

# On the Kālam Cosmological Argument

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## Abstract

In this paper I present objections to the Kālam Cosmological Argument (KCA), a modernized formulation of the general class of cosmological arguments for the existence of god. Specifically, I focus on the philosopher William Lane Craigs defense of the argument given in his academic writings, public debates, and online articles. The aim of this work is not, however, to show that the KCA is unsound. Rather, it is to demonstrate that the KCA fails to meet the requirement for it to be considered a successful piece of natural theology: that its premises are more likely to be true than their contradictories. Towards that end, I will: (i) summarize and briefly assess various arguments that have been posed for and against the KCAs two central propositions: that whatever begins to exist has a cause of its existence and that the universe began to exist, (ii) sketch several of my own arguments against said propositions, which I will explore more fully and rigorously in later works, and (iii) ultimately conclude that the KCA fails to establish that the existence of god is more probable than not.

## 1 Introduction

The Kālam Cosmological Argument is an exercise in positive deist apology which aims to demonstrate that the existence of god can be inferred to be highly probable. To arrive at this conclusion, the argument employs facts concerning causation, cosmology, and contingency, as related to the beginning or coming into being of the universe. The Kālam is grounded in a long tradition of cosmological arguments, drawing from the development of philosophy and science stretching back hundreds of years and probably originating in the writings of Plato and Aristotle, if not earlier in the Ionian tradition. In *Laws* Plato writes,

”...when we find one thing changing another, and this in turn another, and so on,-of these things shall we ever find one that is the prime cause of change? How will a thing that is moved by another ever be itself the first of the things that cause change? It is impossible. But when a thing that has moved itself changes another thing, and that other a third...which of the motions mentioned would necessarily arise in it first? That motion, of course, which is self-moving; for it will never be shifted beforehand by another thing...”<sup>1</sup> (*Laws*, X, 894e-895a)

Intrinsic to Platos argument is the idea that an infinite regress of causation is an impossibility, and therefore there must exist a greatest mover which initiated itself. Plato then concludes (on 895c) that this self-moving motion must be a living being (one that has a soul), which surely motivated the concept of the so-called unmoved mover (unmoved by any prior cause) mentioned in the works of Aristotle, his prized student. According to Plato and Aristotle, the greatest mover, or the ”prime mover,” must be god. Thus is the first formulation of the cosmological argument.<sup>2</sup>

Further development of the cosmological argument came from the great philosopher Leibniz, whose formulation relies upon what he called the ”Principle of Sufficient Reason.” The PSR can be stated simply as follows: for any event or entity E, there is a sufficient reason for why it is that E, and is not  $\neg E$ . Or, as

Leibniz puts it in his work *The Principles of Philosophy Known as Monadology* (with paraphrasing, as this is a translation):

”And the principle of sufficient reason, on the strength of which we hold that no fact can ever be true or existent, no statement correct, unless there is a sufficient reason why things are as they are and not otherwise - even if in most cases we can’t know what the reason is.”<sup>3</sup>

Leibniz uses this principle to construct his cosmological argument for the existence of god, asserting that the universe, by the PSR, must have an explanation for its existence as well. His argument, paraphrased to the best of my ability, is as follows:

**(P1)** ”No fact can ever be true or existent...unless there is a sufficient reason why things are as they are and not otherwise.” (PSR)

**(P2)** All facts are contingent upon other prior facts.

**(P3)** No fact or group of facts, including the universe itself, provides sufficient reason why this entire series of facts is so and not otherwise.

**(C)** Therefore, there must be some reason that is in itself a sufficient cause for the universe and everything within it, as well as itself, by metaphysical necessity (i.e. its non-existence is logically impossible).<sup>4</sup>

Leibniz concludes, as one might expect, that the reason for all contingent facts, as including the universe, must be god. Thus god is Leibniz’s answer to his now famous question, ”Why is there something rather than nothing?” Disputes and disagreements regarding the validity of Leibniz’s argument - particularly concerning his PSR - lead to its usurping by the modern formulation of the cosmological argument known as the Kālam Cosmological Argument, which will be the subject of this paper.

The Kālam Cosmological Argument is a product of the tradition of Islamic science known as Ilm al-Kālam, which was established in order to defend the Islamic faith against academic criticism.<sup>5</sup> It is important to note, however, that the KCA is not intrinsically predicated on any one religion, nor is it restricted to monotheism. If the Kālam is indeed sound, we would only have reason to believe in a creator deity (or deities), but no further information is available to us about the nature of said deity (or deities). That being said, it is of no surprise that the cosmological argument that grew out of the Kālam tradition is now employed not only by Islamic scholars, but by scholars of many other religions as well. I will use the modern formulation given by Dr. William Lane Craig, a respected Christian apologist and one of the world’s foremost authorities on the KCA. The argument:

**(P1)** Whatever begins to exist has a cause of its existence.

**(P2)** The universe began to exist.

**(C)** Therefore, the universe has a cause of its existence.<sup>6</sup>

Following this, Craig presents further argumentation to justify his assertion that the cause of the universe deduced by the KCA must be god. I will expand upon this after-analysis later in the paper, but the essence of it is as follows: first, Craig argues that the cause of the universe’s existence cannot be a part of space or time itself, and is therefore necessarily extra-spacio-temporal. He further claims that the cause of the universe has the property of unicity (existing as one entity) by Occam’s Razor, which stipulates that we should not posit additional causes of the universe if they do not contribute additional explanatory power. Finally, the pivotal point connecting the argued-for cause to god hinges upon a special type of causation, which I will soon define, known as agent causation. In Craig’s analysis he argues that this is the only kind of causation from which an effect can be produced without prior forces or prerequisite material. These facts, he says, point to a single creator deity as being the cause of the universe deduced by the KCA.

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## 2 Definitions

Despite its illusory simplicity, the KCA involves philosophical terminology which is not readily obvious to laymen readers. We will see that while these terms have been historically very useful, they are either at best insufficient or at worst entirely inappropriate for discussion of early-universe cosmology. Nevertheless, my analysis of the KCA cannot commence without a detailed explication of the following terms: agent causation, efficient causation, material causation, and "begins to exist."

Working in reverse, we begin with "begin to exist." In everyday life, this phrase may be used to describe the creation of conceptually coherent wholes from parts, such as a composure from musical notes or - more complex - the making of new life from the merging of gametes. It would be unfruitful to attempt to derive a general definition from crude examples such as these, however. So, to be explicit, we will say that some entity A "begins to exist," "comes into being," or has an "absolute beginning" at some time  $t$  iff:

1. Prior to  $t$  there is no time at which A exists.
2.  $t$  is the first time at which A exists. And,
3. A is not extra-spacio-temporal.

The third condition may at first appear suspect to the unacquainted reader, and rightly so. I have included it to more-closely match the definition that Craig uses in his works, but it is worth taking a moment to address its motivation - i.e. why it is that Craig includes (3) in what already seems like a coherent definition by conditions (1) and (2). Let us assume that Craig is correct in that

- Time came into being simultaneously with the universe at some time, say  $t'$ .
- God existed extra-spacio-temporally until time  $t'$  and
- God put himself into time at  $t'$ .

By our assumptions there was no time prior to  $t'$ , therefore god satisfies condition (1) of our definition. Because  $t'$  was the first time at which god exists, god therefore also satisfies (2). Then, if we do not include condition (3), we can say by our definition that god came into being at time  $t'$ . Obviously this is a problem for Craig, so he must additionally postulate the condition that "A is not extra-spacio-temporal," else the KCA would posit a cause for god as well. In response to this seemingly ad-hoc move, some philosophers have disputed the validity of condition (3) on the grounds that it begs the question, seeing as we have no experience of extra-spacio-temporal entities nor any reason to posit their existence *a priori*. I will not explore this critique in my paper, but it is certainly worth extended consideration and I encourage readers to explore this discussion in the literature. For my purposes, however, I will grant Craig's inclusion of condition (3) without further question.

Next, any analysis of the KCA requires at least three types of causation: efficient, material (which I have taken to include what is now known as formal causation), and agent. In *Metaphysics*, Aristotle lays out the groundwork for thinking about these particular types of causation, two of which are relatively straightforward. He defines material causation as the "substrate: e.g. the parts," or the "essence : the whole, and the composition," which constitute "the material of manufactured articles," and efficient causation as "the source of change or stationariness."<sup>7</sup> (*Metaphysics*, V, 1013b) In my previous example the material cause was the macaroni and the efficient cause was the sculptor.

Agent causation, on the other hand, is quite a bit more complex. It is helpful to think of this as a subset of efficient causation (in fact, Aristotle did not distinguish between the two) in which the actor effecting the cause does so via exercising its freedom of will. In a relevant sense, agents constitute a first-cause, as their will is supposed to be uninfluenced by prior conditions.<sup>8</sup> For the purposes of this paper it is wholly unnecessary to even attempt to summarize the debate around freedom of will, or to address whether or not

this possible exception to P1 is legitimate. Again, this is better left to more comprehensive works.

For convenience, I will use "causality," "traditional/familiar causality," and "Aristotelian causality" to describe the system of cause and effect outlined above, and specifically refer to the separate modes when necessary. The two most important takeaways from this discussion are thus as follows: (i) this conceptualization of causation explicitly associates a source of change with a material cause, such that the interplay gives rise to cause-effect relationships and (ii) these relationships are temporally asymmetrical - i.e. causes must always precede effects.

### 3 Premise (1) and its Generalization in the Conclusion

With the argument and relevant terminology defined, we can now ask ourselves whether or not P1 (and its extension supplied by the KCA's conclusion) is more probably true than false. I will address this question from two perspectives: first, I will interpret and critique some of Craig's philosophical arguments regarding *nihilo* and second, I will posit my own argument against P1 from the perspective of physics. It is worth noting that the former will involve extensive use of the word "nothing" (and, equivalently, *nihilo*), which at times will result in linguistic misnomers that are difficult to avoid. Specifically, it is sometimes necessary to use tensed verbage when referring to nothing, even if we do not explicitly desire to imply temporal relationships. Other times this temporalization is intentional. To avoid confusion, I will denote instances of tensed language that is not *necessarily* meant to indicate a temporal relationship with a \* - e.g. was\*, were\*, precede\*, etc. Words marked with this indicator should not, however, be read as *necessarily non-temporal*. In contrast, when a temporal relationship is explicitly implied the indicator will not appear, nor will it appear in direct quotations. I will do my best to avoid obfuscation, especially when the linguistics themselves play a critical role in my analysis, but I retroactively apologize for any lack of clarity. We thus begin with Craig's defense of P1.

Craig says that premise (1) has solid footing in our everyday metaphysical intuition: namely, our notion that something cannot come from nothing. He argues that we know from experience that things cannot pop into existence uncaused - a proposition he claims no one can honestly deny without "colour[ing] one's intellectual integrity" - and therefore we are compelled to accept that everything must have a cause of its existence.<sup>9</sup> He further claims that this metaphysical intuition is so strong and inherent to our understanding of reality that it constitutes a convincing case for P1 in and of itself. He writes,

"...if originally there were absolutely nothing - no God, no space, no time -, then how could the universe possibly come to exist? The truth of the principle *ex nihilo, nihil fit* is so obvious that I think we are justified in foregoing an elaborate defense of the argument's first premiss."<sup>10</sup>

Craig's statement is problematic in several ways, depending on how we interpret it. On one interpretation, his inclusion of the word "originally" amounts to an unjustified assumption that it must have been\* the case that nothing existed. Said another way, Craig argues that P1 applies to the universe because it could not have popped out of the nothingness that *he assumes* was\* as a matter-of-fact. If this interpretation is accurate, it may be argued that Craig forgoes justification of this implicit assumption because it is either intuitively obvious, or necessarily the case metaphysically. I argue precisely the opposite, and claim that the reasonable skeptic has three compelling reasons to avoid conceding Craig's assumption either *a priori* or by appeals to intuition:

1. Craig's claim is predicated on a misconception about *nihilo*, which is also true on the second interpretation.
2. Doing so lends undue credibility to some of Craig's other, extremely *unintuitive* arguments that arise in his defense of premise (2).

3. This claim begs the question with respect to P2.

I will defer analysis of the first point until after I introduce the second way of interpreting Craig's statement, and similarly defer consideration of the second point until Craig's defense of P2. As to the final point, if we assume that *nihilo* preceded\* the universe (read: it was\* the case that *nihilo* and was\* not the case that the universe existed), then it trivially follows that the universe must have had a beginning from the fact that it exists now. But this is the claim of P2! Surely we cannot deduce the truth of the second premise from an assumption meant to justify the first. Creation *ex-nihilo* is the entire crux of the KCA, not an intuitive truth to be assumed in its support. In the interest of fairness to Craig, I will assume that this is not the intended meaning of his statement.

On a different interpretation, Craig is intentionally (as opposed to implicitly) making the aforementioned assumption, but only for the purpose of arguing the absurdity of P1's contradiction. In other words, he makes this assumption only for the purpose of demonstrating the intuitive obviousness of the principle *ex nihilo, nihil fit* - literally: nothing comes from nothing. But even on this reading Craig's position suffers from issues with coherency and applicability, depending on how we interpret the key terms "were" and "originally." If we interpret them as being intentionally temporal, the statement "there were absolutely nothing" is incoherent. When was it that "there were absolutely nothing?" If Craig's answer is "before the beginning of the universe," he not only begs the question again, but he also runs into the insurmountable task of trying to explain what "before" means in the absence of time, space, and everything. It is of little surprise then that Craig has at times given a different formulation of his argument which avoids this problem. He writes,

"...virtually no one ever challenges the premiss that if in the past nothing existed then nothing would exist now. That something should spring into existence out of nothing is so counter-intuitive that to attack Maimonides and Aquinas at this point seems to colour one's intellectual integrity. The old principle *ex nihilo, nihil fit* appears to be so manifestly true that a sincere denial of this axiom is well-nigh impossible."<sup>9</sup>

Here Craig intentionally (and controversially!) allows time to be exempt from the "absence of anything" definition of nothing. By saying that "in the past nothing existed," he clearly means that nothing existed at some prior point *in time*. On this view, Craig is completely permitted to claim that "if in the past nothing existed then nothing would exist now," but only if we readily concede that (i) time can exist in the absence of *literally* everything else, as well as (ii) that there ever was (in the temporal sense!) nothing to begin with (the assumption I addressed previously). Barring the second concession, we must then ask ourselves, can there be a coherent explanation of what time is *in and of itself*? The answer to this question is not at all obvious and I am personally inclined to say no. As it turns out, Craig agrees with me on this point. Elsewhere he has written,

"It seems to me that prior to creation God is outside time, or rather there is no time at all. For time cannot exist unless there is change. And prior to creation God would have to be changeless."<sup>11</sup>

This statement is curious. Not only does it explicitly contradict Craig's allowance for time alongside *nihilo* in his reformulated argument, it also raises an obvious question about how god could have enacted a change (by bringing the universe into existence) in the absence of time. I will not address said question, however, as this paper is not concerned with theological disquisition. As to the first point, however, I think it is clear that Craig cannot commit to his reformulated argument and to the idea that time cannot exist without change simultaneously. In my opinion, he does better to dispense with the former in favor of the latter. To do otherwise would be to shift the goalposts of his argument by positing an unexplained fact - the existence of time prior to the existence of the universe - in order to account for inconsistencies in his original position.

For the purpose of argument, however, let us assume that time can exist in the absence of change, that the concept of nothing is compatible with the existence of time, and that Craig's reformulated argument in support of the principle *ex nihilo, nihil fit* is inescapably true. I claim that even if this is the case we are still not compelled to accept P1. The philosopher Wes Morriston commented on this point in his paper on P1 of the Kālam in which he says that Craig's alternative position only stipulates that "whatever comes to be *within* time must have a cause."<sup>12</sup> This stands in contrast to the broader requirement of P1, that *anything* which begins to exist must have a cause. That leaves Craig in a predicament, seeing as he has, as Morriston says, "[left] open the question what is to be said about the beginning of time itself." This is especially problematic for his position, being that some conceptualizations of non-emergent time, especially in the cosmological models that I will address subsequently, explicitly contradict Craig's metaphysical arguments against eternity past. If Craig wishes to double-back and say that nothing existed *in the past* (and therefore nothing could have come from it), he is forced to choose between two undesirable positions: he can either accept that time is eternal - which he rejects wholeheartedly - or assert that god brought time into being from nothing such that it then coexisted with nothing before the beginning of the universe. I think the latter enterprise borders on incoherence, which is why I find it hardly surprising that Craig has mostly dispensed with his second formulation in favor of the first.

We thus find ourselves back at Craig's original argument, but now we must adopt a different interpretation of the meaning of "originally" and "were" - one that is non-temporal. So, let us consider, if only for the purpose of argument, the possibility that my critique of Craig's first argument about nothing derives its veracity entirely from unavoidable linguistic limitations. That is, perhaps we cannot do better than to describe nothing as preceding\* the universe - i.e. nothing existed, *and then\** the universe came into being - even if our intended meaning has no temporal aspect to it. If this is true, Craig can potentially avoid my aforementioned criticisms and hold to the claim that prior\* to the universe nothing existed, even if we cannot clearly understand what this means conceptually. But *even if we grant this* there still remains an additional, even more problematic discrepancy in Craig's position. As Morriston rightly points out, Craig's assertion that if nothing existed then necessarily nothing could exist is predicated upon a more fundamental misunderstanding that transcends mere linguistic misnomers. He writes,

On this reading, the principle is difficult to interpret. It speaks of nothingness almost as if it were a "condition" of something...But this is nonsense. Nothingness is not a "condition" of anything. It has no power to "prevent" things from "springing into existence." What we are talking about here, after all, is nothing at all - "no matter, no energy, no space, no time, no deity." And nothing at all has no power at all, not even the power to prevent things from existing. One wants to ask Craig, "If there were nothing at all, what would make it true that nothing could come into existence?"<sup>12</sup>

Morriston suggests Craig's conclusion that "...it seems unintelligible to say that something should spring into existence [from nothing]"<sup>9</sup> fails to take seriously the fact that nothing by definition excludes the influence of any laws or principles of nature, such as the law of conservation of matter/energy. Instead, he replaces the rigorous definition of nothing with a hollow appeal to our intuitive inclinations, such that nothing becomes subject to the logic or governing principles we have come to know from experience. We cannot *really* say that nothing precedes\* the universe, nor posit the claim that things cannot pop into existence out of it, exactly because doing so would be to treat nothing as its negation: something that can have properties, attributes, or tensed matters of fact. If Morriston's analysis is correct then there is nothing about nothing that justifies the principle *ex nihilo, nihil fit*. And how could there be? Nothing being the absence of anything precludes us from saying *anything* about it, other than positing its definition. Craig objects to this reasoning, saying,

"Perhaps Morriston's difficulty is that he thinks of the causal principle as akin to a law of nature, like Boyle's Law or the Second Law of Thermodynamics, which hold only within our universe. But the causal principle is not a physical principle, but a metaphysical principle. Being does not arise from nonbeing; something cannot come from nothing."<sup>13</sup>

From what I know, this is completely and utterly wrong. First, while Craig is correct to say that causality ! = the laws or principles of nature, it is by the systematic workings of natural phenomena that we come to understand causality as an idea. Part of this understanding is inescapably, undeniably, and intrinsically predicated on temporal relationships. Craig cannot dodge Morrision's criticism by hiding behind an ethereal metaphysical principle when that principle has its very grounding in facts-of-the-matter about the universe we live in. Namely, that there *is* something rather than nothing; there are a plurality of those somethings; the members of this plurality interact; and those interactions occur *within time*. Sans these facts (indeed, sans everything!) what meaning could causality possibly have as a metaphysical principle? I will take this point even further in my argument against P1 from physics, wherein I claim that violations of intuitive causal principles *within* the universe force us to reconsider their applicability at the cosmological level.

To make matters even worse, Craig further cheapens the idea of nothing by implicitly exempting god from its clutches. Regardless of whether or not god exists timelessly and spacelessly, why should it be that the "absence of **anything**" does not apply to god? Why should we accept Craig's claim that before our universe was *nihilo and god* rather than simply *nihilo*? The first possibility seems to be in itself a contradiction. To dispute this claim, one might facetiously turn towards the KCA to seek refuge in the necessity of god's existence; in response, I might ask what god's favorite shape is.

For these reasons premise (1) (including its extension in the conclusion) is not more likely to be true than false, at least by the metaphysical arguments Craig provides for it. Summarily, Craig: (i) baselessly assumes that there was\* a point at which nothing existed, (ii) fails to provide a coherent description of nothing that does not imply contradictions or appeals to non-applicable intuition, (iii) assumes his conclusion on several occasions in order to address said contradictions, and (iv) fails to take time seriously. All these things withstanding, perhaps now it is clear why Craig was so eager to "forgo[removed -ing] an elaborate defense of the argument's first premiss," and instead principally relies on intuitive arguments to pass off premise (1) as so clearly true that it would be "repugnant"<sup>10</sup> to affirm otherwise. In his book on the KCA, he writes,

"For the first premiss is so intuitively obvious, especially when applied to the universe, that probably no one in his right mind really believes it to be false. Even Hume himself confessed that his academic denial of the principle's demonstrability could not eradicate his belief that it was nonetheless true."<sup>14</sup>

As aforementioned, however, Craig is of course reluctant to apply this intuition to god. For on the one hand he claims that it is completely absurd to imagine something popping into existence uncaused, but on the other it is somehow entirely reasonable that god can will the universe into existence *ex nihilo*. The validity of Craig's entire argument relies on the fact that many readers come into this discussion with preconceptions about the omnipotence of god, and therefore see no problem with god's violation of the same intuitive principles that Craig uses to pass off P1 as being obviously true. Ultimately, the problem with Craig's use of intuitive arguments lies in the fact that ideological preconceptions play a large part in what we see as obvious or possible. To avoid such relativistic appeal, Craig needs to take seriously the burden of proof imposed on him by the first premise by stepping away from his arguments from intuition.

As such, I will now commence with my positive argument, which will principally concern itself with Aristotelian causation and the literal statement of P1. First, it is worth noting that many cosmologists actually reject the intuition that Craig continually asserts is obvious to those with "intellectual integrity," and instead denounce premise (1) as being incoherent (albiet from the perspective of physics and not metaphysics). This discrepancy in worldview may lend itself to the fact that causation has limited explanatory power and remains principally a speculative metaphysical idea of little to no use to physicists. That creation *ex nihilo* lacks metaphysical and empirical support may also be unpalatable to scientists, whose work is centralized around empirical verification and falsification. As such, my argument against P1 from a scientific perspective will be, in many ways, more convincing than Craig's metaphysical argument to those who regard falsifiable and testable hypotheses as more valuable than unfalsifiable philosophical argumentation. To that

end, my argument has three principal goals: (i) to demonstrate that P1, as stated, actually undermines Craig's position, (ii) to sow sufficient doubt as to the metaphysical *necessity* of P1, and (iii) to demonstrate that our intuitive ideas about causality may fail in certain contexts even within the universe, and therefore should not be applied as fundamental principles of the universe as a whole (as the conclusion of the KCA suggests).

P1's non-applicability at the cosmological level is easily demonstrated by an analysis of its literal content. As posited, P1 states that "whatever begins to exist has a cause of its existence." This raises two clear questions. What does "begin to exist" mean in the context of everyday experience as opposed to at the cosmological level? And what constitutes a cause for something's existence? As we will see, the answers to these questions will provide reasonable doubt as to P1's validity. To understand how so, let us turn to the definitions given earlier for material and efficient causation in the context of the following example: suppose Michelangelo has a block of marble and a chisel and hammer, which he uses to craft a beautiful statue. Prior to the moment that Michelangelo puts down his tools and declares the statue complete, there was clearly no time at which the statue existed (I assume is clear that the statue is not extra-spacio-temporal). Therefore, by our definition, the statue came into being at this moment. What was its cause of existence, then? Well, the efficient cause of the statue was clearly Michelangelo and the material cause was clearly the marble out of which the statue was sculpted. Notwithstanding the many domains in which these relationships may fail (which I will consider subsequently), it appears that everyday causation involves an explicit interplay between an efficient cause and a material cause.

What happens if we try to apply this reasoning to the universe itself? It becomes immediately clear that, if Craig is correct in saying "originally there were absolutely nothing," that he is positing an efficient or agent cause of the universe - god - in the absence of a material cause. In his argument defending P1, however, he claims that it is "intuitively obvious" that it is impossible for something to "spring into existence" from nothing, which is an alternative way to say "for something to come into being without an efficient cause." In what way is the former claim (causation sans a material cause) any more legitimate than the latter (causation sans an efficient cause)? I am compelled to reference Morrision yet again, as he has made an excellent comment on this discrepancy:

"I think the "intuitive" absurdity of making something "out of" nothing is a near neighbor of the intuition that something can't "come from" nothing, and this raises a doubt about the wisdom of relying so heavily on such "intuitions" for the defense of premise (1)." <sup>12</sup>

My analysis of the first premise would not be complete if I did not pause, but for a moment, to analyze the conceptual distinction between cosmological and everyday coming into being on the view of the Aristotelian. In our experience everything comes into being as the result of a shuffling or rearrangement of pre-existent material. Simply put, we have no experience whatsoever of *nihilo*, nor coming into being out of *nihilo*. As such, evidence of the causal coming into being of things within the universe, even if we can show that this is always and necessarily the case, has no bearing on the truth value of P1 when applied in the context of creation *ex nihilo*. I am not claiming, as others have in debates with Craig, that nothing *really* comes into existence in our day-to-day lives; rather, I assert that nothing comes into being within the universe in the same way that Craig asserts the universe itself came into being (unless we concede that libertarian freedom of will exists, and I do not). Therefore using evidence of the former to uphold the truth of the latter constitutes a *non-sequitur*; there is no necessary logical connection between the two.

Keeping the previous point in mind, I claim that philosophical terms like "efficient causation," "material causation," and "agent causation" are rarely suited to the task of describing complex physical systems (this perhaps explains why it is unwise to appeal to them for intuitive support in the way my previous point addressed). Beyond the domain of our familiar macroscopic reality, Aristotelian causality plays almost no role in the explanation of physical phenomena, likely because it does not manifest itself in the obvious ways we expect it to. In some regimes, causal mechanisms could (and arguably do) take different forms such that



it is impossible to analogize them to the language we typically use when describing familiar, macroscopic events (hence my earlier comment about domain of validity). In such domains the question, "What was the cause of some event A?" makes just as little sense as the question, "Who gave birth to the first human?" Both questions wrongly assume that familiar mechanisms can be abstracted away from the situations and subjects that they emerged to describe.

Take for example the period following the inflationary epoch known as decoupling, during which the elementary constituents of matter (photons, electrons, protons, etc) were first formed. Prior to decoupling, the early universe existed in a thermodynamically chaotic state (often referred to as the singularity) whose constituents may have been amorphous or indistinguishable. At such extreme temperatures and energies the laws of nature may very well have been completely different, or even nonexistent, such that our familiar causal mechanisms break down. This is not at all a controversial claim. If the laws, constants, and symmetries of nature that we are familiar with govern the interactions of certain forms of matter, at specific scales, and within a particular range of energies, it should be unsurprising to find that they do not apply in the absence of said forms of matter, at much larger or smaller scales, or outside of that range of energies. Without protons, electrons, and photons, quantum electrodynamics and the standard model of particle physics have no meaning. Without the four-dimensional spacetime manifold, special relativity and its principle metaphysical claim, the relativity of simultaneity, cease to provide a meaningful explanation of the behavior of time. Chemistry, biology, history, psychology, sociology and all of our other fields of scientific inquiry all rely upon the current configuration of matter and energy in the universe for their validity. Apart from it, they hold little to no meaning and cannot be used to infer principles beyond their domain of valid inquiry.

If we apply this reasoning on a larger scale we find that P1 (when generalized in the way that the KCA's conclusion suggests) selectively projects aspects of our everyday reality onto the universe in a way that is intellectually dubious. In their book *The Singular Universe and the Reality of Time* Robert Unger and Lee Smolin (a philosopher and a physicist, respectively) address this faulty mode of inference, which they refer to as the first cosmological fallacy. Unger writes,

"The argument against the first cosmological fallacy ends in a negative claim: the claim that we are not entitled to apply to the whole world the methods and habits of mind that modern science has applied to parts of the world."<sup>15</sup>

One comes to this negative claim by taking seriously the aforementioned supposition that Aristotelian causation may just be a convenient way to conceptualize physics on the scale that comprises our everyday life. That is, it may very well be one of many "habits of mind" that are not applicable to regimes within which our macroscopic intuition fails (e.g. prior to decoupling). I claimed earlier that it is enough to demonstrate that Aristotelian causality may fail within, or not apply to, certain subsets of the universe in order to impress a reasonable doubt upon the assertion that it necessarily holds at the cosmological level. My main argument for this claim will not require going back to the early universe, as we did previously, nor to high-energy regimes, but instead comes from an experiment that most students of quantum mechanics (myself included) have done themselves.

The famous double-slit experiment (and its interpretations) lends support to the negative claim against the cosmological fallacy, and will constitute my main argument against P1's mode of inference. We are to imagine firing a single photon from a source to a detector, between which is a plate with two slits. When we observe the pattern formed at the detector screen by successive firings of single photons we do not see two bright lines as would be expected on classical intuition. Instead, we observe bright and dark lines of varying amplitude, extraordinarily similar to a single-source wave interference pattern. This pattern emerges despite the fact that the photons are fired individually, and can therefore not interact with one another. Even more interestingly, if we observe the slits themselves, to determine which one the photon ultimately passed through, this pattern completely disappears and the classical expectation is realized.

In order to make sense of this enigma, proponents of the Copenhagen interpretation claim that the position an individual photon is indeterminate until it is observed. On this view, the wavefunction of the photon (which provides a complete description of its quantum state) must therefore consider every possible path from the source to the detector, even ones which are impossible classically, to arrive at the resultant probability distribution of the photon's position before observation. That is, the photon literally has no determined position prior to detection, but instead conforms to a non-deterministic distribution of probable positions which then collapses to zero in all locations other than where it is ultimately observed on the screen (for which the probability is by definition unity).<sup>16</sup> Afterwards, the photon's position will be given by a new distribution determined only by pathways consistent with our previous observation. Therefore, depending on how we conduct our observation, the distribution of possible pathways may vary drastically. In the original experiment, we do not observe the slits themselves (meaning we do not have knowledge as to which one a particular photon passes through), therefore the wavefunctions of these photons necessarily consider pathways through both slits. These pathways are unequally probable, and the experimental apparatus is symmetric with respect to the slits, so the interference pattern produced can be understood by analogy to the double-slit interference pattern generated by a single-source wave generator (the wave's crests and troughs are analogized to the probability amplitude in QM). Because we are firing one photon at a time, however, it is the accumulation of many firings that will, over time, begin to conform to the underlying probability distribution (by the strong law of large numbers). This explains why we see photons appearing in locations that are impossible classically (in these locations the probability contributions from all pathways sum to a non-zero value) as well as why we see empty regions where we would normally expect photons to appear (in which the contributions sum to zero exactly). On the other hand, if we do observe the slits, the wave function collapses such that all pathways that contradict this observation are eliminated, and therefore interference is no longer possible, resulting in the classical picture.

On the Copenhagen interpretation, the quantum regime appears to be exempt from the rule of Aristotelian causality. It is impossible to analogize its explanation of the double-slit experiment to the modes of causation defined previously, especially the concept of the wavefunction. This is not the result of causality's linguistic simplicity, nor is likely to be the result of deficiencies in the explanatory power of the wavefunction (as proponents of hidden-variables might say). Rather, if the Copenhagen interpretation is correct, I argue that at least three non-trivial problems arise for Aristotelian causation. These quandaries serve to delegitimize the intuitive argument for P1, but do not in any way imply deterministic versions of quantum mechanics are not viable or possible (in fact, Craig dodges these points by rejecting the Copenhagen interpretation in favor of a deterministic model). These three problems, given in question form, are as follows:

1. What is the material cause of the interference pattern?
2. If causes are to always precede effects, in what way can a photon's path be retroactively determined by the observer effect and the subsequent collapse of the wavefunction? (This idea is explored in the famous Schrödinger's Cat thought experiment)
3. If the collapse of the wavefunction is a reasonable ontology, is causality coherent in the absence of observers?

If these questions are indeed problematic (meaning they are fundamentally incommensurable with Aristotelian causation), we can take only one of the following two positions: either the Copenhagen interpretation is completely wrong or our intuitive ideas regarding causation need to be modified or dispensed with. Even if philosophers of quantum mechanics can reconcile these questions with strict Aristotelian causality, there remains an ever-present burden of proof on those who assert that traditional causal relationships continue to hold beyond subsets of the universe, at the cosmological level, and are a more-legitimate way of interpreting the double-slit experiment in terms of explanatory power, parsimony, or otherwise.

It is worth taking a moment to address a possible misinterpretation of my argument. I am not at all claiming that causality is rendered incoherent or nonexistent by our explorations into quantum mechanics

and the early universe. In fact, I am personally disposed to the position that causal mechanisms (of varying forms) are a fundamental characteristic of reality as we know it. Rather, my claim is that because causality manifests itself in ways that are not intuitively obvious to us (i.e. in ways that seemingly violate Aristotelian causality), we have no good reason to believe that causal relationships either (i) exist at the cosmological level or, a weaker claim, (ii) are generalizable as a metaphysical principle - which by definition extend beyond the universe - from our experience within the universe. My consideration of the dynamics of the early universe and of the implications of the Copenhagen interpretation of quantum mechanics serves principally to evidence the foundations of these claims. Therefore, the generalization of causality implied by the conclusion of the KCA (which I have incorporated into my analysis of P1 in general) rests upon a weak foundation. The failure of Aristotelian causality within subsets of the universe renders Craig's cosmological extrapolation at best uncertain. If we again consider the fact that Craig's argument relies upon creation *ex nihilo*, a process that is wholly unfounded in any empirical evidence and not extrapolatable from any principles that we are currently familiar with, it is immediately clear that P1 is untenable.

Nonetheless, Craig's position is not at all scientifically baseless: in response to the questions raised by the double-slit experiment, he has expressed support for deterministic interpretations of quantum mechanics (and condemnation of the Copenhagen interpretation), which preserve classical causal relationships. The mathematical coherence and explanatory powers of these interpretations are not inferior to those of the non-deterministic theories, so we have no reason as yet to definitively assert one's truth over another. And, because quantum gravity may be the key to understanding early-universe physics, it is in principle possible that deterministic models could apply in this domain as well, however unlikely that is to be true. Nevertheless, the existence of viable alternatives to our traditional notions of causality within the universe *at the very least* calls into question P1's obviousness or necessity, especially when applied to the universe itself, which is sufficient for my purposes. As such, Craig's assertion that P1 is "*especially*" obvious (emphasis mine) at the cosmological scale is simply not true, and we should not accept it as such when analyzing the KCA.

## 4 Premise (2)

Premise (2) of the Kālam Cosmological Argument is phenomenally controversial and complex; as such, it is beyond the scope of this work to address all of the uncountable number of sub-arguments that it entails. Rather, I will present my own argument and subsequently address two of Craig's arguments from the perspective of physics at the cost of ignoring the important and interesting consequences of the philosophy and mathematics of the infinite. With regard to the latter, however, I will say a few words to summarize the debate.

Some of Craig's strongest arguments for the validity of Premise (2) come from his metaphysical arguments about time and actualized vs. potential infinities. To summarize his argument, I must begin with a quick description of the two principle metaphysical theories of time: A-theory (presentism) vs. B-theory (eternalism). On A-theory, the only thing that is real is the present moment. The past was real at one point, but is no longer, and the future does not exist. This opposes B-theory, which states that all times - past, present and future - are equally real. A popular view of B-theory references the "block universe" model, which states that all points on the spacetime continuum are equally real; therefore, all times must be real.

Craig is an outspoken defender of A-theory, and even states outright that the Kālam is committed to A-theory - in other words, it is not valid if B-theory is accurate. As I myself have presentist-tendencies, I will simply grant him that A-theory is accurate (for the purpose of keeping this summary short), and focus on the arguments that occur within that paradigm. One of Craig's principal arguments uses the Hilbert's Hotel thought experiment - which presents apparent absurdities that arise when we try to think about infinity in the world - to support his claim that actualized infinities cannot exist in reality, and therefore time itself cannot extend infinitely into the past (i.e. it must have had a beginning). The second of his two main

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arguments concerns the idea of infinity by successive addition. It is:

**2.21** A collection formed by successive addition cannot be actually infinite.

**2.22** The temporal series of past events is a collection formed by successive addition.

**2.23** Therefore, the temporal series of past events cannot be actually infinite.<sup>17</sup>

In tandem, Craig argues, these two arguments provide good evidence in favor of premise (2) and against the idea that time can be eternal. The validity of said arguments is far from undisputed, however, especially considering the long history of debate between A-theorists and B-theorists that continues today. It is beyond the scope of this work to consider this argument in more detail, so I encourage readers to explore some of Craig's further arguments cited here<sup>17, 18</sup>, and some objections given by Morrision cited here.<sup>19, 20</sup> With that, I will move away from Craig's arguments from the philosophy of time and proceed with my argument against premise (2).

In a way, my first point will constitute a negative argument from ignorance: instead of filling a gap without justification, I assert that our ignorance of the early conditions of the universe, *especially* prior to the Planck time, leaves us in no position to definitely posit an absolute beginning of the universe. Indeed, there are many elements of the early universe that we currently do not understand. We have no viable model of quantum gravity; we don't have a good grasp of what the singularity prior to the Planck Time behaved like; we have no empirical evidence to determine directly whether or not the Many Worlds Hypothesis is true; and, most of all, we have no idea what sparked the inflationary epoch, nor what preceded the big bang. With these problems to consider, a good scientist or philosopher would exercise due skepticism concerning any claims about the early universe, at the *very least* until we have a viable model of quantum gravity. If we take these glaring holes in our understanding seriously, there is no question as to whether or not we can definitively affirm the truth or falsity of P1: we cannot.

For a positive claim against P2's necessity, we need only look towards the academic literature regarding viable cosmological models of the universe which do not posit an absolute beginning of the universe. Although I do have training in physics, I do not claim to be in a position to evaluate the advanced arguments and higher level mathematics that these models involve. As such, I must defer to those with the proper training in cosmology in composing this list of so-called boundary-less/self-contained, cyclic, and eternal cosmologies. Carroll references two of said classes in the source cited previously. The first is a self-contained, boundary-less model (meaning that the laws of nature hold everywhere within the this universe, and that this model does not require any external causes) proposed decades ago by the scientists Hartle and Hawking. I will defer analysis of this model to later in my refutation of Craig's comments, but suffice it for now to say that it has extremely unintuitive implications which contradict P2 directly. I dedicate substantially less time to this model, however, as I personally do not find it compelling. Nevertheless, Craig uses this cosmology in a way that is dubious, which warrants some discussion. As to the second class, Carroll cites a theorem that governs a wide range of cosmologies which share some simple assumptions. As we will see, this theorem is stronger than the one which Craig cites in his defense of P2 (which Carroll alludes to in the quote), the Borde-Guth-Vilenkin theorem, because of it takes seriously the rules of quantum mechanics. Carroll writes,

"I quoted a stronger theorem, the Quantum Eternity Theorem (QET) - under conventional quantum mechanics, any universe with a non-zero energy and a time-independent Hamiltonian will necessarily last forever toward both the past and the future."<sup>21</sup>

Cosmologies meeting the requirements of the QET will necessarily be eternal in both the past and future directions in that their time parameters take on all values from  $t = -\infty$  to  $t = +\infty$ . Critics of such cosmologies may point out that many physicists reject the idea of actualized infinities, and thus the implications of this theorem represent either limitations of our mathematical tools or deficiencies in our understanding of quantum mechanics. I have sympathies with this position, but there is an important addendum to be made: typically this assertion regarding actualized infinities concerns parameters like density, temperature,

or energy, with particular emphasis on the singularity of the big bang. Extending this analysis to the concept of infinite time is possible (Craig has emphatically done so in his writings) but requires principally metaphysical argumentation with little opportunity for empirical falsification. Said metaphysical arguments are beyond the scope of this paper, however, so the cosmologies I will reference in my argument should be considered speculative - they are reliant upon assumptions that may or may not be valid.

Such cosmologies are numerous and diverse. Carroll and his colleague Jennifer Chen have proposed their own eternal cosmology in which the time parameter is real and is defined on the range  $t = -\infty$  to  $t = +\infty$ .<sup>22</sup> This model posits a double-headed arrow of time with a relatively low entropy state in the middle, but does not posit a beginning of time itself. Cyclic models of the universe, such as Roger Penrose's "Conformal Cyclic Cosmology," posit that the universe did not come into being at the Big Bang, as Craig asserts, but instead cycles through many big bang events.<sup>23</sup> These cosmological models have been popular among scientists and philosophers of science, including Einstein, and as such new cyclic models have been constructed from the perspective of quantum mechanics and string theory as well. Other cosmological models posit that the singularity preceding the inflationary epoch is not a true singularity (in which actual infinite values of density, temperature, etc, are realized), and that the universe preceding the big bang was in a state of quantum potential eternally into the past. One such model was proposed by physicists Ahmed Farag Alia and Saurya Das just this past February, propounding the idea that it is not at all impossible, or even difficult (for theoretical physicists, of course), to construct a cosmology which extends to eternity past and agrees with the rules of quantum mechanics.<sup>24</sup>

My positive argument against P2 is not committed to any one of these cosmologies in particular: they could all be completely wrong, and on balance of probability they likely are. Instead, my allusion to these models serves the purpose of developing support for the fact that eternal cosmologies can be, and have been, constructed in concordance with what we know about modern physics, including quantum mechanics, and are well documented in the scientific literature. Summarily, I argue that because there exist such self-contained, eternal, and cyclic cosmological models, we are forced into a position of agnosticism with regard to the emergence or non-emergence of time and, indeed, the universe itself (at least until empirical evidence convinces us otherwise). Therefore, P2 is at best uncertain, but certainly not necessary, from a scientific perspective.

Craig's defense of P2 is significantly more interesting and complex than his defense of P1. I will address Craig's argument from physics, specifically his use of the Borde-Guth-Vilenkin theorem to assert an absolute beginning of the universe and his arguments against the Carroll-Chen and Hartle-Hawking cosmologies.

We will begin with the Borde-Guth-Vilenkin theorem, which asserts that:

"...a cosmological model which is inflating – or just expanding sufficiently fast – must be incomplete in null and timelike past directions. Specifically, [there is a] bound on the integral of the Hubble parameter over a past-directed timelike or null geodesic."<sup>25</sup>

Craig claims that because our universe is expanding fast enough to satisfy the theorem's assumptions, the BGV theorem proves that it must have had an absolute beginning in time. This is, however, a blatant equivocation on the meaning of "incomplete in null and timelike past directions," which has *nothing* to do with a beginning of time as Craig imagines it. In fact, even a cursory reading of the original paper is sufficient to show that this claim is patently false, and that Craig has tailored the theorem's conclusion to fit his ideological preconceptions. The paper's actual conclusion is plainly stated in the abstract (almost always the first item in a scientific publication), which makes it difficult to believe that this error was simply the result of a misinterpretation. From the abstract:

"Thus inflationary models require physics other than inflation to describe the past boundary of the inflating region of spacetime."<sup>25</sup>

Phrased in another way, classical theories of inflation - those which do not account for quantum mechanics - are insufficient for the task of describing the extremely early universe preceding the inflationary epoch. This all comes back to the fact that we currently lack a viable model of quantum gravity (which we suspect is necessary to provide a complete description of the universe prior to the Planck time), and to the idea that causal mechanisms may have behaved in uncharacteristic ways during this era. The BGVT does not, in any way, give us reason to believe that the universe must have had an absolute beginning in time, preceded by nothing (nothing in the sense of creation *ex nihilo*). The theorem simply does not do what Craig wants it to. To be fair, Craig indirectly responds to this objection later in his criticism of the Hartle-Hawking model, in which he claims that time-infinite quantum gravity regions are unstable and therefore must have a finite beginning in time. Curiously, though, he does not directly acknowledge the connection between the claims given by Hartle-Hawking and the BGVT, and as such does not admit to his aforementioned misrepresentation.

Next, Craig claims that models like Carroll's and Hartle-Hawking's are misleading because they equivocate on the meaning of past-eternal. With regard to Carroll's model he said, in a publicized debate sponsored by the Greer Heard Forum,

"On [Carroll's] model, the universe contracts down from eternity past for infinity to a relatively low entropy point and then begins to expand again. And that kind of model is physically impossible: it contradicts the Second Law of Thermodynamics. That's why you've got to have the arrows [of time] pointing in both directions if you want to hope for this model to be realistic. But if you have a double-headed arrow of time in both directions then you've got a beginning of time and of the universe."<sup>26</sup>

In his argument, Craig uses a correct fact about the Second Law of Thermodynamics to draw a dubious conclusion about what Carroll's model implies. Craig is right to say that the negative time portion of this universe is in violation of the Second Law of Thermodynamics, but this claim tacitly assumes that matter behaved the same way both before and after the entropy minimum. While this assumption seems reasonable, we must take care to remember that all inquiry directed prior to the Planck Time, which occurs just  $10^{-43}$  seconds after the entropy minimum, will be inherently speculative given that we do not have an understanding of the causal mechanisms that govern said regime. Therefore, Carroll is permitted to (and he does) imagine an alternative paradigm in which entropy is instead required to decrease, resulting in an arrow of time pointing backwards. This kind of speculation is not ad-hoc, and characterizes most, if not all, cosmological models that address the regime prior to the Planck time. On the arrow of time, the paper reads:

"From that starting point, we are led to conclude that the Hilbert space must be infinite-dimensional, with at least one accumulation point for the set of energy eigenvalues, and to the suggestions that the de Sitter phase toward which our current universe is evolving is somehow an unstable configuration, and that the very far past of our universe could be experiencing an arrow of time directed in the opposite sense to our own."<sup>22</sup>

In fact, Carroll says that this cosmology actually explains the Second Law of Dynamics by reducing it to a local phenomena (although it is more-correct to say that his model constrains it). To understand how, consider the previous quote from Craig in which he concludes that the arrows of time in Carroll's model must be reoriented such that they always point in the direction of increasing entropy. Craig is assuming that the time parameter, by which the universe evolves, is inherently determined by the arrow of time. That is, our *experience* of time must always be in accordance with entropy increase. But Carroll directly contradicts this supposition when he said that, sufficiently far into the past, the universe could have experienced a backwards arrow of time with respect to ours. This "experience" is in accordance with the overarching time parameter in the Carroll-Chen model, which extends from eternity past to future. Therefore, the correct conclusion of Carroll's model is that time can monotonically increase towards the future from eternity past in a universe with entropy that does not increase monotonically.

From this we see that Craig is incorrect to assert that there is a beginning of time in this model: while there is an absolute entropy minimum from which opposing arrows of time emanate, the time parameter itself is well-defined for all values on the interval  $(-\infty, +\infty)$ , on which  $t = 0$  does not correspond to the first instance of time he is arguing for. To assert that this model suggests an absolute beginning of time at the minimum entropy point is to falsely conclude that the  $t = 0$  boundary, which lies in the middle of this cosmology's history, was the point at which the universe had its absolute beginning. On this reading, Craig's claim is clearly contradictory to the proposed cosmology, and therefore the problem that the Carroll-Chen model presents for P2 cannot be dismissed in this way.

Craig's criticism of the Hartle-Hawking model mirrors my criticism of his interpretation of the BGV. He argues that Hawking's cosmology is not past-eternal, but instead posits a boundary at which classical spacetime breaks down and the quantum domain takes over. To be fair-handed, Craig is mostly correct here. Hartle and Hawking posit that this boundary is at the Planck time, and is actually the point at which time itself emerged out of the then four dimensions of space (and is therefore by definition non-eternal)<sup>27</sup>. Hawking has called this boundary the absolute beginning of time, and has additionally referred to the big bang singularity (in the actualized infinity sense) as the beginning of the universe itself.

This second claim, as to the beginning of the universe, is not meant to be equivalent to the *coming into being* of the universe as discussed earlier, however. It is a bit of misnomer by Hawking, but public lectures are typically non-rigorous so it is of little importance. If we are to discern Hawking's intended meaning, we need only look to the model itself. According to the Hartle-Hawking no-boundary proposal, the universe *as we know it* existed as a true singularity comprising four dimensions of space, and none of time. In this regime, the term "begins to exist" has no meaning because time had yet to differentiate itself from space. In contrast, the beginning of the universe *as we know it* does have meaning in that the Planck time marked the first instance in which our 3D spacial and 1D temporal universe existed. Therefore, while Craig may correctly contend that time came into being at the Planck time, it is incorrect to conclude therefore that the universe itself must also have come into being. Under this model, the assertion of the coming into being of the universe is not-even-wrong: it is conceptually incoherent. More problematically, this model directly challenges the central philosophical assumption of the KCA, found in our definition of begins to exist, that nothing but god can exist timelessly. However, as mentioned previously, the controversy around actualized infinities is a severe problem for models like Hartle-Hawking's, and is therefore Craig's best route for denying the implications of this cosmology.

Summarily, Craig's objections to the various eternal cosmologies I've mentioned are based upon misunderstandings (or blatant misrepresentations) of the physics, and as such his case for P2 from a scientific perspective is lacking in veracity. There exist a multitude of viable eternal cosmologies (the Hartle-Hawking model notwithstanding) in the scientific literature, but due to our empirical limitations - especially with regard to the early universe - it is difficult to say whether or not our universe had a beginning in time, let alone an absolute beginning *ex nihilo*. Thusly, P2 also remains uncertain from a purely scientific perspective. Craig's best bet for affirming P2's necessity comes from metaphysical arguments regarding the philosophy of mathematics and the infinite, but these are unsatisfactory in the absence of hard empirical verification and in the context of our poor understanding of the early-universe.

## 5 The After-Analysis or Argument Unpacking

Craig's after-analysis of the KCA consists of a few key assertions, which I touched on earlier in the paper, aimed at demonstrating that the cause of the universe must be god. While the after-analysis is technically not part of the KCA, I will nonetheless dedicate a small part of the paper to addressing its claims. The three claims are as follows:

1. The cause of the universe is extra-spacio-temporal and immensely powerful.
2. The cause of the universe has the property of unicity (existing as a single entity).
3. Agent causation is the only viable cause that is consistent with the above qualities.

The first claim is the definition of creation *ex nihilo*, along with a sneaking assertion regarding the power of said cause. With regard to the first half of the claim, if the person putting forth the KCA can demonstrate that the universe must be preceded by nothing, then this is immediately true by definition; the cause of space and time must necessarily precede their coming into being. I would say that this is hardly a controversial assertion. However, issues arise when one ponders how a cause can be enacted in the absence of time, which is a problem in metaphysics that warrants serious discussion far beyond the scope of this paper and which is ongoing in the philosophic community. With regard to the latter claim, I say sneaking because the attribution of power to the cause itself is a subtle form of anthropomorphizing and question-begging. It assumes that power is a characteristic which the cause can possess, which in turn hints that claim 3 is true as well (we imagine a being with these incredible abilities, rather than allowing for the possibility of a naturalistic process). We see this in the fact that, barring its use to describe the rate of work in physics, power is not used to characterize the capabilities of physical processes to enact changes: it simply is not appropriate terminology to describe the universe scientifically.

The second claim in the after-analysis relies exclusively upon Occam's Razor, a somewhat controversial heuristic in epistemology but an almost universally accepted principle in the natural sciences. It posits that among theories with equal explanatory power, we should adopt the one which requires the least number of assumptions or unnecessary multiplied entities. By this principle, Craig argues, we should not posit more than one uncaused cause unless we have reason to. I remain skeptical of this claim, simply because Occam's Razor is a heuristic developed to discern between unequally parsimonious models in science, not to discern the number of relevant causes for some event. This is a yet another form of question begging and ad-hoc postulation with the goal of propping up monotheism.

Lastly, Craig's third claim regarding agent causality is at best not-even-wrong. We saw earlier that agent causality is defined in accordance with the idea of libertarian freedom of will, such that any actor with such freedom of will can act in a way that is fundamentally uncaused. If Craig wishes to use agent causality as a mechanism to argue for the existence of a creator deity, he will need to address the following possible contradictions. First, P1 of the KCA asserts that "everything which begins to exist must have a cause of its existence," but agent causality implies that there are some things *within* the universe which are inherently uncaused. One must consider what exactly comes into being as the result of free will, which is not an easy question nor one that I have a proposed answer to, but if a feasible answer to this question is found Craig will need to find a way to reconcile agent causality with P1. Second, Craig's reliance upon deterministic interpretations of quantum mechanics flatly contradicts libertarian freedom of will, which dissolves any basis for projecting this quality onto the cause of the universe. Craig cannot have this both ways. Either we have reason to believe agent causation exists in accordance with libertarian free will, or it does not.

## 6 Conclusions

In this paper I have provided what I believe to be a strong case against the premises and therefore the conclusion of Kālam Cosmological Argument. Premise (1) relies principally on the intuitive obviousness of the principle *ex nihilo nihil fit*, but this principle suffers from coherency issues and deeper inspection reveals that it is, under some interpretations, question-begging. Premise (2) is called into question by the very existence of viable eternal, cyclical and self-contained cosmologies pervasive in the scientific literature, and Craig's defense of the second premise - from the physics perspective - consists primarily of misinterpretations and misrepresentations of said models. For these reasons, I find that premises (1) and (2) are not more likely to be true than their contradictories and, as such, the KCA fails to establish its conclusion.



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