

## Travel Through Time and Space

“The Grandfather Paradox [where you go back in time and kill your grandfather] is not an issue.”

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Time travel paradoxes appear to be something that can happen when, in reality, they are impossible even if we allow for real time travel. Why is that the case? It is simply because the future from which a time traveler comes will already be based upon the history that he enters. The time traveler is a product of the very history that he affects.

An example of this is the presumed paradox that would occur if a time traveler went back in time and killed his own father or grandfather so that he would not be born and therefore couldn't go back in time to do such a thing. This seems to be a quandary, but one which is as much of an optical illusion as the things portrayed in Escher prints.

The simple fact is that if a time traveler exists to travel back in time he will simply be incapable of killing his father or grandfather simply because in the past he “didn't” kill them. If he tries to kill them he will simply fail because in the past he already did fail. Literally he can do nothing in the past which will affect the future (his present) because he is a product of the very past in which he has become a participant.

This sort of thing was aptly illustrated by a Twilight Zone TV show where a person travels back in time to kill Adolph Hitler before he can be responsible for starting WWII. Through the uncertainties of time travel the female traveler travels back to the period in which Adolph is a baby. Despite the moral dilemma the traveler finally chooses to kill the baby and she herself dies in the process. For a short time we believe that the traveler has succeeded in killing Adolph Hitler and averting WWII. Then you find that as a result of the death of the baby a child is abducted and raised as a replacement for the dead child. The new baby is renamed Adolph and this abducted baby turns out to be the Adolph Hitler who becomes responsible for starting WWII. The time traveler merely succeeded in creating the very past that she was trying to prevent. That past had to happen in spite of her actions because it was the past that did happen because of her very actions. Her actions were simply unrecorded historical fact leading to the very event she was trying to prevent.

Another seeming paradox involves the uncreated object. This is an object from the past, let's say a coin, which is taken back in time and given to the time traveler's earlier self who will eventually become his future self who again takes the coin back in time and gives it to his earlier self, ad infinitum. This coin would have lost any creation point (it is never given to the person independent of its travel back from the future). Again, this paradox simply cannot take place because it never did take place. The coin always has a creation point otherwise it doesn't exist to get into this circulating position. There will have to be an independent arrival of the original coin in the hands of the time traveler somewhere during the forward flow of time. When he goes back in time he will always give himself the original coin from the future that will then for a while coexist with its earlier counterpart. When the time comes to take the coin back in time, the

original coin that has now aged will be returned to the past and be given to the time traveler just as always. The coin that has already been through the time loop once will not be given back simply because it never was given back.

So what does all this mean? Well, without the fear of paradoxes to worry about a time traveler can seemingly feel free to observe any previous time in history without concern for having changed anything. This is because the history from which he springs is in fact the very history in which he was a participant. If he remembers that Pearl Harbor was bombed on December 7th, 1941 before he starts his trip to the Jurassic period, after his return Pearl Harbor will still have been bombed on December 7th, 1941. There is literally nothing he can do that will change this or any other historical event because the fact is that he has already affected anything that can be affected.

Time traveling stories seldom concern themselves with the problems associated with travel to the future and are always concerning themselves with the problems regarding travel into the past. Strangely enough exactly the opposite concern may be more warranted. Since the time the person is traveling to has not already played out from the traveler's perspective, anything he does in the future will affect the rest of time beyond the point at which he has done something. Quite simply, just the act of him being there and occupying space may have the "butterfly effect" that will subsequently cause monumental things to take place.

Now with the paradoxes of time travel apparently safely behind us it would seem that time travel is quite safe. Not so. While it is true that we will not be able to change anything that is part of our history, it is also true that travel into the past does have an affect on history, our present and possibly even our future. Just as in the attempt to kill Hitler, the time traveler can inadvertently set things in motion in his history that he has no idea that he is responsible for.

In the mid 1300's the Bubonic Plague spread from China throughout Europe and killed about 25 million people. Let us consider that in the year 2310 a virus mutated from a relatively benign form into the one that causes the Plague. Then in the year 2311 a time traveler wishes to study the spread of the Plague from China and makes arrangements to go there and study this as part of preparation for his doctoral thesis. Everything is set in motion, but just before the time trip the traveler is exposed to the mutated virus yet does not show any symptoms that would prevent him from making the trip. He then travels back to 1346 when he becomes ill and infects others around him. Realizing he has contacted the Plague he signals that he needs to return to his own time and is transported back to 2311. Sure enough he has the Plague, but the medicine of the time is well advanced and is able to cure him. However, 25 million other people are not so lucky and die in the mid 1300's directly because of his trip. The traveler doesn't even know he is the cause and assumes he simply had the bad luck of contacting the disease in 1346 just like many of those people. There is no paradox (the death of 25 million people is historical fact), but the traveler has just caused the death of 25 million people simply because he traveled to their time. If he had not traveled to that time they would not have died, yet the fact that they did die in the traveler's history has doomed him to cause their death inadvertently.

So, now let's wonder for a moment if the extinction of the dinosaurs was a time travel accident? Who is to say that the "asteroid" 65 million years ago wasn't really the reactor of a timeship that

went critical during a crash landing? Of course it used an Iridium power core.

So, clearly, time travel is not without its pitfalls. The only saving grace is that the historical disasters have already happened. In this respect time travel to the very recent past is possibly more of a concern since the effects of such trips may not have had a chance to reveal their full potential consequences. Trips to the more extreme past, on the other hand, have likely already produced any truly undesirable effects and would be part of the traveler's known history (Bubonic Plague, extinction of the dinosaurs, etc.).

A related concern is travel of a person at faster-than-light speeds. Time and time again (pun intended) such travel is stated to result in the traveler going back in time (i.e., a time machine effect). A simple thought experiment illustrates how preposterous this idea actually is.

Let's presume for a moment we have a ship capable of traveling at many multiples of the speed of light and that we can survive travel at such velocities. Now we decide to take a little trip across our galaxy (about a 100,000 light years). Let's say for the sake of argument that travel time is instantaneous. We step into the ship and press the GO button and presto we are on the other side of the galaxy. In this ship we have traveled at infinite velocity relative to normal space-time and we are on the other side of the galaxy. Now if we had an amazingly good telescope we could look back at earth and see just what it looked like 100,000 years ago because the earth light from 100,000 years ago is only now reaching our current location. However, we have not traveled backward in time. On earth it is still just an instant after we left and to us it is still an instant after we left. No time travel has taken place. We can view the past, just as scientists do everyday with telescopes, but we are no more capable of altering events in the past than scientist can alter events they are observing every day.

Then we jump back into our space ship and press the RETURN button and, abracadabra, we are back at our starting point just moments after we left. Earth has not aged eons nor have we traveled anywhere in time.

Now the situation I describe does not apply to travel at speeds just below or even at the speed of light. In those cases, travel to us would be near instantaneous or at least reasonably fast while eons would pass on earth before our return. What I am describing above is travel outside of normal space-time in an environment where the speed of light is a meaningless concept.

Making time travel possible begins with understanding that time does not exist independent of space and visa versa. Time only exists within the context of space (distance) and space only exists within the context of time (how long it takes to traverse distance). Both time travel and instantaneous space travel would come about by exiting space-time and then re-entering it at another location (a different combination of space and time). However, exactly what is required to exit space-time is unknown. Also, assuming that one manages to exit space-time, what is required to re-enter space time elsewhere/elsewhen is also unknown. It is also unclear whether we could survive the attempt. Our bodies would appear to depend upon being imbedded in space-time for our very existence. So, one might assume that we would have to make this jump from place/time to place/time within some kind of space-time bubble that would allow us to survive the journey. Essentially we would be taking a little self-contained piece of universe with

us on the trip. Also, the ability to navigate to particular space-time coordinates while being external to space-time is likely to be an interesting trick.

To navigate to particular space-time coordinates while outside of space-time would seem to require some kind of sensing system that can transcend the space-time boundary in some way. Otherwise we might have to understand how space-time looks from “outside” in the same way we can view a three dimensional wooden cube from outside. The problem with navigating to space-time coordinates from “outside” is that no one knows what space-time “looks like” from that vantage point. We are essentially in the same predicament as a termite in a wooden cube trying to envision what his wooden home looks like without leaving it. Though we are a little more intelligent than a termite (at least sometimes), determining how to sense the size and shape of space-time from within would prove daunting. We can only hope that from “outside” things might become a little more obvious just as the shape of the block of wood is to us when viewed from the outside.

Will time travel or faster-than-light travel ever happen? Whatever humanity has imagined we eventually succeed in achieving. Perhaps it is just a matter of time.