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Without Clocks There Would Still be Time

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Abstract

This article, through an analysis of time and the mathematical symbols v and *c* demonstrates flaws in the logic and mathematics of The Theory of Relativity.

The Key to Measurement (Why Geometry?)

Living on the earth, it is only natural that the earth dominates our perspective and perception of the universe, and has an influence on the development of our mathematical languages and measurement systems. With this in mind, *Geometry* is not just an arbitrary word of the nomenclature of mathematics and science, but with *geo* signifying: of the earth, and *meter* signifying: measurement device; *Geometry*, in a word, abstractly defines and represents one of our basic measurement systems. For example, the shape of the earth, relative position on the earth, and the earth's relative position and movement in relation to the other celestial bodies within the universe are all understood by the earth's interaction with light. In essence, the earth's relation to light provides our fundamental, *geometric*, astronomical measuring instrument and reference. Hypothetically, if living on another planet, such as Venus, Mars, or Saturn, instead of the Earth (because the relative position and movement of these other planets in relation to the light received from the sun and the other celestial bodies is different than that of the earth), there would be a different basis of astronomical reference; and, with a different basis of astronomical reference, there would be a different basis for systems of measurement. Most notably, as the speed of rotation and orbital path of another planet (such as Venus, Mars, or Saturn) in relation to the sun would be different than that of the earth, what is commonly referred to as days, months, and years would be different - in other words, the mathematical basis of the measurement of time would be different.

What, then, can be considered a true basis for time?

Sequential Occurrence

To look at time another way: all change and movement; each and every idea, thought, event, and interval; all matter, energy, and space occurring in the universe are part of, and connected in, the sequential process of existence. Try to think of anything that is not a part of the sequential relation of existence; either existing before, during, or after something else. Ordered sequence, the process of occurrence, is the systematic pattern underlying all existence. One thought, one concept, one event, one interval proceeds another, one follows another; this simple truth is a touchstone, a reference of the mind and the shared experience of existence. However, sequence of occurrence, the basic underlying structure and truth common to all existence, as a process, in and of itself, offers no common physical reference against which to directly relate to or compare. As such, sequence of occurrence must be interpreted and represented in the language of mathematics indirectly, abstractly, in terms of some physical reference (some movement or change) that can be observed and measured. So, from the myriad of inequable movement and change occurring in the universe, from the infinite number of individual cycles and patterns of change and movement (all the relative movement of the planets and the other celestial bodies; all the birth, development, and deterioration), the earth's periodic movement relative to light (the common physical truth dominating our existence) has been chosen as the reference against which to indirectly compare, measure, and (abstractly) represent, the common course and condition of the shared experience of existence - the relationship of sequence of occurrence, i.e., time.

Common Measurement

The pattern, or periodic cycle, of the earth's movement relative to light, used to abstractly measure time, is the pattern of movement used to indirectly, mathematically reconcile all the diverse movement and change occurring in the universe.

To paraphrase Copernicus:

The many movements of the spheres or orbital cycles, the most obvious the daily revolution, the temporal span of day and night, this movement is taken as the common measure of all movements, since we measure time itself principally by the number of days.[1]

What would measurement systems be, what would science be, without the ability to measure the movement of the earth in relation to light; as so aptly stated by Copernicus, a comparative movement which, employed as a measurement of time, is used as a common measure of all movements (e.g., used to mathematically express acceleration, gravity, momentum, velocity - the velocity of light included)? The common periods of mathematical time: seconds, minutes, hours, days, months, years, etc. (indirectly, mathematically relating sequential relation and duration to physical change of position or movement), each mark and measure the earth's physical change of position (rotational and orbital movement) relative to light. The movement of the earth in relation to light is abstractly represented in the pattern on the face of a clock, and in the grid pattern of a calendar. The clock and the calendar, such common and familiar references of everyday life, are, in actuality, navigational instruments, astronomical references, that mark the position and movement of the earth in relation to light: specifically, with every hour on the clock face indicating 15 degrees of rotational movement of the earth, and every day on the grid of a calendar marking another position of the movement of the earth in its orbit about the sun. In addition, the measurement of the periodic movement (change of position) of the earth relative to light has been represented mathematically in the form of an abstract delineation of the sphere of the earth, in a conceptual grid pattern of latitude and longitude lines, for terrestrial navigation; a conceptual grid pattern which has also been projected outward from the earth and used as a reference to delineate the universe (e.g., declination and ascension) - to chart the celestial bodies in astronomy. A reference basis not only of mathematical time, the comparison of the earth's position and change of position relative to light is a reference basis of measurement systems used to evaluate the entire universe.

Scholium

Wherever you look in science, the movement of the earth relative to light is accepted as a common basis of measurement: even the growth rings of trees, used in dendrochronology as a means of establishing dates and environmental conditions of the past, indirectly demonstrate the movement of the earth relative to light. So, with the earth's movement relative to light such a fundamental part of the accepted and developed scientific systems of measurement and mathematics; how, then, can the relativistic theoretical interpretation, that it is impossible to measure the earth's motion relative to light, be accounted for? This dilemma, this mathematical labyrinth set up by a theory (Relativity), which uses accepted measurement systems and mathematics based upon the measurement of the earth's movement relative to light (mathematical time and velocity) to mathematically support the premise that it is impossible to measure the earth's movement relative to light, this obvious contradiction within the logic of Relativity, can be attributed to two separate and distinct limitations that can arise in the language of mathematics. These limitations are best illustrated by looking to the mathematical basis of Relativity, to the definition and application of the mathematical symbols in the Michelson-Morley Experiment of 1887.

Definition

In the Michelson-Morley Experiment:

[T] time was undefined, considered as an implicit given without need of definition;

v was designated as mathematically representing the velocity of the earth in relation to (or through) the hypothetical aether, and also defined as equivalent to the velocity of the earth in relation to (or through) space; and,

c was designated as mathematically representing the velocity of light in relation to (or through) the hypothetical aether, and, again, also defined as equivalent to the velocity of light in relation to (or through) space.

First, to address an issue concerning the mathematical symbol [T]:

With the basis, definition, and validity of any mathematical velocity dependent upon this symbol, as a primary given, [T] needs to be defined. Without explicit definition, how can [T] be consistently and accurately applied within the language? Leaving time, [T], undefined only promotes and communicates mathematical confusion.

To define time:

Absolute time can be defined as the relationship of sequential occurrence - the common sequential truth that forms the fundamental framework, the substratum, of our existence and understanding; the underlying sequential process that brings order out of chaos, giving systematic order (a basis of connection and association) to the stream of consciousness, to thought, to the entire shared experience of existence. *Absolute time* is a process, a process that (although everything in existence is a part of), in itself, offers nothing tangible to measure or compare against; and, therefore, must be measured indirectly, in relation or reference to matter and/or energy that occur in sequence.

In contrast:

Mathematical time, [T], is a system of measurement (expressed in the language of mathematics) that science has developed to indirectly measure *absolute time*; a mathematical system that is based upon, and derived from, the experience and measurement of the earth's movement relative to light.

With the distinction made that *absolute time* is different than *mathematical time*, and with the distinction that the system of measurement science has developed and called *mathematical time*, [T],

1. uses the earth's movement relative to light as a standard, to indirectly measure intervals of duration and the sequential relationship of existence (i.e., to indirectly measure actual, *absolute time*), and
2. uses the earth's movement relative to light as a basic dynamic reference, a standard periodic movement, against which to compare and measure all other movement and change occurring in the universe;

effectively, the relativistic interpretation of the Michelson-Morley Experiment, the theory that it is impossible to measure the earth's movement relative to light (which relativists use as a basis of their reasoning that light has the same velocity for all observers, independent of their motion or the motion of the light source) stands unsupported. With this definition of *mathematical time*, the mathematical basis of Relativity is removed and eliminated, and Relativity is disproved and invalidated; but more importantly, this definition provides the mathematical means to move

beyond Relativity to the real problem, to the limitations in the language of mathematics that are simply being demonstrated and expressed by relativistic theory.

Beyond Relativity (The First Limitation)

Simply put, attempting to define something in terms of itself presents a unique limitation in language. For example, try to define the words "mathematics", "time", "point", and "line" in terms of themselves. Imagine looking in the dictionary and finding:

math e mat ics defined as, of or pertaining to mathematics; or

time, defined merely as time.

Definition - the act of explaining the essential characteristics or nature of anything - in reference to itself, is neither a valid nor productive application of language. In language, definition is achieved through reference, relation, or comparison to something else. This holds especially true in the language of mathematics. To explain, measurement can be said to be a form of mathematical definition achieved through reference, relation, and comparison: length can be determined, or "defined", in reference to centimeters (e.g., the pen is 15 cm in length). However, using the centimeter as a standard reference to "define" length renders the centimeter unmeasurable, "undefinable", within the same system; e.g., how long is a centimeter in centimeters? The standard reference of a measurement system is difficult to compare to, define, or measure in terms of itself. Similarly, applying this concept to time, using the earth's motion relative to light as the standard basis and reference for "defining" and abstractly representing *mathematical time*, effectively, renders the earth's movement relative to light (as the standard reference of the measurement system) difficult to measure in terms of the same reference system.

To illustrate:

When expressing the velocity of a car, the velocity

$$v = [L] / [T]$$

is a mathematical expression of the distance [L] (miles, meters, etc.) a car travels in dynamic comparison to *mathematical time* [T], the earth's movement in relation to light. However,

1. as the earth's change of position relative to light is expressed, mathematically, as time [T], and,
2. velocity (e.g., meters per second, miles per hour, etc.) is a mathematical expression of change of position (displacement, distance) over time, or *v* = [L] / [T];

how should the velocity of the earth in relation to light be expressed mathematically,

1. [change of position of the earth relative to light] over [change of position of the earth relative to light]: either [L] / [L] ... [T] / [T] ... or [L] / ([L] / [T]) ... ad infinitum?

Mathematically ludicrous, this mathematical approach to expressing the earth's velocity relative to light is the mathematical equivalent of a dog chasing its tail. As in the application of any language, this example illustrates the importance and necessity of understanding what the abstract symbols represent and, the significance of, specifically, what the symbols are communicating within the language. Considering the displacement of the earth in relation to light and *mathematical time* (the displacement of the earth in relation to light) as separate and distinct, fundamental, dimensional quantities, to be treated algebraically (added, subtracted, divided, and multiplied) in an equation without regard to or a clear understanding of what the abstract mathematical symbols actually represent, can invalidate the mathematical structure. This one misunderstanding, this example of specious mathematics concerning *mathematical time*, could, conceivably, lend support (on the basis of the mathematics, alone) to any number of misconceptions concerning relative movement with respect to the earth and light, such as:

the velocity of the earth relative to light as being either unmeasurable or mathematically unresolvable,

the motion of either the earth or light as absolute unity (Ptolemy chose the former, relativists have chosen the latter), and/or even,

the free and liberal establishment or adjustment of scale and unit value to fit and support any desired concept relating to relative movement with respect to either the earth or light.

Eureka!?

Using the periodic movement of the earth relative to light to measure and express time mathematically raises a potential conflict within the language of mathematics: a conflict which can be avoided by an explicit definition of *mathematical time*, [T]. Specifically, the obvious fallacy (contradiction) exhibited in the mathematical logic of Relativity (the application of the earth's motion relative to light as *mathematical time*, [T], to support the theory that the earth's motion relative to light cannot be measured) can, with explicit definition, be recognized for what it is; an example (or result) of trying to define something in terms of itself. Therefore, as implicit, rather than explicit, definition leaves the door open to misconceptions; with an explicit definition of *mathematical time*:

1. a potential conflict or limitation within the language of mathematics is exposed (and can be avoided),
2. the entire theory of Relativity can be disproved and set aside, and, consequently,
3. it is demonstrated that in definition can be found a key to understanding - a mathematical liberation and enlightenment.

Leaving Time (The Second Limitation)

While the definition of *mathematical time*, [T], brings to light a "time specific" limitation that can occur within the language of mathematics, the definitions of the mathematical symbols *v* and *c* (in the Michelson-Morley Experiment) express a limitation that is elemental and characteristic to physical science and mathematics in general. To examine the definitions of the mathematical symbols *v* and *c* in the Michelson-Morley Experiment (and Relativity):

v was designated as mathematically representing the velocity of the earth in relation to (or through) the hypothetical aether, and also defined as equivalent to the velocity of the earth in relation to (or through) space; and,

c was designated as mathematically representing the velocity of light in relation to (or through) the hypothetical aether, and, again, also defined as equivalent to the velocity of light in relation to (or through) space.

The first remarkable, or outstanding, feature of these definitions is the designation of velocity in terms of two references - velocity is expressed in reference to both the hypothetical aether and to space.

To address the designation of velocity in reference to the hypothetical aether:

As the existence of aether is an acknowledged hypothetical, an unknown, the assigning of rate of movement (velocity) in relation to a hypothetical aether as a "given" is mathematically invalid. Logically, if the aether is an unknown, it cannot be defined as a given: the aether cannot be both an unknown and a given in the same experiment.

Considering the designation of velocity in reference to space:

With the intent of the experiment to determine the existence of aether, when Michelson and Morley defined the unknown (the hypothetical movement of the earth and light in reference to the aether) as a "given", they attested to a mathematical impossibility; their intent and their mathematical "givens" concerning the aether belied each other. But, more to the point, in syllogistic logic, by defining the unknown movement through the hypothetical aether as mathematically equivalent to movement through space, Michelson and Morley communicated, they proclaimed and established (in the language of mathematics), that movement relative to space was also an unknown and not a given in their experiment.

To clarify: in a type of "pretzel logic", if something is mathematically defined as equivalent to an unknown, logically, that "something" must be equally unknown. Therefore, the conspicuous necessity for having the velocity of the earth and light defined in two ways - in reference to a hypothetical aether and in reference to space - is not an expression of

1. a valid mathematical derivation, nor
2. an assured and definitive cross reference for accuracy, precision, or exactness, nor even
3. an appositive, a referent for clarity; but, rather,

is the mathematical declaration of the unsure and uncertain search for a reference.

Relative To, or Through?

What Michelson and Morley demonstrated and communicated with their own initial intent, their subsequent definition and application of *v* and *c*, and their empirical results is that, rather than having a definite reference against which to compare the respective movement of the earth and light, they were searching for a reference. To make a distinction, having the actual references of Jupiter and its moon, Io, against which to compare the movement of both the earth and light, Olaus Roemer (in 1675-1676) was able to, astronomically, determine the approximate mathematical velocity of light *through* space, by comparing the differences in the time (interval of duration) and distance of travel of light caused by the earth's orbital movement (change of position/displacement) relative to the light received from Jupiter's moon, Io. In contrast, in their (1887) experiment, Michelson and Morley were searching for a reference, some aethereal substance against which the motion of the earth and light could be measured *relative to.* They compared the motion of the earth and light in the hope of discovering some invisible, hypothetical substance filling all space (a luminiferous sea of elastic particulate that would permeate all space and the interstices of matter, offer a physical vehicle and explanation for the travel and/or propagation of light energy, and offer a basis of comparative reference): a hope or search, as evidenced by their negative or null empirical results, that went unfulfilled.

Continued Use

Normally, mathematics concerning hypotheticals (such as, aether, caloric, etc.) if rendered invalid by empirical results, are recognized as part of negative data; to be recorded and remembered, but otherwise forsaken. However, this has not been the case with the mathematics of the Michelson-Morley Experiment; as the mathematical formulation, specifying velocity in reference to a hypothetical aether as equivalent to velocity in reference to space, sets up a barrier to "normal" scientific procedure. Whether it is believed that aether exists or not, it is acknowledged that light travels through space, and this one fact gives the appearance of validity to the continued, associated use of aether and space, "aether-space", in mathematics (and to the continued contradiction and confusion within the mathematics of Relativity). For example, the relativistic mathematics of Lorentz, 1: $(1-v^2/c^2)^{1/2}$, theorizing a contraction of length along the line of direction of travel through the aether, are based upon belief in the existence of aether; and conversely, Einstein's relativistic mathematics, $E = mc^2$, supposedly based upon the non-existence of aether, also use Michelson and Morley's "aether-space" mathematical definitions, of *v* and *c*, as a basis of calculation. Whether acknowledging the existence of aether or not, through repeated association, the use of "aether-space" mathematics has become a conditioned (Pavlovian) response; and relativistic mathematics and doctrine demonstrate a fundamental contradiction or disagreement in the continued (automatic) use of "aether-space" mathematics. A decision has to be made concerning whether or not aether exists. In light of the negative results received in the Michelson-Morley Experiment, if it is accepted that aether does not exist, any further use of the mathematics concerning aether must be discontinued, abandoned. Otherwise, the continued, mathematical association of aether and space, "aether-space", i.e., the filling of all space with a hypothetical aether and assigning movement through the hypothetical aether as equivalent to movement through space, must be recognized for what it is, the mathematical equivalent of attempting to give physical

properties and dimension to space.

Principal/Principle Unknown

Again, the experiment, mathematics, and logic of the Michelson-Morley Experiment are dependent upon the existence of "something" (some invisible substance filling all space) that the earth and light are moving relative to, which would offer a basis of reference and comparison. However, if you acknowledge that aether does not exist, and remove the aether from the experiment and mathematics, you are left with an experiment attempting to determine movement relative to space; and consequently, with the realization that what Michelson and Morley assumed as a principal "given" reference (the velocity in relation to space) was, in fact, the principal unknown.

Taken in this context, the experiment, mathematics, and the negative or null results of the Michelson-Morley Experiment exemplify a problem faced throughout the ages, the same problem faced by Aristotle, Ptolemy, Galileo, Newton, etc. - the problem of establishment and measurement of absolute motion, and the search for an absolute reference. Therefore, the Michelson-Morley Experiment of 1887, as demonstrated and exemplified by the definitions of the mathematical symbols *v* and *c* (the mathematical creation of "aether-space"), exhibits and communicates a defining point, an expression of one of the paramount limitations of mathematics and science - the inability to use space as either a physical or mathematical reference.

Conclusion

Irony

The great irony in the basic mathematical premise of Relativity - the premise (based upon the Michelson-Morley Experiment) that it is not possible to measure the earth's motion relative to light, and, subsequently, light is measured as a constant under any circumstance of motion - is that the earth's movement relative to light was used (by Olas Roemer in 1675) in the first scientifically recognized astronomical determination of a mathematical value for the velocity of light, *c*.

In 1675, Olas Roemer (with his observations and measurement of the earth's orbital movement relative to the light received from Jupiter's moon Io) proved beyond a doubt that:

1. The movement of light can be used as a standard against which to measure the earth's motion,
2. Light has a finite (measurable) velocity, and
3. Comparisons of the distance and time of travel of light can be used to indicate, not only the orbital movement of the earth relative to light, but also the velocity of light itself.

Also, (continuing the irony, and removing any mathematical basis of relativity) the experience, observation, and measurement of the earth's movement relative to light is accepted, by the scientific community, as the basis of *mathematical time.*

In reality, Relativity has nothing to do with light: Relativity is about comparative motion. All the controversy and mathematical confusion that has been generated by, and since, the 1887 Michelson-Morley Experiment - the whole Relativistic era- is simply the result of science's continuing attempt to assign physical properties to space, to measure motion relative to (*not through*) space, and the non acceptance (despite all evidence to the contrary) of its inability to do so.

References

1. Nicolaus Copernicus, *On The Revolutions Of The Heavenly Spheres*, Great Books of The Western World, (Encyclopedia Britannica, Chicago, 1952), p. 513.