The Second Argument

The Second Argument

I would now like to consider a second strategy for arguing that Bruno does not act freely when he fails to kill Grandfather.

Let us start by going back to Susan and her unsuccessful attempt to travel by train to Alaska and add a new element to the story. Suppose that the reason Susan was unable to leave is that she was prevented from doing so by an external influence. She was being monitored by a powerful enemy, who is committed to keeping her in New York. As Susan was about to board the train, the enemy arranged for the train to be cancelled. In fact, the enemy wouldn't have stopped there: he would have thwarted any other effort to leave New York.

On this version of the story, Susan is not in a position to make a train trip to Alaska.

This has nothing to do whether whether we---who are having breakfast with Susan in New York the next morning---happen to have information about how Susan's story will in fact turn out. It is instead to do with whether Susan was *in control* of the outcome of the story. And, of course, Susan is not in control of the outcome in this case: the enemy will make sure that any effort to leave New York is thwarted. So the Control Hypothesis entails that Susan does not act freely when she stays in New York.

The argument I would like to consider is based on the idea that something similar should be said of Bruno and his unsuccessful attempt to kill Grandfather. The claim is that Bruno fails to act freely because he faces an analogue of Susan's enemy. If Bruno were ever on track to kill Grandfather, the laws of physics would intervene to derail him, much like the enemy intervened to derail Susan's attempt to leave New York.

In order to assess this argument, it is useful to start by thinking about physical law.

Two Conceptions of Physical Law

For a system of laws to be **deterministic** is for it to entail, on the basis of a full specification of the state of the world at any given time, a full specification of the state of the world at any later time.

There is a temptation to think that possessing free will is simply a matter of having a decision-making process that is not subject to deterministic laws. As it turns out, however, the relationship between determinism and free will is not as straightforward as that.

To see this, imagine that your brain is equipped with a "quantum module", which uses indeterministic quantum phenomena to issue "yes" or "no" outputs entirely at random. Imagine, moreover, that you make your choices by consulting your quantum module and acting in accordance with its randomly generated output. Under such circumstances, would you be acting freely? Certainly not. Far from being free, you would be a slave to the random outputs of your quantum module.

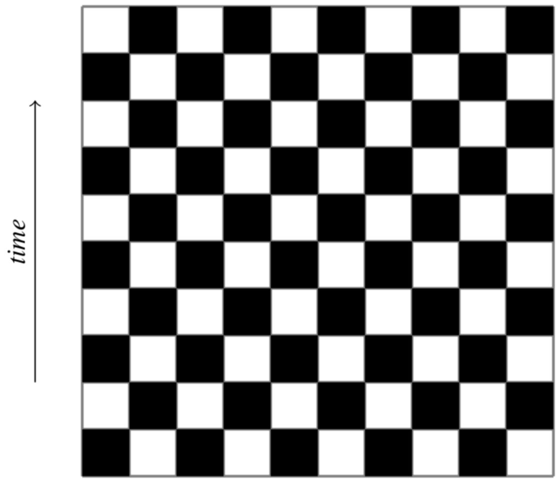
What then is the relationship between determinism and free will? This is a complex question, about which philosophers disagree. (For references, see below.) I won't attempt to reproduce the debate here, except to point out that whether or not one thinks that determinism is compatible with free will might depend on one's conception of physical law. Broadly speaking, there are two different conceptions to consider:

- The laws tell us what *will* happen, on the basis of what has happened.
- The laws tell us what *must* happen, on the basis of what has happened.

To get a sense of the difference, think of the world as a "mosaic" of events, distributed across spacetime.

In an orderly world, such as our own, the distribution of properties across the mosaic is subject to patterns. These patterns can be used to make projections. They can be used determine, on the basis of information about one region of the mosaic, what other regions of the mosaic are like.

Consider, for example, the following mosaic:



It consists of square cells each of which is painted black or white. The coloring of the mosaic satisfies a pattern: neighboring cells are never colored alike. This pattern allows for very strong projections. For instance, it can be used to determine, on the basis of the color and location of any given cell, the color distribution of the rest of the mosaic.

On the first of our two conceptions of the physical laws -- a law tells us what *will* happen, on the basis of what has happened -- a system of laws is nothing more than a description of the patterns that, as a matter of fact, characterize our world's mosaic.

In other words, a law is just a device for inferring what one region of the mosaic is actually like on the basis of information about what another region is actually like. It tells us nothing about what a given region of the mosaic *would* look like if we were to make changes somewhere else. (Notice, for example, that learning that the mosaic above is, in fact, such that neighboring cells are never colored alike tells us nothing about how the cells in one region of the grid would change if we were to make changes somewhere else.)

In contrast, on the second of our two conceptions of the physical laws -- a law tells us what *must* happen, on the basis of what has happened -- the laws don't just describe the patterns that, as a matter of fact, characterize our world's mosaic. They also tell us that those patterns *must* hold, and would therefore remain in place if we were to modify the mosaic. (In the example of the mosaic above this might be cashed out as the claim that the color of a cell cannot be changed without also changing the colors of other cells, so as to keep in place the pattern that neighboring cells are never colored alike.)

On this second conception of physical law, it is natural to think that determinism is incompatible with free will. For a deterministic world will be a world in which the laws make it *impossible* to do something other than what we actually do, assuming the initial conditions of the universe remain fixed.

As far as I can tell, however, there is nothing in contemporary physics that encourages such a conception of physical law. Physics is in the business of uncovering the patterns that characterize the world as we find it. But, as far as I can tell, it remains silent on the more philosophical question of whether the relevant patterns *must* hold.

On our first conception of physical law, in contrast, it is not obvious that we should think of determinism as incompatible with free will. For assume that the Control Hypothesis is correct. The fact that the world, as it actually is, instantiates a particular pattern does not obviously entail that we aren't in a position to decide differently than we actually did. And this is so even if the pattern in question is highly projectable and can be used determine, on the basis of a full description of the mosaic at one particular time, what the mosaic is like at any future time. So there is no obvious tension between determinism and free will.

Back to the Argument

Let us now return to our second argument for the conclusion that Bruno fails to act freely when he misses his shot. The claim, recall, is that Bruno faces an analogue of Susan's enemy in the laws of physics. He fails to act freely because the laws would "intervene" to derail him, if he were ever on track to kill Grandfather.

I would like to suggest that the lesson of the preceding discussion is that whether or not it is right to think of the physical laws as an analogue of Susan's enemy depends on one's conception of physical law.

On the second of the conceptions we considered -- a law tells us what *must* happen, on the basis of what has happened -- it is indeed the case that the laws make it impossible for Bruno to act otherwise (assuming the initial conditions of the universe remain fixed), much like Susan's enemy makes it impossible for Susan to leave town.

But we saw that on the first conception -- a law tells us what *will* happen, on the basis of what has happened -- the laws are *not* analogous to Susan's enemy: they are simply descriptions of the patterns that, as a matter of fact, characterize our world's mosaic. So even if the laws of Bruno's world are deterministic, the effect of determinism is not that Bruno fails to be free. It is simply that it is in principle possible to predict how Bruno will exercise his free will. (As it might be: that he will exercise his free will by aiming a little too far to the right.)

Back to the Toy Model

Before bringing this section to a close, I'd like to ask you to think back to the toy model we considered above.

The first thing to note is that we were given no reason to think of the laws of the toy model as telling us what *must* happen on the basis of what has happened, as opposed to simply telling us what *will* happen on the basis of what has happened.

Next, recall that the laws of the model entail that any situation in which particle A is on a "paradoxical path" is also a situation in which there are additional particles living inside the wormhole region, and it is a situation in which one of these particles collides with particle A before it is able to enter the wormhole, averting the paradox. Notice, however, that the additional particles in this scenario are not exactly analogous to the enemy in Susan's story.

The enemy's actions are partly *caused* by Susan's decisions: the enemy interferes with the trains *because* he sees that Susan is about to board. But, as noted above, we have been given no reason to think that the presence of the additional particles in the wormhole are caused by particle A's paradoxical path. The laws tell us that the additional particles will be in the wormhole if particle A is on the paradoxical path, but they do not tell us that their presence in the wormhole is *caused* by particle A's paradoxical path.

This difference is significant because it affects our judgments about counterfactual scenarios. Suppose that, as a matter of fact, particle A is not on a paradoxical path, and that, as a matter of fact, there are no particles within the wormhole region. What would have happened if we had altered particle A's velocity slightly, so as to put it in a paradoxical path?

Don't say that additional particles would have appeared in the wormhole. That assumes that the presence of the additional particles is caused by particle A's trajectory, and we have been given no reason to think that it is.

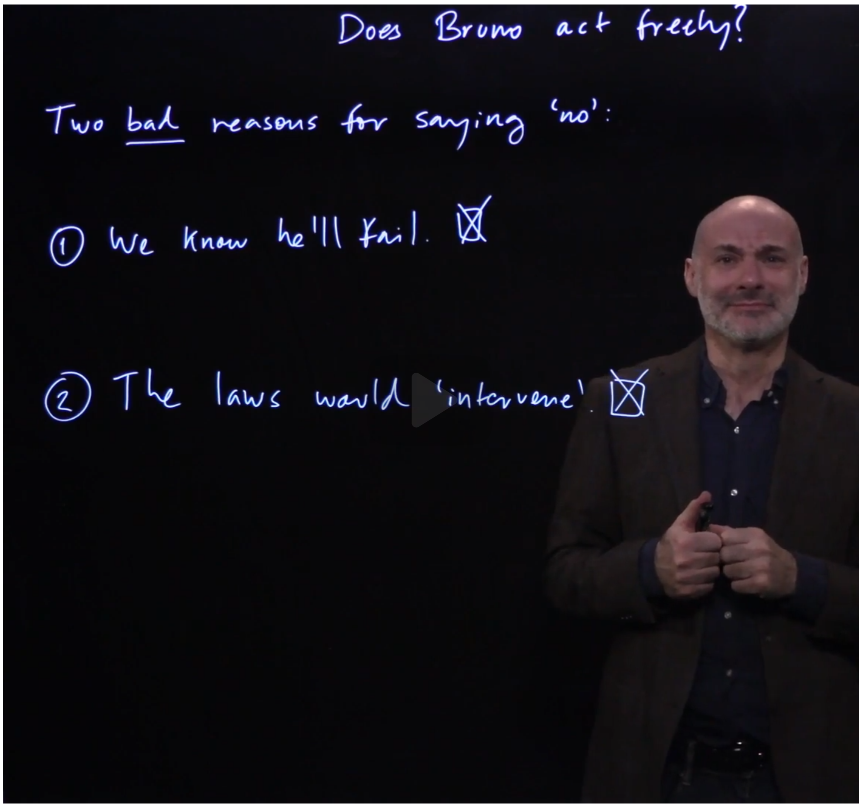
What we should say instead is that the laws of the toy model entail that we will never be in a situation in which particle A is in a paradoxical path without anything to stop it within the wormhole region. So if we were to alter particle's A's velocity in the relevant way, we would end up in a situation that cannot be accounted for within our model.

When we think of the laws of physics as telling us what *will* happen, as opposed to what *must* happen, it is natural to think that Bruno's situation is akin to particle A's. We know that any scenario consistent with physical law in which Bruno travels back in time in an attempt to kill his childless Grandfather is also a scenario in which his efforts are defeated, somehow. Suppose that, in fact, his efforts are defeated because he aims a little too far to the right. What would have happened if Bruno had aimed just right?

Don't say that some additional defeater would have appeared and saved Grandfather. That assumes that aiming just right would have *caused* the additional defeater to come about and we have been given no reason to think that such a causal structure is in place. What we should say instead is that if Bruno had managed to aim just right, we would would have ended up in a situation that cannot be accounted for while keeping the rest of the story fixed.

The upshot of our discussion is that it is not clear that we should think of Bruno's situation as analogous to Susan's, when she is in the presence of an enemy bent on preventing her departure. So even if it is clear that Susan does not act freely when she is thwarted by the enemy, it would be a mistake to conclude on that basis that Bruno does not act freely when he fails to kill Grandfather.

Video Review: Does Bruno Act Freely?



in the sense that I do not think we
have a full story of the situation that's

enough to give a proper answer to this question.

But I still think that our discussion has made progress

by clarifying some of the issues involved.

And also, its so cool.

8:18 / 8:18 1.50x

End of transcript. Skip to the start.

Video

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The video below is part of a conversation I had with Alyssa Goodman and two of her students in connection with PredictionX, an online project created at Harvard and hosted on edX.

Video: Free Will and Determinism

And it doesn't matter how deterministic physics gets.

I mean, of course, the more deterministic

it is, the more useful it'll be in terms

of knowing what will happen.

But again, that's a separate issue

from the issue of free will.

End of transcript. Skip to the start.

4:21 / 4:21 1.50x

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Discussion

Topic: Week 4 / The Second Argument

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Some major flaws in this argument above

discussion posted 7 days ago by tschrans

First of all I have already stated that the toy model is invalid as there is no such a thing as a mirror in that universe as it cannot be described by the physical laws identified in that universe, so the whole toy model breaks down.

Second we all know by now that nature and physical law is not deterministic, as we have learned from quantum mechanics. Unlike implied in the argument above, that doesn't mean that quantum mechanics makes everything random. It just means that no matter how well you have been able to characterize the initial state, in general there are always different possible outcomes,each with a probability. Those probabilities don't have to be the same for the different outcomes. And especially for macroscopic systems that we usually observe usually one outcome has very high probability, which is why we always observe it, and we never observe the less likely outcome. However for systems of only a few particles you will get different outcomes each with a reasonable probability, so you will observe different outcomes of you repeat the system. An example of a macroscopic system is all the gas molecules in a room. Physical law does not prevent all the molecules to suddenly be in only 1/2 of the room, leaving the other side void of gas molecules. There is nothing in the laws of physics to prevent that. However the laws of physics tell us that the probability of this happening is so small that you won't observe it over the life of the universe. The laws of physics tell us that there are some many possible states where all the molecules are equally distributed across the room compared to other states , that it is with a very very high (I mean 99.999 with a gazilion9s%) probability (but not 100%) that that is what we will observe.

But that doesn't make the laws of physics deterministic. The fact that for macroscopic systems we will observe something that seems to repeat itself every time, doesn't make it deterministic. It still has a statistical/probabilistic aspect to know, we just don't have the capabilities of observing it.

So let's not make arguments based on assuming that physical law is deterministic. It is not. Any universe where they are is an imaginary universe. The argument has to hold not just in a universe where the physical laws are deterministic, but also in a universe like the universe we live in, which is to our best knowledge today ruled by quantum mechanics and not deterministic laws

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2 responses

joshuavvv
5 days ago - endorsed 2 days ago by **Cosmo_Grant** (Staff)

I'm curious about your first point. To reconstruct the set-up of the model as I see it: the "physical laws" of the toy model describe how particles interact with other particles. Then wormholes are introduced with a description of how particles behave when interacting with this new kind of "entity". And finally the mirror is introduced with a description of how a particle would interact when it comes into contact with it. To quote:

> Now suppose that our world contains a "mirror" : a stationary object that reflects particles by inverting their velocity.

Why is it that the introduction of the mirror, and not the wormholes, breaks the model? Why can't we think of the descriptions of the wormholes and mirror as a series of addenda to the original laws (i.e., the full picture of "the laws" hasn't given until the mirror has been introduced)? Why can't we think of the mirror as a new type of wormhole that affects spatio-temporal velocity instead of spatio-temporal position?

The wormhole does not violate any of the 2 laws as it does not affect the velocity. The mirror affects the velocity and violates the 2nd law. The stationary object exchanges velocity with the incident object.

posted 5 days ago by **tschrans**

But only if you consider the mirror to be the same kind of thing (the same kind of particle) that the first two laws are describing. What I'm suggesting is that the mirror is a different kind of thing that is not subject to the initial two laws (it obviously can't be - because as you say, if it were, it would violate one of the laws). Instead, you can only make sense of how a particle interacts with the mirror by considering the full description of the model that accounts for particles, wormholes and mirrors (and the interactions between them).

Perhaps the way the model set up is described (relying on a series of iterative introductions which redefine the model) is not the clearest exposition, but it doesn't seem beyond the powers of imagination to assemble it into something coherent.

posted 5 days ago by **joshuavvv**

So the mirror is a magical thing that somehow does not need to follow the 2 laws that describe what happens to velocity.

On the other hand the wormhole maintains velocity, it just moves a particle from 1 time to another time at the same position, keeping the same velocity. It may sound like another magic, but at least it does not somehow circumvent the 2 laws that were postulated.

posted 4 days ago by **tschrans**

I think the 2 laws along underspecify the toy universe.

1. **Our Particle Zoo**
- **Ordinary** particles *travel in time and space.*
- **Mirror** particles *travel in time but not in space*
- **Wormhole** particles *travel in space but not in time.* These particles are always created in pairs at the same points of space, but at different times.

1. **Particle Interactions**

- *Ordinary collides with Ordinary*
  i. Times of particles not changed.
  ii. Velocity of particles are exchanged
- *Ordinary collides with Mirror*
  i. Time of ordinary particle is not changed.
  ii. Velocity of ordinary particle is reversed
  iii. Mirror particle is unchanged.
- *Ordinary collides with Wormhole*
  i. Time of the ordinary is changed to the time of the wormhole's paired partner.
  ii. Velocity of the ordinary particle is unchanged.
  iii. Wormhole particles are unchanged.
- Mirror particles cannot collide with Mirror particles.
- Wormhole particles cannot collide with Wormhole particles.
- *Mirror collides with Wormhole.*
  i. If Mirror collides with the earlier wormhole of the pair, it jumps to later time. Its velocity is unchanged. (It would appear to cease to exist for a period of time.)
  ii. If the Mirror collides with the later wormhole of the pair, it would jump back to the earlier time. It would continue forward in time at the same place until it once again collided with the later particles. (It would appear to be in a time loop.)[In addition it would form a barrier inside the wormhole space-time region that no ordinary particle could cross.]

posted 2 days ago by **kurtklinzing**

@kurtklinzig yeah, if you flesh out the rules like this you get something like the full picture of the model I was talking about. Although, I'm not sure you have to think of wormholes as particles. The SEP entry where the model is introduced describes the wormholes as cut-and-pasted space-time:

> What happens if we change the topology of the space-time by hand to produce CTCs? The simplest way to do this is depicted in figure 3: we cut and paste the space-time so it is no longer simply connected by identifying the line L− with the line L+. Particles "going in" to L+ from below "emerge" from L− , and particles "going in" to L− from below "emerge" from L+.
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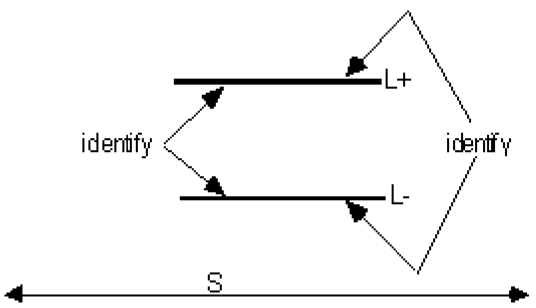
> 
>

posted a day ago by **joshuavvv**

Adding a link to the SEP article where the toy model is introduced.

posted a day ago by **Cosmo_Grant** (Staff)

Is this a peer reviewed publication?

They still don't introduce and define consistently the magic mirror. No wonder you find paradoxes if you're not rigorous.

posted about 21 hours ago by **tschrans**

Editorial policies: https://plato.stanford.edu/info.html#policies

posted about 18 hours ago by **joshuavvv**

@tschrans

I don't understand why you think the toy model is inconsistent. It seems to me that joshuavvv has answered your question (several times over). In the model, there are the two laws governing particle-particle interactions and some facts about the topology of space-time (the mirrors and the wormholes). The laws about the particle-particle interactions are independent of the facts about the topology of space-time.

But if you're right that the model is inconsistent, that would be notable: the kind of thing that a journal might publish. So you could write up your reasoning and submit it somewhere! We'd be delighted if you uncovered a mistake and helped make progress in the field. That would be a wonderful outcome of running the course.

A word about tone in the forum. We want the forum to be a constructive, encouraging place, where people work through things together. We welcome people disagreeing with the material. That's one of the reasons we have the forum! (In fact, for the MITx Philosophy Award, we explicitly ask people to argue against Prof. Rayo's diagnosis of one of the paradoxes.) But we want the disagreement to be serious and respectful, with all parties engaging with the material and each other in a friendly, scholarly spirit. We welcome your posts, and hope you continue posting, but please do bear this in mind.

posted about 5 hours ago by **Cosmo_Grant** (Staff)

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denisos
about 9 hours ago

I'm not clear where it was suggested by anyone that physical laws were deterministic. Maybe I missed that. The idea was that it was possible for us to be acting un-freely even in a non-deterministic world if we were forced to follow the instructions of even a random quantum device. It wasn't claimed that that is (or is not) the case, just that such a situation would not be compatible with free-will, even though at the same time it would not be deterministic.

(I won't enter into the discussion of the toy model ...)

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