What is the Ultimate Velocity?

Introduction

This question may seem nonsensical in light of the Special Theory of Relativity. Namely, any object with rest mass cannot travel faster than the speed of light, or for that matter, *at* the speed of light. The ultimate velocity of any object with rest mass will always be slightly less than the speed of light. However, there is a precept which the author has heard in another scientific discipline, which does not seem to have been acknowledged within physics. *In science, we can never prove that something is right. We can only prove that it is wrong.* With this tenet, there should be immediate clarification as to the nature of this paper.

This paper will *not* state that special relativity is wrong, or is to be dismissed. This paper will readdress certain aspects of special relativity. Upon the presentation of this analysis, we will again ask the question which is the title of this paper. Since the reader is undoubtedly "perturbed" at the very notion of special relativity being reanalyzed, an analogy may assuage the reader's concerns. The reader may be cognizant of the theoretical construct of worm holes. Simplistically speaking, these constitute "short cuts" through the fabric of space. If they prove to be real, this will enable us to one day travel from one region of space to another in an exceedingly short period of time. This analogy illustrates that although special relativity is not being (seriously) challenged, traversing inordinate distances may be possible. (Prior to completing this introduction it will be stated that the author is assuming that the reader is familiar with the Special Theory of Relativity. No instructions will be given in the course of this paper as to the nature of the theory.)

The concept of length contraction will not be questioned in this analysis. The first aspect of the theory which will be reanalyzed is mass increase. Although a myriad of experiments have seemingly confirmed $M = M_o \Big/ \sqrt{1 - v^2/c^2}$ the reader should keep uppermost in mind the italicized precept in the first paragraph. This equation was developed in order to maintain consistency with the law of conservation of momentum. However, nature "knows" nothing of physics conservation laws. From the perspective of nature, can we ascertain what is transpiring to an object when its length contracts? This paper will postulate a very similar, but somewhat different equation.

$$\rho = \frac{\rho_o}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad (1)$$

The reader may feel that it would be best to stop reading this paper as it's "foolishness" has just been established. The equation for density is $\rho = M/V$, thereby dictating that when an object's mass increases its density automatically increases. However, this paper is postulating that when an object begins to reach relativistic speeds, its density is increasing via the *exclusive* means of volume reduction, *not* the result of mass increase. *If* this is correct, let's assess whether decades of experimental work could potentially have been misinterpreted.

Let's take a spring scale. When an object is placed on the scale, the degree to which the scale descends is dictated by the equation $P = F/A$ where F is the force exerted by the object and A is the area occupied by the object which culminates in the equation for pressure. We'll present a hypothetical scenario. For some "magical" reason, the object undergoes length contraction thereby reducing it's volume. What will happen with the scale?

Working within the parameters of this paper, its force has not changed as its mass has not been altered and its acceleration towards the earth obviously hasn't been altered either. However, the pressure that the object exerts on the scale is inversely proportional to the area it occupies. Consequently, it will exert more pressure on the scale and the scale will sink lower. If we assume a two sided scale with two different objects *of the same mass*, if one of them were to undergo volume reduction, the scale on that side would sink lower. This argument leads to the following conclusion.

Density increase, via the exclusive means of volume reduction,
can be experimentally misconstrued for mass increase.

(The author is a theorist, not an experimentalist. Therefore, it is incumbent upon the community of experimentalists to develop experiments to refute or confirm this postulate.)

The next aspect of special relativity to be reanalyzed is time dilation. If there is any hope of a viable analysis, the first priority is to define and explain the precise nature of time. We will commence with a succinct answer to the question, what is time.

Time is a label (or series of labels) which tell us when events have occurred, are occurring, or will occur. The value of time lies in its precision. Without precision time is completely useless to man. If we wanted to know when an event in the past transpired, the phrase "a long time ago," is worthless. "A long time ago," could mean decades ago or millennia ago. If time is to have meaning, we must introduce labels so that we have a more precise idea as to when the event transpired. For example, if we ask the question, "When did Houdini die?", a long time ago means nothing. For time to have meaning we must introduce a label. Specifically, 1926. If we want greater precision we introduce a second label, October. If we want still greater precision, a third label is introduced, the 31st. And if we seek even more precision, a fourth label is introduced, 1:26 P.M. All of these labels, 1926, October, the 31st, and 1:26 P.M. have been designed by man. Nature has had no bearing on the creation of these labels. (The reader may oppose the last statement as these labels have been introduced in accordance with the rotation of the earth about its axis as well as the orbit of the earth around the sun. However, keep in mind that man has *arbitrarily* imposed these labels on the rotation of the earth about its axis and the orbit around the sun. If, hypothetically speaking, an alien species were to come to our solar system they would not necessarily give the same credence to the rotation of the earth around its axis or the orbit around the sun as we do.)

Time only exists because of man's existence. As has already been stated, for time to have value, it must have precision. Precision is created via labels. All of the labels pertaining to time have been created by man. Therefore, time is an arbitrary *concept* that has been designed by man. Without man time would be completely non-existent.

With the presentation of these concepts, let us deal with the question, what is the precise reason that inordinate velocity induces time dilation? The answer is as follows. *Inordinate velocity does **not** induce time dilation.* For all intensive purposes time is not an actual entity that exists. It is nothing more than a concept. The reader may find this (there is no time dilation when dealing with inordinate speed) highly disturbing. However, give appropriate consideration to the stated position and contemplate everything that has been stated pertaining to time. How can something which does exist (speed) affect a *concept* which does not exist (time), except in the mind of man?

At this stage, the precise nature of the reader's vehement opposition is clear. The most elegant arguments in the world must bow down before simple experimental facts. Time dilation has been vigorously tested. Every test has always verified with 100% accuracy the validity of time dilation. Therefore, all of these arguments are completely useless in the face of overwhelming experimental data. The author is fully cognizant of the experimental results. The reader may then ask that if the author is aware of the experimental results, how can the position pertaining to time outlined in this paper possibly be maintained? The stated position pertaining to inordinate speed not inducing time dilation can still be maintained while simultaneously explaining the experimental results.

When clocks have slowed down, they did not slow down because time was slowing down. They slowed down because their *mechanism* was affected by the effects of relativity. To be exact, length contraction, and, more importantly, density increase (the inherent effect of length contraction) caused the clock's mechanism to be affected in such a way that the clock slowed down. In other words, anything that could effectively function in the capacity of a clock, would have its mechanism affected in such a way as to cause it to slow down and subsequently give the appearance of time slowing down. By way of analogy, let us take the heart. It beats at a steady rate and could potentially function in the capacity of a clock. Let us assume that we could continue to keep the heart beating independently of the body and attached a dial to it so that it could function as a clock. If we placed this contraption on a spaceship and accelerated the vessel to relativistic speeds, the heart would contract and its density would increase. This increase in density would cause the heart to slow down and give the appearance that time had slowed down. The rationale being that the valves ("holes" which allow the passage of blood) would become narrower, and smaller amounts of blood would flow through them. Therefore, it is not time unto itself that is slowing down but merely the mechanism that is being affected in such a way as to cause the clock to run more slowly. (This analysis would apply to all experiments which have substantiated time dilation. For example, muons have had their "internal mechanism" affected via density increase thereby causing them to decay at a slower rate when they reached relativistic speeds.) A further elaboration of this is as follows. Working within the current parameters of the special theory of relativity (that are independent of this paper), the effects of length contraction, mass increase, and time dilation are all independent of each other. No one of these effects relies on the other for their occurrence. However, if this paper is fundamentally correct, then special relativity must be modified to reflect that these effects *do* rely on each other for their occurrence. In other words, if, hypothetically speaking, inordinate speed did *not* induce length contraction and density increase, then the prediction of time dilation would have failed. The *only* reason the clocks slowed down was because their lengths were contracted and their density increased, thereby causing the mechanism of the clock to slow down and subsequently giving the appearance that time was running more slowly.

The reader may feel that even if it is only the clock's mechanism which is being affected, the reality remains that time slows down. However, if we examine the relationship between time and clocks, this precept is not valid upon closer scrutiny. We have come to accept that if a clock slows down when objects travel at high speeds, this shows that time has slowed. However, does a clock actually *constitute* time? A clock should be viewed as *measuring* time, not constituting time unto itself. To adopt the position that a clock constitutes time is comparable to stating that a calendar constitutes a period of one year. The calendar, unto itself, does not *constitute* a year. A calendar is a means of measuring a year. Therefore, when objects travelling at high speeds show the effects of time dilation, it is imperative that we differentiate between what constitutes time and what measures time. Clocks which slow down measure time, they do not actually constitute time.

In dealing with the experimental verification of time dilation, it has been stated that the nature of these various objects have been changed as a result of length contraction and density increase. This brings us to another point pertaining to the (alleged) phenomenon of time dilation. In this paper, the concept of time dilation has been opposed as time is nothing more than a concept that does *not* exist independently of man. However, as a result of length contraction/density increase *processes* would slow down in accordance with $t = t_o\sqrt{1 - v^2/c^2}$. An explanation behind this is as follows. As has been previously stated, density increase is inherent to length contraction. It is density increase which is the primary factor responsible for the slowing down of processes when they are relativistic. Any process which would be affected by density increase would slow down in accordance with the equation for time dilation. The following is an example in order to elucidate. Let us assume that an individual is in a stationary spaceship. He drops a ball on the floor of the ship and waits for it to bounce back to his hand. The spaceship is now accelerated to half the speed of light. Everything in the spaceship will have its density increased. This, of course, would include the ball. He drops the ball again and waits for it to bounce back to his hand. Since the ball's density has increased, it would take longer for the ball to bounce back to his hand (as when compared to how long it took when the ship was stationary). This is for the simple reason that the same amount of mass is concentrated over a smaller physical area (density increase). To clarify this point in slightly greater depth, let's present a hypothetical scenario and assume that here on earth a ball were to "magically" contract while simultaneously maintaining the same mass. It would require more force for us to pick it up as the same mass is being exerted over a smaller physical area. Since density increase can have the same final effect as mass increase, the ball on the moving ship would not bounce back to the hand as quickly as when the ship was stationary. The exact time by which this process is slowed would presumably be in accordance with the equation for time dilation. In fact, the speed of almost any process which would be affected by the density of the objects involved would be slowed down in accordance with $t = t_o\sqrt{1 - v^2/c^2}$. However, it is not time which is actually slowing, but the speed of the process.

If the reader has given appropriate consideration to everything stated pertaining to time dilation, hopefully he can recognize something reasonably important. This paper has (almost) come full circle from the previous statements that time does not dilate. The specific details of this are as follows. The position that time does not dilate as it is nothing more than a concept is being adhered to. However, *processes* will slow down in accordance with $t = t_o\sqrt{1 - v^2/c^2}$ if the speed of these processes are affected by the density of the objects utilized for these processes. Therefore, when it was stated that time does not slow down when the analysis of time dilation began, it may have come as a substantial shock to the reader given the inordinate amount of experimental verification of the phenomenon of time dilation. However, this paper has now come full circle by acknowledging that *processes* do indeed slow down. It is merely that certain processes (especially the ticking of a clock) can easily be misconstrued for constituting time. Consequently, the final position pertaining to time dilation is not quite so radical as what it may have initially appeared to be.

The astute reader may be wondering about how the twin paradox fits within the parameters outlined in this paper. The answer is as follows. If the *process* of aging is affected by density (regardless of whether that density pertains to the body as a whole, the individual cells, or components of the cells), then the twin paradox is a reality. If on the other hand, aging and density are completely independent of each other, then the twin paradox will no longer be a paradox. Specifically, a twin travelling on a spaceship at an inordinate speed will find that he has aged at the same rate as his twin when he returns to earth.

This completes the analysis of special relativity. The reader is undoubtedly wondering where the title of this paper comes into effect. Firstly, let's compare Einstein's theory with this modified version.

	Einstein's version	This version
1.	Length contraction	Length contraction
		$\Downarrow$
2.	Mass increase	Density increase
		$\Downarrow$
3.	Time dilation	Processes slow down

As previously written, in Einstein's version, the effects of relativity are independent of each other. However, in this modified version, the new effects are *inter*dependent. Processes slowing down are the *result* of density increase, and density increase is the *result* of length contraction. One process simply does not transpire without the preceding effect taking place. What bearing would this have on the ultimate velocity?

If, somehow, we could nullify length contraction, what would the result be? We would not have to be concerned about the object in question contracting to dimensions of zero. Furthermore, its density becoming infinite would no longer be germane. Thirdly, processes would not slow down to a time span of less than zero. Consequently, there would be no limit to how fast we could travel. This is in contrast to Einstein's version which dictates that an object which travels at the speed of light will have a length of zero, its mass will become infinite, and the elapse of time will slow down to zero.

The reader's natural question is, how do we achieve the means of nullifying length contraction? That is not the question for today. The only question for today is, if it were possible to achieve the nullification of length contraction (via whatever means) would we be able to travel faster than the speed of light? If the (newly postulated) effects of special relativity are interdependent, then the answer would be yes. It is a self evident fact that there would be a myriad of complications to overcome prior to the actual achievement of superluminal propagation. However, as special relativity stands, it is futile to even remotely consider these difficulties as it seems impossible to travel beyond the speed of light. However, this paper has (possibly) given just cause for the consideration of this possibility.

Conclusions

What is ultimately possible in physics? For more than a century, there has been the stalwart belief that it is impossible for any object with rest mass to travel at the speed of light, let alone beyond the speed of light. Furthermore in 104 years, there has been no experimental, or theoretical contradiction to the Special Theory of Relativity. However, this paper has reanalyzed these tenets and presented theoretical opposition. It this paper is correct, then one day it may be possible to travel faster than the speed of light.