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Examining the light clock argument, clocks on planes, wavelength and Doppler shift, in relation to Object and Image reality

Re-examination of the light clock argument using the idea that for a particular observed phenomenon or object the same physics must be occurring in foundational reality that is the source for the different observations made. I.e. There is the same underlying reality. Rather than considering events to be happening in space time the re-examination happens using the understanding that the uni-temporal source reality (Object reality) is not seen but it is products of electromagnetic information receipt and processing (Image reality) that are seen.

Examining the light clock argument

To correctly extend relativity to light, electricity and magnetism, the concept must be held that those phenomena are, in foundational Object reality, unaffected by alteration of observer viewpoint, and relative motion.

Re. Einstein's light clock

The light clock is one of Albert Einstein's thought experiments. It consists of a beam of light that is bounced between two mirrors. One return journey is a 'tick' of the clock. When the clock is moved laterally, it will seem that the light must travel further between the mirrors.

Light within the light clock cannot be travelling further within the clock in Object reality, because of the way it is observed. There must be one and the same physics occurring in the clock that is the source of different observation products. It will be argued that; the time measured by the clock itself is not slowed by the translation of the clock. Even though this means disregarding the logic of the diagonal straight-line light path argument. Though the period and frequency of the light motion is unaltered in Object reality (traveling the same wave motion distance in the same time), from the relative perspective of the stationary observer the motion is extended over a longer spatial distance.

Demonstration

Three observers watch a click wheel with a constant period of rotation. A. is a co-moving observer. B. is an observer following in the direction of the wheel's motion but at half speed. C. is a stationary observer, watching the wheel move laterally away. To the three observers, the wheel has been translated different relative lateral distances. However, in each case it is the ***same motion*** of the material body that is the *source* of the observations. What is altering during the motion and is different for the different observers is the relation to the potential sensory data emitted from the material object. When the observer moves together with the observed object the distance that the potential sensory data must travel from emission to be received by the observer is remaining constant. When moving at half the speed of the object there is an increasing distance that must be travelled by the information for receipt and when the observer is stationary there is even greater growth in the increase in distance that must be travelled by the information for receipt. This results in three different experiences of the motion via the outputs generated from the received potential sensory data. That is three different image realities produced simultaneously from different EM information.

The image reality of the stationary observer will be produced from potential sensory information that has increasing delay between production and receipt, and will be the image reality formed from the *oldest* information of the three observers. The half speed observer will also be receiving information that has had increasing delay between production and receipt but will be *younger* information than that being received by the stationary observer. The co-moving observer will have received the *youngest* information of the three and the delay will remain constant. If these were very accurate clocks and very large distances the co-moving observer should see his clock keep steady time. Whereas the other two observers should see the clock slow. This is because the information to produce an accurate time has not been received due to the increasing delay, due to the increasing distance between clock and observer. The stationary observer seeing the clock progressively slow the most as the object clock gets further away.

Light is a periodic phenomenon. In mathematics, a periodic function is a function that repeats its values in regular intervals or periods. Periodic functions are used throughout science to describe oscillations, waves, and other phenomena that exhibit periodicity. Light, considered as a periodic wave phenomenon, can be compared to other kinds of periodic motion. As the period of periodic motion is unaffected by linear translation (mathematical fact), it follows that the period of a light clock *itself* is unaffected by linear translation. Mathematically the period of an ideal clock is unaffected by lateral translation. In Object reality is only an alteration of the spatial change that was occurring as the 'stationary' clock moved with the motion of the Earth. That is observer independent change in the relation between the clock object and other material bodies

The light traveling between the mirrors is not moving in a straight line like a ray, but undergoing wave motion. Following an oscillating path that is the same whether there is relative translation or not. *The notion that the light takes a longer path when the clock is moved is based on the incorrect diagonal straight-line motion assumption.* Instead it can be thought of as a fixed length of periodic motion with a fixed frequency, imagined as extended spring like in the translated reference frame. Following the path along the coils of the spring, the imagined absolute motion, *it is the same length* whether the spring is extended or not. It is the same source 'spring' for both observer viewpoints but seen differently because of how the emitted EM potential sensory data is arriving at the observer and being formed into the different relative Image realities.

The speed of light is the same for moving and unmoving clock, and for the clock itself timekeeping is unaltered even though *it appears* that when the clock is moved the light is travelling further in a straight line at c , making each tick period of the clock longer. Giving the saying that; moving clocks run slow. It is very important, for correct relativity, that the distance travelled by the light in the light clock is the same *in foundational Object reality*, in both moving and stationary scenarios, being unaffected by observations.

Light must be received to be seen. It is not the light beam moving between the mirrors itself that is seen but the product of processing of light that has been received, at the observer location, from the scattering of light from the light beam. Relative motion

alters the relation between the observer and the EM information scattered from the beam.

Increase in distance between observer and clock is important. The increasing separation increases the time delay between emission and receipt of the light. Lateral translation away from the observer causes the output Image reality to have *the appearance* of a greater distance travelled by the light beam and a resulting slowing of tick.

Simultaneously, for a same speed co-moving observer, for whom the clock apparatus appears stationary, the tick must be constant and unchanged.

It is not correct to say that (because of relativity) “a moving clock runs slow”. The product formed from information emitted by the clock can give the impression of the clock running slow, if there is an increased delay in signal receipt. A distant clock that approaches an observer is seen to become increasingly less slow when compared to a stationary clock at his location, as the delay between signal emission and receipt decreases. *There may be non-relativistic reasons for a clock object to run slow that should not be muddled with effects of relativity.*

In support of The Twins paradox, human metabolism has been likened to a clock, sometimes reduced to an argument about the oscillation of individual atoms. That argument can now be turned around and used in support of no alteration of metabolism under translation; dispelling the paradox. Firstly, because periodic phenomena are unaffected by linear translation and secondly because clearly the notion that the bodies themselves age differently is due to the category error that confuses the outputs of sensory data receipt and processing for the source material objects themselves.

The planes problem

Premise: The substantial objects of Object reality are not formed or directly affected by derived relative reality; including Image reality; 'what is seen'. (Though a living agent might affect substantial objects in reaction to perceived Image reality.)

Based on that premise, if there is a permanent alteration to the time shown on two formerly synchronized clocks, that have either been subject to different gravitational potential or travelling at different velocities, making them out of synchronization when brought together, there must be another process or processes occurring that affects substantial matter, rather than only relative perception. As the difference in time shown on the substantial experimental clocks is found to persist when they are reunited it must be rooted in their substantial, ontic reality not different relative emergent realities from EM information receipt. It is not necessary to conclude that it must be differences in “time itself”, unless “time itself” is given the definition of being (only) what the clock measures.

Quote “Basically a clock consists of four items: something that generates events at a regular interval (the oscillator), a counting mechanism, some method to calibrate the rate of the events, and a time setting mechanism. In a fundamental sense, we do not tell time, but only count events. On a low level, we deal in time intervals, not time. The zero of our time system is arbitrary and set by convention – or some committee. This origin, along with a definition of the second, defines a time frame. The rate that the events occur must be calibrated. This means that there must be standards.....” James R. Clynch. 2003. **1**

Quote: The principle underlying the cesium clock is that all atoms of cesium-133 are identical and, when they absorb or release energy, produce radiation of exactly the same frequency, which makes the atoms perfect timepieces. Betts, J.D. 2015: Encyclopedia Britannica. **2**

Quote: The oscillation frequencies within the atom are determined by the mass of the nucleus and the gravity and electrostatic "spring" between the positive charge on the nucleus and the electron cloud surrounding it. Schanker, J. 2005 **3**

Requirement: A cause of change in the number of 'events' generated or events measured needs to be investigated. It could be an effect on any of the components that generate the time intervals, regulate them or count them or the whole system.

Re. the Hafele–Keating experiment:

Consider those two atomic clocks flown in opposite directions around the globe. Plane A travels in the direction of rotation of the Earth, plane B flies against the rotation of the Earth. To the hypothetical observer at the centre of the Earth (or a distant observer stationary above the spatial co-ordinate of the starting point of the two planes (not geostationary above the start position on the Earth), plane A is seen to fly a greater distance with the movement of the Earth than the plane flying against the rotation of the Earth.

Thought 1: Plane A gets an easier task moving with the mass movement of the atmosphere whereas plane B must work harder to overcome the inertia of the plane-atmosphere system, both components resisting change.

Quotes: “Unfortunately, an atom or molecule does not vibrate, or-putting it more accurately-emit or absorb energy at one frequency only, but rather over a range of frequencies. The narrower the range, the more accurate the spectrum line will be as a time standard. The range or width of the spectrum covered by the spectrum line is determined by several factors. Among the most important of these are the violent collisions between the atoms or molecules which disturb the vibration, causing a broadening of the spectrum line. The thermal motion of the gas atoms also gives rise to what is called a Doppler broadening...” ...the signal will be absorbed when the frequency or vibration rate of the radio wave is exactly equal to the frequency of vibrations corresponding to the spectrum line...”, “This phenomenon can be made use of in making an atomic clock. If the cyclic or vibrating mechanism giving the beat of the clock is made to generate a radio wave, the absorption of this wave by the gas will be at a maximum when the vibration rate of the wave and the clock is at the right frequency, and weaker if it is off frequency; this is the basic mechanism involved in control, although details of execution may vary.” Quotes from Harold Lyons, 1950. **4**

Thought 2: The need to have precise frequency matching to generate an accurate event together with sensitivity to disturbance could tie together a lesser number of events and greater instability of the clock on the anti-rotation journey. The higher frequency for the plane with the greatest velocity, exceeding the Earth rotation, in the Earth rotation

direction, also needs mentioning. It could be due to the additional inertia (resistance to change of motion) at that higher velocity, of the atomic nuclei used for time event generation. That might have a dampening effect on the noise causing imprecise frequency matching. Giving a cleaner faster matched frequency generation and consequent faster rate of the clock.

Thought 3. It is possible that there could be an effect produced by different external gravitational potentials on the fundamental time keeping process.

In conclusion: There are two different classes of phenomena occurring both attributed to time dilation. One class of phenomenon is the difference to the emergent product reality, seen as difference in the rates of change by comparison; because of the way in which EM information is received. The second class is alteration of timekeeping due to an effect upon the substantial timepiece or timepieces, as discussed above. This class of alteration needs further investigation.

There is no alteration of the passage of Object universal time. The clocks are not differently time travelling. There can be no going into a substantially real future ahead of the Uni-temporal Now as only Uni-temporal Now, the current configuration of the Object universe exists. Nor slipping into a substantial past as there is no substantial past either. That being so prevents the Grandfather paradox.

Relic EM radiation from which derived, relative Image reality can be formed, when it is received and processed into product. allows perception of events that have already occurred. Non-simultaneity of events is due to differences in the where of observation, at the same when, and thus the 'Object universe configurations of origin' of the information received at those locations.

The image reality of the observer does not affect the object reality of the source object.

There is no alteration of "time itself" affecting a clock *object* or any other periodic motion in Object reality because of relative motion between the object and the observer.

The (unobserved) intrinsic period of a clock object or any periodic motion is invariant, in foundational Object reality, with change in observer viewpoint and relative motion; so long as there is no change in the functioning of

the system, brought about by physical effects on it, that occur in conjunction with the motion of the object.

The concept of wavelength

Definition: "noun, Physics. The distance, measured in the direction of propagation of a wave, between two successive points in the wave that are characterized by the same phase of oscillation." Dictionary.com

Wavelength is a spatial distribution measurement that combines position due to periodic motion and linear translation in the direction of propagation. Amount of linear translation can vary according to observer reference frame, and observed frequency is inversely proportional to observed wavelength. It can be understood from the earlier investigation into the light clock and planes problem that the periodic phenomenon in Object reality is not altered because of the change in relation of it and the observer.

Doppler shifts can be thought about as changes in the relation of an observer or reality interface to the potential sensory information produced by a source. Decreasing distance between source and receiver gives an increasing frequency of wave interception and increasing distance gives an increasing delay in receipt, a decreasing frequency. Though in Object reality the wavelength and frequency of the light or sound waves remains the same.

References

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4 Lyons, H. 1950. The atomic clock A universal standard of frequency and time. American Scholar, Vol. 19, p 159-168. Retrieved from tf.boulder.nist.gov/general/pdf/2.pdf