Chapter 20

EINSTEIN'S MAJOR ASSUMPTIONS, POSTULATES & GOALS

Einstein assumed that all physical laws of nature must be symmetrical and transformed into the same algebraic form for every inertial observer; that all measurements must be physically made with coordinates by hand and eye approximations; and that stationary ether was superfluous to his theory, therefore all motions and times are relative. He postulated that a radical mathematical principle of relativity applies so as to make all laws of nature 'co-variant.' For Einstein, 'co-variance' meant that each law of nature must be constituted so that its space-time coordinate variables of magnitude will be transformed by Lorentz transformations into a law of exactly the same algebraic form for every inertial observer. As a result, 1) the magnitudes of all non-EM physical phenomena must mathematically vary depending upon their relative velocities, and similarly 2) Einstein postulated that mathematically light en vacuo *must propagate relative to all linearly moving inertial bodies at the absolutely constant velocity of c. But it turns out that most of Einstein's mathematical assumptions, and both of his fundamental mathematical postulates, were not correct: logically, physically or empirically.*

Remember from Chapter 16 that Poincaré assumed in 1904 that all physical laws of nature (including light) must be the same for all inertial observers, regardless of their different uniform velocities. (see Logunov, p. 25) This assumption (which Poincaré called the 'principle of relativity') seemed to be reasonable: 1) because the algebraic laws of mechanics were empirically the same (mechanically covariant) for all inertial observers regardless of their different uniform velocities (Galileo's Relativity); 2) because Maxwell's law for the constant transmission velocity of light at *c* relative to the medium of stationary ether was theoretically the same for every inertial observer (Rohrlich, p. 52); and 3) above all because such assumption would theoretically explain why terrestrial light experiments could not detect the motion of the Earth through the stationary ether.

Remember also from Chapter 16, that in his April 1904 treatise, Lorentz transformed the space and time coordinates in the M & M experiment with his own radical Lorentz transformation equations. Lorentz did this for three main reasons: 1) in order to mathematically do away with the troublesome factors (c – v and c + v) which the Galilean transformation equations had previously produced;[1] 2) to achieve the necessary theoretical contraction of the longitudinal arm on Michelson's apparatus in order to explain away Michelson's 'missing' time interval and thus to mathematically justify the paradoxical M & M null result with respect to stationary ether; and 3) so that his results would be consistent with Poincaré's principle of relativity (expanded to include electrodynamics and light as well as mechanics) which Poincaré had been talking about.[2]

It is asserted by the author that when Einstein read Lorentz's above described April 1904 treatise and Poincaré's writings about his expanded principle of relativity in the latter part of 1904 or the early part of 1905, Einstein soon realized that Lorentz's and Poincaré's new concepts could mathematically resolve the 'difficulties' between the relativity of mechanics and Maxwell's velocity of light, if they could be reinterpreted in a radically different way. Most importantly, Einstein realized that Maxwell's electromagnetic law for light waves at velocity c (when transformed by the Lorentz transformations) would remain mathematically invariant and constant in both of Lange's inertial reference frames. In other words, Maxwell's law could retain the same invariant algebraic form (c) for every inertial observer anywhere in the Cosmos, regardless of such inertial observer's different linear velocity v relative to the light ray. This result could also mathematically explain why no light experiment (including the M & M experiments)

[1] Such factors implied that terrestrial light experiments should be able to detect the velocity of the Earth through the stationary ether.
[2] Lorentz's radical 1904 transformations also mathematically demonstrated that electromagnetic mass (a resistance) increases with its velocity. (see Chapter 17)

had been able to detect whether an inertial frame (i.e. Earth) was moving or not.[3]

The *ad hoc* 1904 theories of Lorentz and Poincaré then became a template for Einstein's 1905 Special Theory, his two fundamental postulates, his Lorentz transformations, his relativistic kinematics and dynamics, and all of the other bizarre mathematical consequences of his Special Theory. One major problem with this happy scenario was that the 'difficulties' which Einstein imagined to exist with respect to the velocity of light were never a real problem that needed any solution, mathematical or otherwise. Such 'difficulties' (including the baffling M & M null results) were merely very explainable paradoxes. All that was needed was the correct analysis and explanation of the situations, so that all of such perceived 'difficulties' and paradoxes would completely disappear. These correct analyses and explanations are primarily set forth in Chapters 6 – 7, 10 – 12 and 19 – 24 of this treatise.

Before Einstein began to write his Special Theory in 1905, he obviously had developed various goals for his treatise (see Memo 20.1), and numerous fundamental assumptions concerning its content. In this Chapter, we shall identify, discuss and begin to analyze these basic assumptions, his two fundamental mathematical postulates, and the major goals that Einstein assumed would resolve all of the 'difficulties' and paradoxes described in our Chapter 19 and elsewhere in this treatise.

A. Einstein assumed that all physical laws of nature (including the velocity of light) must be constituted so that they are described to be algebraically symmetrical for every inertial observer.

The word 'symmetry' is generally defined as a 'similarity of form or arrangement

[3] There was an additional mathematical advantage: such absolute velocity of *c* with respect to all inertial observers could become a universal constant for measurements. However, all of these wonderful mathematical results were physically impossible, as we shall explain in Chapters 20F, 21 and 22.

on either side of a median or dividing line that results in an aesthetically pleasing whole or beauty.' It implies a graceful proportion, a pleasing harmony and aesthetic balance of the parts. 'Symmetry' can also be interpreted to have other meanings. For example, in mathematics, it can mean creating an equation or relationship whose terms or parts can be interchanged without affecting its validity.[4] (Webster's Dictionary, p. 1356) When a mathematician (such as Einstein) describes a formula or a mathematical law as beautiful or elegant, he usually means that it has most or all of the above qualities.

It is apparent from the very first paragraph of Einstein's 1905 Special Relativity treatise that he was convinced that all physical laws of nature (including electrodynamics) must be described so that they are symmetrical for every inertial observer, but that they were not being described by the scientific community in a symmetrical manner.[5] For example, Einstein asserted that the "customary view" of Faraday's reciprocal electrodynamic action of a magnet and a conductor (which induces an electric current in a wire) involves two very asymmetric descriptions: one body or the other is at rest and the other body is moving.[6] (see Hoffmann, 1972, p. 69) Instead, Einstein concluded: "the observable phenomenon here only depends upon the relative motion of the conductor and the magnet."[7] (Einstein, 1905d [Dover, 1952, p. 37])

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[4] Such interchangeable terms or parts are often referred to as 'invariant' or 'equivalent.'

[5] For a detailed description of the asymmetries which Einstein was talking about, see Holton, 1973, p. 509. Briefly, they had to do with the description of a mysterious 'electromotive force' for which there was no corresponding energy rather than an electric force caused by relative motion.

[6] "It was not the same when looked at from the reference frame of the magnet and from the reference frame of the loop. Einstein felt that this phenomenon should be exactly symmetrical since only relative motion is involved." (Rohrlich, p. 58) This was an example of the 'electrodynamics of moving bodies.'

[7] The relative motion that Einstein was referring to was a uniform linear reciprocal motion. Einstein most likely got the idea for this example from August Föppl, who described a similar asymmetric thought experiment in Chapter V (entitled 'The Electrodynamics of Moving Conductors') of his well-known 1894 German textbook. Föppl concluded that the only thing that matters is the relative motion of the magnet and the conductor toward each other, in which case the ether appears to be superfluous. (see Neffe, pp. 136 – 137; Miller, pp. 142, 146) Einstein used much of Föppl's exact language on pages 37 and 38 of his 1905 treatise. (see Einstein, 1905d [Dover, 1952, pp. 37, 38])

It is true that many different types of symmetry do exist in physical laws. A sphere, a crystal and a snowflake are all symmetrical in 'shape.'[8] A flower, a vegetable, and a human being show some degree of symmetrical shape. There are also symmetries of 'identity' in physics. For example, all electrons and all hydrogen atoms are theoretically identical, so in this sense they are symmetrical.

There are other interpretations of symmetry. The horizontal displacement of two identical moving apparatuses in space or in time on the surface of the Earth should have no effect upon their physical operations. Their motions should be exactly the same (symmetrical) regardless of their locations (positions) or times of operation. (Feynman, 1963, pp. 52-1, 52-2) Similarly, there is a symmetry or equivalence of accelerated motions that occurs on any terrestrial platform with a uniform velocity in a straight line (a motion of translation). Such accelerated motions will occur so that the laws of mechanics (and the algebraic form of such laws, F = ma) will appear to be the same (mechanically covariant) on all inertial bodies (Galileo's Relativity). (*Id*.) The Galilean transformation equations mathematically inferred this type of symmetry for two inertial reference frames in a relative translational motion, and accelerated motions occurring thereon. (Chapter 14) This mathematical version of Galileo's Relativity, the implied covariant symmetry of mechanical accelerations produced on inertial reference frames in relative translational motion, is also what Einstein was alluding to in his 'induction of a current' analogy.[9] However, Einstein's 'induction' analogy went far beyond Galileo's Relativity and further inferred that relative inertial motion applies to the realm of electrodynamics, as well as to

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[8] There are also rotational symmetries of geometrical invariance. For example, when a square or cube is rotated through 90°, such rotation leaves the geometrical shape invariant. (Rohrlich, p. 21)
[9] Einstein's induction analogy also exemplified the symmetry of reciprocity of relative motion.

mechanics.[10]

Based partly on his very limited knowledge of astronomy and partly on his assumptions of symmetry, Einstein later conjectured in his Special Theory that space is isotropic (it has the same properties in all directions), and that space and time are both homogeneous (all points in space and time are equivalent). (Einstein, 1905d [Dover, 1952, pp. 43 – 44]) As we shall see in Chapters 25 and 27, these theoretical extensions of symmetry to space and time would be necessary for Einstein to assert the constancy of light propagation in opposite directions, and to 'derive' his Lorentz transformation equations.[11] (Resnick, 1968, pp. 56 - 57)

On the other hand, it is also true that there are as many exceptions and limitations to such symmetries as there are valid applications of them. For example, all snowflakes are symmetrical in 'shape,' but no two are symmetrically 'identical.' Identical apparatuses will not necessarily operate the same way if they are located in very different climates, at very different altitudes (because of gravitation), or if they are rapidly revolving (because of centrifugal forces). An apparatus or structure that operates well at one scale may not operate the same way (symmetrically) at a much larger or smaller scale. Most living things have many asymmetries, such as a head and a tail, roots and flowers, one heart on one side of the body, etc. Many revolving 'spheres' (such as the Earth) bulge asymmetrically at their equators; their orbital motions are not symmetric circles, but rather are ellipses. Similarly, time is not necessarily symmetrical. For

[10] Partially based on this analogy, and somewhat similar to Poincaré's principle of relativity, Einstein would thereafter attempt to generalize and extend the very limited sensory and empirical concept of Galileo's Relativity so that it could mathematically apply to electrodynamics, the velocity of light, optics and all of physics. This dubious generalization would form a critical part of Einstein's first fundamental postulate: his own very different and radical 'principle of relativity.' (see Chapters 20E and 24)

[11] The theoretical symmetry of space and time would also be necessary for Einstein's concept of simultaneity (Chapter 25), for Einstein's General Theory, and for many other mathematical theories in the future.

example, an egg once cracked and cooked cannot be symmetrically reversed in time. [12] (Feynman, 1963, pp. 52-2, 52-3) Thus, not all physical laws or phenomena are or can be symmetrical in every way. (*Id*., pp. 52-11, 52-12) As Smolin concludes: "Nature becomes less rather than more symmetric the closer we look." (Smolin, p. 219)

Why was Einstein so demanding of symmetry in his Special Theory? One major reason is because he needed the concept of symmetry in order to rationalize his way to his ultimate *ad hoc* conclusion: that all laws of nature (including the velocity of light at *c*) must retain the same (symmetric) algebraic form for every inertial observer. (see Chapter 20E) This false conclusion grew out of the fact that the algebraic form of Newton's laws of mechanics (i.e. F = ma) always remains the same (mechanically covariant) for every inertial observer. Another major reason is that, with the aid of symmetry, Einstein was able to rationalize his way to a new *ad hoc* mathematical concept: that Maxwell's natural law for the constant velocity of a light ray *en vacuo* must always retain exactly the same (symmetrical, invariant and covariant) algebraic form of *c* (300,000 km/s) with respect to every inertially moving observer on every inertial frame or body, regardless of such observer's different linear velocity relative to the light ray. (Chapter 20F and 21D) There were also many other applications of symmetry in Einstein's Special Theory. (see Memo 20.2)

Concerning the velocity of light, and contrary to Einstein's new relativistic covariant concept, we will discover in Chapters 21 and 22 that the constant transmission velocity of a light ray at *c* should theoretically be described to have the same invariant magnitude of 300,000 km/s relative to the <u>medium</u> of empty space through which it

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[12] One cannot always put the genie back in the bottle. On the other hand, elementary particles and fundamental laws on the quantum level are theoretically asserted to be "completely reversible in time." (Feynman, 1963, p. 52-3)

propagates.[13] However, with respect to each material observer moving linearly at a different speed relative to such light ray, the velocity of the propagating light ray is logically and empirically measured to have a different magnitude (either more or less than 300,000 km/s) relative to such linearly moving observer. Such relative velocity of the light ray propagating over varying distances and time intervals depends upon the speed of the inertial observer and his direction of motion either toward or away from such light ray. (see Figures 20.3 and 21.1) Einstein's impossible attempt to mathematically require that every light ray propagating over different varying distance/time intervals must always have exactly the same (symmetrical) absolute velocity (of 300,000 km/s) relative to every different material observer moving at a different linear velocity relative to the light ray (Chapter 21E), is what Special Relativity is all about.

"The symmetries most deeply embedded in contemporary theory are those that come from Einstein's special and general theories of relativity. The most basic of these is the relativity of inertial frames." (Smolin, p. 219) Because of the almost universal acceptance of Einstein's relativistic theories, 'observed symmetry' has now been elevated to a necessity in theoretical physics. (*Id*., p. 218)

> "Modern physics is based on a collection of symmetries, which are believed to enshrine the most basic principles. No less than the ancients, many modern theorists believe instinctively that the fundamental theory must be the most symmetric possible law."[14] (*Id*.)

Throughout the remainder of this treatise we will demonstrate that this absolute necessity of symmetry in physics is not correct.

[13] For this reason, the transmission velocity of light is also received at *c* by every inertially moving body and observer, regardless of their linear motions. (see Chapter 22E) Very importantly, the receipt of light at *c* by a moving body (meaning the velocity of light upon 'contact') and the propagation velocity of light relative to a moving body are very different concepts.

[14] With respect to the above beliefs, we set forth the following caveat: Rationalizations of symmetries, topologies and equivalences may be useful to and satisfy mathematicians, but they do not necessarily make a mathematical law physically or empirically true.

B. Einstein assumed that all measurements must be physically made with Cartesian coordinates, by hand and eye approximations between inertial reference frames.

As will become obvious during the remainder of this treatise, Einstein assumed the validity, applicability and necessity of his artificial system of measurement for the description of physical laws, which system of measurement he designed for the express purpose of achieving his relativistic goals. Briefly, Einstein's system of measurement was as follows. An observer (a measurer) situated in one inertial frame of reference (which he also defined as a system of coordinates[15]) would visually measure and physically plot on Cartesian coordinates the time and space coordinate magnitudes of an event occurring in another inertial frame of reference (system of coordinates) which was moving linearly with respect to the first frame at the uniform relative velocity of v; and vice-versa.[16] Einstein generalized his system of measurement, as follows:

> "Of course we must refer the process of the propagation of light (and indeed every other process) to a rigid reference-body (co-ordinate system)." (Einstein, *Relativity*, p. 22)

In Chapter 22 we will explain why this reference of light propagation to a material co-ordinate system is, in general, an impossible concept. All of the spurious axioms, assumptions, rationalizations, and conventions that Einstein invented for his system of measurement are further described and analyzed in Chapters 21 and 24 – 29.

It is an obvious fact that hand and eye coordinate measurements made between two distant inertial frames (bodies) with different velocities will always produce imprecise, distorted and at best approximate coordinate results. One reason is that during

[15] (see Einstein, *Relativity*, p. 11) At page 14 (*Id.*) Einstein defined an 'inertial system of coordinates.'
[16] Einstein only used physical measurements, such as by rigid rods and stationary clocks, to make measurements of length (distance) and time intervals when there was no relative velocity involved.

the time interval delay for the light signal to propagate from one frame to the other, the relative velocity of the frames will constantly change the relative coordinate positions of objects being measured on the two frames. It is also obvious that this archaic method of distant measurement is inherently an unreliable and imprecise method of measurement.[17] Yet, without this dubious type of coordinate measurement, Einstein would never have been able to contrive his concept of Relativistic Kinematics (Chapter 28) nor his Special Theory as a whole.

In the 21st century, radar and laser beams, light and electronic sensors, software programs, digital computers and television cameras describe and measure physical laws and magnitudes on one inertially moving distant planet (i.e. Mars) and transmit such data at the speed of light to another distant inertially moving planet (vis. Earth) without any coordinate measurements or transformation equations. However, even if such modern technology had been available in 1905, Einstein could not have used such modern methods of measurement for his Special Theory. Why? Because he would not have been able to manipulate such high tech measurements and misinterpret their results in order to construct his relativistic mathematical theories.

Einstein's arbitrary system of measurement resulted in numerous spurious relativistic concepts and in numerous mathematical formulae, most importantly his Relativity of Simultaneity and Distance (Chapter 26), his Lorentz transformation equations (Chapter 27), his Relativistic Kinematics (Chapter 28), and his relativistic formula for the Composition of Velocities (Chapter 29) Once Einstein arrived at a mathematical formula for such measurements he no longer had to physically make eye

[17] It should only be employed when there is absolutely no alternative, and then only as a rough approximation.

and hand coordinate measurements. At this point, all Einstein had to know were the relative velocities involved, and the distorted 'measurements' that he needed would follow with mathematical precision.

Einstein used his artificial system of measurements and his mathematical formulae to demonstrate his concept for the absolute propagation velocity of light at *c* and the rest of his Special Theory. He also attempted to extend his Special Theory to other phenomena (i.e. mass and energy, and space and time) and to confirm his Special Theory with data selectively chosen from somewhat related experiments. The only problem was that his system of measurements and his relativistic mathematical formulae, data and concepts derived therefrom were all completely *ad hoc*, artificial, arbitrary, contrived, invalid and meaningless.

C. Einstein assumed that ether was superfluous to his Special Theory, and that all motions are relative.

Directly after Einstein's example of asymmetries in the description of Faraday's process for the induction of an electric current, Einstein asserted as follows:

> "Examples of this sort, together with the unsuccessful attempts to discover any motion of the earth relatively to the 'light medium,' suggest that the phenomena of electrodynamics as well as of mechanics possess no properties corresponding to the idea of absolute rest." (Einstein, 1905d [Dover, 1952, p. 37])

One assumes that these statements were made to bolster Einstein's aforementioned assumption that all motions are relative, and to imply that the fictitious 'light medium' of stationary ether might not exist.[18]

[18] In 1905, Einstein (like Föppl before him), avoided the issue of the validity of ether with the following language: "the introduction of a 'luminiferous ether' will prove to be superfluous in as much as the view here to be developed will not require an 'absolutely stationary space'…" (Einstein, 1905d [Dover, 1952, p. 38]) Einstein did not categorically denounce and abolish the concept of ether until much later. (see Einstein, *Relativity*, p. 59)

If there is no such thing as 'absolute rest,' it follows that there can be no absolute space and no stationary ether reference frame from which to absolutely measure: motion, direction of motion, velocity, distance traveled, or anything else. It also follows that if there is no absolute motion then all motion must be relative. For this reason, all measurements of motion must be made from a relatively stationary point or event, or from one co-moving reference body to another co-moving reference body, and vice-versa. It also follows that rest, velocity, distance traveled and direction of motion are also relative concepts. These are all reasonable and correct assumptions.

However, we must then ask the question: Were Einstein's above assertions and suggestions concerning the non-existence of absolute rest only intended to bolster his assumption that all motions are relative, and to imply that stationary ether might not exist? One would think not, for the following reasons.

First, the assumption that all motions are relative had already been implied or asserted by numerous other scientists, including Galileo, Newton, Maxwell, Lange, and Poincaré, so by 1905 it was not a new idea. Other prominent physicists (including Maxwell, Lange and Poincaré) had also questioned the existence of stationary ether and/or absolute rest; Michelson had even categorically denied the existence of ether in his 1881 paper. (Chapter 9) Therefore, by 1905, Einstein's aforementioned suggestions were only echoing the conclusions of others concerning relative motions and the non-existence of ether and absolute rest.

Second, Einstein's example of "the unsuccessful attempts to discover any motion of the earth relatively to the 'light medium'… [which] has already been shown to the first order of small quantities" (*Id*., p. 37), undoubtedly refers to the failure of all light experiments conducted on the Earth which were intended to detect and measure the solar orbital velocity of the Earth (30 km/s) relative to stationary ether. In the very next sentence of his 1905 paper, Einstein conjectured that the failures of such light experiments suggest that the concepts of Galileo's Relativity and the Galilean transformation equations of mechanics should be extended and generalized so as to apply to electrodynamics and optics as well as mechanics. Einstein's exact words were:

> "[Such failures] suggest that…the same laws of electrodynamics and optics will be valid for all frames of reference for which the equations of mechanics hold good. We will raise this conjecture (the…'Principle of Relativity') to the status of a postulate…"[19] (Einstein, 1905d [Dover, 1952, pp. 37 – 38])

Thus, it appears that Einstein's major reason for all of such aforementioned assertions and such examples was really to bolster his conjecture that Galileo's Relativity and the Galilean transformation equations of mechanics should be generalized to include electrodynamics and optics. In any case, Einstein's above conjecture was a *non sequitur*, because it turns out that Galileo's Relativity had nothing to do with such light experiments or their failures, nor with electrodynamics or optics. (Chapters 23 & 24)

Third, Michelson's 1881 and 1887 interference of light experiments would also come within the category of such failed light experiments, *albeit* to a higher order of approximation. We now know the reasons why Michelson's experiments did not detect any motion of the Earth (Chapters 10, 11 and 12), and these reasons had nothing to do with Galileo's Relativity, nor with the Galilean transformation equations of mechanics. So why should we believe that any of such failed light experiments are compelling evidence that the concepts of Galileo's Relativity and the Galilean transformation equations for mechanics should be extended to apply to electrodynamics and optics?

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[19] The 'equations of mechanics' which hold good in 'all frames of reference' for classical mechanics are the 'Galilean transformation equations,' the so-called mathematical version of Galileo's Relativity.

There is no logical or empirical reason.[20]

Einstein's real reason for all of the above suggestions was his attempt to generalize Galileo's empirical and sensory concepts of relativity and the Galilean transformation equations to include electrodynamics and optics (in other words, to include the velocity of light), because the generalization of such concepts was absolutely essential to his Special Theory. Einstein needed an empirical foundation for his mathematical Special Theory. Without the empirical foundation which Galileo's Relativity might provide, his Special Theory would have no empirical basis, and like Lorentz before him it would be viewed by the scientific community as only an *ad hoc* mathematical exercise of the imagination. Therefore, Einstein needed to attempt to connect and characterize Galileo's sensory and empirical concept of relativity as his empirical foundation. He also needed the Galilean transformation equations to blame for the 'difficulties' with the velocity of light that he imagined, and in order to modify them into his Lorentz transformation equations. Much more about this later.

Specifically with reference to relative motion, Einstein stated, "every motion must be considered only as a relative motion." (Einstein, *Relativity*, p. 67) He also asserted that relative linear motion exemplified the symmetry of reciprocity. For example:

> "we can express the fact of [relative linear motion]…in the following two forms, both of which are equally justifiable:
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> (a) The carriage is in motion relative to the embankment.
> (b) The embankment is in motion relative to the carriage." (*Id*.)

With respect to these examples, Einstein would state that the relative linear velocity v in

[20] Einstein may have been questioning the existence of ether in 1905, but he avoided any controversy by stating that ether would be superfluous to his Special Theory. Nevertheless, his Special Theory was largely based on experiments and concepts that relied upon the theory of ether, such as the M & M experiments, which attempted to measure the velocity of the Earth relative to the stationary ether, Lorentz's concepts of contraction and local time, which attempted to defend the concept of ether, and Poincaré's generalized principle of relativity, which attempted to explain the null results of ether experiments.

example (a) is reciprocal to the relative velocity –v in example (b), and vice-versa. (see Einstein, 1905d [Dover, 1952, p. 47])

Let us now analyze these concepts of relative linear velocity with other specific examples. The Stanford Linear Accelerator is a huge building that is approximately 2 miles long. Inside the accelerator building, atomic particles of matter are theoretically accelerated down its length at about 99% of the velocity of light relative to the accelerator building. (see Figure 20.3A) Special Relativity claims that at this relative velocity such particles contract in length to only about 15% of their former rest length, that the mass of such particles increases about 7 times, and that the duration of time (eternity) on such particles slows down about 7 times. (see Chart 15.4 & Figure 15.3, and Figure 16.2 & Chart 16.3) It would, of course, be difficult or impossible to empirically prove or disprove any of these claims, so Einstein implied that we should just take his word that such claims are valid.[21]

But, what about the linear accelerator and the people in it? If such atomic particles were relatively moving in one linear direction at 99% of *c*, then Einstein would say (based on symmetry) that the accelerator building and the people in it are reciprocally moving at 99% of *c* relative to the atomic particles in the opposite linear direction. (Einstein, *Relativity*, p. 67) According to Special Relativity, this means that the accelerator building (and such people) should contract in length to only about 15% of their former rest length, that the mass of such building (and such people) should have increased about 7 times, and that the duration of time (eternity) in such building should slow down about 7 times.

[21] Einstein acknowledged in his book *Relativity* (at pp. 49 – 50) that these difficulties of proof exist. He also assured us that such relativistic effects have been confirmed to exist at high velocities, but that at low velocities such effects "are too small to make themselves evident…" (*Id*.) How convenient!

However, we, situated in the accelerator building, do not notice any of these relativistic effects. Neither do any of the other people on the Earth, many of whom are also theoretically moving reciprocally at 99% of *c* relative to such atomic particles. Therefore, it is rather difficult for us to believe Einstein's relativistic predictions. The empirical results of these simple thought experiments should give us pause and make us wonder: Do not such null results constitute a serious contradiction to Special Relativity? Such null results should also (at this early juncture) be a convincing demonstration that Einstein's Special Theory is possibly internally inconsistent and even meaningless.

Einstein also stated that he could not attach any meaning to "motion in itself," but only to "motion with respect to the body of reference chosen in the particular case in point." (Einstein, *Relativity*, pp. 59 – 60) In other words, Einstein could not find any meaning with respect to motion or velocity in the abstract, but only with respect to relative motion. For example, Einstein claimed that the abstract motion of the Earth through cosmic space does not produce a contraction of things on Earth, whereas the same motion of the Earth through cosmic space relative to the Sun does? (*Id*., p. 60)

Einstein's definition and description of relative motion depends upon the body of reference that the measurer chooses in order to mathematically describe such motion. (*Id*., pp. 59 – 60) Since there are an uncountable number of linearly moving bodies in the universe, the relative motion that the measurer describes depends upon which reference body such measurer chooses. Thus, such measurer could describe one or an infinite number of relative motions. If, after making a choice, the measurer changes his mind and chooses a different body of reference, then theoretically his relative motion will also suddenly change. But, again, no physical effect is noticed.[22]

Strangely enough, Special Relativity does not claim that length, time, mass and many other physical phenomena are velocity dependent. Instead, it only claims that these phenomena are dependent upon a relative velocity. Think about this claim for a few moments. Why is an abstract velocity through empty space physically different than a velocity relative to a body? What is so special about a relative velocity that theoretically it can relativistically and physically change the magnitudes of such physical phenomena, and at a distance? (see Figure 20.3B) How does this magical process occur? [23]

When a body translates from one point to another at a uniform velocity, the laws of nature on such body are the same at any point along the way. Galileo demonstrated this fact with respect to mechanics with his uniformly moving ship analogy. At the end of the nineteenth century this fact was also described mathematically with the Galilean transformation equations, which compared the coordinate measurements of a body at two different points along its uniform translation.

But when Einstein and others tried to do the same thing with the constant velocity of light at *c* (300,000 km/s), the coordinate measurements of *c* at point A mathematically changed to *c* – v when compared to the coordinate measurements of *c* on body B moving away from A at uniform velocity v. Einstein interpreted this result to be a violation of translational symmetry; in other words, Maxwell's law of the constant velocity of light at *c* had a different velocity at two different locations…point A and point B. (see Einstein, *Relativity*, pp. 22 – 23)

[22] For all of these reasons, in Special Relativity there is nothing certain about relative motion, nor about relative directions of motion.
[23] We will discover in later chapters that all of the above artificial paradoxes are only the result of Einstein's dubious coordinate theories of measurements, and of the application of his Lorentz transformations and their interpretations. (see Chapters 26 and 28)

Einstein's entire Theory of Special Relativity was invented in order to mathematically require that the measurement of a relative velocity (i.e. *c* – v) would always remain absolutely velocity *c* with respect to any linearly moving body B when measured from point A. In other words, mathematically symmetrical.

D. Einstein assumed that all times are relative.

It follows from the finite velocity of the light signal and the abolition of absolute rest, stationary ether, and absolute space that there can be no absolute measurement of an instant in time or of an interval of time that would be valid for all observers in the Cosmos. Thus, there can be no such thing as an absolute 'true time' for all observers measured from absolute rest, from absolute space or from stationary ether. Nor can there be a 'local time' based on 'true time.'[24] All instants and time intervals must also be relative to an observer. Therefore, all measurements of an instant or of a time interval must be made from one relatively stationary point or event to another, or from one co-moving reference body to another co-moving reference body, and vice-versa.

Based upon Römer's observations of eclipses of the Jovian moon Io, the resulting finite distance/time interval delay of the light signal, and Bradley's empirical confirmation thereof (Chapters 6 and 7), it follows that the instant of occurrence of a distant light event cannot be simultaneous with the local observation of such event. A local observer's judgment of the local time for the occurrence of a distant light event must factor in the distance/time interval delay of the light signal at *c* from the position and instant of such distant event, to the position and instant of its observation by such local observer. Therefore, the Galilean transformation equations for an instant in time (t

[24] Nevertheless, Einstein later adopted Lorentz's absolute and artificial concept of 'local time' for his concept of 'time' in Special Relativity. (see Chapter 25)

= t') with respect to the occurrence of spatially separated events cannot be simultaneous; in other words, t cannot equal t'. Einstein assumed and asserted that the Galilean transformations for the local instant in 'time' (t) of a distant event must be revised.[25] These assumptions by Einstein were correct, but they were not a revelation.[26] We shall discuss them in much greater detail in Chapter 25.

Based on his above assumptions, Einstein further assumed that a local inertial observer could not simultaneously physically measure the coordinates for the instant in time at the front end and at the rear end of a distant linearly moving object on another frame of reference. Without this simultaneous measurement of time, Einstein also assumed that a local observer could not accurately physically measure with coordinates the length of a distant linearly moving object on another frame of reference. Therefore, Einstein concluded that relative motion between reference frames affects an observer's hand and eye coordinate measurements of length and time. (see Chapter 28) For this reason, Einstein also assumed that length and time coordinate measurements between inertial reference frames could only be defined in terms of a distorted 'relative simultaneity' and therefore such kinematic concepts and measurements were dependent upon such relative velocity. (see Chapter 26)

It turns out that all of the above dubious measurements and rationalizations were

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[25] A very simple algebraic revision could have been, t ± vt = t' – *c*t and t' + *c*t = t ± vt, where t = the instant of the local observation, *c*t = the distance/time interval delay of the light signal at *c* from emission of the distant light event until the local observation thereof, vt = the relative linear distance traveled by the observer during such delay, and t' = the instant of the distant light event (emission of light). But apparently this simple algebraic revision would not have satisfied Einstein's theoretical agenda.

[26] Neffe states that: "this seemingly simple [problem and its necessary correction] had been standard knowledge in physics for a long time prior to Einstein." (see Neffe, pp. 128 – 129) But apparently mathematicians had neglected to incorporate such knowledge into the Galilean transformation equation for time (t = t'). Miller went even further and stated that such known differences in the time of distant events were intentionally ignored by Poincaré and other mathematicians so that the definition of physical time in physics could "be expressed in a convenient and simple form," i.e. the equation t' = t contained in the Galilean transformations. (Miller, p. 176; see Chapter 25)

only made to further Einstein's relativistic agenda: to make his concepts of Relativistic Kinematics, Length Contraction and Time Dilation mathematically consistent with his impossible second postulate concerning the absolute velocity of a light ray at *c*. (see Chapters 20F and 20G) We shall discuss the fallacies of these absurd measurements, rationalizations and their related assumptions in detail in Chapters 25, 26 and 28.

E. Einstein's first postulate: His radically changed and expanded principle of Galileo's Relativity.

Right after Einstein abolished "the idea of absolute rest" in his 1905 Special Theory, he conjectured a definition for his *ad hoc*, radically changed and expanded Principle of Galileo's Relativity:

> "…the same laws of electrodynamics and optics will be valid for all frames of reference for which the equations of mechanics hold good."[27] (Einstein, 1905d [Dover, 1952, pp. 37 – 38])

He then arbitrarily "raised this conjecture to the status of a postulate," which he stated would "hereafter be called the 'Principle of Relativity.'"[28] (*Id*., p. 38) It also became known as the 'first fundamental postulate' of Einstein's Special Theory.

What does the above conjecture by Einstein really mean? Is it simply an *ad hoc* generalization of Galileo's Relativity to include EM (light) and optics? Is it just a generalization of Lange's relatively moving inertial reference frames and the Galilean transformation equations that described them? Is it merely a restatement of Poincaré's 1904 Principle of Relativity? (Chapter 16) The answer to all of these questions is: No.

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[27] Notice that Einstein claims such validity for 'frames of reference' rather than human observers. Also, contrary to Einstein's assertions, Galileo's Relativity, inertial motions, coordinates, reference frames and their transformation equations are strictly material concepts. They are not applicable to the velocity of light and other forms of electromagnetic radiation. (see Chapter 23)

[28] "Einstein claimed from the start that his Special Theory was really a 'relativity principle,' but the scientific community was not ready to grant it that lofty status, so by 1911 Einstein finally capitulated" and referred to it as a theory. (Folsing, pp. 208 – 209)

Simply stated, Einstein's first postulate (his so-called 'relativity principle') really asserts: that the laws of electrodynamics, optics (including the velocity of light), and mechanics will be valid within his Special Theory only with respect to the abstract mathematical concepts of inertial reference frames, artificial coordinate measurements, and the Lorentz transformation equations. In effect, his first postulate is really just a short summation of his Special Theory. These conclusions only become evident later in Einstein's Special Theory when he asserts that: 1) the only mathematical reference frames that he is talking about are those in "uniform translatory motion"[29] (Einstein, 1905d [Dover, 1952, p. 41]), and 2) that the laws of mechanics only 'hold good' in inertial reference frames when such laws are measured by his artificial coordinate measurements and are transformed by the Lorentz transformation equations. (*Id*., pp. 41, 43 – 48; Einstein, *Relativity*, pp. 34 – 39, 47 – 48) Also, "the equations of mechanics" which Einstein was referring to in his first postulate had to be the Lorentz transformation equations (rather than the Galilean transformation equations), because otherwise his first postulate would not be valid within the meaning of his Special Theory.[30]

In Chapter 14 of his book *Relativity*, Einstein specifically stated what he meant mathematically by his Principle of Relativity:

> "Once in possession of the Lorentz transformation…we can combine this with the principle of relativity, and sum up the theory thus: Every general law of nature must be so constituted that it is transformed into a law of exactly the same [algebraic] form when, instead of the space-time variables x, y, z, t of the original co-ordinate system K, we introduce new space-time variables x', y', z', t' of a co-

[29] All other reference frames, i.e. those exhibiting accelerated, rotary, or arbitrary motions, are specifically excluded from his Special Theory. This means that Special Relativity is, by definition, a very narrow and limited mathematical theory.

[30] Numerous physicists agree with the author's interpretation in this regard. Therefore, we must ask the question: If the Lorentz transformations were already embedded in Einstein's principle of relativity, why did Einstein insist that he 'derived' such Lorentz transformations by combining his two fundamental postulates? Such a derivation would be artificial, meaningless and redundant. For the answers to this question, see Chapter 27.

> ordinate system K'. In this connection the relation between the ordinary and the accented magnitudes is given by the Lorentz transformation. Or in brief: General laws of nature are co-variant with respect to Lorentz transformations."[31] (Einstein, *Relativity*, pp. 47 – 48) "This is a definite mathematical condition that the theory of relativity demands of a natural law." (*Id*., p. 48)

In other words, for Einstein, 'co-variance' meant that each law of nature (including the velocity of light) must be constituted so that its space-time coordinate variables of magnitude will be transformed by Lorentz transformations into a law of exactly the same algebraic form for every inertial observer.' This is how the velocity of light mathematically became *c* for all inertial observers in Einstein's Special Theory.[32]

It must be emphasized at this early point that Einstein's 'principle of relativity' was not at all the same as the principle of Galileo's Relativity. Einstein's principle of relativity is strictly mathematical, not empirical. It is a greatly expanded *ad hoc* concept that incorrectly includes all of optics, electromagnetics, and other physical phenomena as well as mechanics, and it requires the *ad hoc* Lorentz transformation equations (instead of the so-called Galilean transformation equations) in order to make it mathematically appear to work. For all of the above reasons, and many more described in Chapters 23 and 24, Einstein's first postulate, his principle of relativity, is invalid and meaningless.

What was the empirical basis (if any) for Einstein's conjecture concerning his radically expanded Principle of Relativity? How did Einstein rationalize his way to the above radically expanded mathematical conclusions? Does Einstein's Principle of

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[31] Einstein's above-generalized conjectures (in 1916) go well beyond anything else that he specifically asserted in his 1905 Special Theory. They require the mathematical result of algebraic co-variance, not only for all physical laws, but for all general laws of nature as well. This generalized requirement would necessarily include not only electromagnetism, light, optics and mechanics, but also astronomy, cosmology, chemistry, thermodynamics, quantum mechanics, etc.

[32] It is also the mathematical reason for all of Einstein's relativistic consequences, including the 'contraction of matter' and the 'dilation of time.' Don't worry, any confusion the reader may now have should be cleared up by reading and understanding Chapters 21 through 29. Physicists and mathematicians have been confused by Special Relativity for over a century.

Relativity have any physical validity? We will discuss and answer these and related questions in Chapters 23 and 24.

F. Einstein's second postulate: The impossible absolutely constant propagation velocity of a light ray at *c* relative to any inertial observer …anywhere…at any time.

Immediately after postulating his expanded 'Principle of Relativity,' Einstein introduced a 'second fundamental postulate' for his Special Theory, which he claimed was "only apparently irreconcilable with the former…," to-wit:

> "…that light is always <u>propagated</u> in empty space with a definite <u>velocity *c*</u>…"
>
> "which is independent of the state of motion of the emitting body."[33] (Einstein, 1905d [Dover, 1952, p. 38])

Although Einstein hardly mentions James Clerk Maxwell by name in his 1905 Special Theory, it is quite obvious from his 1905 paper (*Id*.),[34] from his book *Relativity*,[35] and from his other writings, that by 'velocity *c*' Einstein was intending to refer: 1) to Maxwell's equations which described the constant velocity of light as *c* (300,000 km/s) with respect to the stationary ether[36] (see Chapter 6A), and also 2) to velocity *c* relative

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[33] One empirical basis for this statement of independence was Bradley's 1728 aberration of light experiment where the velocity of light emitted by different stars moving at different linear velocities appeared to always be received by the Earth at the same velocity. (see Chapter 22E for why this paradox of received light occurs) Another empirical basis was the observations of double (or binary) stars by astronomer Willem de Sitter, and his conclusion of such independence. The reason for de Sitter's conclusion was that no ghost images of stars were observed by him in such binary star systems. *A priori*, if they had been observed then this would mean that the velocity of starlight was dependent upon the velocities of the binary stars that emitted such light. (see Dingle, 1972, pp. 205 – 207; and Figure 7.2) Feynman points out that de Sitter's conclusion "is analogous to the case of sound, the speed of sound waves being likewise independent of the motion of the source." (Feynman, 1963, p. 15-2)

[34] For example, see Einstein, 1905d [Dover, 1952, pp. 38, 41 – 44].

[35] For example, see Einstein, *Relativity*, pp. 22 – 23, 35.

[36] In his June 1905 Special Relativity paper, Einstein only refers to Maxwell's theory of electrodynamics for stationary bodies. (Einstein, 1905d [Dover, 1952, p. 38]) However, this must be a mis-reference by Einstein to Maxwell's light medium of stationary ether, because: 1) in the next sentence Einstein mentions that the 'luminiferous (light carrying) ether' will not be necessary for his Special Theory; 2) on the previous page he refers to the ether as the 'light medium' (*Id*., p. 37); and 3) Maxwell never had a theory for the velocity of light with respect to <u>ponderable</u> stationary bodies. In Einstein's related treatise of

to inertial bodies (such as a railway carriage) that are moving linearly relative to a propagating light ray. (Chapter 21)

The first part of Einstein's second postulate has uniformly been interpreted to mean that: "all uniformly moving…observers obtain the same measured velocity of light, independently of their own speeds." (Bohm, pp. 54, 60) In other words: "Light waves must travel with the same invariant speed of 186,000 miles [per second] through any Galilean [inertial] frame when this speed is measured by the observer located in the frame."[37] (D'Abro, 1950, p. 146)

What exactly do these assertions concerning the velocity of light really mean? Simply stated: they mean that the velocity of a light ray propagating over changing distance/time intervals toward or away from any inertially moving body in the Cosmos is theoretically measured by an observer on such inertial body to be the same velocity of *c* (186,000 miles/s or 300,000 km/s), regardless of the magnitude of the linear velocity of such inertial body and such inertial observer either toward or away from the light ray. (see Resnick, 1992, p. 469; Goldberg, p. 105) However, this so-called measurement of light at *c* would be an impossibility, because the inertial observer would be moving linearly at v relative to the tip of the light ray. Therefore, any so-called measurement of such light velocity would be a relative velocity of $c + \text{v}$ or $c - \text{v}$ (more or less than *c*) depending upon the relative direction of motion of the observer and the light ray. (see Chapter 21, Feynman, 1963, p. 15-2, and Sobel, p. 200)

Thus, according to Einstein, every light ray has an absolute velocity of *c* relative

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September 1905, he more correctly acknowledged: "the principle of the constancy of the velocity of light is of course contained in Maxwell's equations." (Einstein, 1905e [Dover, 1952, p. 69, footnote])

[37] This theoretically measured velocity is, of course, a myth, because there is no currently possible way for an inertial observer to measure the one-way velocity of light either in the abstract or relative to the linear velocity of such inertial observer through the Cosmos. (see Chapters 6, 9 and 10)

to every inertial observer and every inertial body in the universe, regardless of their linear motions relative to the light ray. [38] For example, as Resnick stated, where Observer A is situated at the emitting light source, Observer B is moving away from A, and Observer C is moving toward A, "Einstein's second postulate…asserts that all three observers measure the same speed *c* for the light pulse!"[39] (see Figure 20.4; Resnick, 1992, p. 469; Goldberg, p. 105)

In effect, Einstein made no distinction between the instantaneous emission velocity of a light ray at *c* and its constant velocity of transmission at *c* relative to the medium of empty space (a 'vacuum,' as Einstein called it) through which it passes, on the one hand, and the light ray's varying velocities of propagation over varying distances and time intervals relative to different linearly moving bodies, on the other hand. This "requires us to express…the velocity of light with respect to two relatively moving bodies [so]…that the value *c* results for both." (Dingle, 1961, p. 20) In other words, "Einstein's special theory of relativity…compels us to consider the velocity of light as an absolute."[40] (D'Abro, 1950, p. 154) Einstein acquiesced to all these interpretations, because during the 50 years from 1905 until his death in 1955 he never claimed that they were wrong nor proposed a different interpretation.

What could have prompted Einstein to postulate such a ridiculous concept? (see Chapter 21E) In Chapters 21 and 22, we will further analyze and explain the invalidity and fallacies of Einstein's second fundamental postulate, which constituted a major false

[38] "…The 'principle of relativity' implies (although it does not explicitly state) that the velocity of light is constant…for any observer." (Folsing, p. 180)
[39] Actually, Resnick's above examples could only empirically happen if all three of such observers (A, B and C) were at rest relative to the point of emission and the tip of such light ray (see Chapter 22), which clearly they are not.
[40] Rohrlich referred to these forced mathematical conclusions as 'Einstein's Fiat.' (see Rohrlich, pp. 55 – 62) The word 'fiat' means: arbitrary order or authoritative decree.

premise for his entire Special Theory.[41] In such chapters we shall also explain how and why light really transmits and propagates.

G. Einstein's (implied) third postulate: The magnitudes of all non-light physical phenomena must vary depending upon their relative velocities.

In the previous Sections E and F of this chapter, we have discovered the following. Einstein's second postulate was really just an application and a mathematical consequence of his first postulate: his radically expanded 'principle of relativity,' which conceptually implies and includes the Lorentz transformations. In order to make his second postulate (the absolute velocity of light at *c*) work mathematically relative to all inertial frames of reference, Einstein had to apply the Lorentz transformations to the velocity of light propagating in such moving frames of reference. The symmetrical and 'co-variant' transformation result was that the velocity of light is always measured by any inertial observer (using coordinates and synchronized clocks) to have the same algebraic form *c* in any inertial frame. Therefore, Maxwell's velocity of a light ray propagating relative to a linearly moving inertial observer, which is logically and empirically dependent upon the velocity v and direction of motion of such inertial observer, artificially becomes mathematically independent of the different velocities of all linearly moving inertial bodies in Einstein's relativistic Special Theory.

However, Einstein could not just apply the Lorentz transformations to just one phenomenon of nature in his Special Theory, the velocity of light, because this would appear to be too *ad hoc*. To remain mathematically consistent, he would also have to apply the Lorentz transformations to all of the other physical phenomena of physics, such

[41] There is no problem with the second part of Einstein's second postulate. The velocity of a light ray is independent of the motion or velocity of its emitting body, as we will further explain in Chapter 22.

as length, mass, time, force, electricity, energy, etc. But this created another serious conceptual problem for Einstein, because all of these phenomena of physics had always been considered to be completely independent of their velocity and thus invariant in all inertial frames. If Einstein applied the Lorentz transformations to these velocity independent phenomena, then the laws of physics would be different in every inertial frame.

The only way out of this theoretical conundrum was for Einstein to conceptually change the laws of mechanics and all the other physical laws and phenomena of physics so that they would be considered to be dependent upon relative velocity.[42] Then, when the Lorentz transformations were applied to them, such changed velocity dependent laws would be the identical (algebraically co-variant) in every inertial frame. This would, of course, mean completely changing all of mechanics and physics so that its phenomena could be considered to be velocity dependent, algebraically co-variant, and consistent with Einstein's impossible second postulate for the absolute velocity of light at *c*. (see D'Abro, 1950, p. 162) In other words, the impossible tail would be wagging the logical and empirical dog. But so be it.

Most of the rest of Einstein's Special Theory after he stated his second postulate was devoted to arbitrarily and conceptually changing all of the velocity independent phenomena of physics, one by one, by dubious rationalizations, analogies, and the Lorentz transformations, so that theoretically and mathematically they could be considered to be velocity dependent. This is why we must consider the theoretical velocity dependence of all of the non-light phenomena of physics to be tantamount to

[42] There never was a logical or empirical reason to consider such phenomena as dependent upon relative velocity.

Einstein's third fundamental postulate. Einstein's relativistic concepts of 'Simultaneity,' 'Common time' and synchronous clocks (Chapter 25), his concepts of the 'Relativity of Simultaneity' and the 'Relativity of Distance' (Chapter 26), his 'Relativistic Kinematics, Length Contraction and Time Dilation'[43] (Chapter 28), his 'Relativistic Composition of Velocities' (Chapter 29), his 'Relativistic Dynamics and Relativistic Mass'[44] (Chapters 31 and 32), and of course his Lorentz transformation equations (Chapter 27) were all primarily devoted to achieving this spurious mathematical goal.[45]

By way of example, Einstein asserted in his concept of the 'Relativity of Distance' that the length of a rigid meter rod contracts (shrinks) in the direction of its velocity relative to another inertial body of reference, which 'Length Contraction' was then mathematically confirmed when the Lorentz transformations were applied to such rod in two different inertial frames. Einstein's 'new law' of the velocity dependent length of a rod was then algebraically the same ('co-variant') in each inertial frame. Likewise, all of the above-described relativistic concepts were little more than Einstein's radical conceptual manipulations of classical physics.

As we shall discover in Chapters 25 through 29 and in Chapters 31 to 33, when Einstein (the 'mathematical magician') was in charge of the thought experiments, the *ad hoc* equations, the arbitrary definitions, the artificial coordinate measurements, the illogical interpretations, the bizarre analogies and rationalizations, and the topological approximations, there was no limit to the phenomena and theories that he could invent.

[43] It turns out that all of these absurd kinematic concepts were only a result of the arbitrary and invalid method that Einstein used to measure their magnitudes. (see Chapter 28)
[44] Einstein's attempted justification for the variation of mass was Kaufmann's and Abraham's discovery that electromagnetic mass (a resistance, not a mass of atoms) increases with velocity. (see Chapters 17 and 32A)
[45] In such chapters we will demonstrate why each artificial relativistic concept is invalid and totally meaningless.

Mathematically, he could turn a long rigid rod into a short one, a small mass into a large one, and a normal time into a slow time. Mathematically, he could even make a long rod disappear, make a tiny mass become infinitely large, make time stand still, and make any two velocities that were less than *c*, add up to *c*.[46]

H. Einstein assumed that his two fundamental postulates taken together would resolve the mathematical 'difficulties' that he perceived.

After describing his second fundamental postulate, Einstein assumed and concluded that his two postulates taken together would solve all of the 'difficulties' that he perceived, and which we described in Chapter 19. In Einstein's words:

> "These two postulates suffice for the attainment of a simple and consistent theory of the electrodynamics of moving bodies based on Maxwell's theory for stationary bodies."[47]
>
> "The theory to be developed is based—like all electrodynamics—on the kinematics of the rigid body, since the assertions of any such theory have to do with relationships between rigid bodies (systems of co-ordinates), clocks, and electromagnetic processes.[48] Insufficient consideration of this circumstance lies at the root of the difficulties which the electrodynamics of moving bodies at present encounters."[49] (Einstein, 1905d [Dover, 1952, p. 38])

The kinematics of a rigid body and the above-described material relationships were evidently what Einstein meant by the phrase: 'the electrodynamics of moving

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[46] Special Relativity and the Lorentz transformations have caused much more mischief and confusion in physics than they could ever solve. Do not be concerned if you do not fully understand every statement or conclusion contained in this chapter. Again, they will be fully and clearly explained in the chapters to follow. However, the sooner the reader fully understands the false premises, misassumptions and impossible goals for Einstein's Special Theory, the more meaningful the remaining chapters will be.

[47] On the contrary, as we shall discover in the next Chapter 21, Maxwell never had a "theory for stationary [material or ponderable] bodies." Maxwell's electromagnetic wave theory was only about the hypothetically stationary material ether, which does not exist.

[48] Electrodynamics (vis. electric currents, their related forces and other electromagnetic effects) may have to do with kinematics and such material relationships, but Einstein neglected to point out that electromagnetic waves (radiation) and the velocity of light at *c* do not. And his Special Theory was primarily about light and its velocity.

[49] In this paragraph, Einstein was implying that electrodynamics (electric currents, their related forces and other electromagnetic effects) and electromagnetic waves (light and EM radiation), on the other hand, were all the same concept, which of course they are not. (see Chapters 6A and 6B)

bodies.' However, by 1905, the term 'electrodynamics of moving bodies' and such relationships were normally reserved for electric charges in motion (electric currents), EM forces, and the relationships between them…not the relationship between propagating electromagnetic waves (light) and linearly moving bodies. Maxwell never used the term 'electrodynamics' in his theories or equations (see Chapter 6B), and he never applied the phenomena of light to frames of reference, stationary (ponderable) bodies, nor linearly moving bodies.

We will begin to demonstrate in the next four chapters that actually it was Einstein's insufficient consideration of the velocity of light, and of the mathematical results (*c* – v and *c* + v) which occurred when the Galilean transformations were misapplied to the constant velocity of light at *c* in two inertial frames of reference, that lies at the root of Einstein's mathematical 'difficulties.' When these circumstances are properly analyzed, it turns out that (strange as it may seem) there were no real 'difficulties' that needed any solutions. (see Chapters 21 through 24) Thus, Einstein's entire *ad hoc* and artificial Special Theory for the 'electrodynamics of moving bodies' was totally unnecessary. It merely distorted Maxwell's natural law concerning the constant velocity of light at *c en vacuo* relative to its medium of empty space, and in the process it distorted all of the rest of physics as well.

MEMO 20.1 Einstein's Five Major Goals

Because Special Relativity is seemingly so disorganized and confusing for most readers, and it often appears to be doing several inconsistent things simultaneously, we have proposed a more intuitive structure for the theory in the form of an outline of Einstein's five major goals for his Special Theory. They were:

1. To make every physical law of nature (including light) mathematically symmetrical; that is, the same for every inertial observer by making such law algebraically co-variant with respect to Lorentz transformation equations. (see Chapters 20A, 20E, 20F, 20G, & 27)

2. To defend Maxwell's equations and Einstein's theory of a constant propagation velocity of light at *c* relative to anything, against the paradoxical computation of velocities (*c* + v and *c* – v) caused by the Galilean transformation equations. (Chapter 19) Einstein attempted to accomplish this goal, *inter alia*:

   A. By conjecturing that Galileo's Relativity and the Galilean transformation equations were applicable to all of physics including electrodynamics (light) and optics (Chapters 23 and 24); and then

   B. By asserting that the Lorentz transformation equations must be substituted for the Galilean transformations, so that mathematically the propagation velocity of light would always be measured as *c* in every inertial reference frame. (Chapter 27)

3. To establish the Lorentz transformations as a universal law of nature, because they mathematically resolved the above paradox concerning the propagation velocity of light, and because they resulted in a relative (dilated) time and a relative (contracted) distance (Chapter 28) that mathematically explained the M & M paradox. Einstein attempted to accomplish this goal, *inter alia*:

   A. By defining 'time intervals' in terms of simultaneity, synchrony, common time, and relative simultaneity, with respect to inertial reference frames (Chapters 25 and 26); and

   B. By defining 'distance' (length) as a variable quantity depending upon the relative velocity of inertial reference frames, because of relative simultaneity. (Chapter 26)

4. To change all of the non-EM laws of physics so that mathematically they appear to be velocity dependent and are consistent with his second postulate for light, by applying the Lorentz transformations to every conceivable physical phenomenon. Einstein attempted to accomplish this goal, *inter alia*:

   A. By conjecturing that the coordinate measurements of Newton's laws of mechanics were no longer valid (Chapters 26 and 28);

   B. By devising a new relativistic formula for the computation of velocities where no two velocities can exceed *c*, and where *c* was the maximum possible velocity (Chapter 29);

   C. By asserting formulae that mathematically demonstrated that electromagnetic mass increases with relative velocity (Chapter 32);

   D. By conjecturing relativistic mathematical explanations and formulae for Fizeau's paradoxical 1851 experiment, the Doppler effects of light, the relationship between mass and energy, as well as many other mysterious phenomena and experimental results. (Chapters 8, 29, 31, 32 and 33)

5. To attempt to confirm the above equations, conjectures, concepts, explanations, and mathematical consequences with analogies, rationalizations, interpretations and related experimental results that appeared to have some approximate or coincidental relevance to the same. (Chapters 36, 37 and 38)

MEMO 20.2 Some Reasons Why Einstein Needed The Concept Of Symmetry For His Special Theory

1. So that he could do away with asymmetric ether measurements and postulate that all motions are relative. (Chapter 20C)

2. So that he could claim that inertial reference frames, as in Galileo's Relativity, evidenced the symmetry of equivalent and reciprocal relative translational motion. (Chapter 20C, 23 & 24)

3. So that he could claim that one inertial observer is as good as another for measuring the velocity of light in an inertial frame. (Chapters 20F & 21A)

4. So that he could claim that the symmetry of simultaneity (identical times) was the proper starting point for a definition of time. (Chapter 25)

5. So that he could claim that all clocks on an inertial reference frame must be synchronized to show a symmetrical and mathematical simultaneous time. (Chapter 25)

6. So that he could then refer to and describe non-simultaneous times as asymmetric. (Chapters 26 & 28)

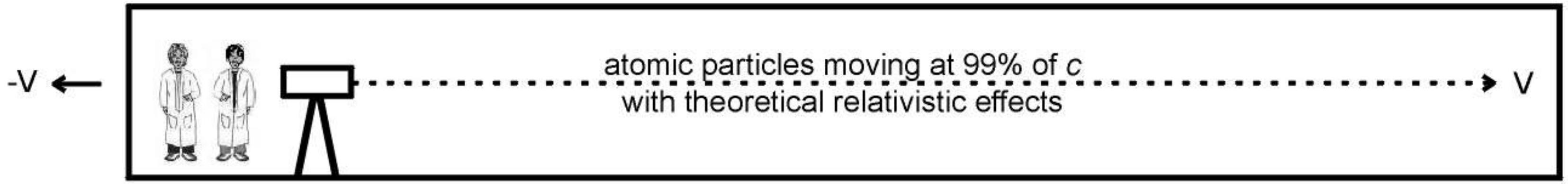
7. So that he could postulate that the velocity of light was the same in two opposite directions. (Chapters 25 & 27)

8. So that he could claim that coordinate measurements between inertial frames could not be made simultaneously (symmetrically). (Chapters 26 & 28)

9. So that he could rationalize that the symmetry of Galileo's Relativity applies not only to mechanics but also to light. (Chapter 24)

10. So that he could finally claim that all physical laws of nature (including light) must be constituted so that they are algebraically the same (symmetrical and algebraically covariant) for every inertial observer. (Chapters 20E, 20F & 20G)

A.

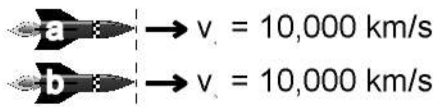


No reciprocal motion or relativistic effects for the accelerator building nor the people in it.

Stanford Linear Accelerator

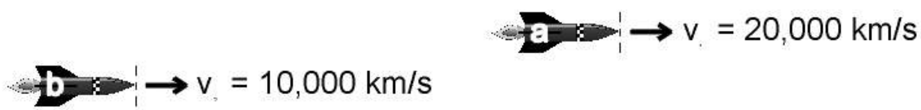
B.

1.



Rockets a & b move in tandem through empty space at the same velocity. There are no relativistic effects because of such <u>velocity</u>.

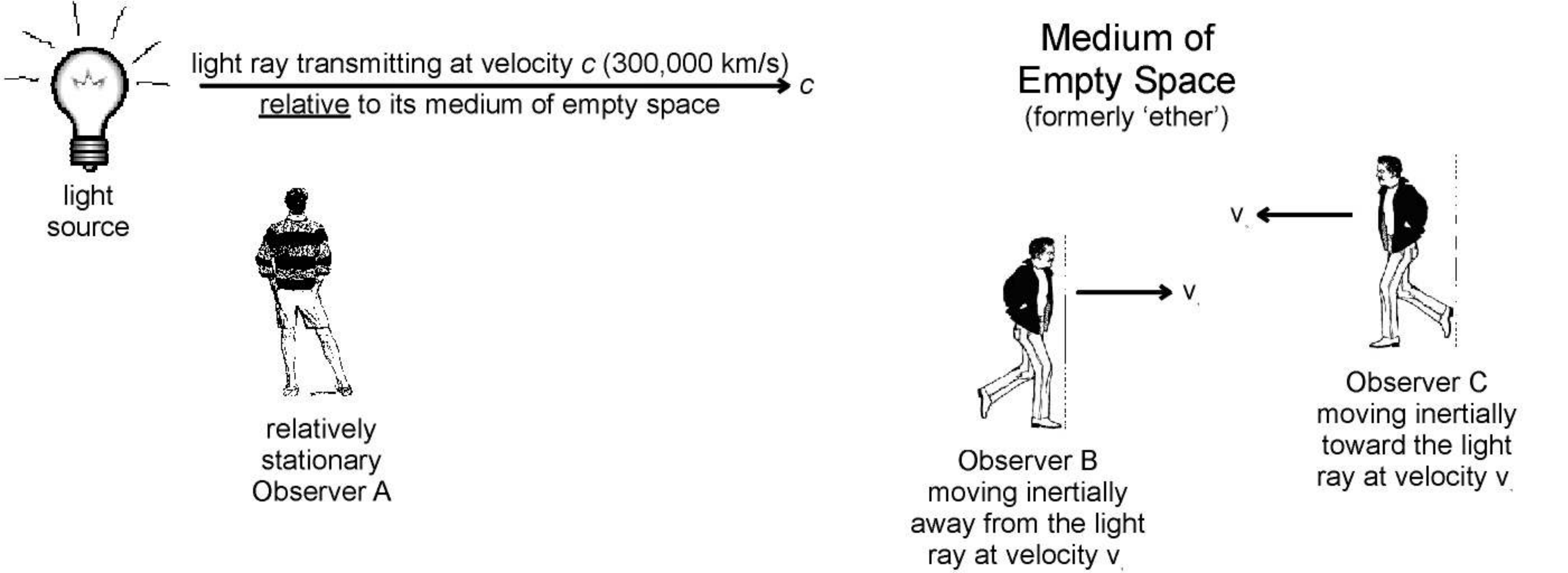
2.



Rocket 'a' then accelerates to 20,000 km/s. Thereafter, according to Special Relativity, each rocket is contracted, the time on each rocket is slowed down, and the mass of each rocket is increased...when viewed from the other rocket, because of their <u>relative velocity</u>.

C. In Chapters 26 and 28 we will discover that the only reasons for all of the above theoretical relativistic effects are Einstein's absurd methods of measurements, his Lorentz transformations and their interpretations.

Figure 20.3 Einstein's Relativistic Effects Of Relative Motion



The constant transmission 'velocity *c*' of the light ray relative to its medium is not what linearly moving inertial observer B or C would measure when the light ray passed them. Instead, each inertial observer would theoretically measure a velocity of the light ray's propagation relative to him (equal to c - v or c + v), which is less or more than 300,000 km/s. (see Feynman, 1963, p. 15-3)

Figure 20.4 Einstein's Second Fundamental Postulate: The Impossible Absolutely Constant Mathematical Velocity *c* Of A Light Ray Propagating Over Changing Distance/Time Intervals Relative To All Linearly Moving Inertial Observers

Source: Resnick, 1992, p. 469