

EMAAN: An Evolutionary Multiverse Argument against Naturalism

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Abstract: In this paper, an evolutionary multiverse argument against naturalism (EMAAN) is presented: *E1*. In an evolutionary multiverse, phenomena have variable evolutionary ages. *E2*. After some time T , the development of the empirical sciences will be evolutionarily conserved. *E3*. The phenomena with an evolutionary age above T are methodologically supernatural. Entities are classified according to whether they are (1) physical and spatiotemporal, (2) causally efficacious, and (3) either observed by or explanatorily necessary for the empirical sciences. While the conjunction of (1) and (2) is taken to be sufficient for existence in reality, the negation of (3) defines methodological supernaturalness. EMAAN uses a generalization of evolutionary theory, namely cosmological natural selection, to argue that phenomena evolve that fulfill conditions (1) and (2), but not (3). This shows that methodologically supernatural phenomena have a clear epistemology according to a theory that is grounded in the commitments of naturalism. Supernatural phenomena are not observed by the empirical sciences because the empirical sciences themselves are supernaturally guided and predestined to develop according to an evolutionarily conserved plan. In spite of this scientific plan, there is room for afterlives and supernaturality in the everyday experience.

Keywords: experimental falsifiability, methodological naturalism, Smolin's cosmological natural selection, supernaturalism, theory of everything, universal Darwinism.

1. Introduction

Multiverses are a hot topic in physics and cosmology and almost all the advocates of multiverses are naturalists who accept the evolutionary theory of Darwin. Indeed, multiverses can replace a supernatural designer of the fine-tuning for life of our observed big bang universe. The aim of this paper is to show that the conjunction of these beliefs, multiverse theory and evolutionary theory, sustains a worldview that naturalists will not easily accept: supernatural entities exist, not in the form of a strictly separate supernatural designer, but in the form of entities that are evolutionarily much older and more advanced than the entities that the empirical sciences can observe. The theory in this paper is not new, but has been extensively developed by Blondé (2015, 2016). Blondé shows that a maximally large multiverse evolves toward benevolence on computer scientific grounds (2015) and that we should expect that an eternal life starts in a universe that has the minimum fine-tuning for intelligence (2016). The current

paper adds a solidly defined distinction between natural entities and supernatural entities and has more emphasis on the commitments that underlie the theory.

2. Defining Naturalism

Naturalists concede the claim that all and only natural entities exist in reality. However, 'natural entity' can be defined in myriad ways depending on which necessary and sufficient conditions natural entities are assumed to fulfill. I propose to classify entities according to whether they (1) are physical and spatiotemporal, (2) have a causal effect on our observed universe, and (3) are methodologically necessary (i.e., are either subjects of observations in the empirical sciences or are necessary to explain the observations of the empirical sciences). Assigning condition (1) (Lewis 1986), or conditions (1) and (2) (Sellars 1927), as necessary and sufficient for natural entities results in a sort of ontological naturalism. Methodological naturalists (Forrest 2000; Miller 2009; Boudry et al. 2010) cannot deny that (1) and (2) are a sufficient set of conditions and that (1) and (3) are necessary conditions for entities to be natural.

Using these distinctions, it will be possible to analyze an evolutionary multiverse argument against naturalism (EMAAN¹) in an essential (*E*) three-step formulation (*E*1. In an evolutionary multiverse, phenomena have variable evolutionary ages. *E*2. After some time *T*, the development of the empirical sciences will be evolutionarily conserved. *E*3. The phenomena with an evolutionary age above *T* are methodologically supernatural.) and in an advanced analytic (*AA*), seven-step formulation (see Section 4).

Naturalism and supernaturalism have been thoroughly analyzed in the philosophic literature. According to Lewis (1986), modal realism is true: all the possible, causally and spatiotemporally isolated worlds exist in reality. Therefore, modal realism is a sort of ontological naturalism that does not require causal efficacy. Forrest argues that methodological naturalism, notwithstanding its lack of entailment relation with ontological naturalism, is "the only reasonable metaphysical conclusion" given, among other things, "the lack of a method or epistemology for knowing the supernatural" and "the subsequent lack of evidence for the supernatural." (2000, 7) This, Forrest concludes, leaves supernaturalism as "little more than a logical possibility." (2000, 7) Boudry et al. claim that while "science does have a bearing on supernatural hypotheses," such hypotheses are rejected on "purely evidential grounds, instead of ruling them out by philosophical fiat" (2010, 227). Although Miller admits that science is limited, he maintains that methodological naturalism works "only if science confines itself to the investigation of natural entities and forces," which are to be

¹ EMAAN imitates the abbreviation of Plantinga's (1993) "evolutionary argument against naturalism" as EAAN. The meaning of Emaan (or Iman) as Faith in the Islamic metaphysics is a coincidence.

understood “in terms of natural cause-and-effect processes.” (2009, 117) Articulating a stance common among supernaturalists, Plantinga (1997) argues that hypotheses about supernatural entities are hypotheses about a singular deity or god. Considering that Plantinga’s god exists in reality but is not natural in any sense, his argument counters both ontological and methodological naturalism.

In response to these positions, I will argue that supernaturalism, defined for the purposes of this paper as methodological supernaturalism, has a clear epistemology within the context of a generalized evolutionary theory in which physical, spatiotemporal entities are methodologically supernatural entities that exist in reality. To proceed with this argument, I must first provide a more stringent definition for methodological naturalism. *Narrow* methodological naturalism will be defined as the claim that, first, conditions (1) and (2) are necessary and sufficient, and second, condition (3) is necessary but not sufficient. The narrow methodological naturalist rejects causally isolated universes in a multiverse, even if they are explanatorily necessary for the observations of the empirical sciences. I argue that narrow methodological naturalism is not tenable for this reason. In contrast, *broad* methodological naturalism can be defined as the claim that, first, conditions (1) and (3) are necessary and sufficient, and second, conditions (1) and (2) are sufficient but not necessary. Broad methodological naturalists accept causally isolated universes in a multiverse as existing in reality if, and only if, they are explanatorily necessary and take causally efficacious entities to be a subset, albeit not necessarily a proper one, of those that exist in reality.

While ontological naturalism seems to be a commitment that one can adopt without arguments, methodological naturalism, including broad methodological naturalism, is vulnerable to argued reasoning. In launching an attack on naturalism, I will take naturalism to mean broad methodological naturalism and take, along with all the introduced types of naturalists, the conjunction of conditions (1) and (2) to be sufficient for existence in reality. This attack can be expressed in terms of methodological supernaturalism, with the negation of (3) serving as a necessary and sufficient condition for methodologically supernatural entities. I will thus argue that some methodologically supernatural entities also fulfill conditions (1) and (2) according to the generalized evolutionary theory, meaning they exist in reality according to the theory.

EMAAN starts from two hypotheses that, I argue, broad methodological naturalists have to accept: evolutionary theory (Darwin 1859) and the multiverse hypothesis (Carr 2007). Methodological naturalists claim that the biological entities in Darwin’s tree of life exist precisely because the conjunction of their existence and evolutionary theory has been proven to be methodologically necessary by more than a century of observations made by biologists. Evolutionary theory is therefore an inevitable hypothesis for the methodological naturalist. The inclusion of certain differently parametrized

universes in a multiverse as entities that are necessary to explain our observed universe is a more recent development in physics, particularly in the domain of string theory (Witten 1995). Such universes are necessary to explain, via an anthropic observation selection bias (Carter 1974), the high degree of fine-tunedness of the laws and fundamental constants of physics, which makes them natural according to broad methodological naturalism.

Methodological naturalists will not accept the existence in reality of universes that are not necessary to explain the degree of fine-tunedness of our observed universe. In particular, they will not accept the existence in reality of what I will call *super-tuned* entities. Super-tuned entities are entities in a multiverse (or in a universe, which can be considered a special case of a multiverse) that is fine-tuned for complexity to a higher degree than our observed universe. For example, a system that makes backups of the healthy bodies of biological beings and that transports them to an afterlife world when they die, might be an example of a super-tuned entity. Whereas lesser-and equally-tuned universes existing in reality can account, via an observation selection bias, for the degree of fine-tunedness of our observed universe, super-tuned entities are neither observed by the empirical sciences nor are they necessary to explain why the fine-tunedness of our observed universe is as fine as it is. Consequently, super-tuned entities do not fulfill condition (3), which is why the methodological naturalist claims they do not exist in reality.

However, the conjunction of evolutionary theory and the multiverse hypothesis opens a line of attack on this position. Within the set of all universes that the broad methodological naturalist admits exist, some of these universes must be able to self-reproduce and gradually increase in fine-tuned complexity. No good reason can be offered why such universes would stop increasing in complexity and fail to reach the super-tuned stage. Given that super-tuned entities do not fulfill (3), those that fulfill conditions (1) and (2) risk becoming methodologically supernatural entities that exist in reality.

There seems to be only one way out for the broad methodological naturalist: to seek shelter in physical, spatiotemporal entities that necessarily do not fulfill (2) and the negation of (3) simultaneously. The broad methodological naturalist claims that super-tuned self-reproducing universes, being methodologically unnecessary, do not exist in reality because they are also causally isolated from our observed universe. This results in a defence (*D*) against my attack on methodological naturalism: If a physical, spatiotemporal entity has a causal effect on our observed universe, then the empirical sciences either observe it or they need it as an explanation for their observations.

I will argue, starting from the conjunction of evolutionary theory and the multiverse hypothesis, that *D* is false. In the next section, I will propose a theory that generalizes evolutionary theory to cosmology. In section 4, both the three-step *E* version and the seven-step *AA* version of EMAAN are presented. After that, in section 5, both versions are analyzed theoretically. Section 6 provides

examples of the concepts of EMAAN for each of the steps in both versions. The generalized evolutionary theory of cosmological natural selection (Smolin 1992) is further supported in section 7. Finally, in section 8, the conclusions are given.

3. Generalizing Evolutionary Theory

In refuting *D*, I will argue for a generalized evolutionary theory in which some phenomena are methodologically supernatural phenomena that exist in reality: they are physical, spatiotemporal and causally efficacious, but not methodologically necessary. In arguing for a generalized evolutionary theory, I maintain that naturalists should accept evolutionary theory on two different grounds: first, for its a priori self-evidence that those entities that self-reproduce abundantly are observed with an increased probability, and second, for its a posteriori explanation of the observed evidence in biology. The a priori ground calls for a generalization of evolutionary theory to cosmology: our observed universe is observed by us because it, or a multiverse of which it is a part, modified successfully to an abundantly self-reproducing entity within an even larger multiverse that contains many cosmological entities that can possibly self-reproduce.

Generalizing evolutionary theory to cosmology could be accomplished via the generalization of five concepts in biology. Three generalized concepts are needed for the *E* version of the EMAAN argument: evolutionary multiverse, evolutionary age, and evolutionary conservation (Fraser and Bernatchez 2001). In addition to these, evolutionary dependence will be needed for the *AA* version of EMAAN. These four concepts fit in a fifth: the generalized evolutionary theory of cosmological natural selection.

3.1 Natural Selection to Cosmological Natural Selection

Darwin's (1859) theory of natural selection, also known as the survival of the fittest, predicts that those descendants that have favorable modifications in their DNA are selected for further reproduction as compared to less favorably modified descendants. More recently, physicist Lee Smolin has proposed the principle of *cosmological natural selection*, which states that those cosmological entities that reproduce most abundantly have the highest probability to be observed.

3.2 Biological Organism to Evolutionary Multiverse

Examples of biological organisms include human beings, bacteria, and trees, all of which have the capacity to reproduce. Biological organisms consist of cells that can also self-reproduce. Some cells have organelles that can, again, self-reproduce. Evolutionary multiverses extend this Russian nesting doll of self-reproducing substructures in the direction of always larger, older, and more diverse structures with more spatiotemporal dimensions.

3.3 Evolutionary Conservation

Evolutionary conservation is the observed fact in biology that evolving organisms retain certain characteristics that are fundamental in the reproduction plan of the organism. For example, the fact that the embryo of an animal always begins development in some form of fluid has been evolutionarily conserved since the origin of life in water.

3.4 Evolutionary Age

Biological entities require a certain time to evolve, depending on their complexity. This required time is their evolutionary age. Human beings needed about four billion years to evolve on Earth, whereas some single-celled organisms needed only some hundreds of millions of years to do so. Considering that atoms and biomolecules also had to emerge (develop) in the big bang universe, the evolutionary age of human beings in the big bang universe is around 13.7 billion years. Within an evolutionary multiverse, the evolutionary age of a complex, self-reproducing phenomenon has to be measured relative to a multiverse that has an origin. Complex (highly fine-tuned) phenomena have a greater evolutionary age than simple phenomena.

3.5 Evolutionary Dependence

Biological entities with an evolutionary age T_2 can be evolutionarily dependent on biological entities with a shorter evolutionary age T_1 . For example, eukaryotes, complex single-celled organisms, rely on mitochondria, which are more primitive organisms, to act as organelles. Evolutionary dependence might also hold for cosmological entities in an evolutionary multiverse. For example, human beings could be, within a multiverse, evolutionarily dependent on the formation of atoms, planets, biological cells, and primitive big bang universes.

4. The E and the AA Arguments

Via this generalized evolutionary theory and the definition of broad methodological naturalism, it is possible to formulate both the *E* version and the *AA* version of EMAAN in three and seven steps, respectively. The *E* version uses the concepts of evolutionary multiverse, evolutionary age, evolutionary conservation, empirical sciences, and methodological supernaturalness:

- E1.* In an evolutionary multiverse, phenomena have variable evolutionary ages.
- E2.* After some time T , the development of the empirical sciences will be evolutionarily conserved.
- E3.* The phenomena with an evolutionary age above T are methodologically supernatural.

The *AA* version is more detailed and uses evolutionary dependence and causality in addition to the *E* concepts:

AA1. In an evolutionary multiverse *M*, many phenomena *P* exist that are evolutionarily dependent on universes *U_T* and that can intervene in these *U_T*s. The *U_T*s have an evolutionary age *T* and intelligent, technological inhabitants *I* with empirical sciences *S*.

AA2. Some *I*-technology-caused phenomena in the *U_T*s are evolutionarily conserved. Let the *C*s be those that are most strongly evolutionarily conserved.

AA3. From *AA1*, *AA2*, and the nature of evolutionary dependence and evolutionary conservation, it follows that the *P*s must intervene in the *U_T*s in such a way that they facilitate, but do not alter, the *C*s.

AA4. The *C*s are more directly influenced by the developments of the *S*s in the *U_T*s than by most of the everyday interactions between the *I*s in the *U_T*s.

AA5. From *AA3* and *AA4*, it follows that the *S*s in the *U_T*s are evolutionarily conserved not to observe the *P*s, so as not to alter the *C*s.

AA6. From *AA3* and *AA4*, it also follows that the *P*s intervene in the everyday interactions between the *I*s in the *U_T*s, in order to facilitate the *C*s with more precision.

AA7. The *P*s are (1) spatio temporal and physical, (2) causally efficacious and (3) unobserved by the *S*s and unnecessary to explain the observations of the *S*s. Therefore, the *P*s exist in reality and are methodologically supernatural.

5. Analyses of the Arguments

EMAAN is a complex argument that requires a theoretical analysis for both the *E* and the *AA* versions. Together with the individual steps in the arguments, the analyses provide a complete defence of EMAAN. Let me begin, therefore, with an analysis of the three steps of the *E* version:

Step *E1* starts with the two base hypotheses that the broad methodological naturalist must accept: the multiverse hypothesis and evolutionary theory. Any sufficiently complex phenomenon that cannot self-reproduce will be outnumbered by similarly complex phenomena that can self-reproduce. Therefore, phenomena can be assumed to be subjected to cosmological natural selection, which implies they have an evolutionary age that sets the minimum time they require to come into existence within a certain multiverse.

Step *E2* requires the assertion that every phenomenon, no matter how small or insignificant, is evolutionarily conserved in the reproduction cycle of a sufficiently large (with respect to size, age, dimensionality, and diversity) multiverse in which the phenomenon occurs. The reason that this must be so is twofold. First, evolutionary conservation in relation to increasingly large multiverses is transitive, and second, every phenomenon can potentially result in a selective advantage in an evolutionary competition between sufficiently large

multiverses and, hence, become evolutionarily conserved. Transitivity means that if a phenomenon P is evolutionarily conserved in the reproduction cycle of a multiverse M_1 , and M_1 is evolutionarily conserved in the reproduction cycle of a multiverse M_2 , then P is evolutionarily conserved in the reproduction cycle of M_2 . The potential selective advantage can be corroborated with a biological example: the excretion products of mitochondria have no role in free-floating mitochondria, but they do result in a selective advantage if the mitochondria are organelles of eukaryotes.

The development of the empirical sciences is a process that spans many thousands of years within an intelligent civilization. The evolution of (the development of) the empirical sciences is a process that spans many multiverse (or universe) generations. Although the evolutionary conservation of any empirical science must be a gradual process, we could hypothesize, for any sufficiently large reference multiverse, a time T after which the empirical sciences and their development can no longer be altered.

Step $E3$ follows from the fact that phenomena P with an evolutionary age greater than T were not present in the worlds in which the empirical sciences were still evolving. Therefore, before time T , the P s were not methodologically necessary for the empirical sciences. After time T , the P s can come into existence; however, because of the evolutionary conservation of the empirical sciences, they will be such that they remain methodologically unnecessary. In other words, the P s exist in reality and are methodologically supernatural. This proves the case for the E version.

The E version of EMAAN can be validly applied to any civilization in an evolutionary multiverse that has empirical sciences. It works just as well for three-dimensional beings like us as for hypothetical seven-dimensional beings in a suited hyper-dimensional multiverse. According to the E version, reality is split into two sections for each civilization with empirical sciences: a natural section that can be observed by the empirical sciences and a methodologically supernatural section that is too great in complexity and evolutionary age for it to be observable by the empirical sciences.

The E version of EMAAN is conceptually relatively uncomplicated. However, there are two mutually exclusive objections that can be raised against it:

1. An evolutionary multiverse is self-destructive. Whenever more complex phenomena with a greater evolutionary age come into existence, they will disrupt the evolutionarily conserved empirical sciences of simpler worlds because they have no interest in them. Since we do observe a relatively simple world that is not disrupted, some of the underlying hypotheses of EMAAN must be false.
2. Because of evolutionary conservation, phenomena with different evolutionary ages cannot coexist and interact. More complex phenomena

therefore live in causally isolated multiverses, which is not necessarily enough for the broad methodological naturalist to assert that they exist in reality.

By introducing the generalization of the concept of evolutionary dependence in the AA version of EMAAN, both these objections can be rebutted. Let me therefore analyze the seven individual steps of the AA version:

Step AA1 follows from the generalization of evolutionary dependence. Of all the phenomena that have an evolutionary age that is greater than T , some phenomena will make use of the U_T s as resources that are essential to their reproduction plans. These phenomena are the P s. On the other hand, because of their evolutionary dependence, all the P s must have an evolutionary age greater than T , the evolutionary age of the U_T s. Therefore, all the P s can intervene in the U_T s, given that the U_T s are already present in their world.

Step AA2 is supported by the same analysis as that of step E2. Every phenomenon is eventually evolutionarily conserved, and some phenomena must therefore be the most strongly evolutionarily conserved phenomena that are caused by the technology of the I s in the U_T s.

Step AA3 uses the fact that evolutionary dependence on a universe also implies a dependence on the reproduction plan of the universe, including its evolutionarily conserved phenomena. By altering the C s, the U_T s would die, and, along with the U_T s, the P s themselves would die. Thus, by facilitating the C s, both the U_T s and the P s can thrive.

Step AA4 is implied by the empirical sciences being persistent, publicly available, and a direct source of many technological innovations. Most of the everyday interactions between intelligent beings get lost over time and do not directly result in technological innovations.

Step AA5 extends the evolutionary conservation of the C s to the evolutionary conservation of the S s, which is a result of the direct influence of the S s on the C s. Altered S s lead to altered C s, which is not allowed because of the C s' evolutionary conservation. Therefore, just like the C s, the S s become evolutionarily conserved at a moment when the P s have not yet come into existence. This means that the S s are evolutionarily conserved not to observe the P s. Because the P s are the latest to enter the scene, they have to intervene in such a way that they do not alter the S s.

Step AA6 shows what can happen to phenomena with an indirect influence on the C s. They can be altered in order to facilitate the directly influencing phenomena with more precision. In this way, the directly influencing phenomena that rely on a somewhat unlikely coincidence can be facilitated in a more systematic manner. For this reason, the P s will intervene in the everyday interactions between the I s. These everyday interactions also eventually become

evolutionarily conserved because of this, but later and less strongly than what is the case for the **S**s and the **C**s.

Step AA7 summarizes the conclusions that can be drawn with regard to the conditions (1), (2), and the negation of (3) about existence in reality and methodological supernaturalness. These conditions follow from steps AA1, AA6, and AA5, respectively. It then follows that the **P**s exist in reality and are methodologically supernatural. This concludes the theoretical analysis of EMAAN.

However, an analysis may be clearer if it is supported by examples. This follows in the next section.

6. Exemplary Scenarios

Both the *E* and the *AA* versions of EMAAN contain a series of concepts that can be instantiated by a variety of biological and cosmological examples. Without actually instantiating these concepts, the arguments and their analyses remain rather abstract. Therefore, I will expand step-by-step on a single exemplary scenario for both versions. However, the reader needs to be warned that giving examples of supernatural phenomena inevitably implies speculation.

Exemplifying *E1*: An example of an evolutionary multiverse **M** could be a Russian nesting doll of multiverses in multiverses, in which the smaller multiverses reproduce in multiverses that are larger and older and, probably, have more spatial dimensions. An example of phenomena with variable evolutionary ages can possibly be found in biological organisms in variable numbers of spatial dimensions, sustained by a hyper-dimensional biochemistry. But they do not need to be hyper-dimensional. Three-dimensional aliens that live in an older and larger three-dimensional multiverse must themselves be vastly older than we are, in case we imagine them to be evolutionarily dependent on multiple instances of reproducing big bang universes. They could be biologically fit for this task, for example as self-reproducing robust aliens that can stay intact for astronomically long periods of time. A third example of a phenomenon with a possibly high evolutionary age is a stable gateway between nearby big bang universes, which could be used by the robust aliens to travel.

Exemplifying *E2*: Given that **M** is evolutionary, it has an origin, a development, an end, and **M**-time that can be measured within **M**. Some (astronomically long) **M**-time after the origin of **M**, big bang universes **B** with three spatial dimensions might emerge that contain intelligent civilizations in which empirical sciences develop from century to century. These empirical sciences and their development will at some **M**-time T_i ($<T$) start to have some influence on the reproduction plan of the **B**s, or at least influence the probabilities of the **B**s' reproduction, due to the additional complexity of their technological footprint. We know from biology that the additional complexity of

all kinds of biomolecules also has been evolutionarily conserved. After the M -time T , this additional complexity will have become of vital importance for the reproduction of the B s, which means that the technological footprint and the empirical sciences that sustain it can no longer change much. In other words, they have become evolutionarily conserved.

Exemplifying $E3$: Assuming that some robust aliens, stable gateways, and hyper-dimensional aliens have an evolutionary age that is above T , it follows that the empirical sciences in the B s never had the chance to observe anything that necessitates the existence of these aliens methodologically. The empirical sciences got evolutionarily conserved before the advent of the earliest supernatural aliens. Because of this evolutionary conservation, the supernatural aliens might intervene in the B s' empirical sciences in such a way that they are not detected and documented by the methods of these empirical sciences, for example, by mimicking an alien civilization that sends a message. Even though the aliens are, in this example, physical, spatiotemporal, and causally active, they are not methodologically necessary for the B s' empirical sciences. Therefore, they exist in reality while being methodologically supernatural. This exemplifies the E version of EMAAN.

As previously discussed in the theoretical analysis, there remains a question to be answered. Why do the aliens intervene in the B s in such a way that they remain methodologically unnecessary? Why would they not disrupt the B s, or instead stay far away from them? The AA version of EMAAN provides the answer: the aliens are evolutionarily dependent on the B s. The explanatory logic of this answer is elucidated in more detail by extending the example above with examples of the concepts in the AA version of EMAAN.

Even though EMAAN is strictly speaking not committed to the possible existence of hyper-dimensional life, the belief in this possibility may be serviceable to those who hope that supernaturalism comes with an afterlife. Indeed, in the hyper-dimensional case the supernatural realm may contain hyper-bodies in hyper-bodies in which the larger hyper-bodies make backups of the smaller hyper-bodies. When the smaller hyper-body dies, it can be regenerated from the backup in a far-away place where it does not disturb the evolutionarily conserved plan of the multiverse in which the smaller hyper-body was born. Yet, the belief in higher dimensions is also serviceable to those who believe that the multiverse is either very large, or even maximal or plenitudinous. EMAAN explains why the commitment to higher dimensions does not come with the cost that these higher dimensions are unobserved. If these higher dimensions are there, we would not see them because higher-dimensional phenomena are evolutionarily dependent on the prior evolution of lesser-dimensional phenomena.

EMAAN is also not committed to the specific example that I will propose for the most highly conserved I -technology-caused phenomenon, because every

insignificant technological phenomenon will eventually become evolutionarily conserved in a sufficiently large multiverse. Yet, the most highly evolutionarily conserved technological phenomenon will most likely be a great achievement. An intergalactic laser beam will be chosen as an example, without suggesting that this specifically is ever a realistic possibility. Speculation is inevitable in building an example.

Seven concepts will thus be exemplified: the evolutionary multiverse M (as the 7D multiverse); the evolutionarily dependent phenomena P (as the stable gateways, the robust aliens, and the intelligence-specialized 4D organisms); the universes U_T (as the 3D big bang universes); the evolutionary age T (as the 10^{20} years); the intelligent, technological inhabitants I (as the intelligent 3D inhabitants); the empirical sciences S (as the 3D empirical sciences); and the evolutionarily conserved I -technology-caused phenomenon C (as the intergalactic laser beams).

Exemplifying AA1: Let the example of M be a (not necessarily string-theoretic) multiverse with seven spatial dimensions. Let the examples of the U_T s be string-theoretic big bang universes with three (non-compactified) spatial dimensions that contain civilizations of intelligent inhabitants, which are examples of the I s, and with empirical sciences developed by these inhabitants, which are examples of the S s. Let the astronomically long evolutionary age T of the 3D big bang universes be 10^{20} years, measured from the origin of the 7D multiverse. Within the 7D multiverse, the 3D big bang universes thrive from the 10^{20} years to, for example, 10^{40} years after the origin. Let our observed big bang universe be one of the 3D big bang universes at a random moment within this time frame, say, 5×10^{39} years after the origin of the 7D multiverse.

The evolutionary age T_P is the evolutionary age within the 7D multiverse of the P -phenomena: robust aliens, stable gateways between the 3D big bang universes, and 4D organisms with a 4D biochemistry. Consider, for example, that T_P is 10^{30} years. Given that the 3D big bang universes are already present in the world of the P -phenomena, some subclass of the P -phenomena will be evolutionarily dependent on the intelligent 3D beings in the 3D big bang universes, because they can shorten their evolutionary road toward higher complexity by building on the already extant complexity. The 4D organisms can literally graft upon the intelligent 3D beings by including them as an organ that they can control. The robust aliens can land on the planets of the 3D intelligent beings and the stable gateways can provide access to nearby big bang universes for the 3D intelligent beings.

Exemplifying AA2: Let us consider as an example that the transmission of an intergalactic laser beam is a C . The intergalactic laser beam may have acquired some function, such as signaling or triggering, in the reproduction plan

of the 3D big bang universes within the 7D multiverse. Given that the *P*-phenomena are evolutionarily dependent on the 3D big bang universes, they will facilitate the laser beam in order to reproduce themselves. For properly fulfilling its function in the complex physics of the 7D multiverse, the laser beam has to be right with regard to timing and strength. Not just an intergalactic laser beam is a suitable potential example of a *C*, but everything in the technological footprint of a civilization: electromagnetic waves, space ships, particle accelerators, etc.

Exemplifying AA3: Since the *P*-phenomena are evolutionarily dependent on the 3D big bang universes, they must facilitate the reproduction plan of the 3D big bang universes. This includes precisely reproducing the intergalactic laser beams that have a highly evolutionarily conserved function within the 7D multiverse.

Exemplifying AA4: The timings and strengths of intergalactic laser beams by a civilization is more directly influenced by the findings of scientists and the ideas of a world president than by some ordinary man ordering a drink in a bar.

Exemplifying AA5: If a world president would have been informed about the need to transmit an intergalactic laser beam by a winged angel that was directly materialized by the intelligence-specialized 4D organisms, the future technological footprint, including the timings and the strengths of the intergalactic laser beams, would have much more likely been altered than in the case that the world president developed his ideas in a less spectacular manner. The president might have lost his credibility, resulting in different plans for transmitting laser beams. This explains why the *P*-phenomena exert their control in a manner that does not betray the existence of the *P*-phenomena to anyone who has an impact on the scientific state of the art.

Exemplifying AA6: Contact with extra-terrestrial 3D intelligence may be an important factor in the decision to transmit an intergalactic laser beam. Therefore, the robust aliens could mimic such a contact. The 4D organisms can go a step further and directly take control of the conversations the world president has with his entourage. This enables the *P*-phenomena to facilitate the intergalactic laser beam in a more predictable manner than via sending an angel.

Exemplifying AA7: The *P*-phenomena (1) are physical, (2) intervene in the conversations between intelligent 3D inhabitants, and (3) are unnecessary to explain the observations of the 3D empirical sciences.

This proves the existence of phenomena that are methodologically supernatural for the 3D empirical sciences. All the steps of both versions of EMAAN are thus exemplified.

7. Cosmological Natural Selection as a Logical Ground for Reality

Given that EMAAN depends on cosmological natural selection, this paradigm deserves some more support. Cosmological natural selection was first proposed by Smolin (1992), but was soon rejected by physicists Rothman and Ellis (1993)

on technical, a posteriori grounds. It has been further explored in dozens of publications, most often by physicists (Harrison 1995; Vilenkin 2006; Gardner 2014; Vidal 2014; Blondé 2016). Apart from being relevant to physicists, I argue that cosmological natural selection has the status of a logical, a priori ground for reality, which makes it very relevant to philosophers.

Rothman and Ellis (1993, 204) try to dismiss cosmological natural selection as being merely an analogy to evolutionary theory in the biological world that might or might not hold. That would have been a valid objection if cosmological natural selection and evolutionary theory were empirical laws, like the speed of light being finite or the number of spatial dimensions being three. However, evolutionary theory in the biological world is merely an application of cosmological natural selection in which biological organisms are examples of cosmological entities, and cosmological natural selection itself is a fundamental logical law that grounds any possible reality. That evolutionary theory in biology is confirmed by empirical evidence is useful to know, but not required in deriving its universal validity. Consider three other possible grounds we might contemplate:

1. Reality has no logical, a priori basis. The empirical sciences have the most superior epistemology.
2. Anything that is not observed is not a part of reality. Therefore, the observed world cannot have an external explanation.
3. Reality consists of a non-maximal multiverse (or world) that does not reproduce. The apparent selection of this non-maximal multiverse among other possible non-maximal multiverses has no explanation whatsoever.

These three posits, which are variations on the same theme, are either irrational, or are no grounds at all. They have to be compared with cosmological natural selection in the maximal multiverse, which provides an explanation for any possible non-maximal multiverse: it is observed because it is naturally selected among other non-maximal multiverses. Cosmological natural selection grounds reality recursively via a series of non-maximal multiverses, all the way to the maximal multiverse. Because of its uniqueness, the maximal multiverse is not in need of a selection principle, and therefore valid as an ultimate ground.

Although cosmological natural selection has been discussed in the literature with respect to its falsifiability in physics, I conclude it has not sufficiently been considered as a philosophical project in which cosmological natural selection provides an a priori unfalsifiable logical ground for every possible reality.

8. Conclusions

The logical possibility of supernaturalism turns out to be a loophole in the worldview of the methodological naturalist. This worldview requires the impossibility, or at least the improbability, of cosmological natural selection and

its consequences, which seems hard to maintain for a naturalist. Evolutionary theory, when held to be universally applicable, backfires on methodological naturalism by inferring that the empirical sciences might very well be supernaturally predestined to develop according to an evolutionarily conserved plan. In this case, the methodology of the empirical sciences cannot determine what exists in reality.

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