that both species are descended from common ancestors who appeared about four to six million years ago. We are indisputably part of nature and, more significantly, have a long cosmic and biological evolutionary history. To develop a theology of nature that is compatible with the discoveries of modern science, the idea of

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12 The discoveries from paleontology indicate that more than 99% of the species of life have developed and become extinct in the evolutionary history.
13 For example, the Australopithecus Africanus (the southern ape from Africa).
Rationality of the universe is the fundamental principle for science, without which scientific investigation becomes impossible. In the Prologue of the Fourth Gospel, John particularly speaks of the origin of Jesus to a cosmological extent. The parallel of the use of language between the Prologue and Genesis in the introductory verses is obvious and it connects the cosmic dimension of Jesus Christ, the Word made flesh, to the foundation of the divine creation. Jesus was with God in the beginning, before God’s creation and therefore before the existence of time, space and matter. John commemorates Jesus as the Logos, or the Word of God, accentuating the hearing tradition of the Jewish community as well as the Johannine community: What we hear, see and experience now is the revelation of God. The Word that made the heavens and the earth is the foundation of all creation, as Paul has also proclaimed: “All things were created through him and for him. He is before all things and in him all things hold together” (Col 1:16-17). With a richer and deeper meaning than Genesis, John declares that Jesus not only is the source of all creation, but is the underlying rational principle of all existing things as well. In Greek, the term Logos also means the logic or the rational principle underlying the fundamental reality of the universe. In terms of the Greek language, therefore, the creation and the rational principle in the creation were self-expressions of God who now reveals Himself as the Word, in whom we can find the true meaning of the divine creation.

The integration of the dual meanings of the term Logos clearly connects the Jewish creation ideas to the Greek philosophical conceptions about the ultimate operational rules of the universe at the time of the Johannine community. Moreover, it is significant that John identifies the Logos with God: “the Word was God” and personalizes the Logos with Jesus, as witnessed by John the Baptist and the Johannine community. The use of this special word Logos in the Prologue remarkably conveys to the readers the idea that Jesus was the divine creator who now brings salvation to his creation. In this respect, salvation may be regarded as a continuing process of the divine creation. In other words, creation and salvation are the same activity of God. For the Johannine community, God’s creation had never stopped but had been continuing since the beginning of the cosmic history, particularly through the death and resurrection of Jesus and the receiving of the Holy Spirit that they had experienced. Jesus plainly said, “my Father is working still, and I am working” (Jn 5:17). Creation is not a one-time action but an on-going activity of God.

**The Rational and the Anthropic Principles**

Does it follow that the anthropic principle is one of the self-expressions of the Logos? Scientists and theologians have not arrived at a conclusive answer to this question. On the one hand, one has to be cautious of taking too seriously the possible theological implications of the contemporary cosmological theories because scientific uncertainties about the identity of the author of the Fourth Gospel, we will simply name him as John, following the tradition of Irenaeus (130-200 C.E.).

14 Although there is uncertainty about the identity of the author of the Fourth Gospel, we will simply name him as John, following the tradition of Irenaeus (130-200 C.E.).

15 This is hard to define the meaning of the temporal word “before” here, as time itself did not exist before the creation.


17 In addition to the concept of creation-out-of-nothing (Creatio ex Nihilo), this idea of continuing creation (Creatio Continua) can also be found in the Hebrew writings, for example, Psalm 104.
theories or hypothesis are by nature provisional. As mentioned earlier, we do not yet have a unified theory about the universe. In fact, according to Karl Popper,\textsuperscript{18} we can never be sure about obtaining such a complete theory. If the current theory is to be replaced by a future one, we may then have to rethink our theological inferences.

On the other hand, what is philosophically significant is that our cosmos\textsuperscript{19} is rational and unified, whether we can eventually find a complete theory or not. The work of scientists is after all to study the natural laws reflecting the rational and unified beauty of the universe. Indisputably, the anthropic principle shows us the wonder of our cosmos. This aesthetic experience of scientific exploration was also the conviction of the Greeks or the Stoics in the first century.

Nevertheless, the Stoic philosophical view about the rational principle is static, and impersonal, whereas the Johannine experience of the Logos is dynamic and personal. John celebrates the pre-existent Logos as the life-giver and the light of the world. All things exist in him and through him. The Logos is the light that enlightens people and gives power to all his believers to become the children of God (Jn 1:12). In the beginning he was with God and now he becomes flesh and blood and tabernacles among us (Jn 1:14). The incarnation of the Logos brings glory to God and raises all existing things to a new stage of creation. In John’s writings, the glory is always associated with the love of God; this is the “glory which thou hast given me in thy love for me before the foundation of the world” (Jn 17:24). According to John, to be in unity and in love with God is embedded in the nature of creation.\textsuperscript{20} The incarnation of the Logos effectively marks a new level of existence for the creation. This is a new vision for the nature of the created cosmos that has been evolving from pure radiation\textsuperscript{21} to the complexity of life and intelligence.

In light of contemporary cosmology, the historical Jesus is “the continuation and fulfillment of a long cosmic evolution.”\textsuperscript{22} Being the heart of creation, Jesus reveals to us the full meaning of creation. He as a man shares our long cosmic evolutionary history that started from the Big Bang, continued in the creation of heavy elements in the stars and supernovae, and evolved from the early life forms to Homo sapiens. As the Logos, Jesus is also the self-expression and the self-revelation of God to creation. He is the origin of all beings in the cosmos as well as the ultimate meaning of the evolving conscious cosmos. The evolution of the cosmos is to make way for the incarnation of the Logos who would bring the whole creation into union with God.

In his letter to the Colossians, Paul clearly presents Christ as the creator, the preserver and the savior for the entire creation:

He is the image of the invisible God, the first-born of all creation; for in him all things were created, in heaven and on earth, visible and invisible, whether thrones or dominions or principalities or authorities – all things were created through him and for him. He is before all things, and in him all things hold together. He is the head of the body, the church; he is the beginning, the first-born from the dead, that in everything he


\textsuperscript{19} In Greek, cosmos means orderliness.

\textsuperscript{20} This is interesting to note that in Hebrew, the words God and Nature have the same numerical value, and so do the two words love and one. Therefore, some modern scholars argue that to love implies being in one with God.

\textsuperscript{21} Light is one kind of electromagnetic radiation. In scientific terms, the phrase in Genesis, “let there be light”, can be interpreted as “let there be radiation!” Gerald Schroeder gives an interesting scientific analysis on Genesis in his book \textit{Genesis and the Big Bang} (New York: Bantam Books, 1990).

might be pre- eminent. For in him all the fullness of God was pleased to dwell, and through him to reconcile to himself all things, whether on earth or in heaven, making peace by the blood of his cross (Col 1: 15-20).

It is important to note that Christ’s salvation is for all things, whether on earth or in heaven. All things, from the elementary particles to the galactic systems, and from the microbes to the intelligent beings, were created by him and for him. This important concept of Paul is consonant with John’s conviction that Christ is the alpha and the omega of all creation (Rev 1:8). In addition, Paul also emphasizes that the Passover of Jesus is a single historic event: “The death he died, he died to sin once for all” (Rom 6:10). The incarnation of Jesus may be seen as part of God’s creation that is scheduled for the appropriate social and cultural settings in human history. The salvation of Jesus in this broader sense is a divine creation activity that has become part of human and cosmic history.

The Fulfilment of Human Life

From the biblical anthropology, a Christian can reflect on the way to fulfill the purpose of human life as created by God. The moral actions that he takes should correspond to the inherent values of the human person. This is the basic concept of morality. Although an atheist can also be a moral person by recognizing the goodness of creation through natural reason, he may still fall into error by human ignorance. The true humanity can only be known as it is given to us by the revelation of God as the Creator, especially in the incarnation of Jesus Christ, the Logos. As God himself became one of us in our history, we are assured of the goodness and value of the divine creation and more importantly the ultimate meaning of human existence.

In his book on abortion and euthanasia, Ronald Dworkin maintains that for religious people all human beings are sacred because they are the beloved children of God. He also argues that for the non-religious people every human being is nevertheless sacred because each individual human life is the highest product of natural creation as well as the masterpiece of human creation. Scholars such as Michael Perry and Robert Grant disagree that Dworkin has successfully laid the foundation for the sacredness of human beings in the objective way and therefore they attempt to employ alternative secular justifications for human rights. I propose that one possible response to this opposition is to resort to the new discoveries in modern cosmology. Evolutionary and cosmological scientists today have shown that human beings are the products of some highly improbable evolutionary processes that may happen once and for all in the history of the universe. Moreover, as Teilhard de Chardin pointed out, human beings are
significant and precious because we have the greatest complexity and the highest level of organization in the universe.28

As the children of God, we should live a coherent life showing our special status and relationship among ourselves. As repetitively commanded by Jesus in the Fourth Gospel, our response to accepting God’s love is to love our neighbors as ourselves including our enemies and persecutors. In fact, the self-realization of the human person takes place through our moral acts towards other people and ourselves. The Jesuit, Joseph Fuchs, writes nicely, “…believers must translate their living faith, that is, their ‘Christian intentionality,’ into concrete living and manifest it in their lives. This is the reality of the human person…”29 The fulfillment of the human person is simply “that he live as man, that he discover himself and his world as well as their latent possibilities, that he understand them, that he shape and realize himself as genuinely human, as bodily-spiritual being.”30 I believe this is the best response to the recognition of the anthropic principle.

Concluding Remarks

In this article, we have examined our current understandings of the cosmic evolution and the divine creation and presented a possible integration of these two ostensibly contradicting concepts. By investigating specific questions which concern both disciplines, science and theology can contribute to a coherent vision of reality.

In the cosmic Christology, the real Sabbath in the Genesis creation story is established only if the whole creation is consummated in union with the Logos at the end of the cosmic evolutionary history. This is also the time that the kingdom of God genuinely comes upon us who will then become fully the image of God. In his last book, Teilhard de Chardn offers a remarkable insight that points to the ultimate meaning of the anthropic principle:

Instead of the vague center of convergence envisaged as the ultimate end of this process of evolution, (we see) the personal and defined reality of the Word Incarnate, in which everything acquires consistence, appears and takes its place. Life for Man. Man for Christ. Christ for God.31

Author: Alex Wing-Kee Mok teaches Science and Religion at the Holy Spirit Seminary College in Hong Kong. He has obtained a PhD in physics and a Masters Degree in theology. He won the John Templeton Foundation Science and Religion Course Program Award in 1999.

Email: dralexmok@yahoo.com.hk