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Cover page

Our sub-universe, the wider universe, and their properties

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Our sub-universe, the wider universe, and their properties

Abstract

Following on from an argument that our finite (sub) universe from the Big Bang was created by a natural ‘God’ (thus differing from the supernatural God of the religion) that evolved in the wider universe, this paper argues that our sub-universe is only a small part of the wider universe defined to include everything. From compelling axioms, the wider universe is infinitely old, infinitely large, and was not created but exists by itself naturally from eternity. The question ‘why is there the wider universe?’ is meaningless or at least does not have an answer. Given the first law of thermodynamics, something must have existed for ever. Different conceptions of this ever-existing thing are compared and the conception of the present paper argued to be compelling. The recent report [1] on pre-Big Bang rings of radiation supports the conception of the present paper.

Keywords: Big Bang; cosmology; property; universe.

As announced in an open letter signed by 255 members of the U.S. National Academy of Sciences published in *Science* (Vol 328, Issue 5979, p. 689-690) on 7 May 2010 on ‘Climate Change and the Integrity of Science’, ‘there is compelling scientific evidence that our planet is about 4.5 billion years old (the theory of the origin of Earth), that our universe was born from a single event about 14 billion years ago (the Big Bang theory)’. Accepting this authoritarian view from our top scientists, we may (at least provisionally until new evidence to the contrary) accept the existence of the known universe and its known properties. [Even the acceptance of this is far from universal and there are controversies on the standard model of cosmology; see, e.g. [2, 3]. However, what about things beyond, both in time and space, our known universe (called our sub-universe in this paper)? Do things exist outside our sub-universe? Were there things before our sub-universe? Our scientists do not seem to be able to answer these questions. Perhaps some logical and/or philosophical reasoning may help, as shown in this paper.

The universe from the Big Bang (called our sub-universe) is finite in time and size. It is thus just a part of the wider universe which is shown below to be infinite in time and size. Our sub-universe is also observed to be expanding and accelerating in its expansion; see [4, 5]. On the possibility that the present accelerating stage is powered only by the gravitationally induced creation of cold dark matter (CCDM) particles, see [6].

Section 1 outlines an argument that the creator of our sub-universe evolved in the wider universe. This creator or 'God' differs from the God of the religious cycles as the latter is supernatural while the former is natural, having evolved in the wider universe. Section 2 shows that the wider universe is infinite in time and size and exists by itself. Section 3 shows that asking why there is the wider universe is meaningless or at least the question has no answer even just in principle. Section 4 argues that, given the first law of thermodynamics, something must have existed for ever and compares the acceptability of different conceptions of this ever-existing thing. This section also defends the first law of thermodynamics as the highest scientific principle. Section 5 challenges the possibility of the biggest free-lunch argument for the Big Bang.

The recent report [1] on the existence of pre-Big Bang rings of radiation supports the conception of the present paper. Though the idea of a cyclic universe [e.g. 7, 2, 8] and a steady-state universe [e.g. 9] may also be supported, the current more dominant inflation theory seems to be contradicted. Princeton University cosmologist David Spergel was reported by Wire (30 Nov. 2010) as saying, "the existence of large-scale coherent features in the microwave background of this form would appear to contradict the inflationary model". Whether other concepts of the cosmos such as the multiverse or megaverse (on which see [10, 11, 12, 13, 14 and volume 4 of the *Journal of Cosmology*, 2010) are or are not contradicted by this recent finding is less clear, depending on the particular version/interpretation.

1. The Origin of Our Sub-Universe: Axiomatic Evolved Cosmic Consciousness

Let us start with some definitions.

Definition 1: Things: Things literally include everything, phenomena, and/or existence, including matter, energy, thoughts, spirits, whether natural or non-natural (including the supernatural if it exists).

We may stick to this definition irrespective of whether materialism, idealism, or dualism is correct. If materialism is correct, consciousness is just (possibly emergent, if

emergent materialism is correct; the identity thesis is unlikely to be valid, not to mention eliminative materialism) a property of matter in certain complex enough form, and ghosts do not exist. If idealism is correct, the apparently material world could perhaps be the thought of some possibly spiritual being. If dualism is correct, both material and spiritual or even supernatural things may have their independent existence. The validity of any of these positions does not affect D1 (Definition 1), except possibly that certain items mentioned in that definition may be vacuous.

Definition 2: Our Sub-universe: Our sub-universe is the universe we are in and that we, including scientists and cosmologists in particular, observe. If the current dominant view of the scientific community is correct, this sub-universe evolved from the Big Bang about 14 billion years ago.

Definition 3: The Wider Universe: The wider universe include everything in existence anywhere (here, there, everywhere) anytime (including in the past, the present, and the future. It includes our sub-universe and everything else beyond if any. If our sub-universe was created, the wider universe includes this creator and its possibly higher-level universe. If that higher-level universe was also created, the wider universe includes that creator and the higher-higher level universe as well, and so on. The wider (or the widest) universe literally includes everything.

While we must logically allow for the possibility of many layers of universes and creation, we do not lose much generality and will have much simplicity by ignoring the many layers until we have evidence for their existence. Thus, we will at least provisionally just contrast our sub-universe with the wider universe as a whole instead of distinguishing different layers.

A proposition of axiomatic evolved creator is proved from the following 5 compelling axioms.

Axiom 1. (Generalized) First Law of Thermodynamics: ‘Nothing comes from nothing (*ex nihilo nihil fit*); nothing ever could’ (lyrics of a song in the film *The Sound of Music*).

This is the conservation of mass/energy or something more general. Things can only be transformed, not created out of nothing, or disappear into nothing. Taking the nothing here as absolute nothing, this axiom has never been violated. We first learned of the conservation of matter. Then we learned of the possible conversion between matter and energy according to the famous Einstein’s equation of $E = mc^2$ and generalized the conservation law accordingly.

If we learn further that mass/energy may also be converted into and from something else, we may just generalize this conservation law further.

Axiom 2. Accumulation of Strictly Positive Probabilities towards certainty as time approaches infinity: In infinite time, what could happen with strictly positive probabilities will happen.

Things that could not happen or things that have a zero probability of happening such as logically impossible things will not happen. For something that could happen, the probability of it happening in a given period, say a year, may be very small. However, no matter how small this probability, as long as it is strictly positive, say one out of a million, the probability that it will happen increases as more and more time is allowed. For example, consider the simple case where the probability of a certain thing happening in any one year is independent of each other. (The axiom still holds for dependence or interdependence cases though the speed of accumulation may be slower, needing more time to offset this. The case of perfect dependence is extreme; we only need non-perfect dependence for some positive proportion of the time for the axiom to hold. Moreover, the case of perfect dependence actually means zero probability of occurrence for all future periods once the event does not occur in the first period. Such a case is obviously not relevant to our problem here.) If something has 10% chance of happening in any one year, then the chance that it will happen (at least once) is 19% in two years, 65.132% in ten years, and more than 99.99% in 100 years. If we reduce the one-year probability to just 1%, the 100-years probability is reduced to 63.4%, but the 1000-years probability is still more than 99.99%. Thus, as we reduce the one-year probability (but not to zero), we can make up by increasing the number of years, still getting virtual certainty within a sufficiently long time. Thus, if the number of years is increased sufficiently, anything that has strictly positive probabilities of happening will happen with virtual certainty.

Axiom 3. Existence of Things: Something exists in the wider universe.

At the level of pure logic, this axiom may or may not be true. It is logically possible that nothing has ever existed and nothing will ever exist. However, 'I think, therefore I am' (René Descartes, the father of modern philosophy and modern mathematics). So, each of us knows with certainty that we exist. From our senses, reasoning, and scientific studies, we also know with almost certainty that other things also exist. If something exists in our universe, it exists in the wider universe as our (sub)universe is part of the wider universe.

Moreover, as will be shown below, the wider universe is much larger than our finite sub-universe. Thus, Axiom 3 is obviously true.

Axiom 4. Possibility of Evolution: Given some suitable environments/conditions, non-living things could evolve into living things, and living things of less complex species could evolve into more complex species through mutation and natural selection and/or other means.

Note that Axiom 4 is stated in a hypothetical form of just some possibilities. It does not rely on or imply that living things on earth actually evolved as stated. Those who believe in such evolution on earth (in our universe that is not created) must accept Axiom 4. Moreover, even those who do not believe in actual evolution on earth (e.g. due to insufficient time) and those who believe in creation may still accept Axiom 4 as logically possible. Given some suitable conditions (which may or may not be similar to those that existed on Earth), evolution is possible, though perhaps at a much slower speed. One relevant consideration on the sufficiency of time on Earth for the evolution of life is that life might also be brought to Earth from outer space through asteroids, comets, or planetary debris which bombarded the Earth; see [15, 16] and papers on panspermia in vol. 7 of the *Journal of Cosmology*, May 2010.

Some people may doubt even just the possibility of non-living things evolving into living things. However, after the discovery of the double-helix structure of the DNA more than half a century ago [17, 18], we now know how complex molecules may form (though the probability of such formation may be very small) into the reproducing form of the double-helix and start reproducing themselves. But these are living things, things capable of reproducing themselves! Thus, Axiom 4 is compelling.

The recent creation of a bacterial cell controlled by a chemically synthesized genome by scientists of the J. Craig Venter Institute [19]; see also a recent special issue ‘Artificial Life’ for commentaries on this remarkable event in the *Journal of Cosmology*) lends further strong support to the possibility of the evolution of non-living things into living things.

Axiom 5. Possible Development of Science and Technology to Very High Level: When living things evolved to a level capable of using science and technology such as the current level of Homo sapiens on the planet Earth or even beyond, it may be possible for them to evolve further by evolution and/or they may enhance their capabilities through

science and technology possibly including (but need not be confined to) technology-enhanced functions and genetic engineering. This development could reach very high level difficult for us to imagine now.

Again, Axiom 5 only states some possibilities. It does not rule out the possibility that 999,999 cases out of a million attempts at genetic engineering may end up in disasters. As long as there is some slight chance of further advancement to very high level (perhaps after billion times of starting from scratch), the axiom is satisfied. The experience of Homo sapiens on earth has already demonstrated some degrees and levels of such possibilities, including the use of glasses and contact lenses to improve eyesight. Five hundred years ago, if people were told that we can watch in a box (TV set) people dead for decades talking and doing things, they would probably regard this as nonsense. In the absence of disasters (in their presence, starting from scratch may be needed), the levels of technology that could be reached in hundreds/thousands/billions of years from now are certainly difficult for us to imagine now. Thus, Axiom 5 is compelling.

Somewhat surprisingly, from these five compelling axioms, the following proposition of Axiomatic Evolved-‘God’ Cosmology can be proved.

Proposition 1 (Axiomatic Evolved-‘God’ Cosmology): ‘God’ evolved and invented our sub-universe or one identical to our sub-universe.

Proof: Since something exists in the wider universe (Axiom 3) but nothing comes from nothing (Axiom 1), things in the wider universe must have existed forever, with an infinite past. Given some suitable environments/conditions, non-living things could evolve into simple living things, and living things of less complex species could evolve into more complex species possibly through mutation and natural selection (Axiom 4). As the wider universe is no smaller than our sub-universe (probably very much larger) and the latter is already very large, the possibility that in at least some place in the wider universe, conditions are suitable for such evolution must be positive over say any given period of one hundred trillion years. (According to current science, Homo sapiens evolved on Earth within a few billion years.) Given such evolution, and given much more time for further evolution and/or for the use of technology (Axiom 5), the possibility that the evolution/technology leads to some species of living things much more advanced than Homo sapiens and to the level of ‘God’ that is capable of inventing and actually did invent our sub-universe or one identical to it must also be positive, even if possibly quite small. As the wider universe has existed forever (just proved above), that small probability (say 0.000.....1%) over any quintillion

years would already have cumulated into $99.99999\dots\% = 100\%$ (Axiom 2). It is thus certain that 'God' existed and invented our sub-universe or one identical to it. Q.E.D.

Our proposition provides an explanation to the fine-tuning curiosity (why many constants of nature happen to fall within narrow ranges suitable for a stable universe and the evolution of living things [e.g. 20, 21]). In the following, we wish to examine some of the properties of the wider universe (Section 2) and answer the question: Why is there a wider universe at all? (Section 3).

2. The Wider Universe and Its Properties

From just Axioms 1 (First Law of Thermodynamics) and 3 (Existence of Things), we may show that

Proposition 2: The Wider Universe is Infinitely Old.

Proof: From Axiom 3, there are things in the wider universe now. From Axiom 1, nothing comes from nothing. So, if things exist now, they must exist from as long ago in the past without limit. Even if certain things in the wider universe (such as our sub-universe) were created in finite time in the past (such as 14 billion years ago), the wider universe must have a longer history, since it must have existed before the creation of our sub-universe. This is so because the creator of our sub-universe also belongs to the wider universe from the definition of the later (D2 above). This creator and possibly other things in its universe could not pop up from nothing (Axiom 1). If these (that creator and its universe) were in turn created by a higher creator, the same argument applies again, as the higher creator and its universe also belong to the wider universe. Thus, the wider universe must be infinitely old. Q.E.D.

To prove Proposition 3, we need another axiom.

Axiom 6: Second Law of Thermodynamics: In a finite and isolated system, the entropy of the system increases with time, or the orderliness of the system decreases with time, reaching absolute chaos in infinite time.

Proposition 3: The Wider Universe Is Infinitely Large.

Proof: If the wider universe was not infinitely large, it would be of finite size. From the definition of the wider universe, there is nothing else apart from the wider universe. Thus, it is also isolated; there is nothing else to interact with it. If there is something else, it is already included as a part of the wider universe by definition. The wider universe would thus be a

finite and isolated system. From Axiom 6, the entropy of such a system increases. From Proposition 2, the wider universe is infinitely old, thus its entropy would have by now (in fact also by a very long time ago) increased to the level of absolute chaos. There would be no orderly systems anywhere in the wider universe. However, our sub-universe, our Milky Way, our Sun, ourselves are all orderly systems. Thus, our initial supposition that the wider universe is not infinitely large must be false. Thus, the wider universe must be infinitely large. **Q.E.D.**

Assumption 1: Our sub-universe is finite in size and history.

Though put as an assumption, this is really the consensus opinion of most scientists. As mentioned at the beginning of this paper, the virtual consensus opinion of our top scientists is that our sub-universe originated from the Big Bang about 14 billion years ago. So it is finite in size and history. Even if it has expanded since then close to or at the speed of light, it still has a finite size now. Even if the space within has expanded in the meantime at any slow or fast but finite speed, our sub-universe is still finite in size. [Due to the expansion in space, it is believed that our observable universe is now about 80 billion light-years across instead of about 27 (close to 13.7 times 2) light-years across.] So this assumption must be true. This is so even if the virtual consensus view of our top scientists is wrong by a billion times.

Corollary 1: Our sub-universe is not the whole wider universe, it is only a very small part of the wider universe.

Proof: Obvious from Assumption 1 and Propositions 2 and 3.

Definition 4: Created Things vs. Naturally Existing/Evolving Things: We may usefully classify all things into created things vs. naturally existing/evolving things. Things (like an alarm clock) intentionally made by intelligent beings like Homo sapiens are created or manufactured things. All things not so created are naturally existing/evolving things.

Of course, created things are based on some natural materials. On the other hand, after say an alarm clock is made, it may still ‘evolve’ as it will be affected by air, heat, handling, etc. However, there is no need to consider the complication of such combination of creation and evolution, as it is sufficient for our purpose here to concentrate on the contrast of created things (with or without further evolution) versus uncreated and purely naturally existing/evolving things.

Proposition 4: The Wider Universe Was not Created, it Exists by itself Naturally

Proof: If the proposition is not true and the wider universe was created, then from the Definition 4, there was an intelligent being who created the wider universe. However, from the definition of the wider universe, it includes everything. That intelligent being must thus belong to the wider universe. Before the wider universe was created (or had existed), that intelligent being, being a part of the wider universe, did not exist. If it did not exist then, it could not create the wider universe. Thus, the wider universe could not be created. From Definition 4, it must thus have existed and evolved naturally. From Proposition 3, the wider universe has an infinite history or is infinitely old. Thus, the wider universe must exist by itself naturally. **Q.E.D.**

3. Why Is It Meaningless To Ask, ‘Why Is There A Wider Universe?’

One may be inclined to ask further,

Question A: Why is there a wider universe, instead of nothing?

This question must be distinguished from another (presented in both the present and past-tense versions:

Question B1: Is there something, or is there nothing?

Question B2: Originally, was there something to begin with, or was there nothing?

We know that there is something now. [If not, there would not be someone reading this paper right now! This paper, both in its content and in either the soft copy or the hard copy material containing the typescript, would not exist either.] Thus Question B1 clearly has the following correct answer: There is something. From Axiom 1, things must exist right from the beginning if there was a beginning. Thus, the answer to Question B2 is also obvious: Originally, there was something to begin with, not nothing. However, Question A is not asking about this, it is asking: **why** is there the wider universe, **why** was there something to begin with, rather than nothing? This section answers this question by showing that it is meaningless or at least does not have an answer. We only need Axiom 1 to prove this. But first we need some definition.

Definition 5: Meaningful Questions: Meaningful questions are those that may have an answer at least in principle.

Consider the question: On the 1st of April two years from now, will it rain at Trafalgar Square? No one may know the answer now but the question is meaningful, as in time people

will find out and can answer the question one way or the other. Consider another question: Exactly 7,095 years ago, at the spot where Trafalgar Square now is, did it rain that day? Perhaps no one will know the answer to this question ever. However, the question is still meaningful, as in principle it has an answer of either yes or no. We just do not know which one is the correct answer.

Suppose that Miss Z was partying all night and neither slept nor dreamed last night. Consider the question:

Question C: Is the owner of the dog in the dream of Miss Z last night an employee of the Commonwealth Bank?

In a sense, this question is meaningful as we all understand its meaning. However, this meaning is only formal. This question is meaningless in substance, as it cannot have an answer even in principle. The owner of a dog not even dreamed of does not exist; it is meaningless to ask whether she is an employee of a certain bank. The question does not have an answer even in principle. It is reasonable to define (in Definition 5 above) such questions as meaningless.

In a sense, one may say that Question C can be answered. For example, you may answer it by saying: ‘No, the owner of that dog was not an employee of any bank at all but the King of Wales who does not exist.’ But again, while such a meaningless answer may be befitting of the meaningless Question C, the question does not really have an answer in a substantive sense.

Proposition 5: Question A above is meaningless.

Proof: When we ask:

Question D: ‘Why is there X?’

there may be many different answers. However, all such answers may be classified into two types. The first type is that X was made/created by some intelligent being (e.g. human being, extraterrestrials, ‘God’, angels, ghosts, if they exist). For example, in answering to ‘Why is there this alarm clock?’, one may say that she bought it. This implies that the alarm clock was manufactured by some factory somewhere and the answer belongs to the first type. If the answer does not belong to the first type, it belongs to the second type that X was not created but has existed and/or has evolved naturally. From Definition 4, these two types are the only possible answers to a question like Question D. Question A is a question of the same type like Question D with X being the wider universe. Thus, Question A can only have either one of these two types of answer. Next, to complete the proof, we show that neither of these two

types of answer could really be the answer to Question A, so that Question A cannot have an answer in principle.

If the answer to Question A belongs to the first type, it means that the wider universe was created by some intelligent being. However, from the definition of the wider universe (Definition 3 above), it includes everything and must thus also include this intelligent being. Before the wider universe was created, this intelligent being did not exist as it belongs to the wider universe. How could some non-existent thing, intelligent or not, create something that includes itself? Thus, this intelligent being cannot really be the creator of the wider universe as it belongs to the wider universe itself. So the answer to Question A, if it exists, must be of the second type, i.e. the wider universe has no creator but exists/evolves by itself naturally.

For any specific thing like say sand, it may have evolved from other thing or things (e.g. stones) naturally. However, the wider universe by definition includes everything anywhere anytime. If there existed something Y that evolved into the wider universe, Y itself also belongs to the wider universe. Thus the wider universe could not have evolved from some other things (like sands from stones). Nevertheless, the wider universe may exist naturally, by itself so to speak. From Proposition 2, the wider universe is infinitely old, i.e. it has been in existent from eternity. Thus the wider universe must be right there to begin with, with an infinite history. To say that the wider universe exists by itself naturally is not incorrect. However, saying so does not really answer Question A, as the 'why' part is not answered. Thus, answers of type two cannot really answer Question A either. Thus, Question A has no answer even just in principle. So, according to Definition 5, Question A is a meaningless question. Q.E.D.

4. Which Is the More Acceptable Eternal Thing?

To say that the wider universe has always been there to begin with or that it has been in existence from eternity may be regarded as not going to the final cause or basis of things. This reasoning is in fact incorrect. If there was a cause or basis of the wider universe, that cause or basis must also be part of the wider universe from the definition of the latter. Thus, by definition, the wider universe cannot have prior or more basic cause.

The reason we still have some unease on this is due to the fact that we always deal with concrete things with prior cause or origin. To facilitate our survival, we are thus born with the intuition that demands prior cause of all [concrete] things. That this is reasonable for all concrete things does not imply that it is reasonable for the wider universe.

From the definition of the wider universe, only two alternatives are possible. The first is that the wider universe has always been there from eternity. If this is not the case, the only possible alternative is that there was nothing originally and then at some instance in time, the wider universe popped into existence all by itself without being caused by anything. [If it was caused by something, that something must also be part of the wider universe and hence cannot really be the cause.] This violates the highest or most basic scientific principle of conservation [Axiom 1 above]: Nothing could ever come from nothing. The acceptance of the possibility of something coming from nothing must be the most outrageous superstition. Why?

Suppose a healthy man tells you that he needs only half an hour sleeping with a fertile woman to make her producing a baby in nine months; few if any person will find this unbelievable. If he says that, with no need for physical contact, just having the woman dreaming of him will make her producing a baby in nine months, few if any person will find this believable. If he says that there is no need even for a woman, he can just draw a baby with some magic symbols on a piece of paper and burn the paper. Abracadabra! A living baby will appear in the smoke. Any one believing in this will be regarded as very superstitious. Now, not even the drawing or the piece of paper is needed! Just from nothing will out pop a living baby! Or a huge universe that eventually giving rise to billions of babies, some of whom eventually writing papers on the properties of the universe! Is not the belief in this even more superstitious!

Thus, to uphold scientific principles, objectivity, and rationality, it is of the utmost importance to insist upon the impossibility of something from nothing. It would be better to accept supernatural or divine creation than to accept something from nothing. The supernatural may or may not exist, but at least it is 'something'. If accepting supernatural creation is superstitious, accepting something from nothing is even more superstitious. As Pitts [22, p. 676] puts it, accepting something from nothing (i.e. 'denying *ex nihilo, nihil fit*') is 'ceding the rational high ground'.

Rejecting something from nothing as superstition of the highest order leaves us with only one possibility: the wider universe has always been in existence from eternity. While the eternal existence of something is unavoidable, there is still a choice of which thing to take as of eternal existence. At least the following alternatives are possible. Though there may be others, the differences are not likely to be very large.

1. Our (sub) universe [with its relativistic and quantum peculiarities and its constants of nature being within the narrow ranges suitable for the formation of systems of stars

and planets leading to the eventual emergence of living things including intelligent sentients with subjective consciousness] has always been in existence from eternity.

2. The false vacuum that could quantumly fluctuate into our (sub) universe [with similar peculiarities and eventual evolution of lives and consciousness as above] has always been in existence from eternity.
3. The infinite cycles of big bangs and big crunches [with possible changing constants of nature and with at least some cycles with peculiarities and living things and consciousness like our present cycle] have always been in existence from eternity.
4. Something that could explode or inflate into an infinite number of sub-universes, including some with peculiarities and lives and consciousness like our sub-universe, has always been in existence from eternity.
5. The God who created our peculiar universe has always been in existence from eternity.
6. The Super-God who created the God who created our peculiar universe has always been in existence from eternity [possibly with more or even infinite layers of creation].
7. The wider universe, as described in Sections 1 and 2 above, that could largely be non-peculiar, perhaps Newtonian like, has always been in existence from eternity.

Option 1 above is not acceptable because our universe is very peculiar (with its relativistic and quantum physical weirdness). In addition, as the opening sentence of this paper reports, there is a near scientific unanimity that our universe is only about 14 billion years old and hence does not have an eternal past. Some may take the position that time does not exist independent of matter and that nothing existed before the Big Bang. The present author will argue against this position elsewhere, suffice to say here the following. That time and matter are not independent is consistent with the idea of the wider universe. To say that asking what was before the Big Bang is like asking what is north of the North Pole [23, p.6] may actually be correct. What is north of the North Pole is only meaningless if confined to our Earth. Not being so confined, the correct answer to this meaningful question is: air, space and the Northern Stars. Similarly, not being confined to our sub-universe, time and matter before the Big Bang are meaningful and in fact needed to avoid the biggest superstition of something from nothing.

Section 5 below argues against option 2 in more details. Here, it may just be pointed out that, even if it were true that the false vacuum could quantumly fluctuate into our huge universe, this would have to be based on the weird quantum properties of the false vacuum. It is not reasonable that such a weird false vacuum could have existed from eternity, a ‘vacuum’ that could fluctuate into our peculiar universe with its ability to harbour evolution from non-living into living things and the eventual evolution of consciousness and high intelligence. As something that has existed from eternity, options 3 and 4 are open to the same objection of being unreasonable. If a clock needs a creator, a quintillion clocks still need a creator if not more creators; an ever-transforming and ever-lasting clock also needs a creator with stronger force.

What about option 5, the position of many religions (with the major exception of Buddhism which does not involve a creator)? This position has the advantage of being able to explain the peculiar nature of our (sub) universe and its ability to give rise to life, consciousness, and high intelligence within a relatively short time (about 14 billion years). It posits a creator God that solves these difficult problems. However, if God is taken as existing from eternity or beyond time, it runs into bigger problems than the problems it solves.

The strongest argument for creationism is probably that from design. While old creationists focussed on complex living things, modern creationists focus on the universe itself. Over the two decades since 1991, proponents of intelligent design (ID) have focussed on irreducible complexities such as flagellum and eyes. This argument has also been effectively refuted by evolutionist arguments. Even creationist scientists have to admit that ‘it now seems likely that many examples of irreducible complexity are not irreducible after all and the scientific argument for ID is thus in the process of crumbling’ [24, p.188].

If the peculiar universe was created, where did this powerful creator capable of creating the peculiar universe come from? If the clock was made by a clock-making machine, where did the machine come from? Saying that the clock-making machine has existed from eternity is certainly not an acceptable position. The main reason one has to believe in a creator/manufacturer of a clock is that such a complex thing like a clock cannot come into existence by itself. A clock-making machine is even more complex than a clock and hence cannot come into existence by itself with stronger force. Instead of accepting that the clock-making machine has existed by itself, it would be more reasonable to believe that the clock has existed by itself. Similarly, instead of believing that the creator God has existed by itself,

it would be more reasonable to believe that our peculiar universe has existed by itself. Thus, option 5 is more unacceptable than option 1.

Some people in ancient times believed that the Earth was shouldered by a huge turtle. If, in answer to what shoulder the huge turtle, it is answered that an even bigger turtle shoulder it, and so on, the problem has not really been solved, but actually becomes bigger and bigger. Similarly, option 6 does not solve but just enlarges the problem.

Thus, we have seen that all options are not acceptable except the last option 7, the position of the current paper. This option is acceptable, as the thing that is posited to have existed from eternity is the wider universe which is largely non-peculiar and could be Newtonian like. Being more like a rock, it may be rationally accepted as having existed by itself from eternity.

Options 1 to 4 above may be said to be closer to the beliefs of the scientific community and options 5 and 6 closer to those of the religious cycle. However, as argued above, none of these six options are acceptable. It is also difficult to say the set of options 1 to 4 is more or less acceptable than the set of options 5 and 6. As something that has existed from eternity, all the six options are quite unacceptable. To those closer to the position of the scientific community, we may say to them: If you want to uphold science, objectivism, and rationality, it is best to accept option 7, the position of this paper, as this will best prevent people in accepting a supernatural creator. To those closer to the position of the religious cycle, we may say to them: If you want to uphold creationism and the teaching of religions, it is best to accept option 7, the position of this paper, as this will best make people able to rationally accept the existence of the creator of our (sub) universe. The acceptance of evolved-‘God’ cosmology reconciles creationism with evolutionism, and will likely help to reduce the conflict between the scientific community and the religious cycle.

The reason most of us have unease accepting anything as having existed by itself from eternity is that all specific concrete things we have encountered have not existed by itself from eternity. Rather, they have either evolved from something else or have been created/manufactured. Thus, we do not need the intuitive ability for grasping the existence of anything by itself from eternity. Nevertheless, as argued above, the existence of something from eternity is needed. The non-peculiar wider universe is the most acceptable candidate for this. Moreover, it has also been proved from compelling axioms that the wider universe has existed by itself from eternity (Proposition 4 towards the end of Section 2 above). In addition, Proposition 5 in Section 3 above proves that it is meaningless to ask the further question,

two pieces a long way apart, because you have to expend energy to separate them against the gravitational force that is pulling them together. Thus, in a sense, the gravitational field has negative energy. In the case of a universe that is approximately uniform in space, one can show that this negative gravitational energy exactly cancels the positive energy represented by the matter. So the total energy of the universe is zero.’ [25, p. 129]

If one examines this argument carefully, the rather contrived interpretation may be seen, despite our great respect to Stephen Hawking. There is really no negative energy. (The negative energy associated with exotic matter is another matter.) Rather, there is only negative energy ‘in a sense’ (using Hawking’s own words). In what sense? In the hypothetical sense that if you were to separate pieces of matter close together apart, you would need positive energy. In my view, one can hardly use such hypothetical energy to offset the energy in the universe (including the energy equivalent of the matter in the universe) to claim that the universe really contains no net energy/matter. Moreover, even granting such contrived interpretation, it is still incredible that the void, without any outside effects or intervention, could diversify into negative and positive energy and matter. It violates the principle of ‘nothing comes from nothing’.

However, it is believed that quantum physics allows ‘the spontaneous appearance of electron-positron (anti-electron) pairs for brief periods of time in the vacuum’ [31]. However, the creation of such electron-positron pairs are induced by variable electric fields [32], or in the collision of heavy atomic nuclei [33]. Even the so-called ‘spontaneous electron-positron pair production’ in the vacuum is actually achieved by focussing electron laser beams [34], making a photon interacting with an atomic nucleus. Energy equaling at least the sum of the two created particles is needed. This is far from the something from nothing or an ‘ultimate free lunch’ as suggested [e.g. 35, 36, 37, 38]. In fact, even Stenger accepts that the vacuum or void that could give rise the spontaneous production of electron-positron pairs are ‘*false vacuum*’ that ‘has a positive energy density but *negative* pressure’ [38, p.240]. If vacuum can quantumly fluctuate into positive and negative mass-energy, it is not absolute nothing. As Stenger visualize it, the void ‘is not “nothing” in the absolute, philosophical sense’ [29, p.4 of ch.8]. Rather, ‘energy is inherent in the fabric of space. Even if a volume of space were utterly empty – without a bit of matter and radiation – it would still contain this energy’ [30, p. 47]. Moreover, even if spontaneous electron-positron pair production in true vacuum without any cause were possible and/or our universe were an ‘ultimate free lunch’ created just by itself in the void from say quantum fluctuation, such a universe or void is more

peculiar than a clock; nay, it is more peculiar than a magician! Is it credible that such a universe or void has no creator?

It may also be noted that quantum physics is not the ultimate theory. Many if not most scientists believe in the existence of hidden variables. The grand unification theory capable of explaining all the four known forces (gravity, electromagnetism, weak and strong nuclear forces) Einstein was looking for has not been found. Even the partial unification theory (the Quantum Field Theory) has different versions each with different deficiencies (or lacking certain desiderata) [39, p. 537 in particular]. Even within quantum physics itself, ‘Bohr’s own interpretation is ... fundamentally different from and even opposed to the Copenhagen interpretation in virtually all its particulars’ [40, p.736]. Also, quantum physics needs reconstruction rather than just interpretation [41].

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