

Special Topic: Causation, God and the Big Bang

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One of the things I wanted to do with the podcast was devote some shows to answering viewer questions. Occasionally I get emails from people asking me if such-and-such is a good argument or not, because they're involved in a debate with someone else. There's usually a logic component to the question, but almost always there's also a substantive empirical or philosophical question at issue too.

My YouTube friend "Theophage" had a question about simultaneous causation, and the role it might play in a critique of an argument for the existence of God. After thinking about it I thought that this would be a good topic for a video response. This document is based on the transcripts of that video response.

Theophage writes,

For several months now I've been arguing that simultaneous causation is impossible, or at the very least, it doesn't happen in our world. I have a refutation of the Kalam cosmological argument based on the idea that (a) causation is a purely temporal phenomenon, but also that (b) causes need to come before their effects, rather than in the same instant as their effect.

The problem I'm having is that I'm unable to find much in the way of references or philosophical discussions on the matter of simultaneous causation on the internet. Because of this I'm finding it difficult to support my position, and yet all of my opponents, whom I have argued this with, don't seem to be able to back up their arguments by references either. Is there any way you can help me with this?

Well, I'm happy to try.

1. The Kalam Argument For the Existence of God

Let's just set the context so that viewers who aren't familiar with the Kalam argument understand what the broader debate is about and why the question of simultaneous causation is relevant.

The Kalam argument is a species of what are called "cosmological arguments" for the existence of God as the creator of the universe. A cosmological argument is an argument that moves from premises about the existence of the universe to the conclusion that there is a God who the creator or sustainer of the universe.

William Lane Craig is most responsible for popularizing the Kalam cosmological argument. When you see this term in print it will likely have his name attached to it somewhere. But he didn't originate it, it's a very old argument. The term "Kalam" comes from a tradition of Islamic philosophy. There's a big literature on it, but the basic argument is pretty simple. It goes like this:

- 1. If something comes into existence at some finite time in the past, then its coming into existence has a cause.**
 - 2. The universe began to exist at some finite time in the past.**
- Therefore, the universe's coming into existence has a cause.**

Now, if this argument is compelling then we can conclude that something had to cause the universe to come into existence. Rationality demands that we ask what could possibly function as a cause of the universe's coming into being. Of course you need additional argumentation to conclude that this something is the God of Christianity and Judaism and Islam, but this is the crucial first stage of the argument.

Premise 2 is a relatively uncontroversial claim. It's central to the Big Bang model of cosmology, which has almost universal support among cosmologists. There's overwhelming evidence that the universe originated in a very hot, very dense state at some time in the past, between thirteen and fourteen billion years ago, and has been expanding and cooling ever since.

The interesting premise is the first one, which states a general metaphysical principle, that if a thing comes into existence then it must have a cause.

2. Theophage's Refutation Strategy

Here's how Theophage's refutation strategy is going to go. He wants to say that the universe's coming into existence is a special event that by its nature is going to violate this metaphysical principle. Why? Because if we follow the standard interpretation of Big Bang cosmology, the beginning of the universe *also marks the beginning of time itself*. It's the beginning of temporal succession. And that means we can't talk about moments of time *prior* to the first moment, the moment of the universe coming into being, because there are no such moments.

Theophage wants to say that if there are no moments of time prior to the beginning of the universe, then there can be no cause of the universe's coming into being. Why? Because causation is by its nature a temporal

process. Causes necessarily precede — they come before — their effects. But we've just agreed that nothing can come before the universe's coming into being, since that beginning marks the first moments of time. Hence it follows that the universe's coming into being doesn't have a cause, it's an uncaused event, and the Kalam argument can't get off the ground.

So what does this have to do with simultaneous causation? Well, one way that a defender of the Kalam argument can respond to this objection is to say that causation doesn't necessarily have to be a temporal process, with causes always preceding their effects. Maybe it makes sense to say that sometimes causes can occur *simultaneously* with their effects. So if we grant this, the defender can say the cause of the universe's coming into being occurred simultaneously with the universe's coming into being. At that very first moment, some kind of causal power was at work that simultaneously brought the universe into existence.

If we grant this possibility, this takes the steam out of Theophage's objection, because it gives room for God or some other causal agent to enter the picture to function as the causal explanation of the universe. What Theophage wants to do is block this move by giving an argument against simultaneous causation. I

t's a long way around, but this is how I understand the motivation for Theophage's question. He wants information on the status of the concept of simultaneous causation in philosophy and in physics. Do people generally reject it, do they accept it, what's going on?

I'm going to try to answer that question.

But first, Theophage has a couple of arguments of his own against simultaneous causation that he wanted to run past me. I'd like to look at these first before I forget them.

3. Theophage's First Argument Against Simultaneous Causation

Here's Theophage's first argument.

Given the known laws of physics, any kind of transfer of energy, say from one ball hitting another, must take a non-zero amount of time. So for every kind of physical cause, like a ball hitting another ball, there is a necessary lag between cause and effect. Simultaneous causation is thus impossible.

I like how clear this argument is. This is how I would formalize it a bit:

- 1. Every kind of physical cause involves a transfer of energy.**
 - 2. Transfers of energy always take a non-zero amount of time.**
- Therefore, every kind of physical cause takes a non-zero amount of time.**

The conclusion is just another way of saying that every kind of physical cause is not simultaneous with its effect.

The first premise asserts something very specific about the nature of physical causation. There are philosophers and physicists who think along these lines. I want to note here that this kind of physicalist analysis of causation is not the only game in town, but I'll come back to this later.

My first thought is, even if we grant the two premises, I see a problem here with the *relevance* of the argument to the specific case in mind, namely, the origin of the universe. Even if we grant that every physical cause involves a transfer of energy, there's a good reason to think that whatever the nature of the causal agent that is responsible for the universe coming into being, it's probably not an ordinary physical cause. The cause of the physical universe coming into existence isn't going to be like a baseball bat hitting a baseball.

So, to that extent, I don't think a defender of the Kalam argument is going to find this compelling, since they're already thinking of the cause of this first event as a very special kind of cause.

4. Theophague's Second Argument Against Simultaneous Causation

But Theophague has another argument against simultaneous causation. Here it is:

Further, we assume that a thing cannot cause itself to come about or exist, because it would have to exist before it existed in order to cause its own existence. Included in that is the assumption that causes have to come temporally prior to their effects. Naturally it is a logical contradiction for a thing to exist before it exists.

But, if simultaneous causation is allowed, a thing does not need to exist before it exists, only simultaneous with its own existence, which by definition everything does anyway. So it would seem that if simultaneous causation is allowed, then things are also allowed to cause themselves. And yet we don't see this happening around us.

The first paragraph just restates the basic objection that I paraphrased earlier. It's the second paragraph that's interesting to me. What I'm getting out of these paragraphs is this argument:

- 1. If causation can be simultaneous, then a thing can cause itself to exist simply in virtue of co-existing with itself.**
 - 2. But by definition, everything co-exists with itself.**
 - 3. Thus, if causation can be simultaneous, then things are allowed to cause themselves.**
 - 4. But we don't see this happening around us.**
- Therefore, causation cannot be simultaneous**

Here I'm not as confident that I understand the reasoning or precisely what's being asserted, but assuming this is halfway accurate, here are my thoughts.

It seems like he wants to say that, from the fact that effects can be simultaneous with their causes, it follows that things can cause themselves to exist. But I just don't see how this follows. It might be true that if a thing causes itself to exist, then cause and effect must act simultaneously. But the converse surely doesn't follow. If both the cause and effect act simultaneously, it doesn't follow that the thing must, or is able to, cause itself to exist. A might imply B, but it doesn't follow that B implies A. I think this argument relies on B implying A.

That's all I'm going to say about Theophane's arguments against simultaneous causation. I don't think that they win the day, but that doesn't mean that there aren't compelling arguments to be had against simultaneous causation.

5. The Status of Simultaneous Causation

And that gets us to his question about the status of this concept in philosophy and physics. There are two questions here really.

1. Is there a consensus on the status of simultaneous causation in philosophy?
2. Is there a consensus on the status of simultaneous causation in physics?

The answer, I think, is "no" to both questions.

5.1 The Status of Simultaneous Causation in Philosophy

First, there's no consensus on simultaneous causation in philosophy. This is hardly surprising since there's no consensus on *causation* in philosophy.

Causal reasoning is widespread in science and philosophy, and there's a good deal of agreement about what counts as good or bad causal reasoning in specific disciplines. But if you dig deeper you'll see that, while there's general agreement that causation is a relation of some kind, between things we call "causes" and things we call "effects", there's no agreement on what causes and effects are, fundamentally, or what the causal relation is, fundamentally.

You can carve up the various schools of thought in a variety of ways. Your basic introductory philosophy lecture on causation will probably start off distinguishing between two camps: "Humeans" about causation, and "non-Humeans" about causation.

Humean theories of causation are inspired by the 17th century Scottish philosophy David Hume's analysis of causation. He argued that, when we say that A causes B, we're saying that whenever events of type A occur,

they're always followed by events of type B. But for Hume, this is just a way of labeling a certain kind of regularity in the patterns of observable phenomena.

Most importantly, he interprets the *necessity* of causal claims, the feature of a causal relation whereby A somehow necessitates B, as a feature not of the world itself, but of our psychology, about our learned expectations built up through repeated observations of B following A.

When I call a theory of causation a "Humean" theory, I'm not saying that it agrees with Hume's analysis of causation. What I'm saying is that Humean views have a certain family resemblance that share certain features of Hume's approach.

What they share is this: Humean views want to keep the analysis of causal relations at the level of patterns in observable phenomena, or at the level of our theoretical representations of the world, and they shy away from talking about causation or causal laws in metaphysical terms, as part of the furniture of the world.

Non-Humean approaches, on the other hand, embrace the metaphysical path. They want to identify causal relations with relations between properties or entities or processes in the world itself. They think there is a causal structure to the world itself, and the task of a philosophical analysis of causation is to identify the ground of this causal structure.

For example, when Theophane says that every physical cause involves a transfer of energy, he's implicitly working within one of these non-Humean traditions. In fact there is a respectable school of thought about causation that analyses causal relations in terms of causal processes, and analyses causal processes in terms of energy transfer. This is sometimes called the "conserved quantity" theory of causation, since it identifies every causal process with the exchange of a conserved quantity. Energy is a conserved quantity in physics (or mass-energy if you're being precise), so is linear momentum, so is electrical charge, and so on.

I don't want to endorse any of these views here. My point is that critical thinking about causation requires that we know something about the landscape of alternative theories of causality that are out there. And we shouldn't be surprised that a question about causation like "can causes be simultaneous with their effects" will be answered very differently depending on which theory we're using.

So, getting back to simultaneous causation, let me give you an example. On David Hume's own account of causation, there can be no simultaneous causation by definition, since he *defines* the causal relation in terms of the pattern of the temporal ordering of events, where events of type B always follow events of type A.

If you're thinking that this is a pretty cheap way of settling the issue, I'm on your side.

But Hume actually has some other more substantive arguments against simultaneous causation. He argues, for example, that if effects were simultaneous with their causes, then you could never have a temporally extended causal chain. If event 1, a cause, is simultaneous with event 2, the effect, and event 2 is a simultaneous cause of event 3, and event 3 is a simultaneous cause of event 4, then event 1 and event 4, at the end of the chain, are also going to be simultaneous. And so will any event no matter how far down the chain. It seems that on this view, every causally connected event is simultaneous, and no event can ever be causally connected to any event, at any other moment in time. But that seems like a crazy result.

For Hume, the possibility of a temporally extended chain of events actually rests on his belief that time is "atomistic", that it has a smallest indivisible unit, and time intervals are made up of sequences of this smallest indivisible unit.

I mention this because I want to come back to it when we talk about simultaneous causation in physics, since this is an argument that has to be addressed if we think that simultaneous causation is plausible.

5.2 The Status of Simultaneous Causation in Physics

Okay, let's talk about physics. I'm going to say about physics basically what I said about philosophy — that there's no consensus on simultaneous causality in physics, and that how you think about the question is going to be a function of what you understand causality to be.

With physics you have the additional complication that a lot of people think that the concept of causation *actually plays very little if any role in fundamental physics*. But we'll say more about that later.

Let's start the discussion with some simple candidates for simultaneous causation. Imagine a lead ball resting on a cushion, where the weight of the ball causes an indentation in the cushion. The claim is that the downward force of the ball is a continuing event that is causing the continuing indentation, and that the cause and the effect are occurring simultaneously.

Another example is the glow of a heated metal bar. We say that the temperature of the bar causes the bar to glow, but these are ongoing processes that are occurring at the same time.

Reasons for Skepticism About Simultaneous Causation

Now, if you don't like simultaneous causation then you're going to argue that this description isn't quite right. When you look at the physics in detail, you'll want to say that what we have here is an equilibrium situation where certain phenomena are occurring simultaneously, but changes in those phenomena, like changes in the weight of the ball, or the temperature of the metal bar, don't produce instantaneous changes in the shape of the cushion, or the brightness of the light emitted from the bar. There's always a lag between cause and effect, so this isn't really an example of simultaneous causation.

Another reason for skepticism about simultaneous causality in physics comes from relativity theory. If the world is governed by relativistic principles, then the speed of light is the cosmic speed limit, and there can be no causal interaction between spatially separated, simultaneous events.

For some people this is enough to rule out simultaneous causation in physics, end of story.

Defenses of Simultaneous Causation

On the other hand, there have been some explicit defense of simultaneous causation in physics. I dug up a paper from my office files by Michael Huemer and Ben Kovitz called “Causation as Simultaneous and Continuous”. Their view is that in physics causal relations are described by the laws of physics, which they interpret as causal laws. So if you look at Newton’s second law, for example, it says that changes in a body’s state of motion, either speeding up or slowing down or changing direction, are caused by the net forces acting locally on the body, and as the forces change the body’s state of motion changes simultaneously.

They also argue that in order to avoid the problem with extended causal chains that I mentioned earlier, if we accept simultaneous causation we also have to accept that causal processes don’t occur at moments of time, but are actually extended over time, so that causal processes should be viewed as extending over time and overlapping.

I’m not going to say anything more about this paper by Huemer and Kovitz, and I’m not endorsing its conclusions, I’m just it to point out that there are defense of simultaneous causation in the literature.

Does Causation Play Any Role in Fundamental Physics?

Now, the last thing I want to talk about is something I mentioned earlier, about a not uncommon attitude that physicists and philosophers of physics have about causation and the role that causal concepts play in fundamental physics. This attitude makes you think twice about the whole notion of grounding a theory of causation in physics.

What’s the attitude? Well, the most famous expression of this attitude comes from the philosopher Bertrand Russell, who wrote an essay in 1913 called “On the Notion of Cause”. This is what he writes:

All philosophers of every school imagine that causation is one of the fundamental axioms or postulates of science. Yet, oddly enough, in advanced sciences such as gravitational astronomy, the word “cause” never appears. To me it seems that the reason why physics has ceased to look for causes is that in fact there are no such things. The law of causality, I believe, like much that passes muster among philosophers, is a relic of a bygone age, surviving, like the monarchy, only because it is erroneously supposed to do no harm.

The idea he’s getting at is this: the most basic laws and principles of physics aren’t framed as causal claims of the form “A causes B”, but rather as differential equations. What these equations describe are relations of functional dependency between variables — force, mass, acceleration, charge, momentum, energy, and so on. What’s important about this notion of functional dependency is that, at the most fundamental level, these functions are time-symmetric. What this means is that if you take the time variable in these equations and reverse it, the equations still have viable solutions, so the equations themselves don’t distinguish processes running forward in time and processes running backward in time.

Now as a matter of fact we know that many physical processes do have a directionality to them. Ice cubes melt at room temperature, they don’t spontaneously re-form into ice cubes. So we know that irreversible processes enter the picture at *some* level, and this irreversibility seems to be related in some way to our common-sense intuitions about the direction of time. But the puzzle has been how to understand the origins of time irreversibility when the fundamental laws of physics are all time-reversible.

This is a long-standing question in physics and the philosophy of physics, and many books and articles have been written on it. There’s no consensus answer to this question. Many have concluded with Russell that physics might just be the wrong place to look even for an explanation of the directionality of time and change, much less to look for a foundation for a universal law of causality.

I would say that a lot of the recent philosophical work on the relationship between physics and causality seems to accept this pessimistic outlook. But not everyone agrees that physics or science can or should try to get rid of the concept of causation entirely. In fact most don't. Scientists, including physicists, use the concept of cause and effect all the time. It would be hard to imagine what science would look like without it.

So the challenge has been to give an account of causation that acknowledges that our use of causal concepts can't be grounded in fundamental physics, but at the same time seeks to explain and justify our use of these concepts in science and everyday life.

I think that on this issue, the focus has shifted to looking at *how and why we represent the world in causal terms*. And a view that is gaining some popularity is that the naturalness of representing the world in causal terms is best understood as *a consequence of our perspective as agents who intervene in the world, make plans and decisions, and so forth*.

This approach to causation falls into the Humean category, broadly construed. I'm not endorsing this view, I'm just reporting on the state of discussion of these issues as I see them.

6. Consequences for the Original Question

Now, what's the upshot of all this for the original question, which was about simultaneous causation and its application to the origins of the universe.

Well, I think your options break down like this. If you're a non-Humean about causation — let's say you're working with something like the "conserved quantity" approach — then I think reasonable people can disagree on whether causation can be simultaneous. A lot turns on how you define the causal relation and the sorts of things that can function as causes and effects.

However, I don't see how the conserved quantity approach gives you any traction at all in thinking about *the origins of the universe itself*, when you don't have any conserved quantities to start with.

Now, if you're in the Humean camp, then you'll likely be very skeptical of the very idea of applying causal concepts to describe the origin of the universe. On this view the application of these concepts is grounded at some level in human agency and human representations, they're not given in the fabric of the world itself. So I can't see how this approach would be helpful either.

So, I think the situation is grim if what you want to do is use contemporary views of causation to ground a position one way or the other on causal explanations of the origins of the universe.

Now, does all of this pose a problem for defenders of the Kalam cosmological argument? I'm not sure it does. I think defenders of the Kalam argument might respond by saying that when they say that anything that comes into being has a cause for its coming into being, they're not really interested in subsuming this notion under contemporary views of causation. What they're doing is more like wrapping some causal language around a more basic metaphysical principle, some version of the "principle of sufficient reason", which says roughly that for every event or true fact there is a sufficient reason why the event occurred or why the fact is true.

So what they'll say is that the origins of the universe at some finite time in the past is an event *that demands explanation in terms of some sufficient reason*, and they won't care so much whether you call it a causal explanation or some other kind of explanation. I think they'd be happy to grant all these critiques of causation and causal concepts that we've been talking about, and they'll dig in at a more fundamental level and defend the core metaphysical intuition that underlies the first premise of the Kalam argument.

And then, the proper response from a critic, I think, is to challenge this underlying metaphysical intuition on its own terms. That's how I see this playing out, anyway.