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Research Article

Spacetime Conversion and Distance of Time Travel: Research on the Application of Life's Flash in Spacetime Physics

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Abstract

The reason why spacetime conversion occurs is that the displacement change of an object at time t_1 only occurs in t_1 spacetime, and its displacement change at time t_2 only occurs in t_2 spacetime, etc. The motion path of an object is a polyline, and the shortest distance between the ends of the polyline is the distance of time travel. Because the polyline passes through n (a large number) dimensions, its distance of time travel is surprisingly short, giving us a more concrete understanding of time travel.

Keywords: Spacetime conversion, Time travel, Distance of time travel, Flash, Polyline, Material world, Dimension

Introduction

When we walk on the beach, the lost time is like our footprints left behind. May I ask, when we look back at those footprints, where are our past selves? Now we use the observer's flash to time and answer this question. "Thinking or feeling is composed of one flash in series with another. Using a movie as an analogy, successive scenes are played in rapid succession from frame to frame … Simply put, flash is a sudden thought, as fast and short as lightning." [1] Leibniz said, "Thousands of facts lead us to believe that there are an infinite number of continuous perceptions within us" [2]. Assuming that a light source emits a beam of parallel light (light L), an observer (life Y) starts timing. The time of No.1 flash is recorded as time t_1, the time of No.2 flash is recorded as time t_2, etc (Figure 1).

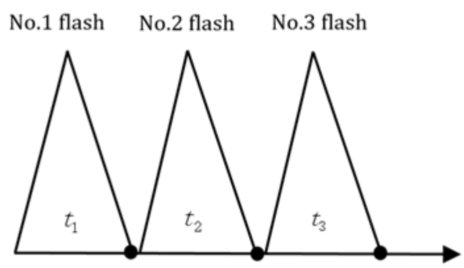

Figure 1: Diagram of the relationship between flash and time.

The spatial region perceived by life Y at time t_x, i.e., the material world $m(t_x)$ of life Y at time t_x, is referred to as t_x spacetime of life Y (abbreviated as t_x spacetime) in this article. At time t_x, light L exists in t_x spacetime; when light L appears in t_{x+1} spacetime, we refer to this spatiotemporal change as spacetime conversion. This article starts with the motion path of light to study the law of spacetime conversion, and we hope to provide new method for the study of spacetime physics.

The First Spacetime Conversion

Assume that life Y observes the entire process of light L traveling, that is:

a) The light source emits light L at A_0.

b) At the end of time t_1, light L reaches location A_1.

c) At the end of time t_2, light L reaches location A_2, etc.

In t_1 spacetime, light L travels from $(A_0+\alpha)$ to A_1, where α represents infinitesimal. The distance from $(A_0+\alpha)$ to A_1 is denoted as A_0A_1. The phenomenon of light L traveling in t_1 spacetime is denoted as L_{t_1}. In t_2 spacetime, light L travels from $(A_1+\alpha)$ to A_2, and the distance from $(A_1+\alpha)$ to A_2 is denoted as A_1A_2. The phenomenon of light L traveling in t_2 spacetime is denoted as L_{t_2}. Although life Y sees A_0, A_1 and A_2 as shown in Figure 2, the path taken by light L in t_2 spacetime is only L_{t_2} (Figure 2).

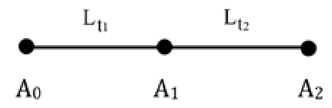

Figure 2: A common diagram illustrating the path taken by light L.

In t_2 spacetime, light L does not actually pass through L_{t_1} (Figure 2). If L_{t_1} appears in t_2 spacetime, life Y will simultaneously see the following two phenomena:

a) Light L travels from A_1 to A_2.

b) Light L travels from A_0 to A_1.

The simultaneous appearance of light L in two locations is obviously not in line with the facts. If L_{t_1} is not perpendicular to t_2 spacetime, then the vertical projection of L_{t_1} in t_2 spacetime is not zero, and the component of L_{t_1} in t_2 spacetime is denoted as $\mathrm{proj}_{t_2}(L_{t_1})$. In this way, life Y can simultaneously observe L_{t_2} and $\mathrm{proj}_{t_2}(L_{t_1})$ in t_2 spacetime, which means that light L appears in two locations at the same time. This is obviously not true. In short, L_{t_1} is perpendicular to t_2 spacetime. When light L appears in t_2 spacetime, the first spacetime conversion occurs. Because L_{t_2} is located in t_2 spacetime, we further obtain $L_{t_1} \perp L_{t_2}$. And $L_{t_1} \perp L_{t_2}$ can be represented by Figure 3, where "a" represents the distance traveled by light L in one flash of time (Figure 3).

Assume that $A_{0\text{-}2}$ represents the actual distance traveled by light L from the start of timing to the end of time t_2.

$$A_{0\text{-}2} = A_0A_1 + A_1A_2 = 2a.$$

Assume that $L_{t0,t2}$ represents the length of the dashed line connecting A_0 and A_2 in Figure 3. Its physical meaning is the distance of time travel, which will be described in detail below.

$$L_{t0,t2}{}^2 = A_0A_1{}^2 + A_1A_2{}^2 = a^2 + a^2,$$

so

$$L_{t0,t2} = \sqrt{2}\,a.$$

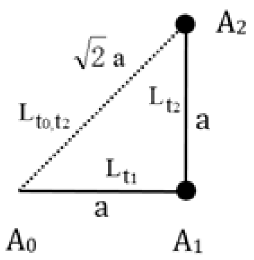

Figure 3: The actual path taken by light L at the end of time t_2.

The Second Spacetime Conversion

The phenomenon of light L traveling in t_3 spacetime is denoted as L_{t_3}. If L_{t_2} and L_{t_1} appear in t_3 spacetime, life Y will simultaneously see the following three phenomena:

a) Light L travels from A_2 to A_3.

b) Light L travels from A_1 to A_2.

c) Light L travels from A_0 to A_1.

The simultaneous appearance of light L in three locations is obviously not in line with the facts. If L_{t_2} and L_{t_1} are not perpendicular to t_3 spacetime, then their vertical projections in t_3 spacetime are not zero, and their components in t_3 spacetime are denoted as $\mathrm{proj}_{t_3}(L_{t_2})$ and $\mathrm{proj}_{t_3}(L_{t_1})$, respectively. Life Y can simultaneously observe L_{t_3}, $\mathrm{proj}_{t_3}(L_{t_2})$, and $\mathrm{proj}_{t_3}(L_{t_1})$ in t_3 spacetime, which means that light L appears in three locations at the same time. This is obviously not true. In short, L_{t2} and L_{t1} are perpendicular to t_3 spacetime. When light L appears in t_3 spacetime, the second spacetime conversion occurs. Because L_{t3} is located in t_3 spacetime, we further obtain $L_{t2} \perp L_{t3}$ and $L_{t1} \perp L_{t3}$. If $L_{t1} \perp L_{t2}$, $L_{t1} \perp L_{t3}$ and $L_{t2} \perp L_{t3}$ hold simultaneously, we use $L_{t1} \perp L_{t2} \perp L_{t3}$ to represent their relationship. $L_{t1} \perp L_{t2} \perp L_{t3}$ can be shown by Figure 4, which depicts a three-dimensional image on a plane, so the shape becomes abstract, but the algebraic relationship is correct (Figure 4).

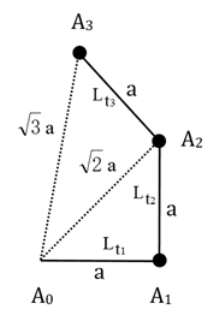

Figure 4: The actual path taken by light L at the end of time t_3.

Assume that $A_{0\text{-}3}$ represents the actual distance traveled by light L from the start of timing to the end of time t_3.

$$A_{0\text{-}3} = A_0A_1 + A_1A_2 + A_2A_3 = 3a.$$

Assume that $L_{t0,t3}$ represents the length of the dashed line connecting A_0 and A_3.

$$L_{t0,t3}{}^2 = A_0A_1{}^2 + A_1A_2{}^2 + A_2A_3{}^2 = 3a^2,$$

so

$$L_{t0,t3} = \sqrt{3}\,a.$$

At the end of time t_n, light L reaches A_n, as shown in Figure 5. Similarly, when light L appears in t_n spacetime, spacetime conversions have occurred (n-1) times, and $L_{t1} \perp L_{t2} \perp \ldots \perp L_{t(n-1)} \perp L_{tn}$ holds (Figure 5).

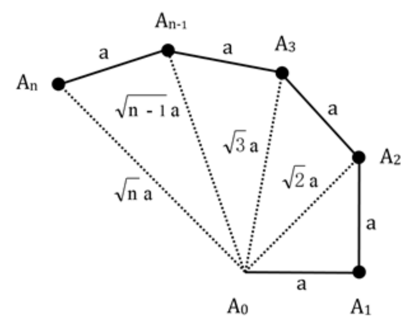

Figure 5: The actual path taken by light L at the end of time t_n.

Assume that $A_{0\text{-}n}$ represents the actual distance traveled by light L from the start of timing to the end of time t_n.

$$A_{0\text{-}n} = A_0A_1 + A_1A_2 + \ldots + A_{n\text{-}1}A_n = n \cdot a. \quad (1)$$

Assume that $L_{t0,tn}$ represents the length of the dashed line connecting A_0 and A_n in Figure 5.

$$L_{t0,tn}{}^2 = A_0A_1{}^2 + A_1A_2{}^2 + \ldots + A_{n\text{-}1}A_n{}^2 = n \cdot a^2, \quad (2)$$

so

$$L_{t0,tn} = \sqrt{n} \cdot a. \quad (3)$$

The motion path $A_0A_1 \to A_1A_2 \to \ldots \to A_{n\text{-}1}A_n$ is a polyline, and the shortest distance between the ends of the polyline is the distance of time travel $L_{t0,tn}$.

Distance of Time Travel

At time t_x, we denote life Y as Y_x; at time t_{x+1}, life Y is denoted as Y_{x+1}. At time t_{x+1}, if life Y_{x+1} perceives the spatial region of a being's t_{x+k} spacetime ($k \neq 1$), then we refer to this spatiotemporal change as time travel. Suppose that there is a star whose beam of light (light F) traveled 25 light-years to reach the earth. The distance traveled by a light in one second is 3.0×10^8 m [3]. "In generally, the number of one's flashes in 1 second is 3.2×10^{14}." [1] Therefore, the length of the path taken by light F in each flash time is

$$a = \frac{3.0 \times 10^8}{3.2 \times 10^{14}} \text{ m}.$$

The length of the path taken by light F in 25 years is

$$A_{0\text{-}n} = 25 \times 365.25 \times 24 \times 60 \times 60 \times 3.0 \times 10^8 = 2.52 \times 10^{23} \cdot a,$$

so $n = 2.52 \times 10^{23}$. The distance of time travel between the beginning and end positions of light F in 25 years is

$$L_{t0,tn} = \sqrt{n} \cdot a = \sqrt{2.52 \times 10^{23}} \cdot \frac{3.0 \times 10^8}{3.2 \times 10^{14}} = 470 \text{ km}.$$

Similarly, $F_{t1} \perp F_{t2} \perp \ldots \perp F_{t(n-1)} \perp F_{tn}$, where F_{t1} denotes the phenomenon of light F traveling in t_1 spacetime; F_{t2} denotes the phenomenon of light F traveling in t_2 spacetime, etc. Consequently, light F enters our field of view after passing through n dimensions. Spacetime conversions results in $L_{t0,tn}$ being so short. The motion path of light is like this, what is the motion path of an ordinary object like?

Suppose that life Y continuously observes a stationary object (beach W) for 25 years. However, beach W is relatively stationary, as the speed of the solar system in the rotation of the Milky Way is about 220 km/s [4]. Then we assume that the speed of beach W in the Milky Way is 220 km/s. The phenomenon of beach W moving in t_1 spacetime is denoted as W_{t1}; the phenomenon of beach W moving in t_2 spacetime is denoted as W_{t2}, etc. If W_{t1} is not perpendicular to t_2 spacetime, then the vertical projection of W_{t1} in t_2 spacetime will not be zero, and the component of W_{t1} in t_2 spacetime is denoted as $\text{proj}_{t2}(W_{t1})$. Life Y can simultaneously observe W_{t2} and $\text{proj}_{t2}(W_{t1})$ in t_2 spacetime, which means that beach W appears in two locations at the same time. This is obviously not true. In short, W_{t1} is perpendicular to t_2 spacetime. When beach W appears in t_2 spacetime, the first spacetime conversion occurs. Similarly, W_{t2} and W_{t1} are perpendicular to t_3 spacetime. When beach W appears in t_3 spacetime, the second spacetime conversion occurs. Finally, the (n-1)th spacetime conversion occurs, and equations (1), (2), and (3) still hold. Assume that a_w denotes the distance traveled by beach W in a flash time, then

$$a_w = \frac{220 \times 10^3}{3.2 \times 10^{14}} \text{ m}.$$

The length of the path taken by beach W in 25 years is

$$A_{0\text{-}n} = 25 \times 365.25 \times 24 \times 60 \times 60 \times 220 \times 10^3 = 2.52 \times 10^{23} \cdot a_w,$$

so $n = 2.52 \times 10^{23}$. The distance of time travel between the beginning and end positions of beach W in 25 years is

$$L_{t0,tn} = \sqrt{n} \cdot a_w = \sqrt{2.52 \times 10^{23}} \cdot \frac{220 \times 10^3}{3.2 \times 10^{14}} = 345\,\text{m}.$$

The distance of time travel is surprisingly short. ***World-Quantum Theory and Time Travel: A Study on the Role of Life in the Composition of the Universe*** "demonstrates that a person can travel back to the past by focusing on reminiscing and travel forth to the future with single-minded visualization" [5]. Therefore, it is believed that personal time travel will become a mature and controllable technology. We can further boldly make the following prediction: One day, human consciousness will be connected to the spacecraft, like a complete life. Then this spacecraft jumps freely between different spaces-times.

Conclusion

This article quantizes spacetime and derives the law of spacetime conversion. The law of spacetime conversion consists of three parts:

Firstly, time is quantized. Time t_1 corresponds to No.1 flash, and time t_2 corresponds to No.2 flash, etc. This is reasonable because series of flashes form the timeline.

Secondly, spacetime is quantized. $m(t_1)$, $m(t_2)$, etc., are world-class macroscopic quanta [3], which means that t_1 spacetime, t_2 spacetime, etc., are world-class macroscopic quanta. Now we can answer the question at the beginning of this article: When we walk on the beach and look back at the footprints behind us, our past selves exist in the spacetimes of the past.

Thirdly, the motion path of an object is a polyline. Some people may ask: Before life Y sees light F, does light F undergo spacetime conversions? Like Schrodinger's cat, if life Y does not observe light F, it means that light F does not manifest in life Y's world. So light F is chaotic in life Y's world, and its motion path is also chaotic. When life Y observes light F, light F and its path collapse from the chaotic state, and thus they manifest themselves. If F_{t1} is not perpendicular to t_2 spacetime, then the vertical projection of F_{t1} in t_2 spacetime is not zero, and the component of F_{t1} in t_2 spacetime is denoted as $\text{proj}_{t2}(F_{t1})$. In this way, light F appears in two locations at the same time in t_2 spacetime. This is obviously not true. In short, F_{t1} is perpendicular to t_2 spacetime. When light F appears in t_2 spacetime, the first spacetime conversion occurs. Similarly, the (n-1)th spacetime conversion also occurs. Doing it in this way is reasonable because the displacement change of an object at time t_1 only occurs in t_1 spacetime; its displacement change at time t_2 only occurs in t_2 spacetime, etc. The analysis of light L, beach W and light F can lead to the following conclusion: the motion path of an object is a polyline that follows the quantization of time and the quantization of spacetime.

The law of spacetime conversion not only reveals the essence of spacetime conversion, but also provides a new perspective for humans to understand the structure of the universe. Time is no longer the carriage moving forward at a constant speed, but rather one flash after another of the observer. This idea reveals distance of time travel, giving us a more concrete understanding of time travel.

Acknowledgment

None.

Conflict of Interest

None.

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