The Human Illusion of the Time Line

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ABSTRACT
Time is (and was) the most controversial entity in the human mind for centuries. Many generations lived under strong pressure of this idea trying to answer the main question about nature of Time. This article discusses more controversies in many aspects of Time from the easiest idea of the Time Line to Time-Multidimensional Universe.

Keywords- *Time, Time Line, Clock, Relativity, Illusion*

I. INTRODUCTION

From its childhood, the humankind was intrigued with all aspects of Time. It looks like the endless effort to understand something that stays beyond the human comprehension.

Development of knowledge through the present and the last century makes some steps in the area of the human imagination of Time. Extensive application of mathematics in every direction of research caused appearance of some new aspects of Time like Time Line (TL) and transformation of time rate under some specific circumstances like one described in the theory of Relativity (1905).

This paper is dedicated to deeper analysis of physical applicability of some ideas related to the Time Line and specific aspects of Time itself.

II. CORE IDEAS OF THE TIME LINE

The initial Idea to represent Time as a line or an axe of reference belongs to Hermann Minkowski, "who was born June 22, 1864, Aleksotas, Russian Empire [now in Kaunas, Lithuania], died Jan. 12, 1909, Göttingen, Germany.
"Minkowski, Hermann was German mathematician who developed the geometrical theory of numbers and who made numerous contributions to number theory, mathematical physics, and the theory of relativity. His idea of combining the three dimensions of physical space with that of time into a four-dimensional "Minkowski space" — space-time — laid the mathematical foundations for Albert Einstein's special theory of relativity."[1]

It was the first attempt to build a mathematical model that incorporates spatial and temporal dimensions. As a result, Time lost its uniqueness and possessed all aspects of a reference axe. For example, motion of a body (or an observer) along any axe in Minkowski space from the point 'A' to the point 'B' appears as changing relative coordinates that represent the location of the body in the Minkowski space.

Those set of coordinates ever appears as a relative one because the point of origin for entire Minkowski space can be selected randomly.

Minkowski space describes location of each body by set of four coordinates. Distance between any given points (or locations) in Minkowski space appears as the difference in their coordinates relative to the four-dimensional reference frame.

III. THE ROOTS OF PROBLEMS

As long as a body stays at rest, the body keeps the same coordinates in the reference frame. Any change in coordinates appears as soon as the body begins motion.

That point of view makes no problem in three-dimensional space. However, fourth axe causes some problem shown in the Fig. 1 (see below).

According to the classical point of view, the Time Line (or fourth dimension) can be shown as an axe of reference. It has the point of origin and many different points of Time along the axe.

Under usual circumstances, the point of origin of a three-dimensional reference frame can be selected randomly because that reference frame represents only a mathematical tool for calculations and has not any physical relationship with the physical world.

In the case of the fourth dimension, the same question turns a thinker to the nonplus. What is the point of origin for Time? What does the meaning of that point? Did Time exist before the point of origin of the Time Line? Those questions and many others cannot be answered regarding classical properties of the Time Line. That is the first set of

[1] **Minkowski, Hermann.** (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition.* Chicago: Encyclopædia Britannica.

unanswerable questions appeared simultaneously with the idea of “Minkowski space”.

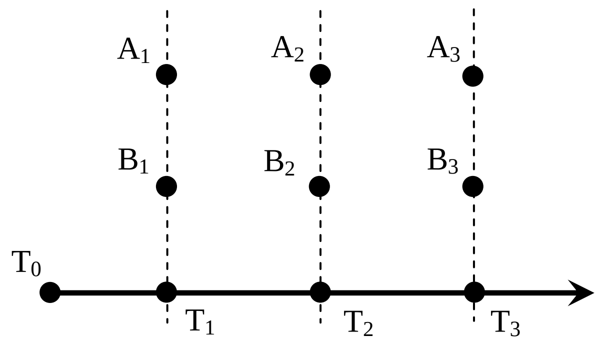

Fig. 1

The general principle of Minkowski space regarding the temporal dimension (the Time Line) was that. A body has one and only one location at a time regarding the temporal dimension. That idea looks naturally and coincides with coordinates determination and calculation regarding other three *spatial dimensions*.

Figure 1 shows the idea regarding the Time Line (T_0-T_3) and two observers A and B “moving through Time”. Their locations are mentioned in the picture as A_1- A_2-A_3 and B_1-B_2-B_3.

According to the Minkowski’s idea of the Time Line, both observers have *the same indications of their clocks* (Time Measuring Devices, TMD) at any point of the Time Line. For example, observers have indications of their clocks equal to A_1 and B_1 ($A_1 = B_1$), as soon as both observers have their location “in Time” at the point T_1.

In other words, location of both observers at the temporal point T_1 causes two different clocks (or any more clocks) to show the same time $A_1 = B_1$ because of their location at the same *temporal location*.

Therefore, as soon as both observers reach the next temporal point T_2, their clocks show some indications A_2 and B_2. Moreover, indications of two different clocks should be the same again ($A_2 = B_2$).

Looking at their clocks both observers should understand that. As soon as more Time passes or they move along the Time Line *further*, they will reach some point of Time T_3 in the future, and their clocks will show indications $A_3 = B_3$.

Some mental dependence of both observers regarding their comprehension of the Time Line appears here. Both of them understand three references to a different set of points of Time as references to “Past”, “Present” and “Future”.

Looking at the Time Line from the point T_2, both observers understand their “Past” as all points of the Time Line that have location between T_0 and T_2. Both observers understand their “Present” (or “Now”) as the point of their current location “in Time” (T_2). Both observers understand their “Future” as all points of the Time Line that have location between T_2 and some remote point of the Time Line located far away from them at the temporal axe (T_N).

In other words, “Future” is the set of temporal points “greater” than “Now” ($T_n > T_2$). According to the same point of view, point T_3 looks like some future for the observers located at the temporal point T_2. Both observers appear at temporal point (T_3) as soon as their clocks show indications A_3 and B_3.

One more question regarding the classical point of view appears here. Does any observer move along the Time Line with the same “speed”? The classical answer on that question is positive because every observer shares the same three-dimensional location moving along the Time Line with the same “speed”. In other words, in the classical model, one second of an observer has the same duration for every other observer. As a result, all TMD of any set of observers show the same indications. Those identical indications represent the same location of the observers *relative to the Time Line*.

Moreover, as soon as an object has only one actual reference to the Time Line, indication of a TMD shows its unique temporal location. For example, indication A_1 means location of the observer ‘A’ at the temporal location T_1 (see Fig. 1). Therefore, indications of another TMD (clock B) at the same temporal location can be only the same (B_1).

In other words, the clock B can not show any different indications regarding indications of the clock A because both clocks and observers share the same temporal location T_1. The same situation appears at any other point of temporal location. Therefore, indications of any pair of clocks at any given temporal location should be the same. As a result, one second determined by any clock is ever equal to any other second determined by another clock and the “speed” of temporal motion (displacement of an observer regarding the Time Line) is ever equal to constant.

That aspect causes some "synchronization" of motion of every observer or TMD along the Time Line. In other words, all observer and TMD in "Minkowski space" exist at the same temporal coordinate of the fourth dimension (the Time Line).

Any other location is forbidden for the following reason. Suppose that, the observer A has temporal location at T_1. He has observation of the observer B located at the same temporal location T_1. They have the same situation at the temporal location T_2. As a result, both observers claim observation of each other during some period of Time between T_1 and T_2.

Any other situation is impossible in "Minkowski space". For example, the observer 'A' located at the temporal location T_2 *cannot make observation* of the observer B located at a different temporal location T_1 (or T_3). Because temporal locations coincide with indications of Time Measuring Devices (clocks, watches and etc.) an observer in "Minkowski space" is able to make an observation of anything located at his own temporal location only (regarding the same Time Line or fourth dimension).

Suppose now that, there is an observer B located at the temporal location T_1 and an observer 'A' located at a different temporal location T_2 in "Minkowski space". Those observers are unable to make an observation of each other because observation (as well as any other interaction) between observers located at different temporal ***locations is forbidden in "Minkowski space"***. In other words, "Minkowski space" does not allow *any interaction through the fourth dimension* (or Time Line).

Therefore,

"Minkowski space" denies presence of different observers with different indications of their Time Measuring Devices at the same temporal location. (A)

Statement (A) has an easy consequence shown as the statement (B).

As soon as an observer in "Minkowski space" has indications of his Time Measuring Device unequal to indications of TMD of other observers, the observer falls off the Time Location of other observers and becomes undetectable for them. (B)

For example, suppose observers A and B shares the same temporal location T_2 regarding the Time Line (see fig. 1). Both of them are able to make an observation of each other as long as they share temporal location T_2.

Suppose now that, the TMD of observer B shows indication B_1 instead of B_2 (for any reason). In that case, the observer B moves in the backward direction along the Time Line and takes the temporal location T_1 in "Minkowski space". That happens because indications of a TMD in "Minkowski space" have a ***one-to-one*** relationship with temporal location of the observer (object, body, and etc.)

In other words, the observer B falls to the "Past" relative to the "present temporal location" of the observer 'A' and becomes unreachable and undetectable for the observer 'A' from his/her "Now" (temporal location T_2). In that case, the observer A sees sudden "disappearance" of the observer B.

Despite those questions and the possibility of further rising controversy, Einstein used Minkowski space (four-dimensional space-time) to make foundation of his theory of Relativity.

IV. THE CORE PROBLEM

One of the most famous equations from Relativity is the equation of Time dilation:

$$T = \frac{T_0}{\sqrt{1 - \frac{V^2}{C^2}}} \qquad (1)$$

"T_0, called proper time, is the value measured by an observer on the moving body, and T is the corresponding quantity as measured by a fixed observer"[2]

As it clearly visible from the equation, every observer moving with a given speed V, relative to a fixed observer, has his/her own rate of time.

According statement (B) a moving observer in "Minkowski space" should fall to the "Past" as soon as the observer follows the equation (1). That happens because of *lesser rate of indications of the moving observer's clock*.

It was the greatest challenge to Relativity. According observations upon natural physical bodies they show not any attempt to "fall in the Past" *after acceleration*.

Therefore, the irresolvable question appeared here. Do a moving observer and a fixed observer keep *the same temporal location* regarding the same Time Line (or fourth dimension)?

To avoid that contradiction, Einstein claimed that each moving observer has a unique "Time". Each "Unique

[2] **relativity.** (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition.* Chicago: Encyclopædia Britannica.

Time" has its own ***Time-Rate*** that depends on the relative velocity of the fixed observer and moving one.

The same statement immediately crushes "Minkowski space" and makes it "obsolete" because that space *allows only one Time Line suitable for every clock*. As a result, Einstein constitutes Time-Multidimensional Universe. In that Universe, every object moving with a unique speed relative to a fixed observer has *its own Time Line*.

Because the Universe has countless number of objects moving relative to each other with different speed Einstein's Time-Multidimensional Universe (ETMU) has countless number of Time Lines. Each Time Line depends on its own object.

That raises the problem of dimensions even higher. Suppose, there are two objects A_1 and B_1 moving to each other with different speed relative to a fixed observer (see Fig. 2)

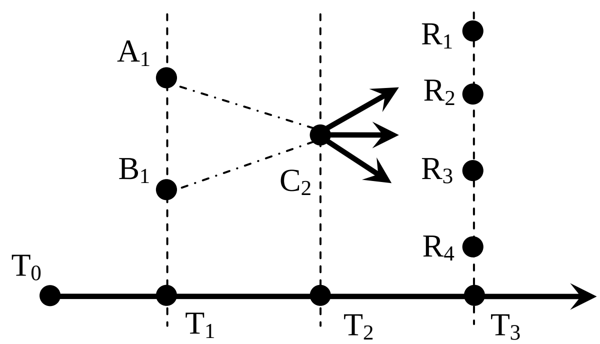

Fig. 2

The relationship with Michelson-Morley Experiment
According Relativity there are two Time Lines. Each of them is associated with a unique object. At the moment of collision (T_2), both objects crush and destroy each other. As a result of the collision, four objects (R_1 – R_4) appear moving with different speeds in different directions.

Therefore, according to ETMU two Time Dimensions before crush transform *by the crush* to four Time Dimensions. In other words, number of Time Dimensions in ETMU depends on object transformations because of equation (1).

Moreover, all objects after collision still belong to the Time Line of the fixed observer despite their different Time Rate (as mentioned above).

According to Relativity, each object can be associated with a fixed observer. Therefore, each object after crush posses three Time Dimensions (!) associated with each other observer (located on, or associated with each other object) because of equation (1).

As a result, Einstein's Time-Multidimensional Universe (ETMU) transforms to Einstein's Time-Multidimensional-Multiobserverable Universe (ETMDOU).

V. CONCLUSION

Einstein himself and Relativity never answered any question mentioned above. That makes Relativity a self-controversial theory (may be the most controversial theory ever created by the human mind).

The same way of thought leads to the main question of the *physical* aspect of Time. Many controversies mentioned above, look like the human mind illusion about some "mysterious" aspect of the Universe that we call Time.
The entire history of science shows that such controversial entities have the same tendency to *self-destruction* under pressure of rising question of their self-controversy.

Is it possible for the humankind to reach the right solution for all problems of Time? That question has a positive answer today.

There is a patent application filed by the author of this article. Today, the application is under review and patent search procedure.

The application describes some methods and a unique device (apparatus) that will be able to answer many questions about Time and Motion (the relative entity of Time).

In the area of Motion, the proposed technology will be useful to make some "incredible experiments" like a One-Way Experiment (the measurement of the light beam propagation in one direction without mirroring) and many others.

The theoretical basis of the technology was explained for the first time in the article Allan Zade - The Epistemological concept of the True Space-Velocity Detector - published at: "International Journal of Scientific and Research Publications (IJSRP), Volume 2, Issue 11, November 2012 Edition".

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