

## Exploring Time Travel Rules in Time Travel Films

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### Abstract

Throughout film history, time travel has been an intriguing concept revisited time and again by film productions, creating a universe of time travel principles and becoming a discipline of scientific import. With some of the greatest minds and thinkers of our time contributing to the living discourse, time travel has gained global significance and has developed several rules films attempt to follow. Time travel theory postulates several theories concerning the effect of an individual traveling through time and coming into contact with themselves; some benign, some many catastrophic. This study reviews time travel films to determine the cinematic consistency of three of these rules; the grandfather paradox, time-traveling for self-benefit, and meeting oneself in an alternate time.

**Keywords:** time travel; temporal paradox; temporal causality; presentism; backward causation; dimensional optics



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# Exploring Time Travel Rules in Time Travel Films

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## Introduction

The film industry has leveraged many concepts and ideas to draw audiences to the theaters to generate strong film box office. Among the most novel and intriguing is the theory of time travel, the ability to move at an accelerated rate from one moment in time to another, outside of the normal time passage of everyday life. This concept, a mixture of folklore and mysticism for untold millennia depicting individuals entering into altered states of sustained sleep or the like, gained popular appeal with the introduction of the time machine as an assembled apparatus able to move an individual through the annals of time (Wells, 1895).

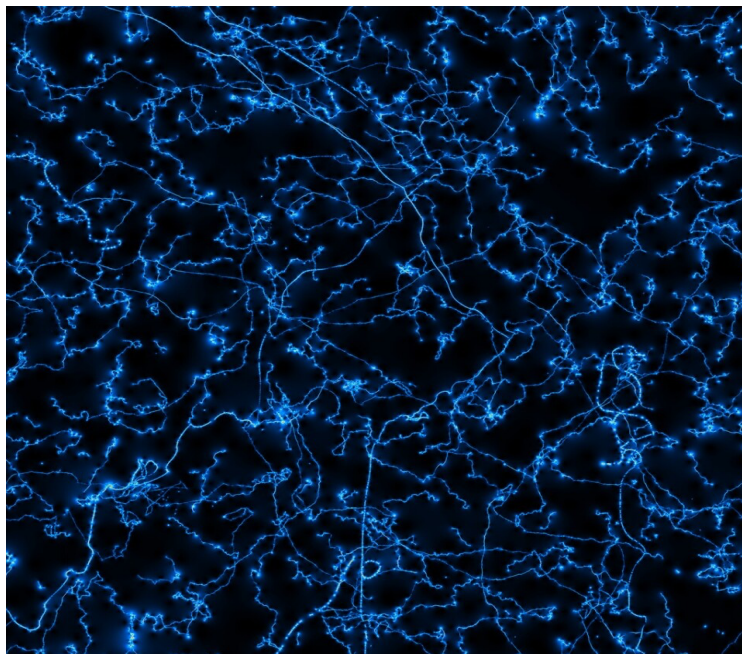
As film grew, so did the connection between popular ideas and film content, leading filmmakers to bring time travel into the big screen in 1921 with the first of many adaptations of Marks Twain's *A Connecticut Yankee in King Author's Court* (Sweeney, 2015). Many more films featuring time travel would be produced over the following century, many of which established or reinforced rules of for time travelers consequences for breaking those rules.

## Theoretical Concepts and Methods

Time travel<sup>1</sup> is a recognized discipline in theoretical physics, starting with general relativity theory (GRT). According to GRT, time travel is theoretically possible in general relativity spacetime geometries that permit traveling faster than the speed of light, like cosmic strings, traversable wormholes, and Alcubierre drives (Markosian, 2020). The geometries of spacetime explain that the universe is comprised of a system of field equations which determine the distance,

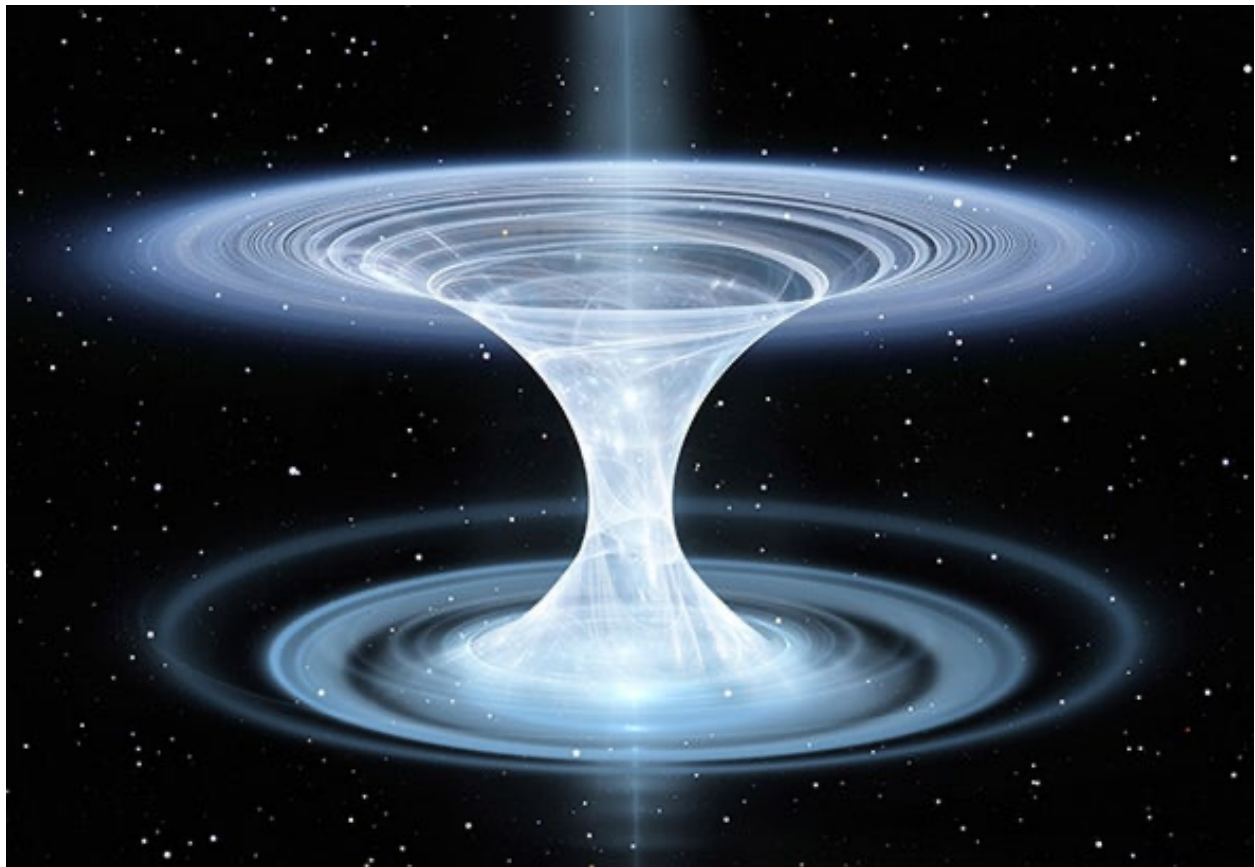
a constant measure, between things—spacetime (Read, 2012). Therefore the thought of traveling outside of the constant of spacetime, is where time travel theories begin.

Cosmic strings (*Figure 1*), essentially one-dimensional cracks in the fabric of the universe which were created shortly after the Big Bang, are a common prediction in string theory (Martin, 2017). The theory holds that hypothetical defects resulting from the creation of the universe have branched out like strings and now are littered throughout the whole of the expanding universe (Martin, 2017). They are thin tubes of energy which weave through the entirety of the universe and could potentially contain so much energy and mass that they would be able to warp space time around them (Martin, 2017). These cosmic strings are partially wrapped on compact cycles associated to extra spacetime dimensions so that only one non-compact dimension remains and can be used as a means to cross from one spacetime within the universe to another connected spacetime (Martin, 2017). Time travel is thus hypothetically achievable by means of these thoroughfares as they bypass spacetime.



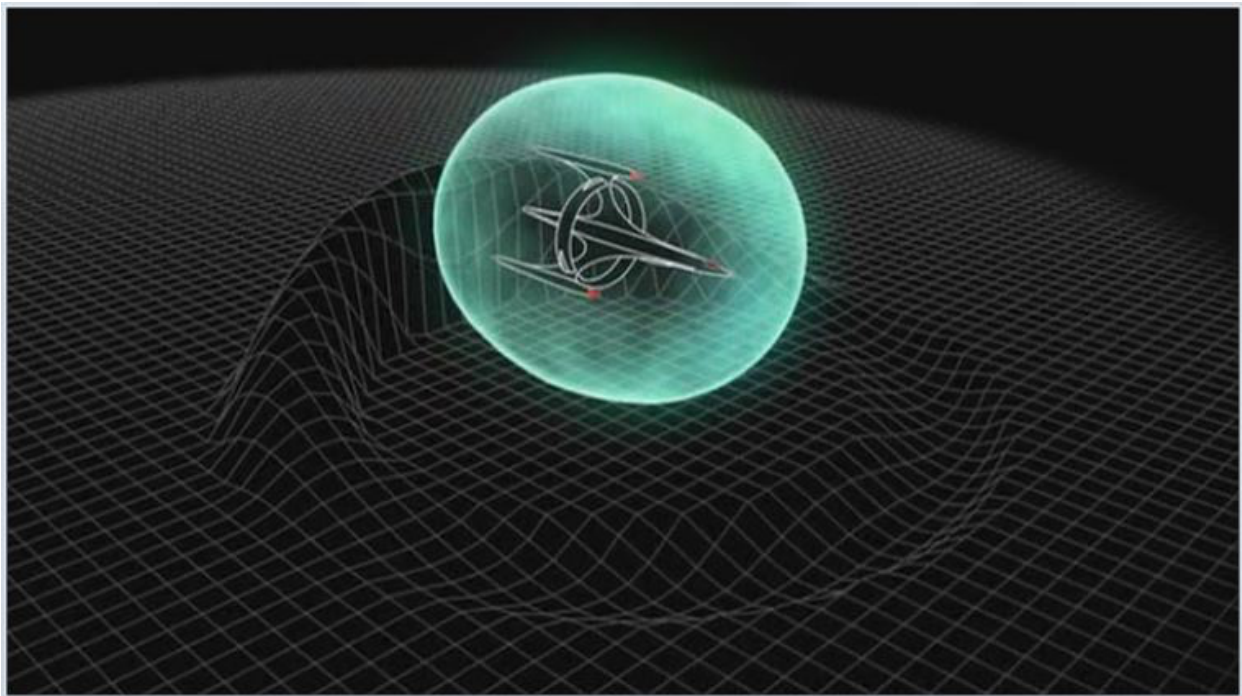
*Figure 1: A simulated image of cosmic strings. Courtesy of iStock.*

When spacetime cannot be bypassed, theory holds that it can be warped (Cuyubamba et al., 2018). Warped spacetime is theoretically seen in the hypothetical wormhole, or Einstein–Rosen bridge (*Figure 2*) as it popularly known in recent years, which presume to link disparate points in spacetime together (Martin, 2017). A special solution to Einstein’s field equations, wormholes would allow travel between different spacetime regions in the universe, whether forward or backward in real time (Cuyubamba et al., 2018). For a wormhole to theoretically form, the energy density in certain regions of space has to be negative relative to the ordinary matter vacuum energy in the spacetime region, likely due to the existence of exotic particles, which contain negative energy density and a large negative pressure (Cuyubamba et al., 2018).



*Figure 2: Magnetic wormhole created in lab. Courtesy of iStock.*

The proposed Alcubierre drive is a construct which hypothetically would achieve time travel by accelerating an object, a spaceship potentially, faster than the speed of light by compressing space in front in the direction of travel (Markosian, 2020). In popular connotation, this is the concept and visualization of warp drive, with a spaceship being propelled at such an accelerated speed that it moves spacetime (*Figure 3*) as it passes by (Markosian, 2020). An Alcubierre drive would require the existence of exotic particles, much like wormholes, and would achieve time dilation as dark fluid, the theorized combination of dark matter and dark energy, is utilized as a gravitationally repulsive negative mass to the positive mass of the spaceship (Dwyer, 1975). Under these conditions, time travel will theoretically occur.



*Figure 3: Alcubierre drive moving through spacetime. Courtesy of iStock.*

Now that we understand how we can time travel, we must understand now what it means to time travel and what we need to be cautious of and aware of. We shift from the scientific theories of time travel efficacy to cinematic rationalizations to discuss the rules of time travel explored in films. The treatment of travel in films has run the gamut of genres, locations, pretexts, and scale. Time

travel has been depicted as an extreme mental exercise allowing a lovelorn individual to transport their mind and body into the past to meet their one true love (Szwarc, 1980). As a sinister and dark masterplan to send human-like robots into the past to assassinate the leader of a future revolt seeking to reclaim the world from self-aware robots (Cameron, 1984). As a comedic jaunt where accidental forces can transport a group on individuals enjoying a steamy soak in the bodies of their younger selves (Pink, 2010). As a wry and heartfelt life lesson for a cynical weatherman who believes the world starts and stops with himself, courtesy of an unseen hand forcing this man to learn to express and appreciate the love in his life as he relives the same day over and over and over again and again and again (Ramis, 1993). Through these and other films, a cinematic compendium of do's and don'ts was established for traveling in time which have become standard rules in film.

These rules govern the practical functionality of time travel in film and are at the heart of this study. The rule of temporal (grandfather) paradox states that going back in time can alter the future causing some apparent or logical contradiction (Lewis, 1976). The grandfather paradox postulates that if a time traveler goes back in time and causes the death of their grandfather, that event will lead to one of the time traveler's parents not being born, and in turn, the time traveler will not be born (Lewis, 1976). This paradox further feeds the believe that bringing information or technology from the future to the past, can change the future (Luck, 2017).

The second rule of time travel is most interesting and concerns or self-dealing, which relates to a time traveler's interaction with themselves or people directly connected to them for a specific benefit or gain (Sider, 2002). These self-dealing rules state that interference with your own destiny should be avoided or catastrophic events may occur (Sider, 2002). Sending future knowledge to yourself in the past of super lotto numbers or the best dates to buy Apple stock early might seem

like a winning idea, but film treats such self-dealing as cheating and cheaters never (well, almost never) win. If a film character travels back in time to impart some future knowledge to their younger self, negative consequences nearly always follow. Therefore, self-dealing time travel rules almost always come with a warning that changing your past for a better future for yourself will always end in disaster (Sider, 2002). Protagonists typically struggle with the rule, but in the end, they usually avoid breaking the rule and end up the wiser for it. Antagonists, however, make self-dealing their bread and butter, never seem to learn or realize that cheating will not result in the better tomorrow they desire, and usually end up suffering terrible fates for running afoul of the self-dealing rule. So, the time traveling protagonist must avoid self-dealing, and in most depictions of time travel, must avoid meeting or interacting with their past selves at all costs (Luck, 2017).

The third and rule is the application of this tantamount principle, when traveling in time, avoid contact with alternate versions of yourself, especially your past self, at all costs for fear of impairing your own timeline, the timeline of your lineage, or the timeline of civilization (LaBossiere, 1998). This rule relates to both prior rules, but has a special application due to *Timecop* (1994), where physical contact between the same person from different times causes you to be erased from existence, and *Looper* (2012) where your past self is has potentially been paid to kill you (luck, 2017). These rules are analyzed through review of ten time trave films.

## Films

In *Looper* (2012), time travel is used by an enterprising company to send individuals from the strict future into the lax past to be quietly and conveniently shot dead by paid killers. The film follows the grandfather paradox where time travel to the past and interruptions with a time travelers alternate self or ancestors have real and direct effects on the time traveler (Johnson, 2012). One scene depicts the torture and mutilation of a time traveler's younger past self by the company's

hitmen to draw out the fleeing older time traveler from the future (Johnson, 2012). As warnings are carved into the arm of the younger, scars appear on the arm of the former (Johnson, 2012). When carved warnings to not suffice, the time traveler begins to lose fingers and limbs, and the audience understands that the hitmen's torture of the time traveler's younger past self has escalated to dismemberment (Johnson, 2012).

Other than the observance of the grandfather paradox, the illegality of the use of time travel as a plot of the film negates most other rules and conventions of time travel. The company's use of hitmen in the future to dispose of unwanted people from the past violates the self-dealing rule (Johnson, 2012). The hitmen's final job is to kill their older selves, called retirement, when the company sends them back through time travel (Johnson, 2012). The protagonists failure to kill older future self in under these terms is the driver for the film, as future time traveler and his younger past self continually meet and physically fight, with the younger continually trying to complete the retirement of the older (*Figure 4*). There is not concern regarding contact between the same individual from alternate points in time (*Figure 5*).



*Figure 4: Future Joe and past Joe meeting at a diner, 42:28 scene (Johnson, 2012).*





*Figure 5: Future Joe drags past Joe off a car he fell off a building onto, 39:18 scene (Johnson, 2012).*

In *Star Trek*, an intergalactic crew of space travelers must save the Earth from destruction by an unknown enemy who time traveled from the future seeking revenge and to cause pain (Abrams, 2009). The time travel occurs unexpectedly as the result of an elder Spock, Spock Prime, who creates a black hole uses red matter, an unstable conglomeration of antimatter and particles, to absorb a supernova threatening to absorb Romulus (Abrams, 2009). Spock Prime is pulled into the blackhole and sent back in time with no option to return to the future (Abrams, 2009). Unable to return to his own time and with Vulcan destroyed leaving minimal Vulcans remaining in the current time, the Spocks reason it is unwise to follow normal time travel protocols and avoid their alternate selves (*Figure 6*). Time travel in the Star Trek franchise is voluminous and inconsistent, but in this incarnation, time travels creates two separate timelines which exist in parallel, the grandfather paradox holds only in certain respects, self-dealing doesn't seem to be a concern, and meeting oneself is fine (Bacon, 2020).



Figure 6: Elder Spock Prime, time traveler from the future, meets younger Spock, 1:54:58 scene (Abrams, 2009).

In the sequel *Back to the Future II*, teen lovebirds Marty McFly and Jenny Parker time travel to the future at the insistence of Marty's friend, mock-mad scientist Doc Brown, by means a theoretically souped up DeLorean to prevent Marty and Jenny's future kids from getting into serious, lifechanging trouble (Zemeckis, 1989). This classic and groundbreaking romp through space and parallel timelines sees Marty and company confront multiple versions of themselves as they succeed in this mission of good even though it runs counter to the time travel rule of self-dealing (Zemeckis, 1989). Undaunted, Marty and company trudge along on their mission when Jenny's unintentional encounter with her future self leads the two Jennys to a comedic shock (Figure 7) and faint (Figure 8). As with Marty and Doc, Jennifer is cautioned to avoid contact with her alternate self for fear of unduly influencing timelines.



*Figure 7: Jenny time travels and is shocked encountered her future older self, 37:03 scene (Zemeckis, 1989).*



*Figure 8: Jenny time travels and faints after encountering her future older self, 37:05 scene (Zemeckis, 1989).*

However, the formula for the film and the franchise is that observance of these rules of time travel will lead to a happy and unimpeded life, but attempts to influence past or future events for your own personal benefit, will be met in the end with failure, heartache, and manure (Zemeckis, 1989). Therefore, to balance the Marty and company's self-dealing, they end up having to put right an altered timeline akin to the potentially existence-ending grandfather paradox which Marty

inadvertently triggered in the original installment by interrupting a pivotal moment in his parents love story (Zemeckis, 1989).

Protagonist future Biff from 2015 steals the DeLorean, time travels to 1955 in the past, gives his younger self an Almanac of future sports scores for the next fifty years, gets the Almanac taken by a second time traveling Marty, and finds young 1955 Biff crashing into manure for the umpteenth time (Zemeckis, 1989). At a certain point, Biff becomes a pitiful character constantly yearning for the love of Lorraine, Marty's future mom who infatuated Biff in their youth. Biff's failures highlight the plight of the time travelers who fail to obey the rules to avoid your alternate self, do not attempt to influence future events with information brought to the past, and avoid physical contact with yourself since like matter cannot occupy the same space (Zemeckis, 1989). Future Biff smacks past Biff on the back of the head (*Figure 9*) and has further physical contact with his alternate self when he forces the Sports Almanac into past Biff's back pants pocket for safekeeping because past Biff does not own a safe (*Figure 10*).



*Figure 9: Time traveling future Biff explains the Sports Almanac to past Biff, 1:08:28 scene (Zemeckis, 1989).*



*Figure 10: Time traveling future Biff gives past Biff the Sports Almanac, 1:10:05 scene (Zemeckis, 1989).*

When Marty time travels to 1955 for a second time, he must avoid running into his past time traveling self (*Figure 11*). The longer second Marty remains in 1955, the more likely his is to run into his first time traveling self and potentially trigger an additional paradox (*Figure 12*).



*Figure 11: Time Marty avoid himself in a car from a previous time travel timeline in 1955, 1:18:41 scene (Zemeckis, 1989).*



*Figure 12: Second time traveling Marty barely avoids contact with first time traveling Marty, (Zemeckis, 1989).*

In the *Time Traveler's Wife* (2009), a genetically-inherited ability to time travel causes Henry to travel through time to different periods where he encounters his future wife in the past at various times and himself one fatal time (Schwentke, 2009). as a child and himself at multiple points in time.



*Figure 13: Past Henry, Clare, Gomez, and Jane witness future Henry mortally wounded, 54:00 (Schwentke, 2009).*

In *Zathura* (2005), two young brothers learn the importance of brotherly love while playing a celestially imaginative board game that brings fantasy to life in the form space traversing single family houses, of frozen siblings, reptilian aliens, time traveling astronauts, alternative timelines, and interesting plot twists (Favreau, 2005). Most time travel rules appear to be on permanent pause in this film, with the grandfather paradox not coming into play, self-dealing not a concern, contact with alternate selves not a concern, and no real discussion or explanation of rules (Favreau, 2005). Older future Walter assists his younger past self and past brother Danny navigate some of the difficulties of the game dimension, without revealing his true identity until much later (*Figure 14*). Although never fully explained, it appears that the game dimension allows the past and future Walters and Dannys to merge once the future counterparts have completed their game of Zathura (*Figure 15*). This alone may be the single time travel rule observed, though thankfully the like matter merge in this case appears to have been a beneficial reward and not a punishment (Favreau, 2005).



*Figure 14: Older future Walter with younger past Walter and past Danny, 1:29:46 (Favreau, 2005).*



*Figure 15: Past Danny (left) merging with future Danny (right) in front of future Walter, 50:10 (Favreau, 2005).*

In *The Adam Project*, a fighter pilot Adam Reed travels to the past, encounters his twelve year old self, and the duo work together and gain closure from life sorrows while defeating a curiously hands-on time-altering villain, Maya Sorian (Levy, 2022). In Adam's future world, time travel is the proprietary property of Sorian, the result of a self-dealing time change by the villain when she went back in time to provide her past self with future knowledge to make a fortune and acquire assets essential to controlling time travel in the future (*Figure 16*).





*Figure 16: Future Sorian meeting her younger self in the past, 1:06:55 scene (Levy, 2022).*

Future Adam, past Adam, and their father are able to defeat Sorian in an epic final showdown by following the rules of time traveling and avoiding self-dealing, even though each of the three have sorrows in their lives that time travel could potentially resolve. In the end, the Adams gain a renewed appreciation for themselves in their times and find closure with their father (*Figure 17*). And just for being a nice guy, somewhat, older Adam is cosmically gifted a second chance for a life with someone he previously lost (Levy, 2022).



*Figure 17: Future Adam with his younger self in the past, 25:51 scene (Levy, 2022).*

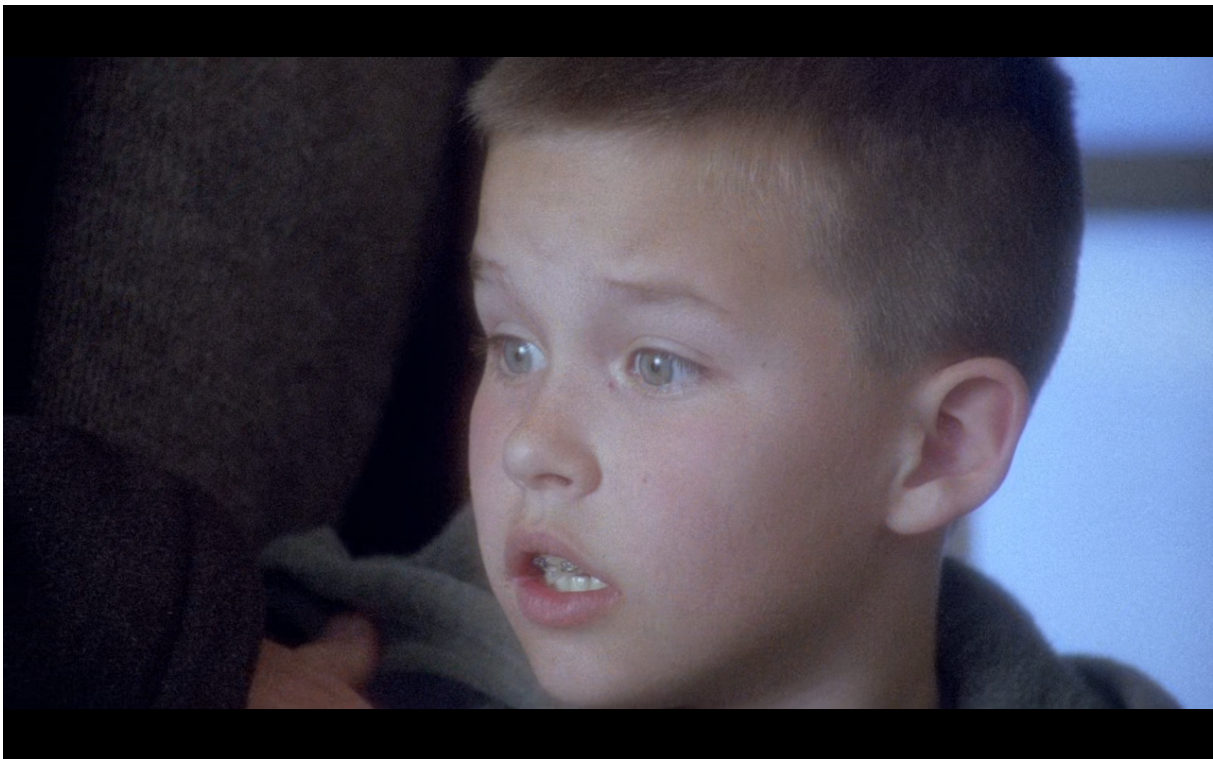
In *12 Monkeys* (1995), time travel is used to send an agent, James, to the past to stop a global catastrophe and in the process, the protagonist has unexpected interaction with his younger self and vice versa. The rules of time travel are secondary to the mission of preventing a catastrophic pandemic supposedly orchestrated by an eco-terrorist extremist group, and which leads to most of humankind dying and survivors becoming subterranean dwellers (Gilliam, 1995). James is haunted by childhood memories of a man killed in front of him, a scenario that future adult James brings to life as he runs through an airport attempting to stop the real eco-terrorist, Dr. Peters, from boarding a plane to spread an engineered disease and is killed (*Figure 18**Figure 19*). Young James witnessed the shooting and the resulting death and the trauma from the experience shapes his entire life, leading severe mental disease, crime, and imprisonment (*Figure 20*). Time travel rules of self-dealing doom both young and old James as punishment for multiple time travels in his attempt to change the past for a better future (Gilliam, 1995).



*Figure 18: Older future James being shot in the airport chasing eco-terrorist Dr. Peters, 2:01:55 (Gilliam, 1995).*



*Figure 19: Older future James dying in the airport after being shot, 2:02:28 scene (Gilliam, 1995).*



*Figure 20: Young past James witnessing unknown man being shot and dying in the airport, 2.02.14, (Gilliam, 1995).*

In *Timecop*, an elite member of the time travel police, Max, takes on a sinister politician who illegally time travel to the past to influence his political future (Hyams, 1994). Max's time travels have the unexpected bonus of allowing him to save his wife who was tragically murdered in his past, a feat he is able to achieve with the assistance of his past self (*Figure 21*). Possibly one of the best examples of rules driven time travel films, *Timecop* includes good use of consistently in the grandfather paradox, the self-dealing rule, and the special self-contact rule, taken to new heights in this film (Hyams, 1994).



*Figure 21: Older future Max avoids meeting his past self, 1:09:52 scene (Hyams, 1994).*

*Timecop*'s major contribution to time travel lore is the special rule based in paradox but rooted in self-dealing, like matter cannot occupy the same space. The results of like matter, person-to-person contact between a time traveler and their counterpart in a different time, is the morphing bubble

merge explosion which erases all trace of the individual from the point in time of the younger version (*Figure 22, Figure 23*).



*Figure 22: Future Senator McComb merging into oblivion due to contact with his past self, 1:24:36 (Hyams, 1994).*



*Figure 23: Future Senator McComb merging into oblivion due to contact with his past self, 1:24:37 (Hyams, 1994).*

In *Lost in Space*, the Robinson family is plagued by bad luck as they travel space to build a neo-superhighway to allow humans to escape a dying Earth and build new lives on planet Alpha Prime, but encounter deadly intentions in the form of space spiders and a contrived time lapse (Hopkins, 1998). Time travel is used a last ditch effort to salvage what one critic termed a “cosmic failure,” when a stranded young Will Robinson spends years building a time machine to travel to the past to save his family. The grandfather paradox appears to be at play in one respect when the older Will’s time machine creates the very temporal dilation that doomed his younger self to isolation on the desolate planet (Hopkins, 1998). The Wills meet briefly, but the sacrifice of the older future Will allows the younger past Will to escape the destiny of being doomed to isolation on the planet for twenty years, following the grandfather paradox rule (*Figure 24*).



*Figure 24: Older future Will Robinson meets his younger past self, 1:40:31 scene (Hopkins, 1998).*

However, bad guy Dr. Zachary Smith is killed by his even worse older future self, but older future Dr. Smith does not cease to exist, as would be consistent with the paradox (*Figure 25*). While the future Dr. Smith does eventually die in an attempt to use the time travel to his own selfish gain, clear evidence of the self-dealing rule and expected punishment for its nefarious violation, the film fails to remain inconsistent within the confirms of the time travel rules it implores (Hopkins, 1998). Will is not punished but rewarded for self-dealing with a second chance at a happy life with his family after the time travel and future Dr. Smith continue to exist after his past self was killed (Hopkins, 1998).



*Figure 25: Antagonist Dr. Zachary Smith meets his future self, a killer mutated by space spiders (Hopkins, 1998).*

In *Bill and Ted's Excellent Adventure*, two scholars are aided by their future selves to time travel in a phonebooth to complete an important academic assignment and find medieval paramours, all important steps in their destiny as scions of a new future world (Herek, 1989). Time travel rules in

the film and the franchise are as hazy as the expectation that either William “Bill” S. Preston Esquire or Ted “Theodore” Logan will provide a single coherently reasonable sentence in the film, but the grandfather paradox is warned against, in a roundabout manner (Herek, 1989). Bill and Ted travel back in time and scoop up multiple historical figures and luminaries to transport them to present-day San Dimas for the sake of getting a passing grade on their history assignment (Herek, 1989). The gentlemen even meet and bring princesses from the past to present to live as their girlfriends (Herek, 1989). All of this is made possible by aid of a telephone booth time machine able to travel between the circuits of time, using a keypad to dial coordinates to specific dates or people in history, and helpful advice from their future selves (*Figure 26*).

Other rules of time travel seem to be inconsequential, as the plot itself is in exercise in self-dealing, the future Bill and Ted seem unchallenged when providing past Bill and Ted critical future knowledge, and there is no mention of avoiding physical contacts with alternate selves (Herek, 1989).



*Figure 26: Past Bill and Ted receive most excellent counsel from time traveling future Bill and Ted, (Herek, 1989).*



## Conclusion

The totality of the review of the ten films through analysis of the three time travel rules can be found in Table 1, where of the ten films reviewed, eight held true to the grandfather paradox; five held true to the rule against self-dealing, and two held true to the rule against self-contact. It is possible to draw a bright line delineating time travel film pre and post 2000, seeing the results show that pre-2000 films all used a conveyance to time travel, all followed the grandfather paradox, and all allowed for both forwards and backwards travel through time. Conversely, the majority of post-2000 time travel films relied on either wormhole or blackhole theory, allowed only backwards travel through time, and all films rejected the time travel rule of self-contact. These results show a trend away from the three rules of time travel and an embracing of new ideas in story development with boardgames and genetic disorders used as means of time travel and use of a character's life as the measure of the time travel range.

**Table 1:** *Time travel rule analysis and general information for ten time travel films.*

Film title	Year	Theory	Method	GP	SD	SC	D	Travel years
The Adam Project	2022	Wormhole	Spaceship	✓	✓	X	<>	2050, 2022, 2018.
Looper	2012	Unspecified	Machine	✓	X	X	<	2074, 2044.
Star Trek	2009	Blackhole	Spaceship	?	✓	X	<	2387, 2233, 2268.
Time Traveler's Wife	2009	Stress	Genetic disorder	✓	X	X	<>	Henry's lifetime.
Zathura	2005	Blackhole	Boardgame	?	X	X	<	Walter's lifetime.
Lost in Space	1998	Temporal distortion	Machine	✓	✓	X	<>	Will's lifetime.
12 Monkeys	1995	Unspecified	Machine	✓	X	?	<>	2035, 1996, 1990, WWI.

Timecop	1994	Unspecified	Machine	✓	✓	✓	<>	2004, 1994, 1929 1863.
Back to the Future: Part II	1989	Flux capacitor	DeLorean car	✓	✓	✓	<>	2015, 1985, 1955.
Bill and Ted's Excellent Adventure	1989	Circuits of Time	Phonebooth	✓	X	X	<>	2688, 1989, 1901, 1879, 1863, 1810, 1805, 1488, 1429, 1209, 410 BC, 1,000,000 BC.

Note: Adapted from the Internet Movie Database (IMDb) and study review of ten films. Copyrighted 2022 by IMDb.com, Inc.

GP = grandfather paradox.

D = time travel direction.

? = unknown presence.

SD = self-dealing.

✓ = present in film.

< = backward travel in time.

SC = self-contact.

X = not present in film.

> = forward travel in time.

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## ENDNOTES:

<sup>1</sup> Editor’s Note: CINEJ previously published article dealing with films and aspects of time travel in their narrative such as (Audissiono, 2014; Uner and Erdogan, 2021). This current article is the most comprehensive survey of the topic so far. The popularity of the time travel narratives continues with recent films like *Arif v. 216* (Örsler, M. & Kennedy-Karpat, 2020) or *Flash* (2023)