

Presentism  
eternalism and  
special relativity  
philosophy essay



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In this essay I hope to show that it is not necessarily true that Einsteins Special Theory of Relativity refutes presentism. It is not my aim to show that presentism is correct, nor is it my aim to show that eternalism is incorrect. I aim to show that it is naïve for eternalists to assume that STR favours the eternalist's view on time over the presentist's view. I will start this essay by explaining and defining the views of the presentist and eternalist. For any valuable work to be done in defending presentism against the claims of STR, I believe a sound understanding of what both presentism and eternalism entails is needed. I will make it clear how presentism and eternalism differ and make it clear what is meant when they say ' something exists'. I will then move onto discussing STR. I hope to explain STR in as clear a manner as possible, although I will not be explaining it in the depth found in physics papers. I will consider the postulates that make up STR and consider the important paradoxes these lead to. In particular, I will discuss the paradox of the speed of light and the paradox of simultaneity, as these are a concern to the presentist's view. With STR adequately explained (in enough detail that I may hope to defend Presentism against its claims) I will move onto considering the arguments Philosophers have brought forward in an attempt that STR supports a 4D model of the universe, and as a result refutes Presentism. I will consider the Rietdijk-Putnam argument, and Penrose's version of this argument, ' The Andromeda Paradox'. By explaining these arguments I hope to show clearly the problem that STR poses for presentism. Finally, I will consider two defenses[1]of Presentism against the claims of STR. The first defense is brought forward by Hinchliff (2000), and the second defense is brought forward by Markosian (2004). I find the latter defense to be the more compelling, and I will explain why I think this. I will conclude by <https://assignbuster.com/presentism-eternalism-and-special-relativity-philosophy-essay/>

offering my reasoning for thinking that STR does not necessarily refute presentism. I start this essay by defining the terms presentism and eternalism, and by discussing what they mean when they say 'something exists'.

## **Section 1- Defining Presentism and Eternalism**

I start this section by considering presentism. To show what presentism actually entails, I think it's important to first consider where the view comes from. Presentism can be traced back to McTaggart's famous 1908 paper 'The Unreality of Time'. In this paper, McTaggart highlights two ways in which we experience time. These ways form what he calls the A-series and B-series. The A-series is a tensed series where events are arranged using tensed properties such as past, present or future. The B-series is a tenseless series where events are arranged relationally using terms such as before or after. McTaggart claims that the A-series is essential to time as events only change with respect to their tensed properties, and time must involve change (p26, McTaggart, 1927). No change occurs in the B-series. If event A is before event B, then event A will forever be before event B. Those who claim that we should talk about time using tenses, and claim that the A-series is essential to time are known as A-theorists. Those who think tensed expressions are reducible to tenseless expressions, and claim that the B-series is essential to time are known as B-theorists. Some A-theorists advocate presentism, and some B-theorists advocate eternalism. Of course, it is not always the case that A-theorists are presentists, and not always the case that B-theorists are eternalists. Zimmerman notes two other views that the A-theorist could hold; the growing-block theory and the moving spotlight

theory (Marcus, 2012). These will not be considered in this essay. Now that I've explained where eternalism and presentism come from, I will move onto actually defining presentism.

There are a number of ways in which presentism has been defined. In this essay, I will take presentism as the view that 'only things in the present exist' or as Markosian (2004) defines it:

"Necessarily, it is always true that only present objects exist" (p1, Markosian, 2004)

The presentist distinguishes the present as being special over the past or the future, in that it is only objects in the present exist. The presentist believes in an absolute (universal) present, where all events happening now, exist. No events (or objects) that exist, exist in the past or future. We can see why the presentist will claim that the A-series is essential to time and why the B-series is not. Only in the A-series can objects or events be located (temporally) in a present moment. The B-series does not treat the present as being any more real than the past or future. It's hard to see what would count as the present in the B-series, as all events are arranged relationally as either before or after other events.

It's important to note here that "necessarily, it is always true that only present objects exist" is not the same as saying "only the present exists" as some have interrupted it (e. g. Davidson, 2003). The presentist may say that the past and future exist (in some sense of the word 'exist'), but no objects exist in the past or future. Nor does presentism equal the tautology that is "only present objects exist at present" (Vallicella, 2003). Nor is it the claim <https://assignbuster.com/presentism-eternalism-and-special-relativity-philosophy-essay/>

that all objects that have existed, and that will ever exist, exist in the present now. It's easy to see the difference between these statements when the flow of time is taken into account (the presentist view accounts for the flow of time, whereas the eternalist view does not). The diagram below shows the presentist's view.

In diagram (a), the present moment (now) happens to be a moment in 1967. The presentist would say that "only things (or objects) in this moment in 1967 exist". Nothing exists in the past or future.

In diagram (b), the present moment (now) happens to be a moment in 2013. The presentist would say that "only things (or objects) in this moment in 2013 exist". No objects exist in the past (which now includes 1967) or future.

Now that I have defined presentism and made it clear how I will be referring to it in this essay, I will move onto defining eternalism and in the process, contrast it with presentism.

Eternalism can be thought of as the main rival to presentism. As mentioned previously, the eternalist sees the B series as being essential to time and denies the existence of the A-series. Eternalism is the view that objects in the past and future are equally as real as objects in the present.

"objects from both the past and the future exist just as much as present objects" (Markosian, 2010)

Others have said that "Eternalism is the view that all times are real" (p326, Ladyman, 2007), but I see this is open to further interpretation. I will be

interpreting "all times are real" as meaning "objects can equally exist in the  
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past or future". It's not hard to see how this contrasts with the presentist's view, nor is it hard to see why eternalists accept the B-series. All times in the B-series are treated equally. There's no special property given to a present moment. Eternalism is sometimes referred to as the block universe view, as the past, present and future all exist in a closed 4-dimensional Space-time block (p2, Peterson & Silberstein, 2009). Presentism, on the other hand, may be thought of as endorsing a 3D view of the universe. As Valente (2012) puts it in "The Relativity of Simultaneity and Presentism":

"For an eternalist (four-dimensionalist) a 3D object is just a slice of a four-dimensional (4D) worldline of a timelessly existing 4D world (or block universe) in which all the slices (i. e. the 3D objects) are actually all given at once. For a presentist, the 3D world consists of all 3D objects and fields existing simultaneously at the moment 'now' or 'present'." (p4, Valente, 2012)

Presentism and Eternalism can be visually imagined as in the diagram below. Presentism features a present 'moving' with the flow of time. Time to the eternalist can be imagined as a block[2] which contains the past, present and future, along with all objects and events.

(Savitt, 2008)

The differences between presentism and eternalism can be further shown by using an example. I will consider the example used by Lombard (2009) in his paper "Time for a Change: A polemic against the Presentism - Eternalism Debate". Let's take the statement 'Dinosaurs exist'. Dinosaurs are not

included on the presentist's list of things or objects that exist. Dinosaurs are <https://assignbuster.com/presentism-eternalism-and-special-relativity-philosophy-essay/>

however included on the eternalist's list of things or objects that exist. Of course, as Lombard points out, the eternalist is not saying that "there are dinosaurs, that is, right now" (p58, Lombard, 2009). As the eternalist believes that objects exist in the past, in the same way as they exist in the present, they must insist that "dinosaurs nevertheless exist" (p58, Lombard, 2009). This is point that can lead to confusion. It's important to understand what we mean by the word 'exist' in the statement 'Dinosaurs exist'.

Markosian (2004) gives a brilliant explanation of what we should mean by 'exist' in his paper "A Defense of Presentism". In what follows, I will consider this explanation and make it clear what 'exist' means.

Markosian highlights two ways in which we may think about the word 'exist'. The first sense in which we may think of the statement 'Dinosaurs exist' is what Markosian calls the 'temporal location sense'. Under this interpretation, 'Dinosaurs exist' is synonymous with 'Dinosaurs are present'. Under the temporal location sense of the word, the eternalist will agree that 'no non-present objects exist right now' i. e. 'Dinosaurs do not exist right now'. However, this is not what we will be taking the eternalist to mean when they say 'Dinosaurs exist'. Markosian calls the other sense of 'exist', the ontological sense. Under this interpretation 'Dinosaurs exist' is synonymous with dinosaurs are "now in the domain of our most unrestricted quantifiers, whether it happens to be present...or non-present..." (p2, Markosian, 2004). The eternalist will agree with this. The presentist will argue that dinosaurs are not "now in the domain of our most unrestricted quantifiers", as dinosaurs do not exist in the present (now), and only things that exist in the present will be included in the domain of our most

unrestricted quantifiers. Under this interpretation of 'exist' the disagreement between the presentist and the eternalist becomes clear.

According to presentism, dinosaurs do not exist i. e. dinosaurs are not included in "the things that our most unrestricted quantifiers range over".

According to eternalism, dinosaurs do exist i. e. dinosaurs are included in "the things that our most unrestricted quantifiers range over". For the

Presentist "what objects our most unrestricted quantifiers range over is a changing matter of fact" (p13, Kehler, 2011). This is because the objects of the present are forever changing as time passes (in line with change in the A-series, as discussed earlier in this essay). The opposite is true for the eternalist. What objects our most unrestricted quantifiers range over never changes (in line with the unchanging B-series as discussed earlier).

With presentism and eternalism defined and discussed, and the difference between the two made clear by discussing the meaning of 'exist', I will move onto the next section of this essay. In the next section, I will be considering Einstein's Special Theory of Relativity (STR). I will be considering the postulates that make up Einstein's theory and discussing some of the paradoxical consequences of these. I will then discuss the arguments Philosophers have come up with in an attempt to show that STR implies a 4D view (eternalism). These arguments will be the Rieldik-Putnam argument, and I will construct my own version of Penrose's Andromeda Paradox. Once STR is made clear, I will conclude the section by considering what these arguments mean for both presentism and eternalism.



## **Section 2 – The Special Theory of Relativity: the Thorn in Presentism’s Side**

As this is a Philosophy essay, and not a Physics paper, I will not be going into any great detail in explaining Einstein’s Special Theory of Relativity (STR), and I’m unlikely to do it justice. I will, however, explain the theory in enough detail so to allow me to adequately discuss the arguments in support of the 4D model and against presentism. This will also help me in defending presentism in the final section of this essay. Without adequate knowledge of STR and its paradoxical nature, it’s unlikely I, or any other philosophers, would be able to even start defending presentism against its claims. I start by considering the postulates behind STR.

In 1905, Albert Einstein presented STR in his paper “ On the Electrodynamics of Moving Bodies”. The theory itself is derived from a number of postulates, of which two can be said to “ form the heart of Special Relativity” (Hamilton, 1998). The first postulate is the Principle of Relativity:

“ There is no absolute rest frame of reference” (p1, Lee, 2012)

The second postulate is the Principle of Constancy of the Speed of Light:

“ The speed of light  $c$  is a universal constant, the same in any inertial frame” (Hamilton, 1998)

Together, these postulates open up paradoxes which lead Philosophers to the thought that STR implies 4D view of time (eternalism). Inertial frame (or inertial reference frame) here will be defined as ‘ frames of reference in which Newton’s first law of motion is observed’. Newton’s first law of motion

is that “ every object will remain at rest or in uniform motion in a straight line unless compelled to change its state by the action of an external force” (Benson, 2010). Before Special Relativity, the speed of light was thought to depend on the speed of the person observing and the speed of the source from which the light came (Lawerence, 2002). An experiment was conducted in the late 1800’s by Michelson and Marley in the hope that this was correct (Carlip, 1996). As the earth orbits around the sun at . 01% the speed of light (Lawerence , 2002), Michelson and Marely hoped they would be able to show that a light beam moving along with the orbit of the earth would be . 01% slower than a light beam going perpendicular to the orbit of the earth. To their surprise, this was not the case. Every attempt to find a difference in the speed of light failed.

“ The light always took exactly the same amount of time to travel down either leg” (Lawerence, 2002)

Since light always travelled at the same speed in the experiments[3], Einstein took the constancy of the speed of light to be a fact of nature, and from it, formed the second postulate of STR. Now that the history behind STR has been discussed, and the postulates of STR have been explained, I will move onto discuss how these postulates lead to some interesting paradoxes.

The second postulate leads to an interesting paradox. In order to understand the problems that STR poses for presentism, it’s important to understand what this paradox entails. I will construct this paradox by way of example, based on the example used by Hamilton (1998). Let’s pretend I’m standing on the surface of the Earth[4]. I’m wearing a helmet on my head. The helmet

has the ability to emit a powerful flash of light. My friend ' Bob' has a super car which just so happens to be capable of moving at a constant half the speed of light ( $1/2c$ ). Bob is moving in a straight line from my right to my left. At the very point that Bob passes me, my helmet lets out a flash of light. This light expands at the same speed ( $c$ ) in all directions. According to the second postulate of STR, the speed of light is constant for both of us. This means that from my frame of reference, the light expands at the same speed in all directions, and that from Bob's frame of reference the light expands at the same speed in all directions (even though he is moving at half the speed of light away from the light source). The paradox here is that, from our own frame of reference, we both believe we are at the centre of the flash of light. It's not possible that we are both at the centre of the flash of light. Before considering the solution to this paradox, I will discuss the example of this paradox as shown by Penrose's (1989) ' Andromeda Paradox'.

Using his ' Andromeda Paradox' argument, Penrose attempts to show that the Universe is a pre-determined 4D Space-time block, which causes problems for presentism. Penrose (1999) asks us to consider two people (Jack and Jill) walking past each other on the street. Jack is walking towards the Andromeda Galaxy[5]and Jill is walking away from the Andromeda. From STR it can be said that Jack and Jill have different ideas about what events are presently happening in the Andromeda Galaxy. It would take light from the Andromeda Galaxy 2.5 million years to reach either person, and as such, they don't know what events are happening, but whether or not they know of the events happening is of no importance here. An event on Andromeda

that Jack thinks is present (from his frame of reference), is an event that Jill still thinks is yet to happen (from her frame of reference). To Jill, the event is in the future. Penrose calculates the event is  $5\frac{3}{4}$  days behind in time for Jill.

“ One can calculate that their planes (or spaces) of simultaneity at the instant at which they pass each other on Earth intersects the history of the world line of Andromeda about  $5\frac{3}{4}$  days apart” (Savitt, 2008)

Our planes of simultaneity[6]are different. The diagram below shows this:

(modified from BobC\_03, 2012)

With the paradoxes explained, I can consider what they mean for both Presentism and Eternalism, and show how the minowski Universe appears to favour Eternalism. It's possible that an event in Andromeda is in the present (and according to Presentism does exist) for Jack, but the same event is in the future (and according to Presentism does not exist) for Jill. Here lies the problem that STR its paradoxical nature poses for Presentism. As can be seen, the problem has at the heart of it the second postulate of STR. No matter what speed they walk past each other in opposite directions, if Jack and Jill were to measure the speed of light (in their own frames of reference), they would get the same result.

“ no matter at what speed or in which direction they or the source of the light are moving, must come to the same result when they measure the speed of light” (Savitt, 2008)

If it's not known whether an event is present or past, then how can

presentists hold the view that only things in the present exist? What things  
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are in the present are both different for Jack and Jill. In an attempt to solve this, the presentist might try to say that the event is taken to be present or future depending on whether it is present or future in the “ absolute rest frame” (p5, Eichman, 2007). However, according to STR there is no absolute rest frame, or absolute simultaneity, and therefore, there can be no absolute present.

If we assume that STR is true, the following argument against Presentism can be constructed:

“(1) STR is true.

(2) STR entails that there is no such relation as absolute simultaneity.

(3) If there is no such relation as absolute simultaneity, then there is no such property as absolute presentness.

(4) Presentism entails that there is such a property as absolute presentness.

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(5) Presentism is false.”

(p29, Markosian, 2004)

Now that STR has been discussed adequately and that the trouble it poses for Presentism has been highlighted, I can move onto the final section of this essay. In the final section, I will consider two ways in which philosophers have tried to defend presentism against the seeming threat posed by STR. The first defense is brought forward by Mark Hinchliff (2000) in his paper “ A

Defense of Presentism in a Relativistic Setting". The second defense, and the defense which I find more compelling, is brought forward by Ned Markosian (2004) in his paper "A Defense of Presentism". I will explain why I find this defense more compelling, and why I think Hinchliff's defense doesn't work.

### **Section 3 – Defending Presentism**

The first defense against STR that I will consider is what Hinchliff calls 'The Point Model'. In the point model, Hinchliff claims that in STR "the present is to be identified with the here-now" (p579, Hinchliff, 2000). In other words, a presentist can argue that in STR, only a single space-time point exists; the here-now. Hinchliff does not hold this view himself and says that he knows "of no one who actually holds this view" (S579, Hinchliff, 2000). Nevertheless he feels it's worthy enough to discuss. A standard objection against this model is to say that it's "lonely", in that nothing but the here-now exists. This objection is easily refuted however. Saying it's lonely is akin to rejecting solipsism because there's no other people. Something stronger is needed in order to reject either the Point Model or solipsism. Putnam (1967) offers a better objection against the view however. Putnam says that anything that is past must have previously been present (p246, Putnam, 1967). Under Point presentism however, there are events in the past which have never been present. Therefore, Point Presentism "" violates the conceptual truth" that what is past was present" (S579, Hinchliff)

This can be shown by way of example. Let's pretend an event occurs which is space-like separated from my here-now. It is therefore not in the present from my frame of reference. When time 'moves on', the event is however

included in my past here-now, without ever being in the present, and therefore violated a conceptual truth.

A presentist may try to argue that point presentism does not violate a conceptual truth, but this would lead them to trouble when trying to explain how certain objects of the present (objects that exists) cease to exist (fade into the past). I do not think this is a suitable defense of presentism against STR. I think if a presentist is to hold their view, then they must look for a way of fitting the outcomes of STR into that view. Point presentism attempts to change presentism in such a way that makes it compatible with STR, and fails to do so. Presentists should rather attempt to change STR in such a way that makes it compatible with presentism. I believe this is what Markosian (2004) attempts to do in his defense of presentism. I will now consider this defense and explain why I find it more compelling than Point Presentism.

In his defense of presentism, Markosian (2004) considers whether STR contains “ enough philosophical baggage built into it to ... entail the proposition that there is no such relation as absolute simultaneity” (p31, Markosian, 2004). If this is not the case, then there is no reason to assume that STR poses problems for presentism. Marksoian asks us to consider two different types of STR (p31, Markosian, 2004):

STR+ : This version of STR does have enough philosophical baggage built into it to entail that there is no such thing as absolute simultaneity.

STR-: This version of STR does not have enough philosophical baggage built into it to entail that there is no such thing as absolute simultaneity.

Markosian rejects STR+ and accepts STR-. I believe the reasons for why he thinks this is key to any presentist wishing to defend their view against STR. All empirical evidence which suggests that STR+ is true, equally supports STR- (p31, Markosian 2004). Just because it is “ not physically possible to determine whether two objects or events are absolutely simultaneous” (p31, Markosian) does not entail that there is no such thing as absolute simultaneity, and no absolute present. Consider the ‘ Andromeda Paradox’ as explained earlier. From their own frame of reference (or plain of simultaneity) their idea of what event is present is different[7]. The presentist is able to agree with this view. Agreeing with this, does not mean they must reject their view on absolute simultaneity or their view that an absolute present exists. It may be the case that an absolute rest frame is not accessible to us. The presentist can reject the first postulate of STR. With this said, it seems the eternalist is unable to refute presentism by appealing to STR, and it looks likely that any such argument will end in a stalemate. The eternalist and presentist view with regards to STR can be summed up as follows:

Eternalist - STR is true and entails there is no absolute simultaneity or absolute present. Therefore, presentism is incorrect.

Presentist - STR being true does not entail there is no absolute simultaneity or absolute present. It entails that these are not accessible to us, but nonetheless may still exist. According to me, they do exist.



It's impossible to say whether either view is true or false (How would one prove that there is or isn't an absolute rest frame?), resulting in a stalemate. It's certainly seems that it's not necessarily true that STR refutes presentism.

## **Conclusion**

In this essay, I have achieved what I had set out to do. I have defined and explained what both presentism and eternalism entail. I've made it clear what the differences between the two are and I've shown that it's important to understand what the word 'exists' mean when discussing both views. I have also explained and discussed the Special Theory of Relativity. In doing so, I have shown how the paradoxes it leads to, causes problems for presentism, and have shown why the eternalist might try to attack presentism using STR. Finally, I considered ways in which the presentist may try to defend their position against STR and the eternalist. I have shown that any attempt by the eternalist to use STR against presentism will result in a stalemate. The empirical evidence which supports STR+ equally supports STR-, and the presentist only needs to reject STR+ and accept STR-. The problem with using STR to attack presentism is that STR+ must be assumed to be true. It is not necessarily the case that STR+ is true, and the presentist may use this point in defending their position. STR+ (or a theory with the same consequences) may be shown to be true someday, but until that day comes, the eternalist should make use of some other weapon in trying to attack presentism.

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