StarSteps3

FUEL 2000

MENU

Always

UNDER CONSTRUCTION

Check out what's new

Home

Up

peterjocis@earthlink.net

Radius of Curvature

CHAPTER FOUR

Space

Among all of the great basic factors of the Universe, perhaps the most difficult to explain is that which we call space. While many of our greatest philosophers and scientists have attempted definitions, few have succeeded in offering anything which the average mind could readily grasp. The German mathematician Leibnitz said, "Space is simply the order or relation of things among themselves." Several centuries afterwards, the late Dr. Einstein used almost identical terms. "Space has no objective reality except as an order or arrangement of the objects we perceive in it."

The average man's definition of space is: "That in which matter can be placed" or "that which matter occupies." This last definition is subject to dispute by those who maintain that matter does not occupy space, but is itself, only a warp or distortion in space. Another school of thought insists with equal vigor, that while matter does occupy space, it creates a warp or distortion in the space surrounding it. Since both of these concepts are subject to the same set of mathematical laws, the same laws can be offered in support of either. There is little, however, in either of these postulates which seems to furnish a good foundation for understanding and it is understanding rather than algebraic formulae that we are seeking in this discussion.

For our purpose, a simple definition will suffice. Space is that which separates

peterjocis@earthlink.net

Watch for breakthroughs and upcoming releases.

Interested investors, partners, inquire by email.

Must indicate elementary comprehension of scientific macros provided in background links portraying a Radius of Curvature & interdependence of All our Natural Laws.

And follow the proposal outlined in The Center for Energy Education Research

bodies of matter, whether these bodies be atoms, galaxies or any component part of either. We can extend his definition by stating that the ***degree*** of separation which exists between any two bodies is determined by the degree of curvature of the natural laws which exist between them. In making observations, of course, we must remember that, since the natural laws are relative, the mass of the body itself influences the degree of curvature.

In the theories of relativity given to the world by Dr. Einstein, the natural laws, in general, retain their linearity, but the space in which they operate is considered to be curved. This concept offers the simplest mathematical presentation, since all of the observed deviations from linearity can thus be explained by a single postulate.

Unfortunately, like most of our mathematical presentations, the concept offers but little for the mind to grasp. A curved space can not be pictured mentally, nor can it be drawn upon paper. There is always something remaining outside the curve. Furthermore, attempts to rationalize this concept lead to many paradoxical statements which become more and more evident, the greater the effort to explain.

One of the best efforts to bring to the average mind an understanding of the principles of relativity, was made by Lincoln Barnett in his well known book, "The Universe and Dr. Einstein." Because of its careful preparation and its explicit presentation of present theory however, it brings out very clearly the paradox which must exist between successive assumptions. For instance: reference was made, as has already been noted, to the theory of Abbe Lemaitre, which supposed that at one time all the matter in the universe was contained in one huge lump or star. Since the curvature of space is considered to be determined by the amount or density of the matter present in it, at that time the universe was very small. That is; it had a very high degree of curvature. Light and other forms of energy do not move outward from this curve, but follow the circumference, so that the light emitted by this body, after a comparatively short journey, returned to its starting point. No attempt was made to speculate upon the length of time in which this body had existed, or the origin of the matter and energy of which it was composed. The theory merely supposed that, after perhaps an infinity of quiescence, this body suddenly exploded. Portions of the mass moved outward in all directions and thereby enlarged the radius of space.

If the radius of space was increased, it is obvious that the matter did not follow the curvature of space, but actually moved perpendicularly to it, (or perhaps at a tangent). At any rate, we see that while the radiated energy followed the "curvature" of space whose radius was determined by the mass and density of the matter, when the matter itself expanded, instead of following the curve, its motion increased the radius.

These statements raise some perplexing questions. In our theories of relativity it is assumed that light follows the "curve" of apace. Yet it is difficult to picture a photon following a curve whose radius is expanding at a rate equal to seventeen times the velocity of the particle.

In the book "The Universe and Dr. Einstein" it is also stated that: while space is expanding rapidly, the matter of the universe, which is likened to inelastic patches on the surface of an

* It has since been announced by Walter Baade of the Mount Wilson and Palomar Observatories that, as a result of the recalibration of the cephid variable stars, the previously calculated size of the universe must be increased by a factor of 2.8

* However the correction factor also applies to the time of expansion, so that the rate of expansion remains the same.

* Note that these statements about the size of the universe were made in 1965 and subsequent discoveries and recalculations would merit the same consideration regarding the rate of expansion.

If it is space that is expanding, it is difficult to understand why we have never detected the increasing distance between the earth and the moon or the sun. No attempt was made to explain why the space which exists between the individual atoms, and between the component parts of those atoms, should not expand also.

None of these difficulties, of course, invalidate any of the mathematical laws from which the concepts have been derived, but they do emphasize the great need for explanations which are more compatible with reason and understanding. For instance, in the above case would it not be simpler to assume that the degree of separation which exists between the galaxies, when considered as individual bodies, is apparently increasing because they occupy opposite portions of the sine curve of natural law?

If we exchange our postulate of linear laws and a "curved space" for a concept which incorporates the curvature of natural law, we find that we have not thereby destroyed or invalidated any of our present mathematics, but we have achieved a position from which the operation of the natural laws can be pictured by the mind and can be charted upon paper. Thus we have taken a great stride in the direction of understanding.

SUMMARY

In summing up our discussion of space we should recall__

1. Our definition: Space is that which separates bodies of matter. This separation is a vector function of the time, energy and mass differentials.

2. The degree of separation which exists between any two bodies, or reference points, determine the degree of curvature of the natural laws between them.

3. The natural laws are relative. That is, the value of one can be altered between any two reference points by altering the value or relationship of the other. This last fact should always be borne in mind when we hear some dogmatist solemnly declare that we are forever barred from reaching the stars by the hopelessly great degree of separation which exists between us.

CHAPTER FIVE

The Quantity C

We have seen that the factor known as the quantity C has a greater significance than is usually credited to it. It is not merely the velocity with which light and other forms of energy are propagated in a vacuum. The quantity C is a degree of energy differential. We can define it as the maximum differential which can exist between two reference points in the factor which we call matter. We can also define it as the minimum differential which can exist between a reference point in matter, and one in energy. This is only true, however, when the reference point in matter is at the same energy level as the observer.

The quantity C is a degree of energy differential. We can define it as the maximum differential which can exist between two reference points in the factor which we call matter. We can also define it as the minimum differential which can exist between a reference point in matter, and one in energy.

One of the postulates of the theory of relativity is that as a body of ***matter*** accelerates and approaches the velocity of light, or a kinetic energy differential equal to the quantity C with respect to a given observer, the body loses dimension in the direction of motion. If the velocity reaches the velocity of light it will ***appear*** to have lost all of its dimension in this direction. To this observer it would no longer be matter, since matter, by definition, requires three dimensions. The matter would have become energy insofar as the original observer was concerned since it would now exhibit a kinetic energy differential equal to the total energy inherent in the original matter.

This statement, however, seems to produce a misconception in the minds of many students of physics. Before we attempt to clarify the concept by the use of a simple analogy, let us recall the thought experiment the reader was asked to perform in chapter three. Follow closely as the analogy proceeds and concludes with the acceleration example, then walk through it again using three stationary objects whose frequency energy differential approaches, equals, then exceeds the quantity Apply the same postulates, noting the spatial separation remains constant.

We will assume that we have three space ships assembled at a given point upon the surface of the earth, (or at a given point in space.) For the purpose of this analogy we will assume that the ships are capable of any desired degree of acceleration. We will dispatch two of these ships into space, flying side by side in a given direction. We will launch the remaining craft in the opposite direction in space. We have an observer upon each of the three craft and a fourth observer who remains at the point from which they departed. We will designate the ships which departed together as A and B, the ship which is moving in the opposite direction as C, and the observer at the starting point as D. When we have accelerated all three of the ships to a velocity equal to one half of light, (with respect to the starting point) we pause to determine what changes, if any, have taken place. To the observer at the starting point D, the three ships have become slightly shorter in the direction of their motion, and have gained a small amount of "mass" but are otherwise unchanged. The observer upon the ship C, however, discovers that while he and his own ship appear to be unchanged, the ships A and B have lost all dimension in the line of motion, because they have reached the velocity C with respect to his reference point. They have ceased to exist as matter and have entered the plane of energy. The two observers upon the ships A and B also note that C has ceased to exist as a material object, but when they examine themselves and each other, they find that no change whatever has occurred to them or to their ships since they are all upon exactly the same energy level and no differential exists between them.

The foregoing analogy also demonstrates that the term velocity has no meaning or significance except as an observed kinetic energy differential between two specified points of reference.

When we state that the quantity C is the radius of the curvature of natural law, we mean simply that if a differential of energy equal to this quantity exists between the observer and the point which he is observing, the natural laws will be suspended. If the energy differential is in excess of the quantity C, the laws will *appear* to operate in reverse at that point.

As we stated earlier, this effect will be demonstrated by a simple analogy in our discussion of the factor called time.

While we have repeatedly referred to the quantity C as an energy differential, we have heretofore considered it only in terms of kinetic energy. Some may believe that it can be reached only when there is a rate of increase or decrease in the degree of spatial separation between the reference points, equal to 3x10(10) centimeters per second, or in simpler terms, a velocity equal to that of light. It is necessary therefore to point out the fact that an energy differential does not necessarily manifest itself as a velocity. It can also exist as a frequency. Our present laws of physics state that the energy level upon which an electron, a photon, or other particle exists is proportionate to its frequency. The mathematical rule is E equals Fh, where E is the energy, F is the frequency and h is a factor called Planck's constant.

We can now see that a frequency differential which by the above formula is equal to 9x10(20) ergs per gram also represents the quantity C. When such a frequency differential exists between the observer and the point which he is observing, we again find that the natural laws at the observed point reach zero value with respect to the observer. If the frequency differential exceeds this value, the action of the laws will become negative. A material object such as a spacecraft upon or near the surface of the earth would cease to exist as matter and would enter the plane of energy insofar as the observer on earth was concerned, but as we have previously pointed out, an observer upon or within the object, whose frequency or energy level had been raised to the same degree as that of the craft, would be unable to detect any change.

We must clear our minds of the thought block produced by the assumption that the quantity C is a factor of absolute limit. We must realize that it is a limiting factor only with respect to two given reference points, and that it is perfectly possible to conceive of a series of consecutive reference points between each two of which a differential equal to the quantity C may exist.

CHAPTER SIX

An Interview with Time

I asked, what Time is it? Time said Now. I asked Where? Time said Here.

Like a fleeting willowy ghost, Time said explore and look through different eyes, from different spaces, and may your joy, beauty, exhilaration and expression of Life increase as you move ever closer to the Now.

For those that have explored physical reality deeper, or intuited Time's perspective through an altered state, the self recognition may have come: It is always Now, here. It is always Now there.

The past is memory and expands to the akashic or collective unconsciousness.

The future is imagination, vision, dreams that foretell the intersection of current (Now) energy and forces that have the possibility, potential, if left unchanged, of creating a future reality.

And so we are left with the beauty of the moving instant NOW, a Universe of constant creation and change.

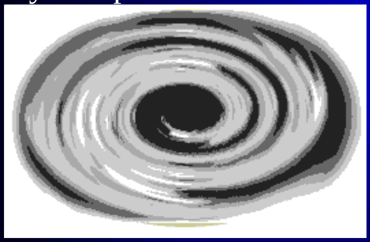
To examine Time, we will add a little perspective, that you may, if you wish, attempt to discredit, for it will only add to your ability to perceive Time clearer.

We will say Time is "that which separates events".

If there is no discernable separation in this respect, the events are said to be simultaneous. Now if two events are separated by space, how shall we determine whether or not they are separated by time? Hold on to that question.

We can also state that motion cannot take place except within the dimension of time. Or alternatively, we cannot experience time without motion, action, activity. Therefore time must be reckoned by its comparative energy value. A separation of space has an energy value, it take energy to cross it. Mass has an energy value. Gravity has an energy value. And so on ...

First we must rid ourselves of thought blocks not actually inherent in the mathematics, but which are obstacles created by the arbitrary interpretations which we have placed upon those mathematics. From black and white holes, to wormholes, hyperspace, time travel, dimensional portals, singularities, speed of light limitation... delete these from your mind. These obstacles are illusionary only. We will realize that the rules of limitation found in our mathematical approach to nature, are limitations only of our own perception and consciousness; and have no absolute significance insofar as nature itself is concerned.



Let's look at the Now here, and the Now there and what may create the illusion of Time differences, and Time dimensions.

Discarding arbitrarily created values of self-centered time, can the moving instant Now be the same throughout? What causes the appearances of time dimensions?

The energy value of Distance comes first into the equation.

Here we must Always remember, in Measurement, reference points become critical, clarity of interpretation vital. Now we are doing this without math, so relax and enjoy the following.

1 You are my neighbor, across the street. We had synchronized our atomic watches earlier. Now we turn on our camera image viewing monitors. We look at each other and our watches. Yes! They show the exact same time.

Our small child, who cannot see the monitor, thinks: "It takes me 3 minutes to walk over there, so by the time I get there, it will be 3 minutes later (future) and then I will be able to see both our clocks to see if they match. So right now, before I go over there, I must be 3 minutes in my friend's future, and therefore, my friend has to be 3 minutes in the past, as viewed from my position at my house. Yet, when I get there, the child muses, we will probably have the same time???"

2 I am in Chicago. You are my friend, in Mississippi, same time zone. We had synchronized our atomic watches earlier. Now we turn on our camera image viewing monitors. We look at each other and our watches. Yes! They show the exact same time.

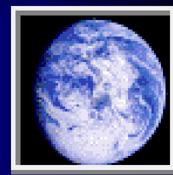
Our small child, ... : "it takes me a month to walk over there, so by the time I get there, it will be one month later (future) and then I will be able to see both our clocks to see if they match. So right now, before I go over there, my friend has to be one month in the past, and I am one month in his future. Yet, when I get there, the child muses, we will probably have the same time???" "

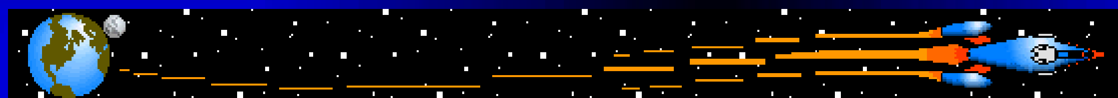
Stop, you say. Give him a car!  ok. Down to two days reference time. The little kid begins thinking, the faster I go, the shorter the difference in time, between my friend and me. A new idea hits him! Could time be dependant upon speed, his future, my past, and the time to reach him? To synchronize our watches, the child thinks, requires my friend and I to be in the same space, but the distance variable is beyond my eyesight capacity to verify; however that is relative, because I heard Dad say he sees the same distance I have to travel to match timepieces, instantly through the monitor. Then again, the "live" monitor shows just the "image" of the same Time Now, not physical actuality. To go there physically, I would really have to go fast, to have the same Time Now synchronized between Chicago and Mississippi. Now speed is an energy differential, and that's a lot of energy. However, change can also be an energy differential, as well as frequency - wow, like dad and the monitor! Boy, I am getting convoluted. Have to think this out some more.

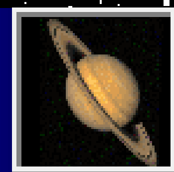
NOTE: The same time zone stretches from the north pole to the south pole along the meridian. East and west, the time zone is arbitrarily and artificially established to flow with the earths' rotation and the sun's position. If you do not change your clock, and go from Chicago to Hong Kong, you will still have Chicago's time, and the "live Monitor" example will synchronize Same Time Now, Now, Now...

3 I am in Chicago. You are my friend, the alien. From Alpha Centauri. We synchronize our atomic watches. The Alien instantly transports himself back home to a planet around Alpha Centauri. We turn on our advanced, specialized camera image viewing monitors. Yes! They show the exact same time. (here the reader is encouraged to determine this for himself, after going through all examples)

< DISTANCE ENERGY VALUE = FOUR LIGHT YEARS SEPARATION >



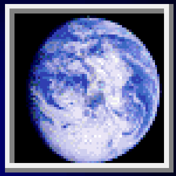


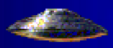


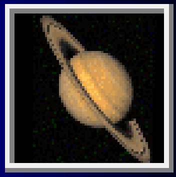
The kid is just starting to get the hang of this. He is going to go in a rocket that almost reaches the speed of light - cause everyone knows, you can't go faster! Four light years distance, and his speed will be just under the speed of light. He calculates, it is going to take him just a little over four years. Now what he is seeing from the earth's viewpoint, is an image from Alpha Centauri that is four years old. And based on the image, he of course, will travel into the 4 year future of the image, or the actual star? No way. It will take him approximately four years to get there, so that should cancel the four year difference, and the kid and the alien will both be in the normal four year future time progression. Whoa, no way again. Didn't Einstein or somebody say that time slows down when approaching the speed of light. At nearly the speed of light, time would barely have moved for the kid, while the earth grows four years older without him. And what about the alien? Is the alien growing older or younger, while the kid is kinda standing still in almost no time? But then his mass is so close to infinite (relativity), he probably is touching both the earth and Alpha Centauri, so that might prove they are on the same time. That's kinda big huh? Hold it, whoa! Your mass may be infinite, but your size goes below micro - I mean, don't people and things get smaller in the distance, regardless of speed? Maybe from where you are at, not from where I am, I did not grow smaller. That is just a light reflection principle....uh, isn't everything we See, reflections of light? Enter-twined with energy differentials we call space, time, mass, change (as in fire, nuclear, chemical, electrical, etc.) Convoluted thoughts again, but not my doing, says the kid, that's what they taught me. Time to upgrade and switch vehicles.

4 I am in Chicago. You are an alien. From Alpha Centauri. We synchronize our atomic watches. The Alien instantly transports himself back home to a planet around Alpha Centauri. We turn on our advanced, specialized camera image viewing monitors. Yes! They show the exact same time.

< DISTANCE ENERGY VALUE = FOUR LIGHT YEARS SEPARATION >







The kid gets into a slightly more modern vehicle. And this is a mean machine. Speeds up to two light years per hour. Be there in two hours. Whoa, that is going to be four years in the alien's future (minus 2 hrs). The alien will have aged 4 years. No. In two hours? And what of my earth friends, will they be four years older?. No way Jose. Going past the speed of light, time goes backward. So the kid is growing younger. So then what? Everybody else will be twice as old????? Wow. What will smart people think of next?

We need some huge clarification here. Pay attention to the radius of curvature? What's that?

follow the Radius of Curvature

STARSTEPS CHAPTER

TIME

In his examination of the natural laws or facts of the Universe, man is greatly handicapped by the fact, insofar as time is concerned, he has never progressed beyond a unidemensional perception Those who are familiar with the analogies used to explain some portions of the theory of relativity, will recall that in attempting to achieve a concept of a four dimensional continuum, the reader is asked first to imagine a man who is conscious of only one dimension in space. His entire universe consists of a single line. If a dot were placed on the line in front of him, and behind, he would be completely imprisoned, since he would not be able to conceive of going over or around them. As his intelligence and consciousness developed, he would eventually become aware of a second dimension, and to imprison him then, it would be necessary to enclose him in a circle. With further development, he would become aware of a third dimension in which a sphere would be a prison, and so on.

We are now conscious of three dimensions of space, and have done considerable mathematical reasoning in regard to a fourth. Unfortunately, insofar as time is concerned, our consciousness has never progressed beyond the first dimension. We are confined to a single line in time. We have no concept of lateral motion, nor can we even turn around upon that line. We can only go forward. Many of the difficulties which we encounter in our attempt to understand the operation of the natural laws arise because of our severely restricted concept of the nature of time.

Time has often been referred to as the "fourth dimension" by those who attempt to explain our present concept of relativity. It is usually pointed out that, since all known bodies of matter in the Universe are constantly in motion with respect to each other, if we wish to describe the position of any body, it is necessary to give a point in time as well as a spatial relationship to any other body or bodies. There is, however, a more convincing method of demonstrating that time is a dimension, although we believe it would be more precise to consider it as the first dimension rather than the fourth since it is the one dimension in which all motion must take place. We are at the present, conscious of three dimensions of space, and we know that motion can take place in any one of the three, but whichever dimension of space is involved, the motion must also take place in time. Our term for the rate of motion is the word velocity, which is defined as being the degree of change in location per unit of time. If an object has a velocity of 1000 feet per second, with respect to our point of observation, we will see that in one thousandth of a second the object will have moved one foot. In one millionth of a second it will have moved only one thousandth of a foot, and so on. We can easily see that if the time becomes zero, the motion must also become zero.

The science of photography has reached a state of development which permits us to take photographs with very short exposure times. By the stroboscopic method of photography, which has been superseded by even faster methods, we were able to take several hundred thousand consecutive pictures in one second. In these pictures even the fastest projectile seems frozen into immobility. We have taken pictures of a rifle bullet penetrating an ordinary electric light bulb, in which several complete and consecutive pictures have been made between the time the bullet first touched the bulb and the time that the first crack appeared in the glass. In these pictures, the bullet appears to be completely motionless. Of course the taking of the pictures actually did involve a very small elapse of time, and so a very small amount of motion did occur during the taking, but it again illustrates the fact that no motion which we can perceive, can take place except within that dimension of time of which we are conscious.

Having pointed out the limitations of our consciousness concerning this factor which we call time, let us now go back and examine it as best we can, with that degree of consciousness and understanding which we have.

We will again attempt to choose the simplest possible definition. We defined space as that which separates bodies of matter, so we will define time as that which separates events. ***(If there is no discernible separation in this respect, the events are said to be simultaneous.)*** Of course we immediately hear the objection that events may be separated by space as well as by time, or that they may be separated by space without being separated by time. This statement, while usually considered to be true, yet forms a stumbling block which has precipitated many a philosopher into the quagmire of misunderstanding and paradox. The difficulty arises in our attempt to define the term simultaneous. If two events are separated by space, how shall we determine whether or not they are separated by time? The observer cannot be present at the site of both events, and so must observe one or both of them through the separation of space, and therefore through the curvature of natural law which the separation represents. In referring to this problem in the introduction to his first book on relativity, Dr. Einstein pointed out that since our only contact with the world about us is through our senses, and since all of the knowledge which we have concerning the universe has come to us through them, if we are to formulate mathematical rules based upon our observations, we must begin with the postulate that the things which our senses tell us are true. If we should observe through a large telescope, the creation of a nova in a remote galaxy, and at the same time observe the eruption of a volcano upon our own earth, we must assume, for the purpose of our mathematics, that the two events are simultaneous. This a postulate which is difficult to accept because the faculty which we call reason immediately interposes the objection that a separation in space involves an elapse of time between the event and our perception of it. However, Dr. Einstein points out that if we allow our reason to modify our observations, we will be evolving a concept whose value is based only upon the validity of our reason rather than upon the accuracy of our observations. We must postulate that events which are observed simultaneously, occur simultaneously insofar as that observer is concerned, and that, therefore, the simultaneity of events is a condition which depends entirely upon the position of the observer with respect to those events.

Almost any student of physics today, be he a beginner or a graduate scientist will argue that no man can ever travel from the earth to the star Alpha Centauri in a period of less than four years, because the laws of relativity state that matter can never move with a velocity greater than that of light.

This is one of the prime fallacies which has been created by misinterpretation of the mathematics. The mathematics do ***not*** say that man cannot travel between the earth and Alpha Centauri in less than four years. They say only that no observer on earth can ever see him do it.

Let us see if we can create an example by which this statement may be more readily understood.

First we will assume that there is a planet in orbit about Alpha Centauri. (Because of Alpha=s proximity to its twin star Proxima Centauri, the orbit would be a rather eccentric one, but perhaps it will do as a reference point.)

Next we will build a small space ship, in which we propose to pay a visit to this planet. Since a small space ship is not a very comfortable place to spend long periods of time, the idea of being confined to the craft for the four years, which relativity seems to say is the shortest possible time, is a distasteful one, so we cast about for means to shorten the journey.

If we do our engineering according to the rules which are known as classical mechanics or ordinary engineering practice, it will become apparent at once that we cannot use any source of energy which originates within the ship. These rules of mechanics tell us that, to accelerate a body of matter to a velocity of 3x10(10) centimeters per second (the velocity of light) will require energy equal to 9x10(20) ergs per gram of mass. Yet the rules of relativity (E=MC2) tell us that 9x10(20) ergs is the total energy contained in a gram of mass. This means that if we wish to accelerate the space ship to the velocity of light by energy created within the ship, we would have to convert ***all*** of the matter within the ship, including our own bodies to energy. We would then achieve the velocity of light, but we would arrive at our destination, not as matter but as electromagnetic radiation.

Since we would much prefer to arrive as matter, we must seek an accelerating force which will act from some unlimited source of energy outside the ship.

It is at once apparent that a force field originating on earth would not be successful because ***the rate of propagation*** of a field is the same as that of light, and no field can accelerate us to a velocity greater than its own rate of propagation.

For the purpose of this example we will simply postulate that we have available, a supply of energy form an outside source, which we can use in any desired quantity, and which can be used to create an instantaneous velocity so high that we will reach our destination, four light years distant, in a single hour.

We will take off from a launching pad which is situated near an observatory operated by a friend of ours, who is an astronomer, and who has a telescope of unlimited power, through which he will observe our progress. Since he can only observe us through the light which we emit during the trip, we must also cause the ship to emit a very large quantity of light.

At a prearranged instant we will takeoff and at once achieve a velocity that will take us to our destination in an hour. After fifteen minutes we will have covered one quarter of the distance, but the light which we emit at that point will require one year to return to earth, and will reach the eyes of the astronomer one year and fifteen minutes after takeoff. He will note in his logbook that we required a year and fifteen minutes to reach the quarter point.

After we have traveled for thirty minutes we will have covered half the distance, but the light which we emit at that point will require two years t return to earth, and so will reach the astronomers eyes two years and thirty minutes after takeoff. After an hour has passed we will have reached our destination, but the light emitted by the craft will not reach the astronomer until four years and one hour after our departure from earth.

All of the light which we emit at intermediate points will, of course, arrive at intermediate times so that the astronomer could observe our progress constantly from the instant of takeoff to the moment of our arrival upon the distant planet, four years and one hour later.

According to the primary postulate of relativity that we must accept the evidence of our senses as being valid, the astronomer must maintain that ***from his reference point*** we did not quite achieve the velocity of light.

The fact that we may have returned long before this, that we may be seated at his side, and may perhaps, be assisting him in his work, does not in any way affect the validity of his observations or the mathematics of relativity which he applies thereto. Let us remember, however, the statement that, AWhen our mathematics are complete, then we may allow reason to deal with that which we have created.@ If we do this, we will not fall into the common error of confusing relativity with a concept of absolute determinism.

Let us reiterate Dr. Einstein=s preface again: ***AIf we allow our reason to modify our observations before our mathematics are complete, we will be evolving a concept whose value is based entirely upon the validity of our reason rather than upon the accuracy of our observations. After our mathematics are complete, then we can allow reason to deal with the formula, but until the formula is complete, we must postulate that events which are observed simultaneously occur simultaneously insofar as that observer is concerned, and that therefore the simultaneity of events is a condition which depends entirely upon the position of the observer with respect to those events@.***

If we examine this concept carefully, we find that time follows the same curve of natural law which is apparent in the operation of all the basic factors of nature, and again the radius of that curvature is measured by the quantity C.

We will now create another simple analogy, in far greater detail, which may serve to make this statement more readily understood. It will put us in a unique position from which we can, ***from a single point in time, observe ourselves occupying three rather widely separated positions in space.***

Once again, we will start today to build a space ship. We will postulate that the ship will require one year of our time to build, and that when completed, it will be capable of infinite acceleration. We will assume that a continuous supply of energy is available from an outside source, and that the craft will continue to accelerate so long as this energy acts upon it.

During the year which we spend in building the craft, light is being reflected from us into space, so that an observer with a telescope stationed at some other point in space could follow the course of its construction. When we have completed the construction of our craft we will enter it and take off for a destination which we will assume to be a planet orbiting about Alpha or Proxima Centauri, our next nearest suns, about four light years distant. We have a telescope of unlimited power in the rear of the craft pointed toward the earth which we are leaving, and another telescope at the front, focused upon the planet which is our destination. We will set the field strength for a constant acceleration, and seat ourselves at our telescopes to observe the result.

After we have risen a few miles from the surface, we will, for the purpose of furnishing an additional reference point, eject from the craft and its field, a cannon ball or other sphere of metal which has been specially painted so that it can readily be observed from any distance with the aid of our unlimited telescopes. Since we had not yet reached escape velocity when the ball was ejected, we will observe that it soon begins to fall back to earth.

As we continue to accelerate, we will observe that the kinetic energy differential which we are producing between ourselves and our points of observation is producing exactly the effect upon time which is predicted by our postulate of the curvature of natural law. Since the distance or degree of separation between ourselves and the earth is increasing with time, the energy differential is negative, which means that the natural laws at the observed point will displaced towards the base or zero line of the sine curve, insofar as our observations are concerned.

If we reach a velocity equal to one half that of light, and then observe a clock on earth through our telescope, we will see that in ten hours of our time, only five hours have been recorded by the earth clock. If we observe the test sphere which we ejected during our take off, (assuming that it has not yet reached the ground) we will see that it is not falling at the rate predicted by our laws of gravitation, but at a rate only half as great. We will also observe that the sphere is not accelerating at the rate predicted by our laws, nor even at half that rate. Since we ourselves are still accelerating, the observed acceleration of the sphere is diminished by a factor which is proportionate to ours.

We must remember that we can only observe events through the light which is emitted or reflected by the objects concerned with those events, and if we ourselves have a motion equal one half that velocity in the direction in which the light is moving, then a column or sequence of light impulses which were emitted from the earth during a five hour period, would require ten hours to pass our point of observation.

When the velocity of our craft reaches that of light with respect to the earth, there will be a negative energy differential, equal to the quantity C, existing between us and our point of observation. We will observe that all natural laws upon the earth have reached zero value with respect to us. All motion and all changes have ceased. If we observe our test sphere we will see that gravity is no longer acting upon it, since it has ceased to fall. All laws of motion are in abeyance and the factor which we call time has ceased to have any significance.

To make these observations, of course, we would require one of the new telescopes which operate on the retention of vision principle, where the last image to arrive remains upon the viewing screen until a new light image arrives to change it. When we reach the velocity C, no new light will arrive, hence the picture will not change until we change our velocity.

Since we postulated at the beginning of this analogy that our craft was capable of unlimited acceleration, and since the postulated force continues to act, our velocity will continue to increase and we will have between ourselves and the earth, a rate of increase in the degree of separation which is greater than that specified by the quantity C. We can do this from our point of reference although, as will be explained later, we cannot do it from the point of view of an observer upon the earth.

When we have passed through the velocity C, a startling change occurs in our observations. We no longer observe the earth from the telescope at the rear of the craft. The earth now appears in the telescope at the front, and we are no longer leaving the earth, we are now approaching it. We will see a craft which is identical to ours, and which is indeed our own craft, detach itself from us and move back toward the earth ahead of us at a rate which is proportionate to our excess over the velocity C.

If we observe the earth, we discover that all natural laws are operating in reverse. If we observe the test sphere we will see that it is now falling ***away*** from the earth rather than towards it. Gravity between the earth and the sphere has become negative ***with respect to our point of reference*** as have all the natural laws. We observe this through the forward telescope rather than that at the rear, because we are now overtaking the light which had passed us before we had reached the velocity C, and since we are now overtaking it, we encounter first the light which had passed us last. All events occur in reverse, just as would the scenes in a motion picture film which is being run backwards.

If we complete our journey to the planet which is our destination, at an average velocity equal to 4 times C, we will arrive with an elapsed time of one year as measured by the clocks on our own craft. During the journey, however, we will observe the elapse of five years of time upon the planet which we are approaching, and the elapse of three years of negative time upon the earth which we are leaving. In other words we will arrive at our destination three years before we left the earth. If immediately upon our arrival we seat ourselves at a telescope of sufficient power to observe the earth at close range, we will see ourselves going about the daily tasks which we performed two years before we began to build the space craft in which we made the journey. If we then focus the telescope upon the proper point in space we will see ourselves in our space craft, flying backwards toward the earth.

We are now in a position from which we can observe the sine curve nature of all natural law, and to measure precisely the radius of the curvature. If we observe the earth, we see that time there is positive. That is: it is moving in the direction which we consider normal. Since there is no significant energy differential, the time rate is essentially the same, but because of the degree of spatial separation there will be a displacement along the time curve, between the observer and the point which he is observing. According to our theory of the curvature of natural law, this displacement should be equal to D divided by C, where D is the distance and C is our basic factor. In the case of our present observation the distance is equal to 4.C.years, which if divided by C will equal 4 years, which is precisely the degree of displacement which we observe.

If we now turn our attention to the space craft, we find that we are observing it through an energy differential which exceeds the quantity C and therefore the craft is within the negative portion of the curve, and all natural laws will be operating in reverse at that point. We are now in a unique position, in that we now can, from a single point in time or at least from a single point in the only dimension of time of which we are conscious, observe ourselves occupying three rather widely separated positions in space.

First: our position at the telescope as the observer. At this point time is positive. Second: our position on the surface of the earth. Here time is also positive but has a negative displacement upon the time curve which is equal to four years. Third: our position in the space craft: here time is negative, as demonstrated by the fact that we observe it flying backwards toward the earth, and all actions taking place within it occur in reverse order. This is, of course, due to the fact that the craft had a velocity greater then that of C and so was constantly leaving behind the light which was emitted or reflected from it. As we observe the craft from our new reference point, the last light which it emitted arrives first.

If we continue to observe for several years, we will eventually see ourselves build the craft and take off into space. At the same time we can see ourselves in the same craft hurtling backward through space toward the inevitable meeting point where the past and the future join to become the present. Since we are observing ourselves simultaneously occupying three different positions in space, we can readily see that we are forced to a concept of time which includes more than one dimension. If we continue to observe the two craft, we will see that the one which is moving away from us is constantly slowing down, while the one coming toward us from the earth is accelerating. At the instant in which the velocity of the receding craft reaches zero, the approaching craft will reach it, coincide with it, and both craft will disappear completely from view. Our lateral excursion into time has completed its curve and we have returned to the starting point of our unidimensional concept.

There is only one thing left to do. We immediately leap into our space craft and begin our return journey to earth. As before, we achieve an average or mean velocity equal to 4 C. We land our craft near the observatory of an astronomer who is a friend of ours, and rush in to tell him of our return. We find him seated at his telescope observing our landing upon the planet which we had set out to visit. When we inform him that we achieved an average velocity of 4 C, his reply is that this is impossible since the laws of relativity clearly state that no object can achieve a velocity in excess of C (with respect to a given reference point.). He will also point out that he has been observing us constantly since our take off from the earth and that only now, today, five years later, were we observed to have reached our destination. Since the journey required five years of earth time, our average velocity was only four fifths that of light.

Again, we must restate with emphasis: according to the primary postulate of relativity, that for mathematical purposes we must accept the results of our observations as valid, the astronomer is perfectly correct in his statement that we did not, and could not have exceeded the velocity C. The mere fact that we have returned, be seated at his side, and may perhaps be assisting him in his work, does not in any way affect the validity of his observations nor the mathematics of relativity which he applies thereto. ***He can only state that our arrival upon the distant planet, and the moment of our return to earth were in fact simultaneous.***

We can see that, even if our energy level had been so close to infinite that the outward trip had required only one second, if during the one second trip we had emitted enough light to make observation possible, the astronomer upon the earth would note that the trip required four years and one second, and so would have undeniable proof of the mathematics which postulate that only with infinite energy may the velocity C be achieved. While the astronomer=s statement is perfectly correct with respect to his reference point upon the earth, if we leave the surface of the earth, our reference point will go along with us, and the limitations of relativity will always precede us at a distance equal to the quantity C. We need not fear that we will ever overtake or be hampered in any way by those limitations.

We can now clearly see a number of those aspects of the principles of relativity which have created what we have described as thought blocks in the minds of many students, scientists and engineers. We have shown that these thought blocks are not actually inherent in the mathematics of relativity, but are obstacles created by the arbitrary interpretations which we have placed upon those mathematics. The obstacles are illusionary only. We must realize that the rules of limitation found in our mathematical approach to nature, are limitations only of our own perception and consciousness; and have no absolute significance insofar as nature itself is concerned.

CHAPTER SEVEN

The Building Blocks

TO BE CONTINUED