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Introducing the Quest for an Explanation

1.1 Introduction

Throughout history, many have embarked on the quest to discover the answers to the fundamental mystery concerning the ultimate origins of the universe and the purpose of our existence. Some of the most brilliant thinkers in human history have contributed to this quest by formulating their answers to these Big Questions in the form of the Cosmological Argument—which attempts to demonstrate the existence of a Divine First Cause or Necessary Being—and the Teleological Argument (TA)—which attempts to demonstrate that our universe is the purposeful creation of a Divine Designer. Originating in Ancient Greece in the writings of Plato (e.g. *Laws*, 893–96) and found in other ancient philosophical traditions (e.g. the tenth-century Indian philosopher Udayana's *Nyāyakusumāñjali* I, 4), the Cosmological and Teleological Arguments have also been developed by scholars of the Abrahamic religions, since the 'First Cause' and Designer of the universe may be associated with Judaism, Christianity, or Islam.

Given that these arguments have been around for thousands of years, one might wonder what more can be said on behalf of them. Many have

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thought that these arguments have been successfully rebutted by the extensive criticisms of David Hume and Immanuel Kant in the eighteenth century, and that they are now obsolete in light of modern science. A review of the literature however shows that—even in our present scientific period—these arguments are still being actively discussed in journals and monographs published by the world's leading academic publishers. One reason is that modern science itself has developed theories (e.g. the Big Bang theory, theories of fundamental physics) which seem to support the premises of these arguments. Moreover, the objections by Hume and Kant are answerable, as I shall explain in the rest of this book.

This book aims to expose the weaknesses in recent assessments of these arguments by their proponents and opponents, to offer a more compelling evaluation of alternative explanations, and to examine whether both arguments can be integrated in such a way that both are strengthened. It will move the discussion ahead in a new and significant way by providing original arguments in response to objections, including those found in leading academic publications within the last few years. These objections include (among others) the problem of ensuring that all the alternative hypotheses to Design have been considered and ruled out[1] (Ratzsch and Koperski 2019; see below), the problem of assigning prior probability for Design (Sober 2019), and the objection to the applicability of the Causal Principle to the beginning of the universe based on bounce cosmologies and the apparent challenge of fundamental physics to the directionality of causality and time (Linford 2020). Despite the huge amount of literature on the Cosmological Argument and Teleological Argument, I am not aware of any other publication which has provided the original arguments which I am going to offer in response to the objections, some of which have remained outstanding despite many years of intense discussions. To help the reader appreciate this point, I shall begin with a review of the background of discussion on the Cosmological Argument and Teleological Argument.

1.2 A Review of the Discussion

There are different versions of the Cosmological Argument (Craig 1980):

(1) The Leibnizian (named after Gottfried Leibniz 1646–1716; see *Monadology*, §32), which attempts to ground the existence of the contingent things of our universe in a Divine Necessary Being.
(2) The Thomist (named after Thomas Aquinas 1225–1274; see *Summa Theologica* I,q.2,a.3 and *Summa Contra Gentiles* I,13,a), which attempts to demonstrate that the universe is sustained in existence by a Divine First Cause.
(3) The Kalām Cosmological Argument (KCA), which attempts to demonstrate that the universe has a beginning of existence brought about by a Divine First Cause. The roots of the KCA can be traced to Plato's *Timaeus* sections 27 and 28 and the writings of the Christian philosopher John Philoponus (c.490–c.570), who argued against the possibility of an actual infinite number of earlier events in *Against Aristotle on the Eternity of the World*, frag. 132. Philoponus' work became an important source for Medieval Islamic and Jewish Proofs of Creation (Davidson 1969; Adamson 2007, chapter 4), and the KCA was developed by the Muslim philosopher al-Kindī' (805–873) and *mutakallimūm* (theologians who used argumentation to support their beliefs) such as al-Ghāzāli (1058–1111).

In this book, I shall focus on the Kalām version of the Cosmological Argument.

Concerning the KCA, the development of the Big Bang theory, which seem, to indicate that our spacetime manifold has a beginning, has led to renewed interest among philosophers and scientists concerning the question of First Cause of the beginning of the universe. Nevertheless, while the Big Bang is commonly understood as the beginning of spacetime, many cosmologists are now discussing pre-Big Bang scenarios in which the Big Bang is not the absolute beginning. While some cosmologists have proposed that entities such as a quantum vacuum or another universe existed before the Big Bang, others have asked where these came from. This question is related to whether everything that begins to exist has a cause (the Causal Principle, CP) and whether an infinite regress of causes and effects is possible. The KCA, as formulated by its most noteworthy recent proponent William Lane Craig, is as follows:

(1) Whatever begins to exist has a cause (Causal Principle).
(2) The universe began to exist.
(3) Therefore, the universe has a cause.

Craig argued that further analyses of the Cause of the universe show that this Cause possesses various theistic properties, such as being uncaused, beginningless, initially timeless and changeless, has libertarian freedom. and is enormously powerful (Craig and Sinclair 2009). Writing in *The Cambridge Companion to Atheism*, philosopher Quentin Smith noted that 'a count of the articles in the philosophy journals shows that more articles have been published about Craig's defence of KCA than have been published about any other philosopher's contemporary formulation of an argument for God's existence' (Smith 2007, p. 183). While many articles have argued in support of KCA, others have raised various objections.

With regard to premise (1), some philosophers have objected that we only have reason to suppose that the Causal Principle holds within our universe, but not with respect to the beginning of the universe itself (Oppy 2010, 2015).

With regard to premise (2) of KCA, Craig has defended two philosophical arguments for time having a beginning: the argument from the impossibility of concrete actual infinities and the argument from the impossibility of traversing an actual infinite. The first argument claims that the absurdities which result from paradoxes such as Hilbert's Hotel show that concrete infinities cannot exist, and since an infinite temporal regress of events is a concrete infinity, it follows that an infinite temporal regress of events cannot exist. The second argument claims that a collection formed by successive addition cannot be an actual infinite, and since the temporal series of events is a collection formed by successive addition, the temporal series of events cannot be an actual infinite. Others have raised various objections, such as claiming that actual infinite sequences are 'traversed' all the time in nature (e.g. whenever an object moves from one location in space to another) (see discussion in Puryear 2014), and arguing that Craig's defence of KCA depends on the highly controversial dynamic theory of time (according to which the members of a series of events come to be one after another) and begs the question against an

actual infinite past (Oppy 2006). Stephen Hawking proposed that the initial state of the universe consisted of a timeless (no boundary) state (Hartle and Hawking 1983; Hawking 1988). This initial state can be understood as a beginningless impersonal First Cause from which all things came, and which avoids the need for a personal Creator.

I have addressed the objections noted above in my previous writings. For example, with regard to the objections noted above concerning premise 1 of KCA, I have proposed a new philosophical argument in Loke (2012b, 2017, chapter 5) which addresses the objections by Oppy (2010, 2015) and others, and which demonstrates that, if something (say, the universe) begins to exist uncaused, then many other kinds of things/events which begin to exist would also begin to exist uncaused, but the consequent is not the case; therefore, the antecedent is not the case. In this book (Chaps. 2 and 3), I shall further develop this Modus Tollens argument in response to more recent objections to the Causal Principle found in the writings of Rasmussen (2018), Almeida (2018), Linford (2020), and others, and in Chap. 6, I shall use it to respond to Hawking's objections to a Creator (including the objections found in his final book published in 2018).

With respect to the objections noted above concerning premise 2 of KCA, I have shown in Loke (2012a, 2014b, 2017, chapter 2) that the argument for a beginning of the universe based on the impossibility of concrete actual infinities does not beg the question against the existence of concrete actual infinities, by demonstrating that the argument can be shown to be based on the independent metaphysical fact that numbers are causally inert. With respect to the argument based on the impossibility of traversing an infinite, I have responded to the objection that actual infinite sequences are 'traversed' all the time in nature, by defending the view that time and space is a continuum with various parts but not having an actual infinite number of parts or points (Loke 2016; Loke 2017, chapter 2). Moreover, I have shown that this argument can be modified such that it does not need to presuppose the controversial dynamic theory of time (Loke 2014a, 2017, chapter 2; see further, chapter 5 of this book). Additionally, I have developed a new argument against an infinite causal regress which demonstrates that, if every prior entity in a causal chain has a beginning, then given the Causal Principle nothing would ever begin to exist; therefore, what is required is a beginningless First

Cause (Loke 2017, chapter 3). In this book (Chap. 5), I shall develop these arguments further in engagement with various pre-Big Bang scientific cosmologies and reply to the latest objections to these arguments (e.g. Almeida 2018; Linford 2020).

With respect to Hawking's conceptual challenge concerning the nature of First Cause noted above, I have argued in Loke (2017, chapter 6) that the First Cause is a libertarian free agent. Against this conclusion, it might be objected that one should not attribute libertarian freedom to the First Cause, because libertarian freedom is associated with a mind with the capacity for decision making, but it has not yet been shown that the First Cause has other properties of a mind with the capacity for decision making. In Chaps. 6 and 7, I shall show that this objection fails, and I shall also provide evidences that the First Cause has other properties of a mind with the capacity for decision making. The latter will be accomplished by developing the Teleological Argument and combine it with the KCA to demonstrate that the First Cause is an intelligent designer of the universe.

Concerning the Teleological Argument, 'according to many physicists, the fact that the universe is able to support life depends delicately on various of its fundamental characteristics, notably on the form of the laws of nature, on the values of some constants of nature, and on aspects of the universe's conditions in its very early stages' (Friederich 2018). Many scientists and philosophers have argued that this 'fine-tuning' is evidence for a Designer (Lewis and Barnes 2016). Others have cited the mathematically describable order of the universe (Polkinghorne 2011) as evidences for a Designer. Critics object that there could be alternative hypotheses which have yet to be considered. This problem beset various forms of design inference. For example, concerning 'inference to the best explanation' (IBE), which involves comparing explanations based on criteria such as explanatory power, explanatory scope, and so on, Ratzsch and Koperski (2019) state that substantive comparison between explanations 'can only involve known alternatives, which at any point represent a vanishingly small fraction of the possible alternatives … being the best (as humans see it) of the (humanly known) restricted group does not warrant ascription of truth, or anything like it'. Others have mentioned the problem of assigning prior probability for Design given that our inferences of intelligent design are based on our empirical knowledge of *human*

intelligence, which may not carry over to hypotheses involving non-human designers (Sober 2003, p. 38). Additionally, many have insisted that we should try to find a scientific explanation for the apparent fine-tuning, for appealing to God can be used to solve any problem, so it is not helpful (Penrose and Craig 2019). Against Swinburne's (2004) formulation of the Teleological Argument, critics have also objected that the range of explanatory latitude is too wide: 'whatever the laws of nature turn out to be, the theist would explain these as brought about by God, hence … the supposed evidences [i.e. the laws of nature] provide no check on the validity of the explanatory premises' (Grünbaum 2004, p. 605).

This book will fill a gap in the literature by devising an original deductive argument (see Chap. 4) which demonstrates that the following are the only possible categories of hypotheses concerning fine-tuning and order: (i) Chance, (ii) Regularity, (iii) Combinations of Regularity and Chance, (iv) Uncaused, and (v) Design (The Designer may [or may not] use chancy, regular, or chancy + regular process; see the discussion on theistic multiverse scenarios in Chap. 4; given this clarification, it should be noted that (i)–(iv) are intended to be exclusive of Design).[2] My book collates a large variety of contemporary cosmological models and classifies them within the five categories. It demonstrates that there are essential features of each category such that, while the alternatives to design are unlikely, the Design hypothesis is not, and that one can thus argue for Design by exclusion without having to first assign a prior probability for Design. The exclusion of all the alternatives implies that the conclusion of design follows logically rather than being merely appealed to solve a problem; it also avoids Grünbaum's objection concerning the range of explanatory latitude. I shall show that KCA can be used to strengthen the TA by answering the question 'Who designed the Designer?' through demonstrating that there is a beginningless and hence un-designed First Cause, and by demonstrating that the ultimate explanation cannot be a scientific one, because the first event was brought about by a First Cause with libertarian freedom (a First Cause with libertarian freedom implies agent causation) and not by a mechanism describable by a law of nature (see Chap. 6). On the other hand, the TA strengthens the KCA by

providing additional considerations for thinking that the First Cause is an (intelligent) Creator (see Chap. 7).

Finally, this book will provide an up-to-date discussion of various theories in scientific cosmology and fundamental physics that are relevant to the philosophy of religion debates concerning the ultimate origins of the universe. It responds to the God-of-the-gaps objection by demonstrating that the KCA-TA is not based on gaps in our understanding which can be filled by further progress in science, but is based on the analysis of the necessary conditions (e.g. what is required for a First Cause to bring about the first event) and follows from deduction and exclusion. It contributes to contemporary theological discussions concerning the relationship between God and time and the doctrine of creation, and responds to the theological objections to fine-tuning by Halvorson (2018) et al. It offers a superior form of design inference which avoids the problems that beset alternative forms. Additionally, it contributes to the discussions on issues of considerable philosophical interest such as time, causality, infinity, and libertarian freedom, and demonstrates the relevance of philosophical arguments for answering the question of ultimate origins against the Scientism of Hawking et al. and the New Verificationism of Ladyman et al. (2007). In these and other ways, this book promotes the dialogue between philosophers, scientists, and theologians concerning the Big Question of ultimate origins.

1.3 Problems with Scientism

Contemporary formulations of the Cosmological Argument and Teleological Argument involve considerations of both philosophy and modern scientific cosmology. Proponents of scientism have dismissed philosophy when considering the question about the ultimate origins of the cosmos, claiming that science is the only or the best way for understanding the nature of reality. Often an appeal is made to the predictive successes and technological applications of science, which metaphysics seems unable to offer. Against this sort of appeal, Feser (2017, p. 282) observes:

> A defender of scientism demands to know the predictive successes and technological applications of metaphysics or theology, and supposes he has won a great victory when his critic is unable to list any. This is about as impressive as demanding a list of the metal-detecting successes of gardening, cooking, and painting, and then concluding from the fact that no such list is forthcoming that spades, spatulas, and paintbrushes are all useless and ought to be discarded and replaced with metal detectors. The fallacy is the same in both cases. That a method is especially useful for certain purposes simply does not entail that there are no other purposes worth pursuing nor other methods more suitable to those other purposes. In particular, if a certain method affords us a high degree of predictive and technological power, what that shows is that the method is useful for dealing with those aspects of the world that are predictable and controllable. But it does not show us that those aspects exhaust nature, that there is nothing more to the natural world than what the method reveals.

On the other hand, scientism is susceptible to the objection that scientism cannot be proven by science itself (Loke 2014c). Indeed, its advocates 'rely in their argument not merely on scientific but also on philosophical premises' (Stenmark 2003). Additionally, science itself cannot answer the question 'Why scientific results should be valued?'; the answer to this question is philosophical rather than scientific. Likewise, the question 'Why is the testing of theories important for understanding how the natural world works?' cannot be answered by simply doing more testing; rather, the answer would require a philosophical explanation of how testing relates to our understanding of the workings of the natural world.

Moreover, philosophical conceptual analysis is evidently important for science itself. Cosmologist Sean Carroll quips that 'Physicists tend to express bafflement that philosophers care so much about the words. Philosophers, for their part, tend to express exasperation that physicists can use words all the time without knowing what they actually mean' (Carroll 2010, p. 396). The point here is that definitional issues are of fundamental importance and they underlie all our knowledge, including scientific knowledge. For example, if scientists do not define the terms in their scientific hypothesis carefully, then they do not even know what they are testing for, and their experiments would fail. It is a pity that some

physicists like Lawrence Krauss are not careful enough about the concepts and words that they use, such as concerning 'nothing' (see Krauss 2012, cf. Bussey 2013).

Physicist Carlo Rovelli (2018) observes that philosophy has played an essential role in the development of science (in particular scientific methodology), and notes that

> Philosophers have tools and skills that physics needs, but do not belong to the physicists training: conceptual analysis, attention to ambiguity, accuracy of expression, the ability to detect gaps in standard arguments, to devise radically new perspectives, to spot conceptual weak points, and to seek out alternative conceptual explanations.

In his survey of the forms of reasoning and criteria of rationality that have characterized the production of knowledge across culture and history, McGrath (2018) observes the emergence and significance of the notion of multiple situated rationalities, which affirms the intellectual legitimacy of transdisciplinary dialogue. Noting the notion of multiple levels of reality, McGrath observes that the natural sciences themselves adopt a plurality of methods and criteria of rationality, making use of a range of conceptual tool-boxes that are adapted to specific tasks and situations, so as to give as complete an account as possible of our world (p. 2). For example, with regard to the scientific study of a frog jumping into a pond,

> The physiologist explains that the frog's leg muscles were stimulated by impulses from its brain. The biochemist supplements this by pointing out that the frog jumps because of the properties of fibrous proteins, which enabled them to slide past each other, once stimulated by ATP. The developmental biologist locates the frog's capacity to jump in the first place in the ontogenetic process which gave rise to its nervous system and muscles. The animal behaviourist locates the explanation for the frog's jumping in its attempt to escape from a lurking predatory snake. The evolutionary biologist adds that the process of natural selection ensures that only those ancestors of frogs which could detect and evade snakes would be able to survive and breed.

McGrath concludes that 'all five explanations are part of a bigger picture. All of them are right; they are, however, different' (pp. 59–60). Just as science itself brings together different explanations to help us see the bigger picture, there is a need to bring together different disciplines that would complement one other in our attempt to gain a fuller understanding of reality.

Contrary to Hawking, who infamously declared that 'philosophy is dead' (Hawking and Mlodinow 2010, pp. 1–2), cosmologist George Ellis observed that philosophy has an important role to play in scientific cosmology. He noted, with respect to the criteria for a good scientific theory (internal consistency, explanatory power, etc.), that 'these criteria are philosophical in nature in that they themselves cannot be proven to be correct by any experiment. Rather, their choice is based on past experience combined with philosophical reflection' (Ellis 2007, section 8.1). In view of the importance of philosophical considerations, cosmologists should not merely construct models of the universe without considering the philosophical problems associated with certain models, such as problems concerning the traversing of an actual infinite and the violation of Causal Principle, which have been highlighted by proponents of the Cosmological Argument. Indeed, scientists who are well-informed about the importance of philosophy have used philosophical arguments against an actual infinite number of earlier events to argue against cosmological models that postulate this. For example, cosmologists Ellis, Kirchner, and Stoeger write in an article published in the *Monthly Notices of the Royal Astronomical Society*: 'a realized past infinity in time is not considered possible from this standpoint—because it involves an infinite set of completed events or moments. There is no way of constructing such a realized set, or actualising it' (Ellis et al. 2004, p. 927). The proofs for the impossibility of a realized past infinity which Ellis et al. are referring to are two of the five philosophical proofs which I mention in Chap. 5, namely, the Hilbert Hotel Argument and the argument for the impossibility of traversing an actual infinite. This indicates that philosophical arguments are relevant for modern cosmology. This book will contribute to the discussion by developing some of these arguments in engagement with modern science.

1.4 Problems with Verificationism

Verificationism, which was popular in the early twentieth century, claims that only statements that are analytic or verifiable are meaningful. It has since been widely rejected, for the principle itself is neither analytic nor verifiable (Creath 2017). While its proponents claim that the principle could be regarded as a definition or axiom, this fails to meet the challenge of why we should adopt such a definition or axiom. The principle cannot meet its own demands (Trigg 1993, p. 20). Likewise, while confirmation by observation and repeated experiments is one way of knowing certain things, it would be wrong to think that this is the only way to know anything, for the view that 'confirmation by observation and repeated experiments is the only way to know anything' is a view which cannot be confirmed by observation and repeated experiments (for other ways of knowing, see below and Chap. 4). To equate factual (what is actually the case) with empirical (what is verifiable by observation) would be to commit the error of verificationism. Moreover, it begs the question against the existence of an immaterial timeless Creator who cannot be verified by observation given the limitation of the method (the method can only apply to observable material entities which exist in time).

While acknowledging 'we may no longer believe in the verificationist theory of meaning', Ladyman et al. (2007, p. 8) nevertheless propose a pragmatist New Verificationism which consists in two claims:

> First, no hypothesis that the approximately consensual current scientific picture declares to be beyond our capacity to investigate should be taken seriously. Second, any metaphysical hypothesis that is to be taken seriously should have some identifiable bearing on the relationship between at least two relatively specific hypotheses that are either regarded as confirmed by institutionally bona fide current science or are regarded as motivated and in principle confirmable by such science. (p. 29)

The main pragmatic motivation for adopting this principle is stated as follows: 'What we really want a verifiability criterion to capture is the pointlessness of merely putative domains of inquiry' (p. 308), such as inquiry concerning whether God is the cause of the Big Bang (p. 29). The

reason why they think that such metaphysical inquiry is pointless is because, first, they claim that armchair intuitions about the nature of the universe ignore the fact that 'science, especially physics, has shown us that the universe is very strange to our inherited conception of what it is like'. Second, they claim that such metaphysical inquiry ignores 'central implications of evolutionary theory, and of the cognitive and behavioural sciences, concerning the nature of our minds' (p. 10). We shall now consider these two claims in turn.

1.5 In Defence of the Possibility of *a Priori* Metaphysical Knowledge

Concerning the first claim, Ladyman et al. state that 'much of what people find intuitive is not innate, but is rather a developmental and educational achievement. What counts as intuitive depends partly on our ontogenetic cognitive makeup and partly on culturally specific learning' (p. 10). Against the reliability of 'our common-sense image of the world' as an appropriate basis for metaphysical theorizing, they claim that 'modern science has consistently shown us that extrapolating our pinched perspective across unfamiliar scales, magnitudes, and spatial and temporal distances misleads us profoundly' (p. 11). For example, 'Casual inspection and measurement along scales we are used to suggest that we live in a Euclidean space; General Relativity says that we do not' (p. 11). Against the 'many examples of metaphysicians arguing against theories by pointing to unintuitive consequences' (p. 13), they ask: 'why should we think that the products of this sort of activity reveal anything about the deep structure of reality, rather than merely telling us about how some philosophers, or perhaps some larger reference class of people, think about and categorize reality?' (p. 16).

The warning to exercise caution when discussing matters that are far beyond our daily experiences is well taken. It is true that in the history of philosophy there has been a cascade of unduly optimistic estimates of the power of specifically philosophical reasoning, eventually corrected by empirically grounded insights.[3] Nevertheless, we need to distinguish

these failures as well as 'common sense' and 'everyday intuitions' from philosophical principles of reasoning such as various forms of deductive and inductive reasoning which underlie the construction of scientific theories themselves, including General Relativity mentioned above. In other words, we need to distinguish 'common sense' and 'everyday intuitions' from philosophical principles of reasoning by which we show 'common sense' and 'everyday intuitions' to be highly unreliable and demonstrate those 'optimistic estimates' to be failures.

With regard to General Relativity, the idea that space itself can be curved may seem strange, but it does not violate deductive and inductive reasoning, properly understood. While quantum phenomena may appear foreign to our 'common sense' and 'everyday intuitions', it does not violate deductive reasoning[4] which assumes the laws of logic and which (together with inductive reasoning) is required for quantum physics itself. To illustrate, quantum physics is often heralded as a scientific theory that is well-confirmed by experiments, such as those that reveal quantum entanglement (an example cited against 'intuition' by Ladyman et al. on p. 19!). The confirmation would take the following form:

(1) If the experiment reveals quantum entanglement, then the prediction of quantum physics is confirmed.
(2) The experiment reveals quantum entanglement.
(3) Therefore, the prediction of quantum physics is confirmed.

This form of valid reasoning is known as modus ponens (1. If A, then B, 2. A. 3. Therefore, B), which is a form of deductive reasoning. Valid deductive reasoning can give a false result if the premise is false, but if the premise is true, then the conclusion which follows from valid deductive reasoning would be true as well. While De Cruz and Smedt (2016, p. 360) have complained that, unlike scientists who can often confirm or disconfirm their theories, philosophers 'do not have independent empirical techniques to confirm or disconfirm their intuitions', the above illustration shows that the confirmation or disconfirmation of scientific theories or intuitions itself would require the laws of logic. Kojonen notes that 'at least some compatibility between the human mind and the cosmos is required in order for the cosmos to be at all amenable to scientific

discovery, and for human survival to have been possible in the first place' (Kojonen 2021, p. 42). Ladyman et al. would agree that scientific theories—and by implication, deductive reasoning which is assumed by scientific theories—is not 'merely telling us about how some philosophers, or perhaps some larger reference class of people, think about and categorize reality' (p. 16) but helping us understand 'the deep structure of reality' (ibid.). They wrote:

> Unlike Kant, we insist that science can discover fundamental structures of reality that are in no way constructions of our own cognitive dispositions …. As collective constructions, the institutional filters of science need not mirror or just be extensions of individual cognitive capacities and organizing heuristics. They have shown themselves to have a truth-tracking power—partly thanks to mathematics. (p. 300)

It is interesting to note that they acknowledge the role of mathematics which, similar to the laws of logic that underlie deductive reasoning, is both necessary for science and yet also knowable *a priori*. Ladyman et al. would acknowledge that mathematical equations such as 2 + 2 = 4, 4 × 4 = 16, and so on are not merely 'everyday intuitions' or 'common sense', but rather correspond with reality, such that they are able to confer 'truth-tracking power' to science. In the subsequent chapters, I will be using mathematical equations such as finite + finite = finite, 0 + 0 + 0 … = 0 for some of my arguments.

Likewise, the laws of logic (e.g. A is A; it cannot be the case that A and not-A; either A or not-A) are not merely 'conceptual analysis', human psychology of reasoning, or human conventions. The laws of logic correspond with the way things are; indeed, they are necessarily true because a violation of the laws of logic would be non-existent. For example, consider a 'shapeless square': such a thing cannot exist because the existence of A implies it is not the case that not-A (the existence of a shape [e.g. square] implies that it is not shapeless). The fact that such things which violate the laws of logic cannot exist illustrates that the laws of logic are necessarily true. They do not merely exist in the human mind but they also apply to mind-independent concrete entities. For example, it remains the case that there cannot be shapeless squares billions of years ago even

if there were no minds to think about them back then. While apparent contradictions can exist, a true contradiction (e.g. a shapeless square) cannot. Huemer (2018, p. 20) notes that

> If you think there is a situation in which both A and ~A hold, then you're confused, because it is just part of the meaning of 'not' that not-A fails in any case where A holds … Now, a contradiction is a statement of the form (A & ~A). So, by definition, any contradiction is false.

The above definition of 'not' (given which contradictions are impossible and the laws of logic are necessarily true) will be used for my arguments in this book. (One should not object to my arguments by using alternative definitions of these terms. To do that would be similar to someone objecting to 'All humans are mortal, Socrates is a human, therefore, Socrates is mortal' by using alternative definitions of human or Socrates, which of course misses the point of the argument by talking about something else. To rebut an argument one has to rebut the premise or the validity rather than use an alternative definition of the terms.)

One might think that the principle of superposition in quantum physics violates the laws of logic which underlie these reasonings. However, this is a misunderstanding. Superposition is the mathematical addition of probability densities of all of the possible states of a quantum system, and it is used to calculate the probability of observing the system in one of the states (e.g. a particle going through one slit or the other in the double-slit experiment). When the system is not being observed, it is not the case that a particle existing in contradictory states. Rather (according to the Copenhagen interpretation), the quantum of energy is spread across the possible states as a wave. It remains in that state until an observation collapses the wave to a particle. A wave has the potential to be observed at slit A or slit B, but it cannot be observed at both slits at the same time because an observation would cause it to be no longer be a wave, but a particle. Having the potential to be one thing or another does not violate the law of non-contradiction (Pratt 2012). (According to Bohm's interpretation, the system consists of a particle riding on a wave which follows the Schrodinger equation, and which guides the particle to only one

position which is revealed when an observation is made. Again, there is no violation of the laws of logic.)

While multiple non-classical logics have been developed to meet specific tasks in knowledge production (McGrath 2018, p. 31), their proven utility has to do with definition, designation, proving, computability problem solving, and so on, i.e., they are helpful in situations where (say) the definitions are vague. On the other hand, classical logic applies to what is actually the case or can be the case (regardless of whether one can define it clearly, prove it, etc.). Thus, for example, it cannot be the case that shapeless squares exist.

Gödel Incompleteness Theorems do not entail the violation of the laws of logic, for there can be incomplete but consistent systems. Russell's paradox (which defines 'the Russell set' as the set of all things that are not members of themselves) can be resolved by arguing that the Russell set does not exist given that it has an inconsistent definition (Huemer 2018, pp. 42–43). Likewise, the liar paradox (Is the sentence 'this sentence is false' true or false?) does not entail the violation of the laws of logic, for one can argue that the liar sentence fails to express a proposition because the rules for interpreting the sentence are inconsistent; thus, it does not have the property of truth or falsehood (Huemer 2018, p. 29). Priest et al. (2018) mention the 'strengthened' liar paradox such as L: L is not true, and argue that, if this sentence is neither true nor false, it is not true; but this is precisely what it claims to be; therefore, it is true. Huemer (2018, pp. 34–36) replies by denying that L makes any claim at all. L does not make any claim because it fails to express a proposition. However, one can say that N: L is not true. Huemer explains 'N expresses the proposition that L is not true; yet L does not express that proposition, even though L is syntactically identical to N. Why is this? Because when we read L, we are invited to accept an inconsistent story about the proposition that it expresses; but when we read N, there is no inconsistent story about what N expresses' (p. 35).[5] Moreover, the claim that contradictions can exist in a self-referential paradox in linguistic games (which may be due to inadequacies of language) is in any case irrelevant to the claim that contradictions can exist in concrete entities such as the universe or ultimate reality.

Some religious mystical traditions (e.g. certain forms of Chinese Buddhism, Taoism, and apophatic theology) postulate a transcendent realm in which the laws of logic are violated (Capra 2010). However, this is impossible, for there cannot be shapeless squares in the transcendent realm either. This conclusion is not based on our inability to imagine it but based on what it would involve: the existence of A implies the non-existence of not-A.

Some might think that a solution to the Paradox of the Stone (If an omnipotent God exists, can He create a stone He cannot carry?) would require the claim that God can violate the laws of logic. However, this is not so. With regard to the Paradox, one can ask, 'If God exists, can God create a 'shapeless square'? The answer is no, because there is no such thing. Likewise, there is no such thing as 'a stone which God cannot carry'; thus, God cannot create such a stone. This does not mean that God's power is limited; rather, there is no such object ('shapeless square', 'a stone which God cannot carry') for God to bring about. Thus, the person who asks God to create a stone He cannot carry is asking God to do nothing, which poses no challenge to His power. Neither do the Christian doctrines of Trinity, Incarnation, and divine foreknowledge and freedom entail the violation of the laws of logic (see Moreland and Craig 2003; Loke 2014d).

One should note the distinction between the laws of logic and the laws of nature. There can be other universes with different properties and different laws of nature, but there cannot be other universes in which the laws of logic do not apply (as illustrated by the fact that there cannot be shapeless squares in other universes). As explained above, the laws of logic are necessary true and inviolable, and the impossibility of their inviolability can be known *a priori* with 100% epistemic certainty.

The 100% epistemic certainty concerning the inviolability of the laws of logic contrasts with the lack of 100% epistemic certainty in science because it is possible (no matter how improbable) that the observations based on which scientists infer the laws of nature are mistaken. A law of nature is derived from induction but—unlike deductive reasoning—inductive reasoning cannot yield 100% certainty because we cannot be 100% sure that there are no counterexample. Moreover, scientific theories, in their attempts to explain a connected sequence of phenomena by

postulating an entity as a cause, face the difficulty that there may be other underlying causes for these phenomena which have not yet been discovered. While causes are necessary conditions for an event, many of them are yet unknown to us, and it is quite impossible for us to state all of them that would be sufficient for an event to obtain. In this way, scientific theories are underdetermined by the observations that purportedly supported them, and other theories for these observations remain possible (for classic discussions see Duhem 1954; Quine 1951; Laudan 1990). Given that there may be undiscovered causes for the phenomena we observe, science can never prove that the laws of logic can be violated or that something began to exist uncaused; on the contrary, as explained above, the laws of logic cannot be violated, and it will be shown in Chaps. 2 and 3 that the Causal Principle, that is, 'whatever begins to exist has a cause' is true as well. Given the Problem of Underdetermination, we should adopt an eclectic model of science whereby realist and anti-realist interpretations of scientific theories are adopted on a case-by-case basis, and adopt an anti-realist interpretation of a theory if a realist interpretation conflicts with well-established truths (Moreland and Craig 2003, pp. 314–318). For example, we should adopt an anti-realist view of a scientific theory if a realist interpretation would result in conflict with well-established understanding of the laws of logic (see above) and Causal Principle (see Chaps. 2 and 3).

While the laws of logic are limited in the sense that—by themselves—they cannot show us what exist, they can show us what cannot exist (e.g. a shapeless square cannot exist). Likewise, philosophical arguments (see Chap. 5) can show that an actual infinite number of prior events cannot exist, and therefore the universe (which we know does exist based on observation) cannot have an actual infinite number of prior events. Indeed, philosophical arguments are particular apt for proving negatives; just as one can prove that there cannot be shapeless squares, I shall show that there cannot be an infinite regress of events, and that it is not the case that something begins to exist uncaused.

In conclusion, I have shown that, contrary to popular misconceptions, quantum physics, Gödel Incompleteness Theorems, Russell's paradox, the liar paradox, and non-classical logics do not violate the laws of logic. Against the worry that how we think about the world may be very

different from what the world itself really is, I have argued that the laws of logic correspond with what the world itself really is, and we can therefore use them to formulate various arguments concerning the world.

The laws of logic imply that the conclusion of a deductively valid argument from true premises must be true. Physics itself requires deductive and inductive reasoning the justification of which is philosophical, and one needs to distinguish between 'appearing weird' (e.g. superposition) from 'impossible' (e.g. it is impossible that 0 + 0 + 0 … be anything other than 0), which is what I shall demonstrate an infinite regress to be in later chapters. It should also be noted that, while what is mathematically impossible is metaphysically impossible (e.g. it is impossible that 0 + 0 + 0 … be anything other than 0), what is mathematically possible is not always metaphysically possible. For example, the quadratic equation $x^2-4 = 0$ can have two mathematically consistent and possible results for x: 2 or −2, but if the question is 'How many people carried the computer home?', the answer cannot be '−2', for in the concrete world it is metaphysically impossible that '−2 people' carried a computer home. Thus, the conclusion of '2 people' rather than '−2 people' is not derived from mathematical equations alone, but also from metaphysical considerations: '−2 people' lack the causal powers to carry a computer home. The metaphysically impossibility of '−2 people carrying the computer' would override the mathematical possibility in the quadratic equation. This shows that metaphysical considerations are more fundamental than mathematical considerations. The arguments against an infinite regress and against the violation of the Causal Principle which I discuss in the rest of this book are based on similar metaphysical considerations which are derived from understanding the nature of the world. This is not 'insisting that the physical world conform to some metaphysical principle'; rather, these metaphysical principles are based on understanding the nature of the world. The above conclusion implies that, even if a cosmological model is mathematically possible, it cannot be a correct model of the cosmos if it is metaphysically impossible.

It should be noted that the laws of logic would hold even at levels far beyond our daily experiences, such as at the beginning of time (there cannot be shapeless squares at such levels too). Likewise, we are able to know truths concerning relevance which hold even at levels far beyond our

daily experiences. For example, the principle 'differences between prime numbers are irrelevant to the number's inability to give birth to a kitten' is clearly true, 'even though it certainly reaches far beyond ordinary experience; after all, it applies to infinitely many distinct numbers and infinitely many distinct ways to give birth to kittens'; we are able to recognize that 'the differences in the size of number make no categorical difference with respect to the ability to give birth to kittens' (Rasmussen and Leon 2018, p. 43).

As for the concern that causality and temporality may 'break down' at the beginning of the universe (Drees 2016, p. 199), following the laws of logic, the 'breaking down' of these would imply being *uncaused* and *timeless*. It will be shown in subsequent chapters that, using the laws of logic and undeniable experiences, one can formulate a Modus Tollens argument to show that the intuition 'all events have a cause' applies to the universe at large (see Chap. 3, contra De Cruz and Smedt 2016, p. 360), and that other arguments can be formulated to show that there is an *uncaused* and (initially) *timeless* First Cause of the universe.

1.6 Reply to the Evolutionary Objection Against Metaphysical Knowledge

Concerning the second claim by Ladyman et al. (2007) regarding the implication of evolutionary theory, they wrote:

> proficiency in inferring the large-scale and small-scale structure of our immediate environment, or any features of parts of the universe distant from our ancestral stomping grounds, was of no relevance to our ancestors' reproductive fitness. Hence, there is no reason to imagine that our habitual intuitions and inferential responses are well designed for science or for metaphysics. (2007, p. 2)

In their reply to why this would not undermine our scientific knowledge, they wrote 'even if one granted the tendentious claim that natural selection cannot explain how natural scientific knowledge is possible, we have plenty of good reasons for thinking that we do have such

knowledge. On the other hand, we have no good reasons for thinking that *a priori* metaphysical knowledge is possible' (p. 7).

However, as explained above, science itself requires the correctness of *a priori* metaphysical knowledge of the laws of logic and mathematics; hence, the success of science in yielding scientific knowledge—which Ladyman et al. acknowledge despite our evolutionary history!—is one good reason for thinking that *a priori* metaphysical knowledge is possible. Moreover, regardless of the success of science, we do know that shapeless squares are not possible, and so on, which shows that we do have *a priori* metaphysical knowledge, and this is true regardless of how we might explain how we could have acquired such knowledge as well as scientific knowledge given evolution. (Plantinga 2011 famously argued that a theistically guided evolution would be able to explain this, whereas naturalism would not, but my argument here does not depend on Plantinga's argument, although I do think that it has plausibility. I have argued that evolution is compatible with Christian theism in Loke 2022.)

1.7 Reply to Empiricist Objections

Many who take a dismissive attitude towards metaphysics trace their view back to Carnap's influential paper 'Empiricism, Semantics, and Ontology' (1950). Carnap claims that 'If someone wishes to speak in his language about a new kind of entities, he has to introduce a system of new ways of speaking, subject to new rules; we shall call this procedure the construction of a linguistic framework for the new entities in question' (p. 21). It should be noted, however, that Carnap did not prove that there cannot be 'ways of speaking, subject to rules' (i.e. a linguistic framework) applied to speaking about a Creator of the universe which philosophers have been doing for thousands of years since the predecessors of Plato, who formulated the Cosmological Argument for a divine Creator. Carnap only offered illustrations of linguistic frameworks involving mathematical entities and material entities. However, these examples do not prove that there cannot be other kinds of linguistic framework involving other kinds of entities and following other rules. Bradley (2018, p. 2249) observes that 'Dismissivists have tended to assume that "Empiricism, Semantics

and Ontology" provides an argument, but when we look there is little to be found'.

Bradley goes on to observe that the argument which Carnap had in mind is based on the Verificationism of his earlier writings, and he notes that Verificationism has long been rejected (see above). Bradley claims that, nevertheless, there is a lack of justification for metaphysical conclusions, but he fails to consider recent works on (say) the Cosmological Argument which shows that a Creator exists. As explained in later chapters, what deductively follows from the true premises of this valid argument is the existence of a Creator with libertarian freedom.

One might object that Carnap's main point is that theists have not specified under which conditions 'God exists' can be known to be true or false.[6] In reply, in this book, 'God' is understood to be referring to the Creator who brought about the beginning of the universe. One can specify the conditions under which the proposition 'A Creator brought about the beginning of the universe' can be shown to be true or false as follows: One can show this proposition to be false by proving that the universe has no beginning; one can show this proposition to be true by proving that the universe has a beginning and proving the Causal Principle using the Modus Tollens argument (see Chap. 2). Since the proposition 'A Creator brought about the beginning of the universe' is meaningful, it can be the conclusion of an argument. Given that this proposition follows as the conclusion of the Kalām Cosmological Argument, and given that the premises of the Kalām Cosmological Argument are true and that its deduction is valid (as argued in later chapters), this proposition is true.

Following Kant, it might be objected that we cannot know that the universe is an effect of God, for to know that A is causally related to B it seems that I must have sensory experience of both A and B so as to establish that they are regularly connected, but we don't have such sensory experiences of God (Evans 2010, pp. 151–152; citing Kant 1965, A603–14, B631–42).

To respond to this objection, it the distinction between affirming that there is a cause and identifying the properties of the cause should first be noted. Before scientists discover the cause of (say) an explosion of a certain chemical substance, did they think that the event has a cause? They

sure did on the basis of Causal Principle, even though they have not specified the conditions or a universal law. Likewise, on the basis of Causal Principle, the beginning of matter-energy would have a cause understood as a necessary condition; how to identify the cause is a different issue.

With regard to the identification of cause, the specification of regular connection ('universal law') can be understood as one of the ways of identifying the properties of causes; this way is inductive. However, no proof has been offered to think that it is the only way. On the other hand, other than induction, deduction is also a method of inference. A deductive argument has already been provided previously to show that the necessary condition for the beginning of matter-energy is uncaused, beginningless, possessing libertarian freedom, and enormously powerful, that is, a transcendent Creator. Given this deductive argument, the inductive method is not required in this case to identify the properties of the Cause.

Sceptics might object that there is no empirical evidence that the universe or the singularity is created by God. Ladyman et al. (2007, p. 29) put it this way:

> Suppose that the Big Bang is a singular boundary across which no information can be recovered from the other side. Then, if someone were to say that 'The Big Bang was caused by Elvis', this would count, according to our principle, as a pointless speculation. There is no evidence against it—but only for the trivial reason that no evidence could bear on it at all.

However, direct empirical evidence is not the only way to find out the truth. On the contrary, for any evidence *x* to indicate that something else *y* is true, the laws of logic and various forms of reasoning are required to show how *y* follows from *x* or is supported by *x*. Scientists are able to conclude that the Big Bang happened, even though none of them have directly observed the Big Bang, because they are able to reason from the evidences (e.g. red shift, cosmic microwave background radiation) to the conclusion. Moreover, even though they do not have direct empirical evidence concerning how everything within our universe is formed, they can nevertheless deduce that that these things came from the Big Bang. Likewise, as I show in the rest of this book, we can conclude that the

universe has a First Cause because there is evidence that there exists a series of causes and effects and it can be shown that an infinite regress is not possible, and it can be deduced that this First Cause has libertarian freedom, that is, a Creator. Even though we do not have direct empirical evidence concerning how the Big Bang singularity of the universe is formed, we can nevertheless conclude that it came from a Creator given that this Creator is the *First* Cause of the universe while the singularity cannot be the first cause because the singularity does not have libertarian freedom which (as I shall show in Chap. 6) the First Cause must have.

Many people today assume that for someone to claim that God created the universe would be to pretend to know what we cannot possibly know. This assumption is related to the Kantian assumption that we can only know the phenomena and that we cannot know the causes beyond the phenomena. However, on the one hand, the fact that something cannot be directly experienced does not imply that we are unable to have any knowledge of it. Experience is not the only source of knowledge. Introspection, rational insight, and moral insight are some other sources of knowledge. On the other hand, Oxford philosopher Richard Swinburne (2005, p.39) notes that the atomic theory of chemistry has shown 'in precise detail some of the unobservable causes of phenomena—the atoms whose combinations give rise to observable chemical phenomena'. Sudduth (2009, p. 206) likewise observes that the evolution of modern science and scientific methodology has made the Humean and Kantian crude empiricism no longer sensible. He elaborates:

> Neither Hume nor Kant envisioned the success of scientific reasoning from observable states of affairs to unobservable entities and causal processes on the grounds of the explanatory power of the latter. Extra-solar planetary science infers the existence, estimated mass, size, and orbital paths of unobservable planets from observable wobbles in the planet's parent star … Boltzmann utilized the atomic model to explain the behavior of gases and liquids. Eventually, the existence and behavior of atoms was explained in terms of yet smaller particles—protons, neutrons, and electrons.

The above scientific findings indicate that the unobservable causes of phenomena are not in principle unknowable; on the contrary, we can

know many details about these unobservable causes through deductive and inductive reasoning. Starting from the phenomenon of the universe—an empirical premise!—one can likewise ask 'what caused this phenomenon?', and use deductive reasoning to arrive at the knowledge that there is a First Cause of the phenomenon which has the properties of being a Creator, as demonstrated by the KCA, which Kant has failed to refute (Craig 1979) and which I shall defend in the rest of this book.

One might object that the conclusion that unobserved causes such as atoms exist is arrived at via verification by experimentation, but one cannot use such a method to prove that an unobserved God exists. In reply, the above examples are only meant to show that unobserved does not imply unknowable. On the one hand, there is no argument which proves that verification by experimentation is the only way to know unobserved causes. On the other hand, as explained above using the example of quantum entanglement, verification itself requires deductive reasoning (in addition to inductive reasoning). As have been explained above, that the laws of logic on which deductive reasoning is based are necessarily true. This implies that the conclusion of a deductively valid argument from true premises must be true, and I shall show in the rest of this book that such an argument (viz. KCA) can be formulated to show that a Divine First Cause exist.

It should be noted that, unlike the Ontological Argument, which is an *a priori* argument that starts by defining God, the KCA does not start by defining God, and neither is it dependent on the Ontological Argument. Rather, as explained in the rest of this book, the KCA starts with the observation that a series of causes and events exist in the world and then demonstrates that an infinite regress of causes and events is impossible, before reasoning deductively to an independently existing First Cause with the capacities of libertarian freedom. The KCA is thus an *a posteriori* argument, and it uses deductive reasoning, which science itself requires. While the laws of logic cannot tell me that there is a square on my table and I need observational evidence to know that there is a square, by using the laws of logic I can know that the square on my table cannot be a square and shapeless at the same time. Likewise, while the laws of logic cannot tell me that there is a series of causes and effects and I need observational evidence to know that, by using the laws of logic I can know that

the series of causes leading to me cannot be finite and infinite. Thus, the series either has a first member or it does not, and given the arguments against an actual infinite regress (see Chap. 5), it can be deduced that the series has a first member, that is, a first cause. Likewise, by using the laws of logic I can know that this first cause cannot be caused and uncaused. Thus, it is either caused or uncaused, and given that it is the first, it can be deduced that it is uncaused and that it has caused an effect (i.e. it has started a series of causes and effects resulting in my existence). The rest of the properties of the First Cause, that is, beginningless, timeless, has libertarian freedom, enormously powerful, and so on, can likewise be deduced similarly, as will be explained in Chap. 6.

A Kantian might object that 'this is just your way of thinking, you are thinking that that there is an actual object called a First Cause which corresponds with your idea'. However, it has been explained previously that the laws of logic correspond to reality, and that the conclusion of a sound argument (i.e. a deductively valid argument from true premises) must be true, it is not just a way of thinking or perspective. My great grandfather (a prior cause of my existence) is not just an idea; even though I have never seen him, it can be inferred that he really existed, for otherwise I would not have existed. Likewise, it will be argued in the rest of this book that it can be inferred that the First Cause really existed, for otherwise I would not have existed.

1.8 Conclusion and Overview of Following Chapters

Contemporary formulations of KCA and TA involve considerations of both philosophy and modern scientific cosmology. Contrary to Hawking, who infamously declared that 'philosophy is dead' (Hawking and Mlodinow 2010, pp. 1–2), cosmologist George Ellis observed that philosophy has an important role to play in cosmology. He noted, with respect to the criteria for a good scientific theory (internal consistency, explanatory power, etc.), that 'these criteria are philosophical in nature in that they themselves cannot be proven to be correct by any experiment.

Rather, their choice is based on past experience combined with philosophical reflection' (Ellis 2007, section 8.1). In view of the importance of philosophical considerations, cosmologists should not merely construct models of the universe without considering the philosophical problems associated with certain models, such as problems concerning the traversing of an actual infinite and the violation of Causal Principle, which have been highlighted by proponents of KCA (see below). Scientists who are well-informed about the importance of philosophy have used philosophical arguments against an actual infinite number of earlier events to argue against cosmological models that postulate this (Ellis et al. 2004, p. 927). This indicates that philosophical arguments are relevant for modern cosmology. This book will contribute to the discussion by developing these arguments in engagement with modern science

Against the New Verificationism proposed by Ladyman et al. (2007, p. 29) which claims that we have no good reasons for thinking that *a priori* metaphysical knowledge is possible (pp. 7, 29), I have shown that mathematics and the laws of logic are both necessary for science and yet also knowable *a priori*. I have also shown that the laws of logic are necessarily true; they would hold even at levels far beyond our daily experiences, such as at the beginning of time. I explain that, contrary to popular misconceptions, quantum physics, Russell's paradox, Gödel Incompleteness Theorems, and non-classical logics do not entail the violation of the laws of logic. As for the concern that temporality and causality may 'break down' at the beginning of the universe (Drees 2016, p. 199), following the laws of logic, the 'breaking down' of these would imply being timeless and uncaused. It will be shown in subsequent chapters that, using the laws of logic, various arguments lead to the conclusion that there is an uncaused and initially timeless First Cause of the universe. Against the worry that how we think about the world may be very different from what the world itself really is, I have argued that the laws of logic correspond with what the world itself really is, and we can therefore use them to formulate various arguments concerning the world. I replied to various empiricist and Kantian objections and note that the necessity of the laws of logic implies that the conclusion of a deductively valid argument from true premises must be true.

It has been noted previously that the KCA is traditionally formulated as follows:

(1) Whatever begins to exist has a cause.
(2) The universe began to exist.
(3) Therefore, the universe has a cause. (Craig and Sinclair 2009)

Craig argues that further analyses of the Cause of the universe show that this Cause possesses various theistic properties.

To make the deduction of the theistic properties explicit, I shall reformulate the KCA and combine it with the TA as follows (KCA-TA):

(1) There exists a series of causes and effects and changes (= events).
(2) The series either has an infinite regress that avoids a First Cause and a first change, or its members are joined together like a closed loop that avoids a First Cause and a first change, or its members are not so joined together and the series has a First Cause and a first change.
(3) It is not the case that the series has an infinite regress.
(4) It is not the case that its members are joined together like a closed loop.
(5) Therefore, the series has a First Cause and a first change (from 1 to 4).
(6) Since the First Cause is the first, it is uncaused.
(7) Since whatever begins to exist has a cause (Causal Principle), the First Cause is beginningless.
(8) Since every change is an event which has a beginning as something/part of a thing gains or loses a property, and since the first change (= first event) does not begin uncaused (given the Causal Principle), the first change (= first event) is caused by a First Cause which is initially changeless (from 5 and 7; here, 'initial' refers to the first in the series of states ordered causally, not first the series of changes/events/temporal series).
(9) Since the First Cause is initially changeless, it is transcendent and immaterial (i.e. it is distinct from the material universe and is the cause of the universe).
(10) In order to cause an event (Big Bang or whatever) from an initial changeless state, the First Cause must have

- the capacity to be the originator of the event in a way that is undetermined by prior event, since the First Cause is the first, and
- the capacity to prevent itself from changing, for otherwise the First Cause would not have been initially changeless and existing beginninglessly without the event/change.
- 10.1 and 10.2 imply that the First Cause has libertarian freedom.

(2) In order to bring about the entire universe, the First Cause is enormously powerful.
(3) (+ the Teleological Argument) In order to bring about a universe with its fine-tuning and order, the First Cause is highly intelligent.
(4) A First Cause that is uncaused, beginningless, initially changeless, transcendent, immaterial, has libertarian freedom, and is highly intelligent and enormously powerful is a Creator of the Universe.
(5) Therefore, a Creator of the universe exists.

The above argument is deductively valid; the key question is whether the premises are true. I shall defend premises 3 and 4 in Chap. 5, premise 7 in Chaps. 2 and 3, premises 8–11 in Chap. 6, and premise 12 in Chaps. 4 and 7. Here is an overview of the following chapters.

In Chaps. 2 and 3, I explain the notions of causality and the laws of nature which are fundamental for KCA-TA, defend the Causal Principle (premise 7 of KCA-TA) against various objections, and develop a Modus Tollens argument which shows that the Causal Principle is true.

In Chap. 4, I explain another notion which is fundamental for KCA-TA, namely, 'design'. I note that various properties of the universe have been suggested as indicative of the work of a designer. In this book, I focus on two such properties: 'fine-tuning' and 'order'. (The word 'order' refers to the arrangement of things in relation to each other [*Oxford English Dictionary*], and in the scientific literature it can be used in various ways such as 'low entropy', 'non-chaotic', or 'governed by laws'. I use the term to refer to patterns of events which can be described by advanced mathematics and which are characterized as 'laws of nature'; see Chap. 2.) I defend these two notions against various objections, and note that, while various forms of design inference have been suggested, the problem of unconsidered alternative explanations besets all of them. I address this

concern by first devising an original deductive argument which demonstrates that the following are the only possible categories of hypotheses concerning 'fine-tuning and order': (i) Chance, (ii) Regularity, (iii) Combinations of Regularity and Chance, (iv) Uncaused, and (v) Design. I go on and demonstrate that there is an essential feature of (i), (ii), and (iii) which renders them unlikely as an explanation for the fine-tuning and order of the universe.

For categories (iv) and (v), I shall evaluate them by showing that an actual infinite regress of causes and events is not possible. I undertake this task in Chap. 5 and evaluate various cosmological models which postulate an actual infinite number of prior events. I note that these cosmologies face various scientific and philosophical problems. On the other hand, there are at least five arguments which demonstrate that an actual infinite regress of causes and events is not the case. I summarize some of these arguments and explain why there are good reasons for thinking that they are sound. I also explain that a closed causal loop involves a viciously circular setup which would not work, and it is contradicted by the Generalized Second Law of Thermodynamics (Wall 2013a, 2013b). Given the refutations of a closed loop (premise 4 of KCA-TA) and an actual infinite regress of causes and events (premise 3), there is a First Cause and a first event (premise 5).

In Chap. 6, I explain and defend premises 6–11 of KCA-TA which show that the First Cause is not part of the physical universe as postulated by Hawking's no-boundary proposal (which in any case has been shown to be scientifically flawed by other cosmologists). Rather, premises 6–11 show that the First Cause is uncaused, beginningless, initially changeless, has libertarian freedom, and is enormously powerful, that is, a transcendent immaterial Creator of the Universe. The conclusion that the First Cause is a Creator who brought about the first event purposefully rather than accidentally can be further strengthened by considering the evidences of fine-tuning and order of the universe.

In Chap. 7, I complete my comparison of categories (iv) Uncaused and (v) Design concerning the fine-tuning and order of the universe. I offer three considerations against (iv) and reply to various objections against the likelihood of Design, and conclude that, while the alternatives to design are unlikely, the Design hypothesis is not. I explain how my

argument from exclusion avoids the problems which beset other design inferences, such as the difficulty of assigning prior probability for Design.

In the concluding chapter (Chap. 8), I summarize the conclusions and contributions of my book and explain how science, philosophy, and religion can continue to work together in our understanding of the Ultimate Designer.

Notes

1. In this book, 'ruled out' does not require 'perfect' elimination understood as demonstrating that other possible hypotheses have zero probability. It only requires showing that their probability is so low that they can be eliminated as reasonable alternatives to Design even if we assign them very generous probability estimates (see Sect. 7.5).
2. I thank Chan Man Ho for clarification of this point.
3. I thank Wesley Wildman for this point.
4. Concerning quantum superposition, see below.
5. While Huemer gives no model to serve as proof of consistency, this does not invalidate his argument, which is simply intended to show that his 'solution to the liar paradox holds that the liar sentence fails to express a proposition due to an inconsistency built into our language' (p. 29).
6. I thank Jonathan Chan for raising this objection.

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