AN IN DEPTH ANALYSIS OF THE SPECIAL THEORY OF RELATIVITY

The purpose of this paper is to delve into a more precise explanation as to exactly *why* objects which approach the speed of light experience the effects that they do. In other words, it is not sufficient to state that an object which approaches the speed of light experiences length contraction, mass increase, and time dilation. Why *exactly* does extreme velocity induce these effects? Although the reader may feel that Einstein addressed these issues in sufficient depth and detail in the presentation of his paper, it is my position that some of his arguments may have been somewhat semantic in nature. Furthermore, upon an in depth analysis of the special theory which seeks precise explanations behind the effects, one may find the development of a new concept which will be revolutionary to physics. The paper will be divided into two sections. The first dealing with the in depth analysis. The second with the revolutionary new concept.

PART I - AN IN DEPTH ANALYSIS

Firstly, we will deal with the precise explanation behind length contraction. Historically speaking, the Lorentz contraction was developed to explain the failure of the Michelson-Morley experiment. However, at the time there was no legitimate reason for believing it. Science was merely twisting facts in order to maintain their firm belief in the existence of the ether. However, the special theory introduced the same concept and was not specifically attempting to explain the failure of the Michelson-Morley experiment in the same way that Lorentz and Fitzgerald were. Although length contraction has now been proven to be a valid phenomenon (as opposed to a fabrication designed to maintain a belief), it is my opinion that scientists are being somewhat complacent in their acceptance of length contraction. It is not sufficient to accept that objects contract at high velocities in accordance with $L = L_o\sqrt{1 - v^2/c^2}$ We must proceed further in our understanding of nature and attempt to ascertain exactly *why* extreme velocities induce this effect.

This phenomenon can be effectively understood if we extrapolate macroscopic systems to the molecular level. If we are sitting in a car and the car accelerates forward, our bodies will be pushed backwards in accordance with Newton's third law. If a spaceship were traveling at speeds approaching the speed of light, the same thing would transpire to the molecules that constitute the spaceship. In order for the atoms to be "pushed backwards" an inordinate force would be required in order to achieve a reasonable effect at the molecular level. This effect can be explained at a quantum mechanical level. This paper will not attempt to delve into a complex formulation of quantum mechanical effects when objects are traveling at inordinate velocities as that is not the purpose of this paper. However, briefly stated, electron orbitals or the strong nuclear force will not be affected at velocities that we are familiar with in every day life. If we are to effectively explain the precise reason as to why inordinate speed induces length contraction, then we must accept that these factors will be affected by inordinate speed. Namely, the spatial orientations of the electron orbitals will become significantly smaller, and any potential spaces between nucleons will also become smaller. Furthermore, when we begin to approach speeds that are closer to the speed of light, the nucleons and leptons themselves may begin to contract as well. When all of the atoms begin to experience this effect, the spaceship will begin to contract at a measurable rate. Therefore, a deeper understanding of length contraction at high speeds could be gained by stating the following. Macroscopic systems will be pushed in a direction opposite to an acceleration in accordance with Newton's third law. The same thing will transpire on a molecular level when speeds are truly inordinate. An inordinate force is required to achieve a measurable effect as various quantum mechanical factors will only be affected by speeds which are significantly greater than speeds we are commonly familiar with.

If the reader accepts that it is inordinate speed which is affecting various quantum mechanical factors, then this possibility could raise another issue pertaining to Special Relativity. Special relativity dictates that we cannot travel at the speed of light as the equation for length contraction shows that an object traveling at that speed would have its length contracted to zero. However, it has been accepted that it is theoretically possible to travel at speeds slightly less than the speed of light, i.e. .99 c. However, working within the parameters *thus far* outlined by this paper, even speeds of this nature seem highly questionable. If quantum mechanical effects such as electron orbitals and the strong nuclear force are affected, then there is a reasonable probability that matter itself would cease to "function" in the conventional way that we are accustomed to. It is highly improbable that anyone could precisely predict what these effects would be. However, we can state that in all probability the spaceship would be crushed well before it came anywhere close to a speed of .99 c. The reader may feel that there is a significant flaw in my position. Specifically, cosmic radiation, or for that matter particles in accelerators are accelerated to speeds arbitrarily close to the speed of light. However, as a general rule of thumb, they do not cease to "function" in the conventional ways that we are accustomed to (what exactly I mean by the phrase "a general rule of thumb" will be dealt with in greater depth towards the end of the paper). However, the reader should keep in mind that these are singular particles, not atomic, or molecular systems. When we are dealing with atomic or molecular systems, things could change quite dramatically when the spatial orientation of electron orbitals are reduced or the potential space between nucleons is reduced. Therefore, given the precepts outlined *thus far* in this paper, even speeds approaching the speed of light seem highly questionable when dealing with macroscopic systems. As an example, a spaceship (and its engines) may be completely crushed (and subsequently cease to function) well before it approached the speed of light.

The next phenomenon to understand is that of mass increase. Specifically, what is the exact reason that velocities approaching the speed of light induce mass increase? The reader may feel that Einstein already dealt with this in his paper as the conservation of momentum is violated when dealing with relativistic objects. Specifically, to maintain consistency with the conservation of momentum, the very concept of momentum was redefined to allow relativistic objects to experience mass increase. However, slightly deeper reflection of the phenomenon may reveal something somewhat different. As has already been stated, Einstein introduced mass increase as an argument designed to maintain consistency with the law of conservation of momentum. However, let's scrutinize this from nature's "point of view". Nature does not (speaking loosely) "know" that the law of conservation of momentum should not be violated. Therefore, how is it that the law of conservation of momentum is not violated when dealing with relativistic bodies? In other words, can we gain a better understanding of how nature works *without* resorting to arguments that are designed to save conservation laws?

An analysis designed to gain a deeper understanding of mass increase should be viewed in conjunction with length contraction. Specifically, when the two phenomena are scrutinized together, we find that it is not mass that increases, but density. The reader may be so taken aback by this latter statement that he wishes to stop reading the paper and dismiss this work as "crackpot". However, I believe I can adequately support my position. As the reader is well aware, density is proportional to mass and inversely proportional to volume. If a body's length starts to contract (and there is no disagreement of this phenomenon when dealing with relativity), is it not inevitable that its density will increase? This, of course, is for the simple reason that its volume is becoming less. In other words, *from nature's perspective* (which is oblivious to arguments that require consistency with the law of conservation of momentum) mass is not increasing but remaining the same. However, the length of the body is becoming less thereby causing the mass to be compacted into a smaller volume and subsequently increasing the density of the object. Therefore, the equation should not be $M = M_o \big/ \sqrt{1 - v^2/c^2}$, but rather,

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

The reader will, no doubt, raise strenuous objections to this position. Specifically, there is a great deal of experimental verification of mass increase when objects are travelling at relativistic speeds. Is it being suggested that we should discard the evidence pertaining to mass increase and arbitrarily accept the new position? On the contrary, it is being proposed that we should realize the dichotomy between facts and conclusions. The experimental facts we have procured have caused us to draw the conclusion that mass increase is a reality. However, appropriate consideration should be given to the stated position and the experiments. As an example, let us propose a thought experiment. In your hand you hold a lead pipe. For this thought experiment, we shall state that the lead pipe "magically" experiences contraction while simultaneously maintaining the same mass. If such a thing could transpire, wouldn't it seem that the pipe experienced mass increase since it seemed to get heavier? To express it more succinctly, if an object experiences length contraction while maintaining the same mass, can we differentiate between density increase and mass increase? Working within the parameters of the thought experiment outlined, the differentiation between the two would certainly not be possible. To be specific, can we differentiate between the two phenomena of density increase and mass increase, or would the two phenomena provide the same experimental results? Theoretically, it may be possible if one were *specifically* striving to ascertain the difference between the two. However, when experiments have been conducted for the purpose of procuring experimental verification of special relativity, have the experiments striven to differentiate between the two phenomena? If they have not, then density increase will provide the same experimental results as mass increase.

Readers are presumably still opposed to my position. The special theory of relativity has stood up phenomenally well both on a theoretical, and more importantly, experimental basis. Even if the reader accepts what has thus far been proposed, why should a theory that has stood up so well be changed? The answer to that can be succinctly expressed in one sentence. *To confront what may be the reality of nature.* Even though experiments have rigorously confirmed Einstein's theories, we must realize that we may have misinterpreted the facts pertaining to mass increase. If that is the case, then we must confront the reality of nature and modify the special theory to state that density is increasing as opposed to mass increasing.

This brings us to the final effect of objects which are moving relativistically. Specifically, time dilation. For the third time, we pose the question, exactly why does extreme velocity induce a certain phenomenon, specifically time dilation? Once again, the reader may feel that Einstein adequately addressed this point in his paper. Namely, if we had a very simple clock on a spaceship that was comprised of a singular photon continuously moving back and forth between an emitter and a receiver, a stationary observer on the ground who may be able to witness the photon would see that the photon took a much longer path when compared to the path that an observer on the spaceship witnesses. Therefore, time would contract. However, this argument is of a highly semantic nature. One cannot legitimately claim that the photon takes a longer path as observed by the stationary observer. Merely because this is the *perception* of the observer, that doesn't mean that the photon takes an *actual* path which is longer than what the observer on the spaceship sees. Perceptions do not constitute the reality of nature. If it is being proposed that Einstein's argument was too semantic, what explanation could be proposed to explain the inducement of time dilation when dealing with relativistic objects? (The reader should be forewarned that the following argument can be somewhat lengthy and complex).

Firstly, let us ascertain exactly what constitutes time. In other words, what would a precise definition of time be? (The reader should keep in mind that I have *not* consulted the dictionary for the following definition.) *Time is a label (or series of labels) which tell us when events have transpired, are transpiring, or will transpire.* 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.)

For the purpose of this paper, I am going to redefine the words absolute and relative. In this paper, relative will refer to something that only exists because man exists. Absolute will refer to something which exists independently of man.

Time is relative. 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.

On the other hand, other factors pertaining to relativity are absolute. Specifically length and mass/density. (I am cognizant of the fact that mass and density are not the same. However, in this paper I have stated that density increases as opposed to mass. If the reader does not agree with me, I have placed both of our positions under the same heading.) Regardless of whether man existed or not, length and mass/density would exist. Granted, there would be nobody there to measure it (if life does not exist elsewhere in the universe). But nevertheless, length and mass/density would exist independently of man. For example, let us assume that there was no life in the universe. Let us assume that a meteor were reasonably close to a supernova at the moment it exploded. The energy would, no doubt, blow the meteor up. However, for our purposes we shall assume the meteor remains intact. The meteor has just experienced a tremendous amount of energy added to it which causes it to rapidly accelerate into space. Let us assume that it accelerated to .75% of the speed of light. Let us assess this in light of certain "aspects" of special relativity. Specifically, speed, length, mass/density, and time. Would speed exist even if there was nobody there to measure it? Since the meteor is moving from one place to another, the answer is yes. Would length exist even if there was nobody there to measure it? Since it possesses dimensions, yes. Would mass/density exist even if there was nobody there to measure it? Since the meteor is comprised of a myriad of atoms and occupies a certain volume, yes. Would time exist even if there was nobody there to measure it? Since time is a *label* or series of *labels* which tell us when events have transpired, are transpiring, or will transpire (and these do not exist in nature but are, instead, created by man) no. Who would be able to ascertain that time (which is nothing more than a concept) contracted on the meteor when it accelerated? To be more specific, how would labels (which constitute time) such as seconds, minutes, or hours be affected by the meteor traveling at .75% the speed of light?

Before proceeding any further with the development of the principles expressed in this paper, it would be appropriate to address another issue. The rationale behind this is that this issue is a little too reminiscent of some of the precepts just expressed and therefore should be briefly addressed. The reader is unquestionably already familiar with this issue. It pertains to a tree falling in the forest and nobody being there to hear it. The answer to this question does not lie in whether there will be a sound or not. The answer lies in reaching a consensus on the definition of sound. If consensus can be reached on the definition of sound, the answer automatically falls into place. However, if no consensus is reached then there is no one, true correct answer. If the physicist insists that sound is the movement of molecules in the form of compressions and rarefactions and therefore there is a sound, he, from a certain point of view, is correct. However, if an anatomist insists that there must be something to receive the sound waves and therefore there is no sound, he, from a certain point of view, is also correct. Therefore, the answer to this question lies in a consensus pertaining to the definition of sound, not whether there is a sound or not. (These precepts do not apply to relativity and its predicted effects.)

For the purpose of emphasis, some of what has previously been stated shall be repeated. Length and mass/density are absolute (keep in mind how absolute and relative have been defined in this paper). Without man there would still be atoms, planets, stars, etc. Therefore length and mass/density would exist even if there was nobody there to measure them. However, time only exists because of man and the labels that man has introduced. Time is nothing more than a concept. It is not a question of reaching a consensus as to the definition of something in the same way as a tree falling in the forest and nobody being there to hear it. The reality remains that without man there would be no such thing as time.

We can now deal with the question, what is the precise reason that inordinate velocity induces substantial 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. Working within the parameters of the definitions outlined in this paper, time is relative. Speed on the other hand is absolute. Regardless of whether or not man existed, speed *would* exist even if there was nobody there to measure it. Specifically, stars, galaxies, planets, etc. would have motion and, subsequently, speed. 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?

A brief recapitulation of some previously outlined precepts would be in order. Time is a label (or series of labels) which tell us when events have transpired, are transpiring, or will transpire. The value of time lies in its precision. Without precision, time is useless. Precision comes about as the result of labels such as seconds, months, and years. All of these have been introduced by man and *only* exist because of man. Time is a concept which is relative. The only factors pertaining to time that are absolute are the rotation of the earth about its axis and the orbit of the earth around the sun. However, as has previously been stated, these motions have been arbitrarily chosen by man to represent the passage of twenty four hours or the passage of a year. To be more precise, a spaceship traveling in outer space at half the speed of light would not have any effect on the rotation of the earth about its axis or the orbit of the earth about the sun. In the final analysis, time is completely different from factors such as speed, length, and mass/density. The other factors would exist regardless of whether man existed or not.

Therefore, time, which does not exist (except as a concept), cannot be affected by speed which does exist independent 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. This theorist is fully cognizant of the experimental results. The reader may then ask that if I am 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.

The primary point (but not necessarily the only point) that must effectively be explained is how clocks have slowed down when they're traveling at high speeds. In this analysis of the special theory of relativity, the concept of length contraction has not been opposed. Only a more precise explanation of why it transpires has been provided. Furthermore, the position has been adopted that length contraction will automatically induce density increase. 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. 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 mass/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.

Previously, it was stated that Einstein was being semantic when he initially developed the concept of time dilation by arguing that an observer on the ground would see a longer path for a photon moving between an emitter and a receiver than an observer on the spaceship. The reader may feel that I too have become highly semantic when it was stated that the mechanism of a clock slows down as opposed to time itself. 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.

The primary point that had to be dealt with in relation to time dilation was the slowing down of clocks. However, it is not the only point that must be contended with when supporting the contention that time does not contract at high speeds. The reader may legitimately ask about the experiment pertaining to muon decay. Surely that experiment proves that time dilation is a real phenomenon. The situation with this experiment is superficially comparable to the experiment pertaining to clocks that slow down when they travel at high speeds. Namely the "mechanism" (speaking in exceedingly loose terms) of the muon is affected by extreme speed in such a manner that it does not "function" as it normally would. It goes without saying that there is no "mechanism" within the muon that is comparable to the machinations of a clock. However, because the muon's length is contracted and its density is subsequently increased, the basic nature of the muon would be changed when it is in this relativistic state. One of these changes would be a slowing in the decay rate of the muon. As was stated when length contraction was initially dealt with at the beginning of the paper, at speeds approaching the speed of light, leptons and nucleons themselves would experience length contraction (and inherent density increase as a result) thereby altering the way they usually "behave". When length contraction was expounded upon it was stated that as a general rule of thumb, cosmic radiation is not affected by high speeds. However, we can readily see that with the muon this is not the case as it is certainly affected by high speeds since their decay rate has been significantly slowed down. In the end, the fact that muon decay is significantly slowed does not show that time slows down. It shows that high speeds will cause the muon's length to contract and density to increase, thereby causing the nature of the muon to change when it is relativistic.

In dealing with the slowing of clocks and the slowing of muon decay, it has been stated that the nature of these 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.

The reader may feel that all processes, without exception, would then slow down in accordance with the equation for time dilation. It is highly questionable as to whether this would be true for *all* processes. As an example, two situations can be presented in which a process would not slow down in accordance with time dilation as the slowing down of this process does not depend on the density of the objects involved. (It is only appropriate to state that although I believe that I am correct in the following analysis, I will admit that I may have overlooked some subtle factor in my thinking.) The process of human digestion will be considered. The reader is undoubtedly cognizant of the fact that when food enters the stomach, various digestive acids are secreted in order to break the food down into its individual components. When a person is standing still (i.e. relativistic effects are not present) all of the acids would not necessarily be concentrated exclusively on the food. Some of the acids may be secreted to areas of the stomach where there is no food (especially if the person has eaten lightly). Now, let us put a person on a spaceship that is travelling at half the speed of light. The person's stomach will have its volume decreased. Therefore, the acids will be able to function over less physical area. Therefore, the acids would be more concentrated on the food as there would be less area of the stomach where there is no food. Therefore, this factor would cause the level of digestion to increase, not slow down. However, the issue of the physical area over which the acids could be secreted is not the only factor involved in digestion. There is also the issue of the chemical bonds of the atoms comprising the food. The food in the stomach would also have its density increased. In all probability, this would entail stronger bonds between the atoms. This factor would cause a slowing of digestion. Therefore, we have one factor which would increase the rate of digestion (less area over which the acid can act) and another factor which would slow the rate of digestion (stronger chemical bonds). In the end, a person who was travelling at half the speed of light may have his digestion rate equal to what it was when he was stationary.

A second analogy can be provided that pertains to the human body in order to illustrate how extreme speed does not necessarily induce a slowing down of *all* processes. This will pertain to the muscles of the human body. If a person could be subjected to the effects of relativity (length contraction, density increase) and still function, the overall density of his muscles would increase. In one respect or another, this could potentially be interpreted as the person becoming stronger. The rationale being that the muscle fibers are closer together which would facilitate any process that would require the use of one's muscles. Since the density of the muscle has increased, it is obviously larger *in certain specific areas* as the same amount of muscle is being distributed over a smaller area. As a direct result of this a *preliminary analysis* would indicate that a man could lift a fifty pound weight from the floor to a position above his head in a shorter amount of time than when he was not subjected to the effects of relativity. However, as with the situation with digestion, a deeper analysis shows that this is not entirely correct. The density of the weight will also increase since it would be in the space ship along with the person. Therefore, this would nullify the increase in speed for this particular process and cause it to transpire in the same amount of time as when the space ship was stationary. However, the relevant point is, this process, like digestion, does not necessarily slow down in accordance with the equation for time dilation.

It has already been stated that in these two analyses, I may be wrong as a result of an oversight in some subtle factor. However, even if this analysis is incorrect, it serves to illustrate an important precept with regards to the slowing down of processes. It is not guaranteed that *all* processes will slow down in accordance with the equation for time dilation. It is possible that there are some processes which will not be affected by an increase in their density. In fact, if what has been stated pertaining to acids having a smaller physical area over which to operate is correct, then it is possible that some processes will be accelerated when they are relativistic. Therefore, we must keep in mind the possibility that all processes will not necessarily be slowed in accordance with time dilation when they are relativistic.

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 contract. The specific details of this are as follows. The position that time does not contract 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 reader may feel that since it has been acknowledged that processes do contract in accordance with the equation for time dilation, it is a trivial matter to differentiate between time and the occurrence of processes as they are so closely related. We can simply continue to accept the special theory of relativity as it is without modifying the element of time dilation. This is not true for three reasons. Firstly, the purpose of this paper is to gain an in depth understanding of special relativity. We should not be so complacent as to accept a simplistic view like time dilation when there is the strong possibility that in nature *processes* are slowing down. Secondly, and more importantly, it has been stated that we must give due consideration to the distinct possibility that *all* processes are not necessarily affected if they travel at extraordinarily high speeds. The third reason is the most important of all and pertains to a significant prediction of the special theory of relativity.

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.

There is one final thing that must be said pertaining to time dilation. Although the following has no bearing on special relativity it is imperative that it be addressed since it plays such a predominant role in the general theory of relativity. In Einstein's general theory of relativity, he addressed clocks , time and the principle of equivalence. The reader may ask, does time run more slowly in direct proportion to the strength of the gravitational field? The simple answer is no. It would be completely redundant to repeat the exact same arguments that have already been extensively dealt with. Briefly, the following will be stated. Time is a concept, not something that is a genuine aspect of nature. Therefore, it cannot be affected by something that is an actual part of nature like a gravitational field. The experimental verification of time dilation in gravitational fields has been procured because the *mechanism* of the clock is affected. Although time itself does not slow down, processes will slow down if the factors utilized for that process are affected by an increase in their density.

PART II - A REVOLUTIONARY NEW CONCEPT

Now that an in depth analysis of the special theory of relativity is complete, it is possible to introduce what may be a revolutionary concept for physics. This in depth analysis (in conjunction with another precept) shows that it is ***theoretically*** possible to break the light barrier if our state of technology was sufficiently advanced. The precise details of how this may be possible are as follows.

This paper shows that all of the predicted effects of relativity are a direct ramification of length contraction. It is length contraction which is *directly responsible* for the other effects. Specifically, an object's density increases because its volume is decreasing, and processes slow down as a result of density increase. Therefore, if it wasn't for length contraction, these other effects wouldn't exist. The prevailing theoretical framework pertaining to relativity dictates that anything with rest mass cannot travel faster than the speed of light (or at the speed of light) as its length becomes zero, its mass becomes infinite, and time is contracted to zero. However, this paper can now state that it is somewhat redundant to address the aspects of density increase and processes slowing down when contending with the issue of breaking the light barrier. More to the point, it is the aspect of length contraction (and its inherent effects) which prevents objects from travelling at or beyond the speed of light.

Prior to outlining how it is theoretically possible to break the light barrier, it will be necessary to briefly recapitulate some of the precepts introduced in the analysis of the Heisenberg uncertainty principle since the reader will claim that what will be proposed is impossible. If a certain technological feat is completely beyond our present day scientific/technological capabilities, that doesn't necessarily mean that it will never become a reality. We have no idea what the future of science holds whether it be new scientific discoveries, or the development of new concepts. (It has already been alluded to that this has been addressed in far greater depth and detail in the paper on the Heisenberg uncertainty principle.)

It is theoretically possible to break the light barrier in the following manner. Nullify the effect of length contraction so that when an object travels at inordinate speeds length contraction no longer transpires. The reader will automatically ask exactly how can length contraction be nullified. I have no idea how length contraction could be nullified. Furthermore, (and far more importantly) *how* to nullify length contraction is not the question for now. The question for now is whether we *are able* to travel faster than the speed of light, even if only on a theoretical basis. Assuming the reader read the paper on the Heisenberg uncertainty principle, this is now becoming more reminiscent of the analysis of the Heisenberg uncertainty principle which attempted to challenge the validity of the alleged impossibility of measuring a quantum entity without collapsing its wave function on the basis of the development of new, advanced technology. Very few "concrete" concepts were developed in that paper. Instead, the alleged impossibility of attaining a certain goal was being challenged. In a similar way, it has been accepted for decades as an absolute law of nature that the light barrier cannot be broken. The purpose of the latter part of this paper is to challenge the validity of that principle, not to show how to break the light barrier as of "tomorrow". If it is agreed that it is theoretically possible, then a revolutionary principle of physics is introduced. Furthermore, if it is actually necessary to break the light barrier, then we can "take the first step in the journey of a thousand miles" (as the Chinese say) and try to develop a method of nullifying length contraction for the purpose of breaking the light barrier.

It would be appropriate to address the issue of nullifying length contraction via an analogy. To be precise, it may seem impossible of achieving a certain scientific goal.

However, by introducing a change of one kind or another, the attainment of that goal may become a reality. In this analogy we will make a comparison between certain scientific principles from electricity and relativity. (When reading the following chart, keep in mind that a comparison between the science that is outlined is not being implemented, but rather certain *principles*. It is best to first read the headings under electricity and then proceed to relativity.)

<u>ELECTRICITY</u>	<u>RELATIVITY</u>
1. To conduct any sort of electric current there must be free electrons.	When an object travels at high speeds, its length contracts. When the speed reaches the speed of light, its length will become zero.
2. Substances such as germanium and silicon are devoid of free electrons.	All objects with rest mass will contract when they experience velocity, especially high velocities.
3. Therefore, it is impossible for germanium and silicon to conduct any sort of electric current.	Therefore, it is impossible for any object with rest mass to travel at the speed of light, or beyond the speed of light.

If one scrutinizes what has just been outlined pertaining to electricity, we all know that the final statement is completely false. It is true that germanium and silicon *in their natural state* cannot conduct any sort of a current. However, that doesn't mean that the conduction of an electric current in these materials is impossible. Specifically, doping can cause these substances to function in the capacity of semi-conductors. Broadly speaking, by altering the fundamental properties of these substances, a scientific goal which previously seemed impossible can be accomplished. (The reader should not feel that it is being suggested that doping will nullify length contraction. It was nothing more than an analogy to show how seemingly impossible scientific goals can be accomplished.) Via highly advanced technology, it may, in one respect or another, be possible to alter the properties of matter in such a way as to nullify length contraction. (If man is to one day travel in spaceships which break the light barrier, is it being suggested that the properties of human beings be changed in order to nullify length contraction in humans? Certainly not. However, in some other respect, the nullification of length contraction in human beings will have to be found.) Again, *how* this can be done is not the question for today. The question for today is if we *are able* to break the light barrier even on a theoretical level.

In the paper on The Origins of the Universe, a singular concept was presented in order to facilitate the reader's ability to grasp the possibility of something always being there. A singular concept to facilitate the reader's ability to appreciate the possibility of developing technology which is allegedly impossible to develop is as follows.

> *We cannot change the laws of nature.*
> *However, it may be possible to circumvent*
> *the laws of nature.*

Conclusions

Length contraction is induced by matter being affected on the molecular level in accordance with Newton's third law in a manner which is superficially similar to the way that macroscopic matter is affected at low velocities. Mass increase does not transpire. Instead, it is density increase that transpires as a direct result of length contraction and a reduction in volume. The experiments which have confirmed mass increase could be reinterpreted as showing density increase as it is possible for density increase to provide the same experimental results as mass increase. Time dilation is not a reality. Time is nothing more than a concept which does not exist independently of man. Something which does exist (speed) cannot affect something that does not exist (time). Time dilation has been experimentally verified as processes slow down as a result of the objects utilized in that process having their density increased. Although processes will slow down in accordance with $t = t_o\sqrt{1 - v^2/c^2}$, we must keep in mind that all processes will not necessarily slow down in accordance with this equation. The *final* speed of certain processes may not be affected by density. Since density increase and the slowing of processes is inherent to length contraction, it is theoretically possible to break the light barrier if, somehow, length contraction can be nullified.