A Comparative Analysis of Time Travel Rules in Select Works of Popular Fiction

Matthew C. Brent

American Public University

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Dr. Jolene Mendel

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Abstract

Time travel is an often-appearing theme within the genre of science fiction. Popular media in the genre, such as novels, movies, TV shows, and video games, utilize time travel as an element to propel the story narrative. While the stories frequently present time travel as being governed by established rules, those rules are often limited to the individual story and may not be scientifically accurate. Using a comparative analysis, the paper will analyze the selected works by identifying the rules within each that govern time travel, the structure of the timelines, and the consequences characters face when altering the past. Using the scientific theories of Albert Einstein, Stephen Hawking, and Richard Gott, the paper will compare the fictional versions of time travel with current scientific theories. The paper argues that popular media focuses on exciting narratives rather than scientific accuracy. The use of time travel as a storytelling device engages the audience in the narrative, and while not serving as an accurate scientific model, does allow to the audience to develop a basic understanding of the science related to time travel.

Keywords: science fiction, time travel, popular media, film, television, video games

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Since the publication of H.G. Wells' *The Time Machine* and the subsequent popularization of the concept of time travel as an element of storytelling, the idea of time travel has regularly appeared in literature, film, television, and video games. Although each work considers the idea of time travel in various ways, most of these works create sets of rules that govern how time travel operates. These rules shape the plot as well as the way audiences understand things like causality, paradoxes, and even time itself. Popular media use time travel in a wide range of ways that range from scientifically inspired to entirely fantastical. Because these stories reach wide audiences and have a great influence on public ideas about time travel, they offer a great opportunity for academic research. This paper examines how different works create their own models of time travel and what these models suggest about the cultural understanding of both science and storytelling.

While time travel has been widely explored across popular media, new works are constantly being released. As a result, there is always ample opportunity to expand upon previous work. Many works present time travel like it were governed by clear rules, however, because time travel is entirely fictional, the rules are not necessarily based on scientific fact. There are different assumptions made about free will, the nature of time and physics, and scientific possibilities. There is a lack of consistency which raises questions regarding how much an audience can truly understand about time travel and the science that it is based upon. To address this gap, this research will explore the principles that shape time travel in selected works and compare them to one another other while including scientific perspectives. This paper will seek to answer the following: How do different works of popular media construct models of time

travel, and what do these models reveal about public understanding of time, causality, and physics?

Literature Review

Time travel is a tool that is used in numerous works of popular culture, from books to video games. It can be used to comment on history, explore paradoxes, and construct narratives to enhance the enjoyment of the audience. Authors often create rules to dictate how time travel works in their respective universes. These rules range across works and may rely on actual physics, like wormholes and space-time, or may simply utilize completely made up concepts. Understanding how popular media creates these systems is important as these representations help to shape the public's perceptions of history, technology, and scientific possibilities. The available literature notes that while time-travel narratives differ, each work tends to adopt rules that are consistent within themselves but not necessarily based on science.

Curry's "Exploring Time Travel Rules in Time Travel Films" attempts to cast the widest net when it comes to examining the application of rules within popular culture. He seeks to explore film specifically and in doing so uses a comparative method to analyze plot events in ten different films, such as *Timecop* and *Back to the Future II.* In order to conduct an analysis, he describes three rules of time travel that he believes are widely recognized which are based on the ideas of General Relativity (Curry 150). The first rule involves the "Grandfather Paradox" or "Grandmother Paradox" and claims that a time travel cannot kill their own grandparent as that would prevent their own existence. The second rule involves "Self-Dealing" which is the idea that a time travel attempts to change events for his or her personal gain. The third rule governs the idea of meeting oneself either in the past or future. In reviewing the films, Curry evaluates whether or not the films enforce, ignore, or change these rules.

Ultimately Curry notes that many of the films he studied broke the rules. They often did so when it was convenient for the plot. For example, while *Back to the Future II* argued against meeting oneself in the future, Marty McFly did so anyway. The use of examples in this study strengthens it, as it shows how rules are inconsistently applied. By clearly establishing and discussing the rules, Curry presents a methodology that is easy to follow and sound. Unfortunately, Curry does not address the audience's perception of the rules and whether or not they expand an understanding of the science related to time travel.

Curutiu and Indolean narrow the focus of their study compared to Curry. They choose to analyze only three films, *Source Code, Edge of Tomorrow,* and *Tenet.* They depart from the idea of strict rules by focusing on what they refer to as video game logic (Curutiu and Indolean 99). Rather than traveling through time to different periods, video game logic refers to the ability to replay events repeatedly as if the characters were in a video game. For these specific films, while time travel is involved, the rules that are applied are not based on physics but rather video games.

Curutiu and Indolean's analysis provides different results than Curry's. While the works studied did not involve traditional time travel, the authors did note that the audience became more literate in nonlinear storytelling (Cuutiu and Indolean 103). Their work shows that the audience has an ability to understand complexity, and though they did not specifically address time travel rules, this ability to understand complex narratives could lend itself to understanding scientifically-based time travel rules.

In further narrowing the scope of study, Matthew's "Dominant Narratives and Historical Perspective in Time Travel Stories: A Case Study of Doctor Who" focuses on one narrative universe. Unlike the previous authors which focus on film, Matthews chooses to focus on television, specifically *Doctor Who*, which is the longest running science fiction television series.

While there are rules present in the *Doctor Who* universe, Matthews instead focuses on the historical narratives of the episodes paying attention to the characters and their cultural identities. She argues that even time travel in *Doctor Who* cannot change what has been culturally ingrained through historical imagery (Matthews 80). Her focus, instead, is not one science.

Though Matthews provides a systematic approach to analyzing the selected episodes of *Doctor Who,* she does not focus as much on the time travel rules or any science that might be associated with those rules. She also does not address the role of the audience in understanding the science or time travel. Rather, she seeks to establish the importance of ideological rules. In other words, the past can't be changed because certain forces, like imperialism, were supported by the ruling class, and challenging those forces would be to uproot those in charge of society.

These three studies take different approaches to their review of time travel stories. While they address rules, they also demonstrate that these rules are not always related to scientific principles or theories. They do show, however, that time travel stories, including multiple universes, nonlinear sequences, and repeating timelines, have become mainstream in popular culture. Still, they do lack certain information. For example, neither study addresses video games or books. In addition, they do not provide a clear study of audience perspectives and understanding of time travel from a scientific perspective.

The current literature demonstrates that while time travel stories may use scientific terminology, they do not usually follow actual physics. Instead, they create their own sets of rules. Time travel in popular media shows how society imagines time works, regardless of the scientific principles behind the concept. Additional research is needed, however, to expand upon the audience's actual understanding of time travel related science and to further expand the media considered, such as video games and books.

Review of Selected Works

The Time Machine

H.G. Wells published his novel, *The Time Machine,* in 1895. In his novel Wells establishes that time is the fourth dimension. While he does not explicitly describe rules associated with time travel as more modern works do, he does describe elements of time travel. These elements are somewhat like directions that describe how an individual travels through time. Essentially, traveling through time is simply moving through the fourth dimension much in the way that an individual walking is moving through the dimensions of length, width, and height. Wells notes that "There is no difference between Time and any of the three dimensions of Space except that our consciousness moves along it."

In the novel the Time Traveler does not go gallivanting throughout time. Rather, he travels to the future, returns to the present, and then travels again to the future. He does not travel to the past. In order to travel through time, the protagonist uses a device he builds which he refers to as the time machine. This device allows him to speed forward through time. Wells describes the observations of the Time Traveler during his journey to the future. He describes the movement of the housekeeper relative to himself. The protagonist states "Mrs. Watchett came in and walked, apparently without seeing me, towards the garden door. I suppose it took her a minute or so to traverse the place, but to me she seemed to shoot across the room like a rocket. I pressed the lever over to its extreme position. The night came like the turning out of a lamp, and in another moment came tomorrow" (Wells). Based on this description, the Time Traveler could see time passing quickly as he sat upon his machine.

The device is central to the plot of the novel. There are no additional scientific theories presented, like worm holes or cosmic strings. Rather, Wells simply uses the idea of a machine.

There is no explanation for how the machine works other than by stating that it travels through the fourth dimension.

Before the Coffee Gets Cold

Toshikazu Kawaguchi first conceived of his idea for this story as a stage play and later turned it into a popular novel. The novel involves a café in Tokyo that customers can visit and potentially travel through time. This novel establishes a clear set of rules that these customers must follow if they do wish to time travel. Kazu, the waitress, clearly explains these rules to ensure customers fully understand the risks.

While these rules do govern the actual time travel element, they also provide guidance for how one is able to travel through time in the first place. For example, there is only one seat available in the café that allows for time travel. Usually a ghost is seated in this spot, and customers must wait for the ghost to get up to use the restroom. Upon sitting in the special seat, the customer can begin the process of traveling through time. There is no explanation in the book as to how the time travel occurs other than the simple acceptance that it does.

The first significant rule of time travel in this novel is that “The present won’t change” (Kawaguchi 26). The additional rules include:

- Customers may not leave their seats when time traveling.
- Customers may only visit with individuals who have visited the café.
- Customers must return to the present before their coffee gets cold.

These rules are made clear to both the reader and the characters. They are also easy to follow. While most individuals wish to visit the past in the novel, there is no rule against visiting the future. The problem with traveling to the future, however, is that there is no way for the character to know if the individual with whom they wish to visit will be there. Despite the uncertainty, the

possibility exists, and one character does make the trip to the future with the help of café employees. Like those who travel to the past, she returns to the present at the conclusion of her trip.

Timeline

Michael Crichton's *Timeline* features a group of students who travel back in time to save their professor. The novel does not have explicit rules for time travel. It does, however, describe the process. Crichton describes the travel as being possible because of advancements in quantum technology. While it appears that the characters are traveling into the past, they are actually traveling into a parallel universe that resembles the past. Crichton notes that "In reality, time doesn't pass; we pass. Time itself is invariant. It just is. Therefore, past and future aren't separate locations, the way New York and Paris are separate locations. And since the past isn't a location, you can't travel to it" (108). In order for the characters to make the journey, they use a type of quantum machine that resembles a fax machine. Instead of sending a document, however, it deconstructs the characters and reassembles them in the alternative timeline.

Because the world of *Timeline* imagines an alternative timeline or parallel universe, there are no traditional time travel rules. The characters can't change the present because the world they travel to is not actually the past. They can return to the present, however, or the original universe. Since the technology used in the novel involves atomically deconstructing the characters, when they are reassembled, they are actually in completely new bodies.

Back to the Future

Robert Zemeckis' film, *Back to the Future,* is one of the more well-known contemporary time travel stories. It uses fictional science to generate time travel possibilities. In the film Dr. Emmett "Doc" Brown creates the flux capacitor which he places in a Delorean. He uses enriched

plutonium as fuel. Upon reaching 88 miles per hour, the Delorean travels through time to the date and time that has been input into the computer system.

In this cinematic universe, Dr. Brown establishes clear rules to his pal Marty McFly. The most significant rule is that actions in the past can affect the future. These actions can also result in one never existing in the present. While stranded in 1955, Marty asks Doc to show him around, to which Doc exclaims “That's completely out of the question, Marty. You must stay in this house. You can't see anybody or talk to anybody. Anything you do could have serious repercussions on future events” (Zemeckis). The film demonstrates the results of these rules. As Following Marty’s involvement with the events of 1955, he returns to the present to find major changes, such as completely different personality for his father and mother. The viewer also notices changes, such as the name of the mall changing from “Twin Pines” to “Lone Pine” as a result of a tree being run down in the past. The sequel, which has Marty traveling to the future, also establishes the rule that characters cannot meet themselves without dire consequences.

Doctor Who

The science fiction television series *Doctor Who* has been on the air for decades. Over the course of its history the show has involved numerous instances of time travel. The protagonist, known only as The Doctor, often travels with companions whom he or she explains the rules of time travel to. Though the rules are established as a part of the show’s narrative, sometimes the rules do get broken.

The idea of time travel in the world of *Doctor Who* is complex. The Doctor notably explained that “People assume that time is a strict progression of cause to effect, but actually, from a non-linear, non-subjective viewpoint, it’s more like a big ball of wibbly-wobbly, timey-wimey stuff” (Moffat). In this sense, time is not fixed. Time can be changed by the actions of

time travelers changing things in the past. The exception, however, comes with respect to certain events which are considered fixed points in time. These are events that are deemed so significant that they cannot be changed no matter how hard one might try.

Time travel in the series occurs through the use of a machine called the Tardis. This machine can not only travel through time, it can also travel through the dimension of space. As a tool it allows the characters to interact with their respective world, sometimes challenging the rules established by the universe. While time is fluid and flexible, there are limitations. The Doctor, for example, often encounters himself during his travels. In these instances only the elder version remembers the interaction.

Avengers: Endgame

While time travel is not the primary focus of this film, it uses time travel as a means to fulfill the mission of the Avengers in their fight against the tyrant Thanos. They create a plan to travel back in time to retrieve the Infinity Stones so that they may reset the timeline. This plan, however, has complications, as it is established in the film that the traditional rules of time travel do not apply. When the team discusses time travel, Bruce Banner explains why so many people get time travel wrong. He states “time doesn’t work that way. Changing the past doesn’t change the future… Think about it: If you travel to the past, that past becomes your future. And your former present becomes the past. Which can't now be changed by your new future...” (Russo and Russo). Despite confusion among the characters, they proceed with the plan and the various characters end up in different points in the past.

Time travel in *Avengers* happens through the use of fictional Pym particles. These particles allow the characters to shrink to a quantum size, and in doing so they are able to travel into the past. They have to develop special suits that allow them to endure shrinking and travel

through the quantum realm. Upon traveling to the past, Banner encounters the Ancient One who possesses the Time Stone. The two have a further discussion about the nature of time. She explain to Banner that "The Infinity Stones create what you experience as the flow of time. Remove one stone and that flow splits. Now, this may benefit your reality, but my new one…not so much. In this new branched Reality, without our chief weapon against the forces of darkness, our world will be overrun. Millions will suffer. So, tell me, Doctor, can your science prevent all that?" (Russo and Russo). Banner responds with "No, but we can erase it. Because once we are done with the stones, we can return each one to its own timeline at the moment it was taken. So, chronologically, in that reality, it never left" (Russo and Russo).

The discussion of time in these two scenes highlights that time travel, even in theory, is complicated. The characters note that the present can be changed by interacting with the past, yet the past can be repaired as well if those changes are undone. Furthermore, they also introduce the idea of alternative timelines and parallel realities or universes.

Chrono Trigger

Released in 1995 for the Super Nintendo Entertainment System, *Chrono Trigger* is a role playing game centered around a hero who must lead his friends throughout time to save the world from a creature named Lavos. The hero, Chrono, is unexpectedly thrust into the past with his companion, Marle, after visiting his friend Lucca's teleportation experiment. Lucca eventually discovers a way to return to the past herself where she explains to the others how they ended up there. In the world of the game there are portals the characters can use to travel through time. Lucca describes these noting "I call this thing a gate. It's a kind of portal that takes you to the same location in a different era. Gates are very unstable, so I used the principle behind my

telepod device to create a gate key" (Squaresoft). Later in the game the characters discover a flying time machine called the Epoch that they can use to instantly travel through time.

The game also utilizes a set of time travel rules within its own universe. The first rule that the characters discover is that only three or fewer individuals can travel through a time gate at one time. If more than three use a gate, they end up at the End of Time. There an old man explains "When four or more beings step into a time warp, the Conservation of Time theorem states that they will turn up at the space-time coordinates of least resistance. Here" (Squaresoft). The game also reflects the idea that changes in the past can affect the future. For example, the robot character is left in the past to revitalize barren land, and upon returning to the present to retrieve him the team discovers the area is now lush with trees.

Comparison of Selected Works

Time Machines

In examining each of these titles, one can identify the tools used in each to facilitate time travel. With most of these works the tools involve scientific devices. Only *Before the Coffee Gets Cold* does not. It uses a supernatural process involving coffee to allow individuals to time travel. Four of the works utilize some sort of time travel vehicle, though each is presented differently and has different abilities. The TARDIS of *Doctor Who,* for example, has the ability to travel through both space and time instantaneous. Wells' time machine, Zemeckis' Delorean, and Squaresoft's Epoch will arrive in the same location, though the Delorean and Epoch can move through space once they arrive in the destination time.

Both *Avengers: Endgame* and *Timeline* utilize a different type of time machine. In these works the machine sends the individuals through time, and then they can return to the present in the same location. These devices utilize quantum technologies, though in different ways, to

facilitate time travel. While the *Avengers* film uses the idea of shrinking the individuals to a quantum state and allowing them to arrive in a previous time, Crichton's *Timeline* uses a sort of faxing process to send a deconstructed version of the characters into the past.

Timeline Structure

While these works all focus on some sort of time travel, they differ in how they perceive time. For most, they present time as a singular stream of flowing time. In other words, if someone travels into the past or future and then returns to the present, they remain in the exact same timeline. *Avengers: Endgame,* however, deviates from this idea altogether. This work argues that if an individual visits the past, changes something, and returns to the present, instead of returning to the original present they will arrive in an alternative timeline. *Timeline,* on the other hand, claims that time travel isn't actually occurring at all. Instead, the characters are visiting a parallel world that simply resembles the past. Anything that might be changed in this past would have no bearing on the original present because they are different worlds.

The malleability of the timeline varies with each work. Only *Before the Coffee Gets Cold* has a fixed timeline. The characters make it clear that the present cannot be changed from visiting the past in the cafe. *Doctor Who* does allow for a malleable timeline, though there are exceptions as certain events are considered fixed and unchangeable. Both *Avengers: Endgame* and *Timeline* make it clear that changes to the past do not affect the present, and they offer different explanations for this fact. *Avengers: Endgame* notes that changes in the past create a new branch of time, and the changes would affect this new branch rather than the original one. *Timeline* notes that because the characters aren't actually traveling through time at all but rather parallel worlds, changes in one world will not affect the other. *Back to the Future* and *Chrono*

Trigger have extensive examples of changes that occur within the timeline, but Wells' *The Time Machine* does not address the concept at all.

Rules of Time Travel

Each work establishes its own rules relating to time travel. Most of the works refer to what is known as the Butterfly Effect. This idea posits that changes to the past, however, small, will certainly have an effect on the future. As a result, a general rule across these works is to be careful in the past as the slightest change could have disastrous results. Alternatively, these changes can also have positive results, as seen with *Chrono Trigger's* reforestation and *Back to the Future's* George becoming more confident.

Most of these works have unique rules of time travel that only apply within their respective universes. For example, in *Chrono Trigger* only three people can travel though time at once, and in *Before the Coffee Gets Cold* café customers must remain seated during their visit to the past. Some rules deliberately do not apply across titles, as they would hinder the story narrative. In *Back to the Future* time travelers are warned that they should not meet themselves in the past or present, yet in *Avengers: Endgame* characters like Captain America not only meet in the past, but they actually fight one another.

Each work also addresses the memories of the time travelers. Regardless of the type of time travel and the version of the timeline presented, the characters maintain the memories of the previous timeline. They do not, however, have memories of the new timeline that reflects the changes that may have happened in the past. The exception comes with *Dr. Who*. While the Doctor generally remembers everything they do, in the event they meet a future iteration of themself, only the future iteration will remember the encounter.

Time Travel Science

Though actual time travel remains fictional, many of the works discussed do rely on actual scientific principles. The first principle to consider is the actual understanding of time itself. In Wells' *The Time Machine* the Time Traveler refers to time as the fourth dimension. Albert Einstein expands upon this idea with his theories of relativity. He argues that time does not pass uniformly and that it may move faster or slower based on an individual's perspective relative to the object being observed. Furthermore, Einstein develops the idea of space-time. This idea is a merger of the components of three-dimensional space with the flow of time (Einstein). Well's Time Traveler demonstrates the idea of relatively when moving through time as he describes his housekeeper zooming across the room.

In *Back to the Future* the audience is able to see Doc Brown conducting a scientific experiment related to time travel. He equips his dog, Einstein, with a clock set to match a clock which he keeps. When Doc sends the Delorean through time, he is able to observe that the dog's clock is now different than his own clock. This experiment ties in to Einstein's Theories of Relativity, as time moved differently for each character. The experiment resembles actual experiments done with atomic clocks to note differences in time.

Stephen Hawking's ideas related to Quantum Theory (1999) have also influenced the time travel methods in the works described, particularly with *Timeline* and *Avengers: Endgame.* In each of these works travelers use quantum technology to make the jump into the past. Both of these works, however, also involve parallel worlds. The time travel in *Timeline* is actually not time travel at all but rather a jump into a parallel world that resembles the past. Similarly, *Avengers: Endgame* discusses how new branches of time can result from the actions of time travelers.

Hawking's work also addresses the nature of black holes. He describes quantum effects causing a type of radiation near the event horizon of a black hole (Hawking). Despite not being located in space or having gravitation effects, the gates or time portals in *Chrono Trigger* resemble black holes. These gates are said to be unstable, much like real black holes.

The Grandmother Paradox is also explored in some of the works. Doc Brown warns Mary McFly about interfering in the past, and when he unintentionally does, his siblings, depicted in a photo, start to fade from existence. Similarly, in *Chrono Trigger,* Marle who is secretly the Princess of Guardia, begins to disappear from existence while her ancestor, Queen Leene remains kidnapped. Upon Leene's rescue, Marle returns to reality. Similarly, Marty's siblings return to the photograph after he reunites his parents. Richard Gott (2002) argues that the Grandmother Paradox is a bit moot. He states that "time travelers don't change the past because they were always part of it. The universe we observe is four-dimensional, with world lines snaking through it. If some of these world lines can bend back and cross through the same event twice, then so be it" (21).

Richard Gott also addressed time travel in relation to the speed of light. He expands upon the work of Albert Einstein. Both discuss how time is relative, and how time moves more slowly as one approaches the speed of light (Gott). *Back to the Future*, on the other hand, ignores light-speed travel. Instead, the narrative focuses on a speed of 88 miles per hour matched with the fictional flux capacitor. In the film the speed is the key rather than the concept of relativity.

Study Limitations

Due to the lack of a formal IRB approval, individuals could not be studied to determine their understanding of time travel and the effect of popular media on their understanding. Had surveying and interviewing individuals been possible, the study would have used a mixed

methodology, blending quantitative and qualitative data. Respondents would have been asked about their knowledge of time travel theories and the popular rules of time travel that appear in fictional works.

Works Cited

Crichton, Michael. *Timeline.* Ballantine Books, 1999.

Curry, Jarvis Tyrell. "Exploring Time Travel Rules in Time Travel Films." *CINEJ Cinema Journal*, vol. 11, no. 2, 2023, pp. 149–76, https://doi.org/10.5195/cinej.2023.521.

Curuțiu, Horațiu, and Ion Indolean. "'See You in the next Life'—Playing with Time in Sci-Fi Movies: Source Code, Edge of Tomorrow, Tenet." *Ekphrasis. Images, Cinema, Theory, Media*, vol. 32, no. 2, 2024, pp. 97–113, https://doi.org/10.24193/ekphrasis.32.6.

Einstein, Albert. *Relativity: The Special and General Theory.* 1916, https://www.gutenberg.org/cache/epub/5001/pg5001-images.html

Gott, J. Richard, III. *Time Travel in Einstein's Universe: The Physical Possibilities of Travel Through Time*, HarperCollins Publishers, 2002. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/apus/detail.action?docID=3433177.

Hawking, Stephen. "Space and Time Warps." 1999. https://www.hawking.org.uk/in-words/lectures/space-and-time-warps

Kawaguchi, Toshikazu. *Before the coffee gets cold.* Translated by G. Trousselot, Hanover Square Press, 2020.

Matthews, Jolie C. "Dominant Narratives and Historical Perspective in Time Travel Stories: A Case Study of Doctor Who." *Social Studies (Philadelphia, Pa: 1934)*, vol. 112, no. 2, 2021, pp. 76–90, https://doi.org/10.1080/00377996.2020.1829527.

"Blink." *Doctor Who,* written by Stephen Moffat, directed by Hettie MacDonald, BBC Studios, 2007.

Russo, Joseph and Anthony Russo, directors. *Avengers: Endgame*. Marvel Studios, 2019.

Squaresoft. *Chrono Trigger.* 1995.

Wells, H.G *The Time Machine.* 2025, https://www.gutenberg.org/cache/epub/35/pg35-images.html

Zemeckis, Robert, director. *Back to the Future*. Universal Pictures, 1985.