Time Travel in Popular Culture

by

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How many of us have wished we could go back in time to correct a mistake? Or visit the future to see our world 100 centuries from now? I bet we all have, and this is why time travel has become so pervasive in popular culture. If time travel were possible, we could travel to the past and visit the dinosaurs or witness the sermon on the mount; you could go back to last week and give yourself the correct answers for an exam; you could even travel into the future to a time where ears no longer run on gasoline, when we all have personal assistance robots, and when space travel is as common as driving to the market. It is this last possibility that is the most intriguing aspect of time travel, and is the focus of most time travel literature and film.

As we examine time travel in popular culture we will begin with early examples of machineless time travel, but our focus will be on time travel via time machine. Appropriately then, our first example of machine facilitated time travel will be H.G. Wells' *The Time Machine,* published in 1895. Since then stories about time machines have been bountiful, but we will look at the *Back to the Future* trilogy and *Planet of the Apes.* I have chosen these because the former is probably the most well-known time travel story, and the latter because it is one of the most scientifically accurate time travel stories.

Although not time travel in the physical sense, an article in a 1856 issue of *Harper's* speculated on what the year 3000 might be like. It fell far short of even the early 20th century, but it shows us that people were interested in knowing about the future. Similarly, in 1889 Jules Verne wrote "In the Year 2889", a look at what the world might be like in a thousand years.

One of the most popular mechanisms for time travel before time machines were introduced was sleeping into the future. In 600AD Gregory of Tours told the story of the Seven Sleepers of Ephesus who slept for 372 years, and we are probably all familiar with the American folk tale of Rip Van Winkle, who falls into a deep drunken slumber prior to the American Revolution and awakens afterward.

There have been other forms of machineless time travel, both before and after Wells. In

"Plausible Fantasies or a Journey in the 29th Century", a Russian story from 1824, the protagonist travels a thousand years into the future when he is swept overboard while sailing. John Macnie used mesmerism in his 1883 novel *The Diothas,* in which the main character visits the 96th century.

The first instance of time travel by machine occurs in *The Time Machine,* an 1895 novel by H.G. Wells that uses time travel as a medium to criticize the contemporary social environment. The protagonist in Wells' story is not named, spoken of only as the Time Traveler, and after demonstrating time travel on a model machine, takes a trip into the very distant future. As he travels, he sees the world around him moving in fast motion, and finally arrives in the year 802 701.

The Time Traveler discovers a race of child-like, peaceful people called Eloi, as well as a race of subterranean humanoids called Morlocks, who steal his time machine. These races are supposedly descended from the wealthy English upper-class white collar workers and aristocracy, and lower-class factory workers, respectively. The plot of the story is mostly concerned with the Time Traveler retrieving his machine to make his voyage home.

Although Wells' cares little about the actual time travel in the novel, as it is first and foremost a social commentary, there is a good deal of discussion about the philosophy of time travel and of time itself. For instance, the Time Traveler explains to a skeptic friend of his that having a temporal dimension is essential for existence. An object must of course have height, length, and breadth, but it does not truly exist unless it exists for some period of time, unless it has duration.

Wells also attempts to explain why spatial dimensions and the temporal dimension feel different to us. The reason the temporal dimension seems special is that our consciousnesses travel intermittently forward through time, while we have to the power to determine our spatial displacement. The Time Traveler, however, had created a machine that permitted him to overcome the limits of temporal displacement.

But Wells' time machine could never actually work. The technology of the machine is not described — all we are told is that the Time Traveler turns one lever to go into the future and another lever to go into the past — but we know the machine could never time travel because it has no spatial displacement, which is necessary according to all scientific theories. Besides scientific necessity it would also be severely risky to travel through time but not space. For

instance, if a building were constructed sometime in the future in the same space in which you were traveling some great problems would ensue.

Do you want to see what the world will be like a thousand years from now? With enough money and a little time that is absolutely possible. According to Einstein's theory of special relativity, the greater one's velocity the slower time progresses compared to a stationary counterpart. This is called *time dilation.* In order to travel a thousand years into the future, you would have to leave earth, travel at an incredibly high velocity for a certain period of time, and then return. Traveling at 99% the speed of light you would have to travel for twenty years, if you traveled at 99.9% the speed of light it would take you two years, and if you traveled 99.99% the speed of light it would take about two months. When you return, the earth and all its inhabitants would have aged a millennium, hut you would have aged no more than a few years.

In 1971, physicists Joe Hafele and Richard Keating proved that time travel into the future is possible by sending very accurate atomic clocks on a flight around the world. When they landed, the clocks were found to be running slow by 59 nanoseconds. This mode of time travel is perfectly legitimate, but it has one disadvantage — it is irreversible.

Time travel into the past, or past travel, is an entirely different phenomenon. Although science certainly does not rule out the possibility of traveling into the past, there is no reasonable method by which to accomplish this task. In fact, many of the ideas for past travel are simply methods by which one could look into the past. This, however, is done every day. Because light travels at a finite speed, when astronomers look at a galaxy that is a billion light-years from earth, they are actually seeing what that galaxy looked like a billion years ago.

It is very easy, therefore, for us to examine the past of places at a distance from us, but could it be possible to examine our own past? Hypothetically, if we could travel faster than the speed of light we could travel away from earth, outrunning our own images, and look back to see our departure. Furthermore, if we traveled faster than light for a long enough period of time, it would be possible to outrun the images of earlier earthly events. We could look back and watch World War II, Columbus voyage to America, examine ancient civilizations, and even witness the birth of man.

Traveling faster than light is truly a physical impossibility, but getting someplace faster

than light might not be. If you roll a piece of paper into a cylinder, the shortest distance between two points on opposites sides of the cylinder is not along the surface of the paper, but through the empty space inside the cylinder. An ant traveling along a pencil stuck through the cylinder of paper would get from one point to the other faster than an ant traveling along the surface of the paper at the same speed.

Space can also be curved, and it might be possible for paths to exist between two points in curved space that are actually shorter than the path one would travel from one to the other in "normal" space. These paths are called wormholes, and would facilitate the same possibilities for traveling in space as the pencil does for traveling around a curved piece of paper.

An astronaut might use a wormhole to cut their journey from earth to Alpha Centauri down to a month. It would take about four years to travel that distance in a spaceship that travels at a speed just shy of the speed of light. If this astronaut hangs out at Alpha Centauri for three years and eleven months, and aims a high-powered telescope at earth, he will be able to see himself leaving earth.

All of these methods of "traveling" to the past are merely ways to *look* into the past. It might be possible, however, to manipulate a wormhole in such a way as to allow for *actual* past travel. A wormhole has two terminals, the opening at either end. In the previous example, one terminal is near earth, and the other terminal is near Alpha Centauri. Presumably, it would be the same time at either end of the wormhole, but wormholes arc physical objects, and would be affected by gravity just like any other object in the universe. If we bring a spaceship near the earth terminal of the wormhole, gravitationally attracting the terminal to the spaceship, and gradually accelerate the spaceship the terminal will follow. We can then use special relativity to bring the spaceship and terminal five years into the future while the Alpha Centauri terminal would age normally, and in this way desynchronize the terminals of the wormhole.

Now, if an astronaut travels from earth to Alpha Centauri via the wormhole in the year 2020, she will arrive at Alpha Centaurs in 2015. If she then takes her almost light speed spaceship back to earth in "normal" space, she will return home in the year 2019, one year before she departed. But there is a catch to this mechanism for past travel: you cannot travel to a time prior to the time when the wormhole was desynchronized.

If this form of time travel could actually be performed it would not fulfill our dreams of visiting the dinosaurs, but it would be intriguing nonetheless. We run into problems when we

consider all the possibilities of past travel, such as if the astronaut who traveled back in time in the previous example decided to murder her past self before she could depart on her journey into the past. It would be certainly be physically possible for the astronaut to take a pistol and shoot her past self, but what would happen if she did? If the astronaut kills her past self, then she would never have been able to travel through the wormhole, and she wouldn't have been able to travel back to 2019 to kill herself. This is a variation of the Grandfather Paradox, which raises philosophical questions about the possibility of time travel.

Some possibilities of time travel create classic catch-22s. For instance, would it be possible for you to past travel to a time when your grandfather was a young man and murder him? If you did, you would prevent yourself from being born, and you would never have been able to travel back in time in the first place. Something as simple and unscientific as this may be the reason past travel is not possible.

The plot of the first *Back to the Future* movie, which is not brimming with legitimate science, is very similar to the Grandfather Paradox. Marty McFly travels back to 1955 in Doc Brown's time machine, and accidentally prevents his then teenage parents from meeting. Consequently, he discovers that his siblings are gradually disappearing from a photo, and he eventually begins to disappear himself. The results of his time traveling exploits affect him gradually, but the paradox here is the same.

It is obviously not possible to drastically change the past, but would minor changes still be possible? Many scholars believe they would not. For instance, when Marty first arrives in *1955* he drives over one the two pine trees in front of Twin Pines Ranch. When he returns to 1985, he finds that the Twin Pines Mall he knew so well is now called the Lone Pine Mall. This minor detail adds some depth to the movie, but the fact that Marty ran over one of the trees should really be an explanation as to why the mall was *always* named the Lone Pine Mall.

Back to the Future may not be incredibly scientific, but the time travel in another popular sci-fi flick, *Planet of the Apes,* is based on completely accurate science. Like *The Time Machine, Planet of the Apes* is essentially a social commentary with a science fiction premise, but the creators of the film take plenty of care to make it as scientifically factual as possible, using special relativity to allow the protagonist to travel into the future. The story starts with four astronauts on an almost light-speed voyage to explore a distant solar system. There are two clocks on the ship, one showing ship-time and one representing earth-time, and since the ship is

traveling at nearly the speed of light the earth-time clock is progressing much faster than the ship-time clock.

During the prologue, Charlton Heston's character says he has been traveling for only 6 months but that nearly 700 years have passed on earth. This means that the astronauts must be traveling at 99.99997449% the speed of light. After another year in deep sleep, the astronauts unknowingly find themselves back on earth more than 2000 years in the future, only to find that after a nuclear holocaust apes have become the dominant species, keeping humans only for science experiments and as zoo-animals. It is very interesting that in a movie of such whimsical science fiction a hardcore principle of physics such as the theory of special relativity would be employed *in* a legitimate context.

For centuries time travel has intrigued us, especially since Wells' conception of the time machine. Some stories are-intended-to speculate about the nature of time travel itself, some are used as a mechanism to speculate about the future, and some are simply designed -to be entertaining. Movies and stories about time travel will probably persist in popular culture unless/until we ever develop the capability to overcome our temporal limitations.