HOW TO RESOLVE TIME TRAVEL PARADOXES

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Objections to the logical possibility of time travel

1. **The Grandfather Paradox:** If I had a time machine then I go prevent my own birth by going back into the past and killing my paternal grandfather before he can sire my father. This situation would seem to be logically impossible since it would then follow that I would both exist (since I time traveled to the past) and not exist (since I never had any parents who could reproduce).

2. Variations on this theme: **The Matricide Paradox**. Cut to the chase and kill your own mother before she conceives you thereby preventing your own birth.

3. The **Auto-Infanticide or Retro-Suicide Paradox**: Go back in time and kill your younger self thereby preventing your time traveling self from coming into existence.

4. If you travel into the past before the date that you are born, then you will be alive in the past before you are even born. Since you cannot exist before you exist, then this would be a contradiction and so time travel is logically impossible.

5. In the movie **Terminator 1**, in the future John Connor, the son of Sarah Connor (played by Linda Hamilton) sends a soldier back named Kyle Reese (played by Michael Biehn) to protect himself from being killed by a Terminator (played by Arnold Swarzenegger). What is paradoxical is that Kyle is the father of John Connor. This means that in the future the son is older than the father. Since this seems to be impossible (no father can be younger than his son) so time travel to the past is not logically possible.

6. **Changing the past**. If backwards time travel is possible, then a time traveler could go to the past and change history. Say Fred the time traveler goes into the past and saves Abraham Lincoln from being assassinated. This means that Lincoln was not killed at that time by Booth. But if Lincoln was not killed, then there would be no reason for Fred to travel back in order to save him. Fred only travels back because he thinks that Lincoln was killed by Booth.

7. The old time traveling Fred gives his younger self the **directions for how to build** the time machine. The young Fred then diligently sets out to build the time machine. He raises money, gathers the parts and it takes him ten years to produce the time machine. In the meantime his copy of the original time travel manual for how to build the time machine has become dog-eared, so he goes to Target and buys a blank notebook. He then proceeds to copy the time travel manual into the new Target notebook. He then travels back in time and hands the time travel manual to his younger self. Who invented the time machine? Where did the information for how to build the time machine come from? Since it seems it just came out of thin air, and there is no explanation for how the time travel manual could have been produced, then time travel must be impossible for otherwise we could have scenario's such as this one (closed causal loops) about the directions for building the machine.

How to Resolve these Time Travel Paradoxes

First, let us consider a non-time traveling situation that will help us better to understand why none of these alleged paradoxes proves in the long run to make time travel to the past logically impossible.

Suppose that it is true that I am not currently wearing a hat on my head at precisely seven o'clock this evening here at OCC in the Captain's Table. Could it also be true that I am wearing a hat at precisely seven o'clock this evening? I answer No. The reason for this is merely logical consistency. No state of affairs is such that P and not P (where P means the same thing) can both be true at the same time. So, to avoid self-contradiction, I cannot both be wearing a hat firmly settled on the top of my head and not be wearing a hat firmly settled on the top of my head. Shall we agree on this?

Second, I am assuming in my talk that there exists only one particular time line and particular series of events that constitutes our past, present, and future. If a person travels to a parallel universe, then that person is not time traveling, but only space traveling (or inter-dimensionally traveling). For genuine time travel to occur a time traveler must either travel to his or her own past or future and not some other universe's timeline.

If I throw up my keys and they land on the floor and there are no tricks such as hypnosis, or mass hallucinations that are deceiving us, then it will be true that my keys not only appeared to land on the floor, but actually landed on the floor. Suppose now that I throw my keys onto the floor and they so land on the floor. Question: Could any time traveler travel back into time and catch my keys before they hit the floor? We know that the answer is "No" to this question. If a time traveler were to travel back, given that the keys actually hit the floor, this time traveler would not be able to catch the keys without the universe being self-contradictory. If the keys hit the floor, then it is logically impossible for them also not to have hit the floor because they were caught by a time traveler.

With these ideas in mind, consider what we now can say to resolve our time travel paradoxes.

With respect to the grandfather (or matricide or auto infanticide) paradox here is what we know. Your grandfather was not killed, but died peacefully in bed. Given this fact, no time traveler can succeed in killing grandfather. Since grandfather was never killed, then no time traveler can have killed him. No matter how many attempted killings of grandfather took place, none of them can have succeeded since grandfather was never killed. The situation is no different from my wearing a hat. If grandfather was never killed, then no time traveler can succeed in killing him so long as logical consistency prevails and it always does.

What about the time traveler existing in a past time before the time traveler was even born? Doesn't this raise serious problems? Again, no. One needs to understand that a person is composed of different spatio-temporal stages. Not all of me is here in the room with you right now. My baby self is in Canada being born 51 years ago and my future self is winning the faculty member of the year at OCC for the year 2008. Neither of these stages of my self are here now, yet each actually is a stage of one and the same person that exists stretched out over time and space. Each person is a spatio-temporal worm spread out at different times and different places in space.

With this conception in mind it is now easy to see how old Fred could exist in the past before young Fred is even born. Just as old Fred could exist in Paris when young Fred exists in Barcelona without contradiction, so can old Fred exist in 1900 while young Fred is being born in 1950 precisely because old Fred has used his time machine to travel to the past. Without a time machine, old Fred's temporal stages will always exist later in external time than any of his younger stages, but with a time machine these temporal stages can be put "out of order" so to speak. In Fred's personal time,

the time that Fred observes, he only notices himself getting older no matter when he exists in external time.

How can John Connor's father in Terminator 1 be younger than his son? Answer: because his father traveled to the past and had sex with his mother in the past. It was the young Kyle who was sent into the past by the old John Connor. Can a young person be sent into the past by an old person with a time machine? Sure, no problem. Once you recognize this, then Kyle can be the father of the old person because John's birth occurs after Kyle had sex with Sarah Connor. After this events proceed "normally."

Why cannot a time traveler change the past? If you cannot change the past, then what is the point of traveling back to the past in the first place?

The main reason why a time traveler cannot change the past is because before young Fred attempts to travel to the past (assuming he goes) his older temporal stage (older Fred) has ALREADY traveled to the past and causally interacted with those events.

Suppose that young Fred wishes to save Abraham Lincoln. Assume that Lincoln was actually assassinated by John Wilkes Booth. So, young Fred gets into his time machine and travels back to Ford's Theater to April 14, 1865. If young Fred gets into his time machine to leave today December 4, 2003 then either his older self has already been there or not. If not, then this means no time traveling Fred is there to change the past. If yes, then the older time traveling Fred was present at the events that occurred on April 14 the one and only time these events did occur and older Fred obviously did not manage to save Lincoln since by hypothesis we are assuming that Lincoln was shot and killed on April 14.

We can consider a different set of circumstances where Fred succeeds in saving Lincoln. In this new scenario the older Fred manages to save Lincoln from assassination, but even this does not end up changing the past. What has happened is that all of the history books are now recognized to be mistaken. Lincoln was never actually killed by Booth because Fred saved Lincoln in such a way that it only seemed that Lincoln had been killed. Since Fred manages to save Lincoln, although this was not found out until we revealed it today, Fred still has not changed the past, since Lincoln was NEVER killed. Fred's saving Lincoln is just the actual series of events that took place on April 14, 1865. Hence, no time traveler (or anyone else for that matter) can change the past from what it was.

Lastly, what about the problem of where the time travel manual's information for how to build the time machine came from? We can somewhat answer this question. The young Fred acquired the manual from old Fred. This is how young Fred came to have such a manual. Where did old Fred get the manual from? He received it as a young boy from his older self and then kept it for ten years before he copied it into the new Target notebook and then traveled back and gave the manual to his younger self. We can explain both how young and old Fred acquired the manual. What is still not explained is where the information came from in this closed causal loop.

The answer is that it did not "come" from anywhere. A caused B and then because of time travel B caused A. With time travel such closed causal loops are revealed to be possible. What this shows is not that time travel is logically impossible, but only what we probably were already aware of and that is that if time travel were possible then the universe is a strange and wonderfully weird place, but time travel has not been shown to be logically impossible by any of these alleged paradoxes.