Universal Specificity Investigation 7: The Theory of Everything That is Light

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Prior investigations into the theory of universal specificity (or specificity for short) found a proper conception of time missed in common practice; which lead to discovering the cause of kinetic time dilation; which lead to revisiting the relativistic kinetic energy, mass and total energy model; which allowed for the integration between potential and kinetic time dilation and an updated total energy model comprised of internal potential, external potential and kinetic energy; which culminated into a theoretical experiment for detecting the universal inertial frame (UIF).

Specificity accepts all observations predicted by relativity, and the appearance of the validity of the conclusions drawn from relativity, but not their actual validity. Specificity asserts that all existents exist at any given instant in some specific state, to include some specific place—nothing exists outside of that. The last remaining question about this theory to be invested is: if spacetime is not a real thing, and therefore, cannot be responsible for kinetic or gravitational time dilation, as an environmental affect on objects, then what causes everything in the same reference frame to be effected by time dilation in the same way? Addressing that question is the focus of this paper.

1. EVERYTHING IS LIGHT

What if light were the atom, the fundamental building block of matter, predicted in antiquity by Democritus [1]? What if matter as we know it, are simply entangled photons in differing structures and arrangements? That is the theory of everything that is light.

If everything were made of light, then it would explain why everything is effected by kinetic time dilation in the same way. In the case of kinetic time dilation, if everything is entangled light, and the speed of light is constant relative to the UIF, than any transnational movement of the entangled light would reduce the light's internal motion to maintain c. Indeed, that is what happens when studying the total energy equation, as shown in Equation (1). Assuming no gravity potential (ΔE_P), as the kinetic energy (ΔE_K) increases, the internal energy (ΔE_I) decreases.

$$E_T = E_I + \Delta E_K + \Delta E_P \tag{1a}$$

$$\frac{1}{2}mc^2 = \frac{1}{2}mc_0^2 + \frac{1}{2}mv^2 + m\int g(r)dr \tag{1b}$$

By implication of light being affected by kinetic time dilation, it would be affected by any time dilation, since previous investigations integrated potential and kinetic time dilation as being the same phenomenon. Time dilation would fundamentally be something that affects light, *quite possibly the only thing that effects light*, which then means it affects everything.

It also would explain why *specific* work done, as opposed to simply work done, is the cause of total time dilation because each particle of light needs the same amount of work done to it to have the same effect, thus, work is required to scale with the quantity of entangled photons.

Obstacles to the Theory of Everything That is Light

The theory that everything is light is not conclusive. It lacks a method of agreement and method of difference experiment that makes inductive proof of this grand generalizations possible [2]. Only certain evidences are available to suggest that it might be true, not that it is true; however, the evidence is compelling enough to warrant the creation of a theory.

Certain obstacles stand in the way of this theory seeming plausible. Light, we are told from relativity, only travels at a constant speed, c, for any reference frame. This is a problem because massed objects, normally not considered to be entangled photons, are clearly not at c; therefore, it presents a paradox of how could this be a case where light is not moving at a constant c simply because of its structure.

Another obstacle is light, we are told from relativity, has no mass. This is a problem because what is implied by the theory of everything that entangled light has mass; therefore, it presents a paradox of how could entangled light achieve mass when unstructured light has no mass.

Given these obstacles, this theory seems ridiculous from the perspective of relativity, but let us see what specificity has to say. For the first obstacle, specificity gains access to two key pieces of evidences, which relativity is blocked from, that shows light does not always travel at c for every reference frame. For the second obstacle, specificity gains access to a total energy model that explains why light actually does have mass. Not to mention there are other observations that support the notion that everything is light.

Light Slower Than c

The two key pieces of evidence that light can travel slower than c are in the case where it is moving through a gravitational potential, and moving through a medium, which amounts to the same thing.

Relativity explains gravity with the bending of spacetime which allows the light to travel a further distance to counteract the fact that it takes more time for light to travel through it, thus, keeping c constant. Specificity does not accept spacetime as a thing that actually exists; it is only a useful model to explain predictions, like assuming a flat earth to predict trajectories, or Ptolemy's model to predict celestial motion. According to specificity, therefore, nothing is actually bending since only units being measured are changing

giving the appearance of a bend. This means light is actually traveling slower than c inside a gravity potential. A prior investigation integrated the total energy equation with changes in gravitational potential energy, and it was discovered that the velocity of objects (including light) slow down in the gravity potential by a factor of $\frac{1}{\gamma_P} = \sqrt{1 - \frac{\Delta e_P}{e_T}}$, which is the reason why light takes longer to travel through a gravity potential.

Light traveling slower in a gravity potential is not too different from what happens during kinetic time dilation—keep in mind that they are the same phenomenon. Specificity holds that unit changes give the appearance that the speed of light rains constant when specific work is done. If the units were properly calibrated, then one would discover that the relative velocity between traveling objects and light is equivalent to that measured in the UIF. It means the relative velocity of light is actually slower than the speed of light in one direction, and faster in the other. Gravitational time dilation, like its counterpart, makes light appear as though its speed were constant, but in reality it slows down.

As far as light's behavior inside a medium, I believe relativity has nothing new to say about refraction; they are treated as separate branches of physics. A common explanation for why light slows down inside of a medium is because it bounces back and forth between atoms, essentially taking the scenic route, which is just wrong [3]. Another common, and more plausible, explanation is the effective wave, due to electromagnetic interference to the original wave from the wave generated by moving electrons (moved by the original wave), makes the effective wave appear slower [3]. This last explanation relies on the electromagnetic waves produced by the moving electrons to move slower than light, to create the desired slower wave, which just sweeps the problem under the rug.

Specificity, however, addresses light speed inside a medium by integrating the effect of a time dilation gradient with the bending of light in refraction. The index of refraction, n, relates to gravitational inertial time differential, $\frac{1}{\gamma_P}$, as follows:

$$\text{Recall}: \; v' = \gamma_P v \tag{2a}$$

$$n = \frac{c}{v} = \frac{v'}{v} \tag{2b}$$

$$\therefore n = \gamma_P = \frac{dt'}{dt} \blacksquare \tag{2c}$$

On this basis, the index of refraction, n, relates to the time dilation gradient, $\nabla\tau^2$, as follows:

$$\text{Recall}: \; g(r') = \lim_{dr' \to 0} -e_T \nabla\tau^2 \tag{3a}$$

$$\text{Where}: \; \nabla\tau^2 = \frac{\tau^2}{dr'} = \frac{\left(1 - \left(\frac{dt}{dt'}\right)^2\right)}{dr'} \tag{3b}$$

$$\therefore \nabla\tau^2 = \frac{\left(1 - \frac{1}{n^2}\right)}{dr'} \blacksquare \tag{3c}$$

What this tells us is that at the threshold, from one medium to another, there is a time differential gradient which causes the light to refract and slow down, due to specific work done, just like with gravity. This would explain why material density is correlated to refraction index, because denser objects exhibit a higher gravitational potential.

Now, the values of τ in the gravitation examples from previous investigations were extremely small. For example, in the studied case on earth's surface $\tau = 4.67 \times 10^{-5}$, which means $n \approx 1$. In contrast, consider the material with highest discovered index of refraction, which is $n = 38.6$ [4], which would mean $\tau = 0.9997$, or five orders of magnitude higher than the earth's gravity case.

Not to mention in our gravitation examples the distance measuring the time dilation gradient were on the order of kilometers, meaning the grade of the gradient was quite shallow. Whereas the time dilation gradient at the threshold of two mediums is practically a step function, implying the gradient is close to a step function. This would explain the "kink" (apparent infinite acceleration) in the light path during refraction, and the arc of the light path for gravitation. This would also explain why light only bends at the threshold (i.e., Snell's Law)—the time dilation gradient is zero everywhere else inside the medium.

The similarities between refracted light and light in gravity continue. The wavelength decreases (blue shift) as light passes into a gravity potential, just as it does when it passes into a medium. In fact, it is the same shift. The relationship between the wavelength in a medium, λ, the wavelength in space, λ', and the index of refraction is given by Equation (4).

$$\frac{\lambda'}{\lambda} = n \tag{4}$$

Which means the relationship between the wavelength in a medium, λ, the wavelength in space, λ', and changes in potential energy is given by Equation (5).

$$\frac{\lambda}{\lambda'} = \sqrt{1 - \frac{\Delta e_P}{e_T}} \tag{5}$$

More generally, the relationship between the shorter wavelength, λ, the wavelength in space, λ', and specific work done—kinetic or gravitational, which includes refraction—is given by Equation (6).

$$\frac{\lambda}{\lambda'} = \sqrt{1 - \frac{w}{e_T}} \tag{6}$$

Thus, color shifting of light (in terms of wavelength) under kinetic, gravitational, and refraction, which were once considered caused by separate phenomena, are now united under a common cause—specific work done. Everything being light would then explain the appearance of space contraction, which is really a change of units. That is the distance between amplitudes of light shrinks in the UIF as specific work is done; therefore, all the formations of entangled light shrinks

along with it. In the case of specific work done by gravity, the speed of light slows down with respect to the UIF, but its frequency remains invariant; therefore, space contraction appears omnidirectional given gravitational time dilation. In the case of specific work done by kinetic forces, the speed of light does not slow down with respect to the UIF, however, relative to the moving object it does, thus affecting light's apparent wavelength, but only in the direction of travel; therefore, space contraction appears unidirectional given kinetic time dilation.

Much would be explained about refraction if everything were light. What remains unexplained, however, is why different frequencies of light bend different amounts during refraction, while they appear to bend the same amount with gravity. It actually may mean that light of differing frequencies do bend differently for gravity too, but the effect is so small that it goes unnoticed. As to why the refractive index is different for different frequencies (larger for shorter wavelengths), which causes dispersion, I do not know for certain, and this will have to remain a question to be answered by future work.

Given the observations of light's speed change in a gravity potential and in cases of refraction we know that light can, and does, travel at slower speeds than c in any given reference frame; therefore, specificity hurtles over the first obstacle. Things made of light travel slower than c because light travels slower than c.

Light Has Mass

From previous investigations into total energy, it was found that rather than rest mass dictating internal energy, it was the speed of light relative to the frame of reference, c_0, as shown in Equation (1). This means the mass of the object remains invariant, which means for specificity, light has mass.

Relativity has another unchallenged issue with regard to light being massless. That is it lacks an explanation for why light has momentum, which prior to relativity was considered a property of things with mass—relativity's solution is to equate mass with energy so momentum now relates to energy as well as mass. Specificity does not cross into this issue because light has mass—mass and energy remain two properties of an object, which have a physical relationship. The mass of light is its total energy divided by specific total energy, and its momentum is its mass times velocity, as shown in Equation (7).

$$m = \frac{E_T}{e_T} = \frac{2hf}{c^2} = \frac{2h\frac{||\mathbf{v}||}{\lambda}}{c^2} \tag{7a}$$

$$p = m\mathbf{v} = \frac{hf}{\frac{1}{2}c^2}\mathbf{v} = h\frac{2}{\lambda}\frac{\mathbf{v}^2}{c^2}\frac{\mathbf{v}}{||\mathbf{v}||} \tag{7b}$$

$$\text{if}: \ v = c \tag{7c}$$

$$\text{then}: \ p = \frac{2h}{\lambda} \tag{7d}$$

Other Observations

Other observations, serving as evidence supporting the notion that everything is light, will be quickly listed and described.

- All objects emit and absorb light constantly
- The food chain begins with light emitted from a process of fusion
- Objects become more like light the closer they approach c

It seems reasonable that when dissecting an object to determine what its made of, that the conclusion ought to be based on the makeup of the components you find. For all objects in the universe they absorb and emit light in accordions with Planck's Law and their spectral emissivity. Does it not seem reasonable that this means all things are made up of light?

To take it another step, all living organisms require food for energy, which fundamentally can be traced back to the sun as its source via plants and photosynthesis. It has been said that we are all made of stardust [5]. Well, starlight is the source of our energy, so maybe we are all made of starlight.

When objects approach the speed of light their rest mass approaches zero, as is the case for light. Light is said to not be charged, what if increased mass being measured by cyclotrons [6], which uses the amount of magnetic force to move the object to estimate its mass, is really the weakening of the object's charge as it was becoming more like light.

2. TRANSFORMING LIGHT INTO MATTER

The only way for light to transform into matter is for light to be within sufficiently close proximity to other light causing each to slow down sufficiently via mutual time dilation each causes the other. That way both become entangled by each others gravity potential, which is governed by the third set of terms, $m\int g(r)dr$, on the right-hand side of Equation (1). When those terms equal $\frac{1}{2}mc^2$, then the light has been absorbed by some object and its mass becomes part of that object's total mass. The light is now part of a new larger system governed by the system's internal and external potential energy, and its kinetic energy. This occurs on a galactic scale all the time, when light is absorbed by objects, and during stray opportunities where light meets in the vastness of space.

The reverse of this process occurs whenever light breaks its entanglement and radiates outward. The light stops being a part of the larger system by removing its contribution to that system's mass and its energy becomes fully kinetic. This too occurs all the time.

The total energy equation fully describes the process by which light is captured (kinetic to potential) and emitted (potential to kinetic). In fact anything in thermal equilibrium is doing both in equal amounts of energy, and therefore, in equal amounts of mass.

3. CONCLUSION

In conclusion, a compelling hypothesis for why all objects in the same reference frame are affected by time dilation in the same way is because time dilation affects light and everything is light. Observational evidence supports this because according to specificity, light can move slower than c, and it does have mass. Additionally, under specificity, it was found that all forms of color shift (kinetic, potential, and refraction) ought to be integrated under a common cause—specific work done. That concludes this series of investigations into the theory of universal specificity.

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