A Disproof of the Special Theory of Relativity

By Robert Sungenis, Ph.D.

On the Internet one can find many different kinds of expositions of Einstein's theory of Relativity. Below is one I discovered written by noted physicist, John D. Norton of the University of Pittsburgh.

http://www.pitt.edu/~jdnorton/teaching/HPS_0410/chapters/Special_relativity_basics/index.html

Dr. Norton is especially valuable in this regard because he explains things very well for his students. As such, we are able to get to the essence of Relativity theory very quickly. It is safe to say that Dr. Norton is as good a representative of Einstein's theory as can be found today.

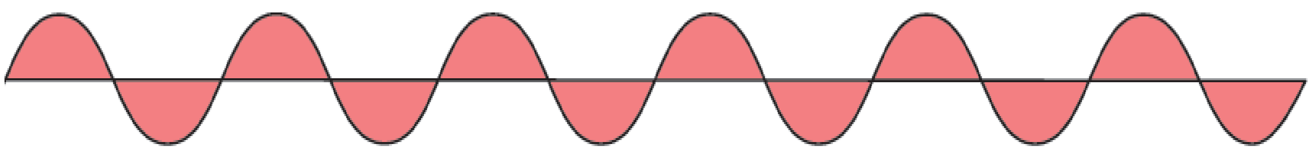
There is a fundamental flaw in the Special Theory of Relativity. I will point out that flaw by going through the arguments Dr. Norton presents.

Dr. Norton: II. The Light Postulate

All inertial observers find the same speed for light.

R. Sungenis: Dr. Norton has not proven this, especially since experiments like the Michelson-Morley, Sagnac, and even the Global Positioning Satellites, contradict this premise. But we will bypass this postulate for now.

Dr. Norton: That speed is 186,000 miles per second or 300,000 kilometers per second. Because this speed crops up so often in relativity theory, it is represented by the letter "*c*".



That Einstein should believe the principle of relativity should not come as such a surprise. We are moving rapidly on planet earth through space. But our motion is virtually invisible to us, as the principle of relativity requires.

R. Sungenis: Dr. Norton has also not proven this premise, especially since no experiment has ever shown that the Earth is moving, but we will bypass this issue for now.

Dr. Norton: Why Einstein should believe the light postulate is a little harder to see. We would expect that a light signal would slow down relative to us if we chased after it. The light postulate says no. No matter how fast an inertial observer is traveling in pursuit of the light signal, that observer will always see the light signal traveling at the same speed, *c*.

R. Sungenis: This has never been proven experimentally, especially since no observer has ever traveled fast enough to detect that a light beam remains at *c*. Einstein, like the rest of us, is at the mercy of experiments like Michelson-Morley, Sagnac, Hefele-Keating, and a host of others that calibrate the movement of electromagnetic waves based on certain presuppositions concerning inertial and non-inertial environments, none of which have been proven.

Dr. Norton: The principal reason for his acceptance of the light postulate was his lengthy study of electrodynamics, the theory of electric and magnetic fields. The theory was the most advanced physics of the time. Some 50 years before, Maxwell had shown that light was merely a ripple propagating in an electromagnetic field. Maxwell's theory predicted that the speed of the ripple was a quite definite number: *c*.

The speed of a light signal was quite unlike the speed of a pebble, say. The pebble could move at any speed, depending on how hard it was thrown. It was different with light in Maxwell's theory. No matter how the light signal was made and projected, its speed always came out the same.

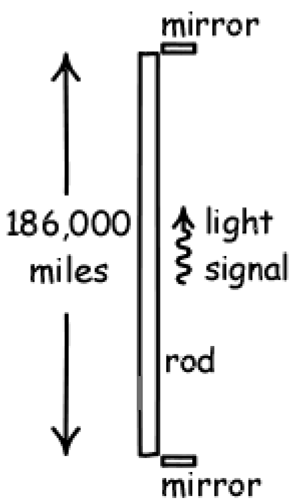
R. Sungenis: Correct, but Maxwell's theory of *c* was in relation to ether (something Einstein rejected). In other words, Maxwell's *c* remained *c* because he believed light moved in a rest frame called ether.

Dr. Norton: The principle of relativity assured Einstein that the laws of nature were the same for all inertial observers. That light always propagated at the same speed was a law within Maxwell's theory. If the principle of relativity was applied to it, the light postulate resulted immediately.

R. Sungenis: But how does one determine that he is an "inertial observer"? To be an inertial observer (*i.e*., one that is either motionless or moving at a uniform rate) one can determine so only if he knows whether the object against which he is measuring himself is motionless, in uniform movement, or accelerating.

Dr. Norton: A Light Clock

One cannot have both of Einstein's postulates and leave everything else unchanged. We can only retain both without contradiction if we make systematic changes throughout our physics. Let us begin investigating these changes, which include our basic, classical presumptions about space and time. One of them is that we learn that a moving clock runs slower.

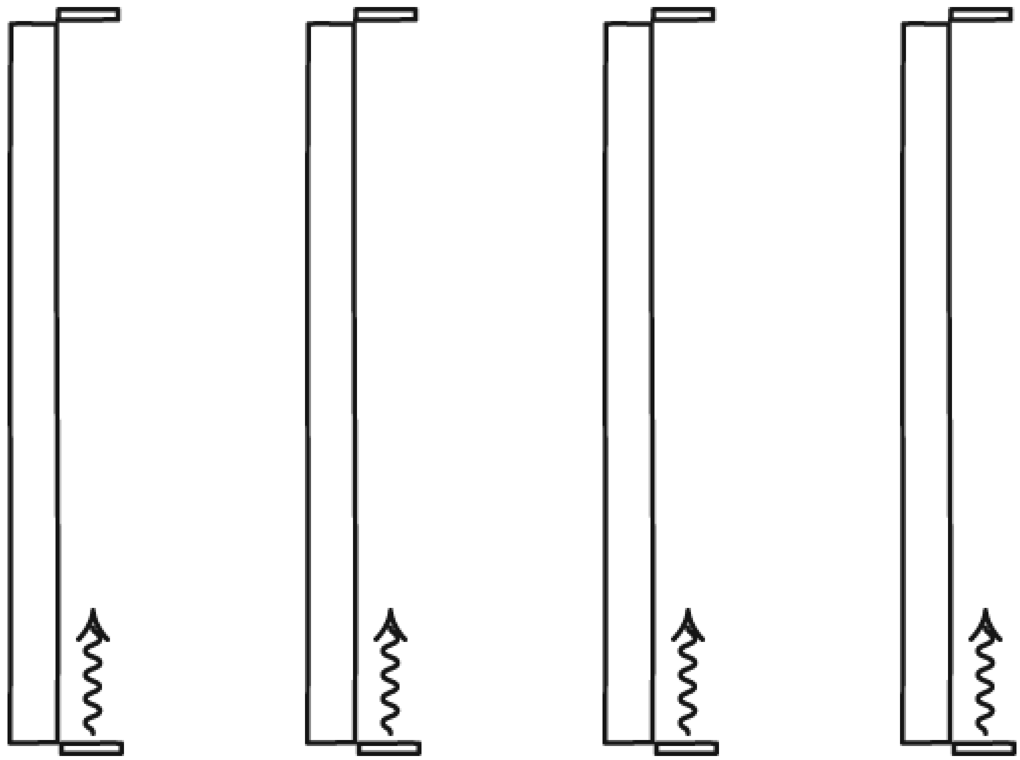


To see how this comes about, we could undertake a detailed analysis of a real clock, like a wristwatch or a pendulum clock. That would be difficult and complicated--and unnecessarily so. All we need is to demonstrate the effect for just one clock and that will be enough, as we shall see shortly, to give it to us for all clocks. So let us pick the simplest design of clock imaginable, one specifically chosen to make our analysis easy.

R. Sungenis: This is an assumption without proof. One clock cannot stand for all clocks since various clocks work by different mechanisms. A "light clock" is going to work differently than a mechanically-geared clock, a cesium clock, a quartz clock, or a sundial.

Dr. Norton: A light clock is an idealized clock that consists of a rod of length 186,000 miles with a mirror at each end. A light signal is reflected back and forth between the mirrors. Each arrival of the light signal at a mirror is a "tick" of the clock. Since light moves at 186,000 miles per second, it ticks once per second.

Here are some light clocks ticking:



Light Clocks are Slowed by Motion

What happens when light clock is set into rapid motion, close to the speed of light. It is easy to see without doing any sums that the light clock will be slowed down. That is, it will be slowed down in the judgment of someone who does not move with the light clock.

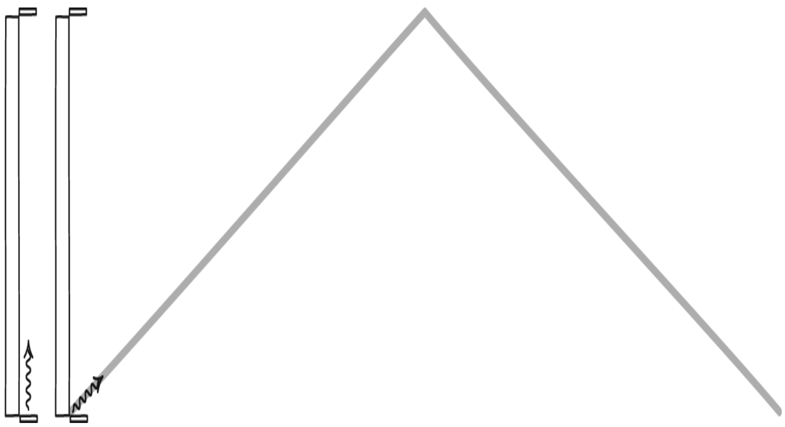
We will take the simple case first of a light clock whose motion is perpendicular to the rod. The light clock will function as before. But now there is an added complication. The light signal leaves one end of the rod and moves toward the other end. But since the rod is moving rapidly, the light signal must now chase after the other end as it flees. As a result, the light signal requires more time to reach the other end of the rod. That means that the moving light clock ticks more slowly than one at rest.

R. Sungenis: It is misleading to say that the "moving light clock ticks more slowly than one at rest." This goes back to the notion of a "clock." It is merely a device that has a consistent pulse. For example, in a pendulum clock, the pulse is the pendulum going back and forth. In a light clock it is the light beam going back and forth. These devices don't determine time. They merely measure pulses that we then apply to time. What we know intuitively is that time passes regardless whether the pendulum clock or the light clock calibrates it. So, it may be innocuous to say a "clock ticks more slowly" but it is not correct to imply that time itself slows down when a light clock moves. A clock that ticks more slowly has little to do with the elapsed time. Dr. Norton's course tells us that movement itself slows a clock, as if movement has some magical power to change the ticking of a clock. But the only thing we know for sure is that time stays the same but the light beam, because it is a physical entity that propagates against other physical entities, may slow down due to those encounters.

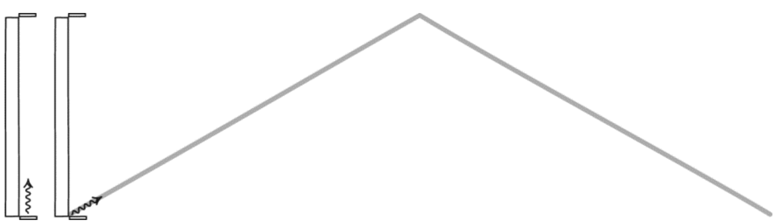
Briefly, the only thing we can take away from Dr. Norton's proposal is that light has a handicap if we use it as a clock. We might say that there is a Luminal Uncertainty Principle just as there is the Heisenberg Uncertainty Principle in regards to determining the position and velocity of an electron. Both involve the weakness of light to be a measuring stick.

Dr. Norton: Remember the light postulate. It tells us that the light always goes the same speed. That the rod along which it bounces is moving rapidly will not alter the speed of the light.

Here's an animation that shows a light clock at rest and a second light clock that moves perpendicular to its rod. The light signal in the moving clock chases after the rod. To reach the other end, it covers more distance and, as a result, required more time.



Here's a smaller version in case the big one is too much for your screen.

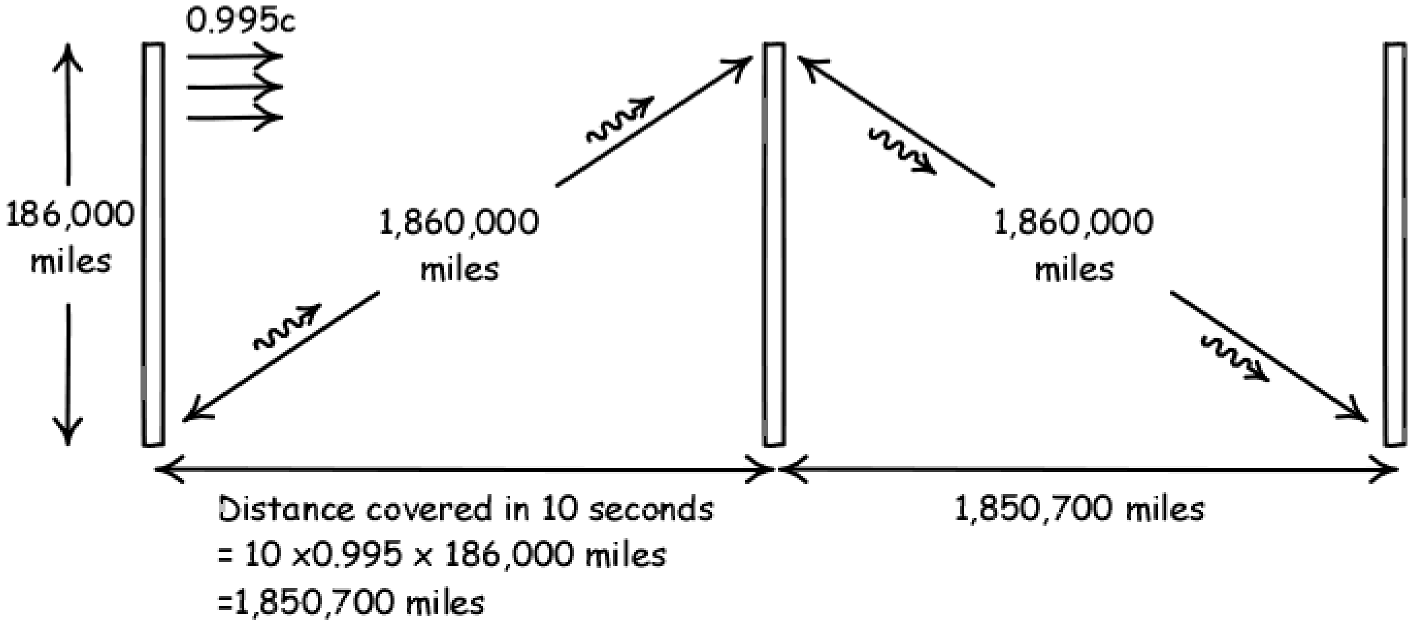


If you watch the animation carefully, you will see that the moving light clock ticks at exactly half the speed of the resting clock. That is because the light signal of the moving clock has to cover twice the distance to go from one end of the rod to the other.

To get this doubling of the distance takes a careful adjustment of the speed of the moving clock. It turns out that the moving clock has to be traveling at 86.6% the speed of light.

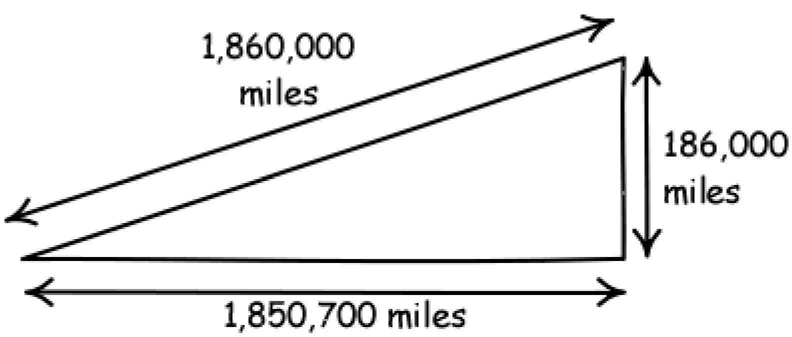
Just how much slowing do we get for some particular speed? That question turns out to be easy to answer with a little geometry. The trick is to figure out how much distance the light signal has to travel to reach the other end of the rod. Once we know that distance, we know the time taken, since light always travels at 186,000 miles per second.

To make things interesting, let's take a very high speed: 99.5% the speed of light. (We'll write this compactly as "0.995c.") An observer traveling with the clock will still see the light signal bounce backwards and forwards between the mirrors as before. This process looks quite different from the perspective of an observer who stays behind and does not move with the clock. The path traveled by the light will now look like this:



That observer at rest will agree with one that moves with the rod: a light signal leaves one end of the rod and arrives at the other end. But the observer at rest judges that end to be rushing away from the light signal at 99.5% the speed of light. A quick calculation shows that that the signal will now take 10 seconds to reach the other end of the rod.

To see this, note that in ten seconds the rod will move 1,850,700 miles, as shown in the figure above. So to get to the end of the rod, the light signal must traverse the diagonal path shown. A little geometry tells us that a right angle triangle with sides 186,000 miles and 1,850,700 miles will have a diagonal of 1,860,000 miles.



Pythagoras' theorem tells us the diagonal is 1,860,000 miles since

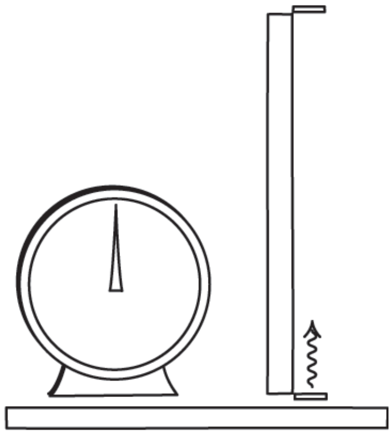
1,860,000 miles2
= 1,850,700 miles2 + 186,000 miles2

Since light moves at 186,000 miles per second, it will need ten seconds to traverse the diagonal.

Setting the arithmetic aside, the result is simple. Since the light signal must travel so much farther to traverse the rod of a moving clock, it takes much longer to do it. So a moving light clock ticks slower. In this case, for a clock moving at 99.5% the speed of light, it ticks once each ten seconds instead of once each second.

R. Sungenis: All this tells us is, if one moves his experimental apparatus near the speed of light, he cannot use light as his clock. Light has a handicap because it can only travel 186,000 miles per second. Light would only be accurate if it moved from one place to another instantaneously. A moving clock may tick slower, but that doesn’t tell us that ‘movement’ is the primary cause of the slowing or that time itself is slowing down.

Dr. Norton: All Moving Clocks Are Slowed by Motion



A simple application of the principle of relativity shows that all clocks must be slowed by motion, not just light clocks. We set a clock of any construction next to a light clock at rest in an inertial laboratory.

We notice that they both tick at the same rate.

That must remain true when we set the laboratory into a different state of inertial motion.

But since the light clock has slowed with the motion, the other clock must also slow if it is to keep ticking at the same rate as the light clock.

You might be tempted to say that the other clock would not keep pace with the light clock. But then you would have devised a device that detects absolute motion, in contradiction with the principle relativity. That device would pick out absolute rest as the only state in which the two clocks run at the same rate.

R. Sungenis: Dr. Norton is using the *petitio principii* argument, or what is otherwise known as 'using as proof the very thing one is trying to prove.' One cannot use the "principle of relativity" to say that two clocks cannot have different calibrations of time when one hasn't first proved the principle of relativity and disproved absolute motion. Dr. Norton, ironically, is making Relativity an absolute in order to determine that everything is relative. Below we will observe Dr. Norton's basis for using the principle of relativity as his absolute.

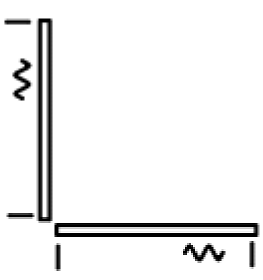
Dr. Norton: Moving Rods Shrink in the Direction of Their Motion

So far, we have considered a light clock whose rod is perpendicular to the direction of its motion. If we now consider a light clock whose rod is oriented parallel to the direction of motion, we will end up concluding that its rod must shrink in the direction of its motion. To get this result, we proceed by reasoning just as we have before. Once again we have a light signal on a moving clock, chasing after an end of a rod that flees rapidly. We now add in the extra complication that the rod is parallel to the direction of motion of the clock. That extra complication will force us to conclude that the rod has shrunk.

Getting to this result uses no new ideas or methods. It is just messier, so if you are not too bothered by details piling up, work through what follows. Or, if you are not so brave, you can skip to the end and just read the final result.

To get to the result, we need two steps:

First Step: Light clocks oriented perpendicular to one another run at the same speed.



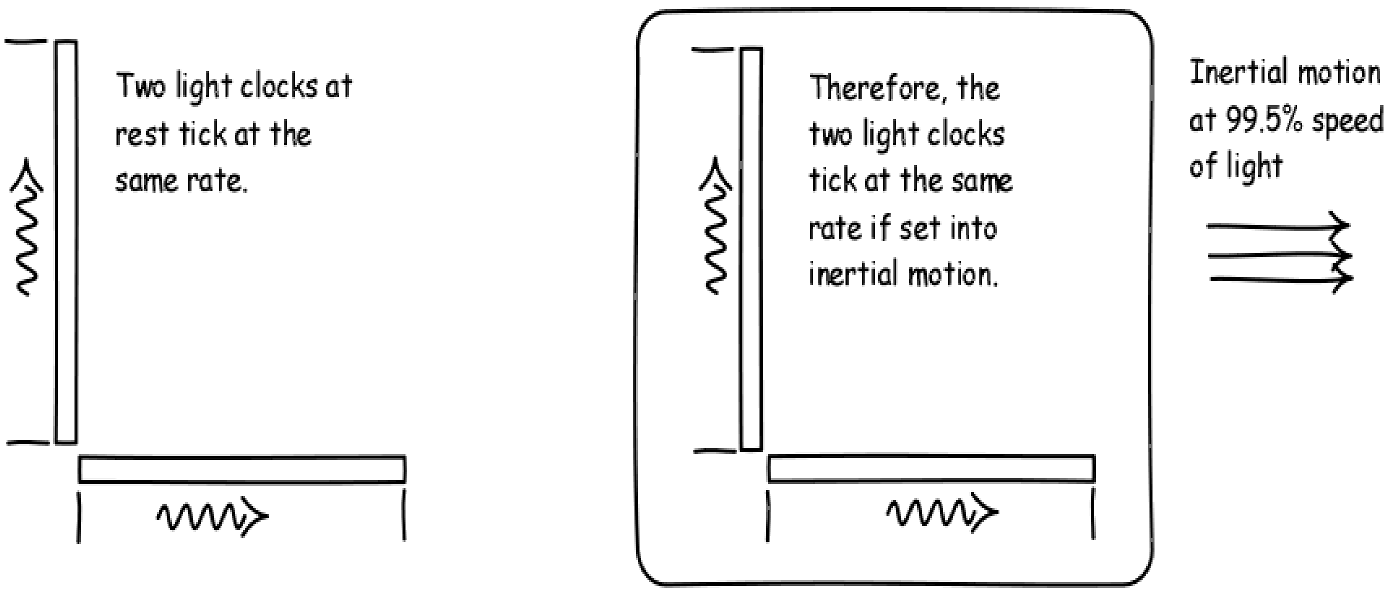
Take the light clock considered above. Image a second, identical light clock with its rod oriented parallel to the direction of the motion. Once again the principle of relativity requires that both clocks run at the same speed. We could just leave it at that--an application of the earlier result. However it is reassuring to go through it from scratch.

R. Sungenis: The "principle of relativity" cannot require anything of clocks. Clocks run the way clocks run. If they slow down or remain the same it has not been determined that they do so based on the "principle of relativity."

Dr. Norton: To begin, we don't need the principle of relativity to see that the clocks at rest run at the same rate. They will run at the same rate simply because they are the same clocks oriented in different directions. That just follows from the isotropy of space. All its directions are equivalent. So the orientation of the clock cannot affect its speed.

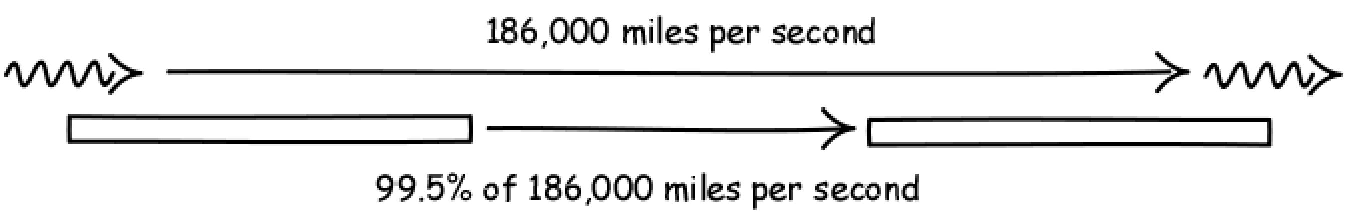
R. Sungenis: This is another assumption without empirical proof. Dr. Norton has not determined that space is "isotropic" or that all its directions are "equivalent." He wants space to be isotropic since this will allow him to say that movement causes clocks to slow down. If space is anisotropic, then the slowing down of a clock may be due to the clock's orientation in space.

Dr. Norton: Now imagine that we take the entire system of the two clocks and set it into rapid motion at, say, 99.5% the speed of light, in the direction of one of the light clocks.



Second Step: The rod oriented in the direction of motion must shrink.

We know from the earlier analysis that a light clock (indeed any clock) moving at 99.5% the speed of light is slowed so that it ticks only once in ten seconds. So now we know that the light clock oriented parallel to the direction of motion must tick once each ten seconds. But that cannot happen if everything is just as we describe it. Imagine the outward bound journey of the light signal.



An observer moving with the two light clocks must find them to continue to run at the same rate. We now do need the principle of relativity to establish this. Our earlier isotropy argument doesn't work anymore, since the two directions of the clocks are intrinsically different. One is perpendicular to the direction of motion; the other is parallel to it. The principle of relativity requires that they run at the same rate. For, if they ran at different rates, the device would be an experiment that could detect absolute motion.

We could detect absolute motion just by taking two light clocks perpendicular to each other and checking if they run at the same rate. Only when we are rest would they run at the same rate. If they do not run at the same rate we would know we are moving absolutely. The principle of relativity prohibits an experiment that can do this. So the two clocks must run at the same rate.

R. Sungenis: This "principle of relativity" is a real stubborn fellow. It has decided that we cannot do an experiment to determine whether two clocks can run independently! What is the "principle of relativity"? Dr. Norton stated it in his opening page:

> "That Einstein should believe the principle of relativity should not come as such a surprise. We are moving rapidly on planet earth through space. But our motion is virtually invisible to us, as the principle of relativity requires."

Dr. Norton has succinctly given us the fundamental basis for all of modern physics. The above rationale produced Special Relativity, General Relativity and the Big Bang, since they are all built on one another. Let's look at it again. Einstein's foundational dictum is that the Earth is moving around the sun. But because our instruments cannot detect it moving, this caused somewhat of a contradiction. There were basically two options: (1) accept the empirical evidence that Earth wasn't moving; (2) adjust the empirical evidence by the "theory of relativity" so that the Earth would appear to be moving. Einstein opted for the latter. He did so by making the empirical evidence for the Earth's non-movement "relative" instead of absolute. This is done by "relativizing" the dimensions of the Earth. Simply put, Einstein said the dimensions of the Earth are not absolute. They change when the Earth moves, and this change prohibits us from detecting its movement.

Now, either this was one of the most ingenious scientific principles ever to be discovered or it was one of the most deceptive sleight-of-hands ever proposed by a human being. Whatever the case, those who did not want to accept the empirical evidence that Earth was motionless hailed Einstein as the greatest scientist the world has ever known. He saved them from being forced to go back to pre-Copernican days.

How did Einstein do it? He borrowed an idea from Henrick Lorentz. Lorentz said that the empirical evidence showing the Earth was motionless was actually a distortion caused by ether (an all pervading particulate substance in space), which squeezed the Earth by 2.5 inches as it moved around the sun. Additionally, everything on the Earth was shortened proportionally, including the experimental apparatus used to detect its motion. Since the apparatus was distorted when it moved, it could never measure the Earth's motion and thus the Earth would always appear to be motionless. The shortening process was called the "Lorentz Contraction" and it was then put into a mathematical equation called the "Lorentz Transform." It is the fundamental equation of Relativity theory and it is used in every relativistic calculation.

Einstein borrowed Lorentz's concept but he did not want the ether. The idea that ether was squeezing the Earth and everything on it didn't seem to be a very scientific explanation and it was never satisfying. So Einstein replaced it with a more abstract mechanism. He said the Earth and everything on it shortened in length just by the mere fact that they moved. Motion causes dimensions to change. The faster the motion, the more the change. The change in dimensions only makes it appear as if the Earth is not moving, but it really is moving.

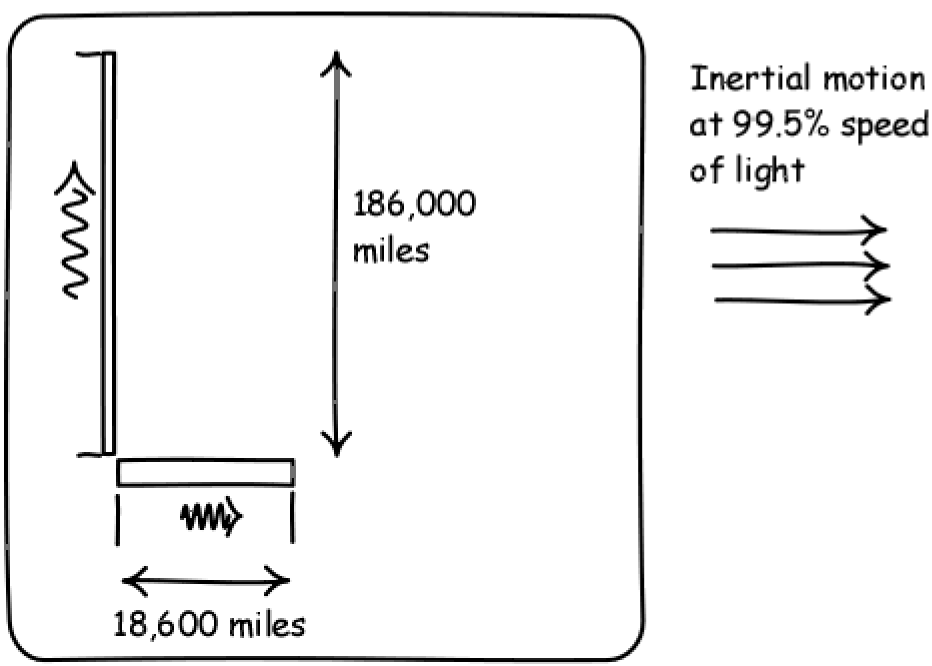
Einstein realized, however, that if the length of an object is shortened when it moves, this will also require that the time it takes for the object to travel must be shortened. Conversely, the mass of the moving object must be increased. Length, time and mass must all change when an object moves. The reason for these additional changes is that if the length of a moving object is shortened, not all of the object that was supposed to pass a given point will pass it in the same time as if the object was not shortened. For example, if the Earth's diameter is shortened by 2.5 inches as it moves around the sun, then the Earth will not reach a designated point in space by 2.5 inches. So, it is required to shorten the amount of time the Earth travels – or what Einstein called "time dilation" – by the amount of time the Earth travels in 2.5 inches. Additionally, if one changes the length of the object and the time it travels, one must also change the mass of the object, since the same amount of mass must pass the same designated point. In other words, since all the objects mass must pass a given point in a certain time, it cannot do so if the time is shortened, so it must make up the difference by increasing its mass. For the Earth, the mass will increase by the amount of mass it would take to travel 2.5 inches in the time allotted.

Essentially, the whole theory of Special Relativity is based on presupposing the Earth moves, which then leads to creating mathematical equations to give the impression that it moves even though experiments never show that it is moving. For Einstein and his generation, it was "unthinkable" that the Earth was standing still in space. So the only alternative was to change the shape of the Earth; the time that it traveled; and its mass when moving. That is the essence of the theory of Special Relativity. Everything else is mere detail.

Does Einstein's solution make sense? Doesn't it make more sense to accept the empirical evidence that the Earth is not moving? Wouldn't that be the better answer for why we can't detect it moving? ☺

Dr. Norton: How do I get this? If you have to know, here are the details. The light signal chases at 100% c after the leading end of the rod. That end is initially 186,000 miles away and moving at 99.5% c. So the light signal approaches the end of the rod at 0.5% c, which is 930 miles per second. The distance to cover is 186,000 miles, so it takes 186,000/930 = 200 seconds. The light signal has to go from one end to the other of a 186,000 mile rod. The light moves at 186,000 miles per second. But the rod is also moving in the same direction at 99.5% the speed of light. So the light has to chase after a rapidly fleeing end and will need much more than a second to catch it. With a little arithmetic it turns out that the light will need 200 seconds to make the trip.

But the light clock has to tick once every ten seconds! Something has gone badly wrong. What has gone wrong is our assumption that the rod parallel to the direction of motion retains its length. That is incorrect. That rod actually shrinks to 10% of original length, so the moving pair of clocks really looks more like:



R. Sungenis: No, what has gone wrong is that Dr. Norton assumed the light clock is a real clock that keeps real time and not merely a light beam that is affected by its environment causing it to slow down or speed up. This false assumption then causes him to force the rod to shrink so that he can have an answer for his problem.

Dr. Norton: Now the light signal has time to get from one end of the rod to the other and keep the clock ticking at once each ten seconds as expected. The signal just has far less distance to travel so now it can maintain the rate of ticking expected.

The analysis is now complete. We have learned that a clock moving at 99.5% the speed of light slows by a factor of ten. It ticks once each ten seconds instead of once each second. A rod, oriented in the direction of motion, shrinks to 10% of its length. Rods perpendicular to the direction of motion are unaffected.

The two effects are not noticeable as long as our speeds are far from that of light. They become marked when we get close to the speed of light. The closer we get the speed of light, the closer clocks come to stopping completely and rods come to shrinking to no length in the direction of motion. For more details of how the effects depend on speed, see What Happens at High Speeds.

R. Sungenis: All we have learned from these explanations is, if you imagine your clock to be moving at 99.5% of the speed of light and want to determine when it arrives at its destination, then a light clock does not make a good clock. Dr. Norton has not shown that time itself slows down, only that the measurement of time by a clock has been affected by the environment.

What might be in the "environment" that causes a light beam to be slowed or a clock to decrease its ticks? Perhaps it is the very ether that Einstein abandoned when he invented his theory of Special Relativity. This is precisely why our Global Positioning Satellites do not measure the same speed for electromagnetic waves that are sent east-to-west as opposed to west-to-east. This discrepancy shows that motion is absolute, not relative.

In the end, the theory of Special Relativity is little more than an *ad hoc* invention based on assumptions that were never proven, namely, the assumption that the Earth is moving. The first error was assuming the Earth was moving, which then led to the second error that its movement could not be detected, which then led to the third error, the theory of Special Relativity, which then led to the fourth error, the theory of General Relativity, which then led to the fifth error, the Big Bang.

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