NEW RELATIVITY
GAMMA

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What is the meaning of gamma? In relativity theory there appears the mathematical expression:

$$\gamma = \left(1 - \frac{v^2}{C^2}\right)^{\frac{1}{2}}$$

It originated from the Lorentz transforms. The question I will answer here is: What is the physical meaning of gamma? It appears in time dilation:

$$T = \frac{T_0}{\gamma}$$

And in length contraction:

$$L = L_0\, \gamma$$

Time dilation and length contraction combine in general relativity to describe space-time. While the speed of light is defined as a constant, gamma is a variable. It varies due to relative velocity, and the result is that we observe relativity effects. Is it gamma that represents the physical cause of relativity effects? Is gamma a property of the universe? Or, is it the speed of light that plays the real role of causing effects?

We are provided a mathematical clue about the possible physical meaning of gamma. The clue is that the mathematical form of gamma is not unique. It is found in a more general form in the application of the Pythagorean theorem. For example, consider a right triangle with short side A, hypotenuse C and remaining side B. The Pythagorean theorem says:

$$A^2 + B^2 = C^2$$

Solving for B:

$$B = (C^2 - A^2)^{\frac{1}{2}}$$

Drawing out C from the right side:

$$B = C\left(1 - \frac{A^2}{C^2}\right)^{\frac{1}{2}}$$

Dividing by C:

$$\frac{B}{C} = \left(1 - \frac{A^2}{C^2}\right)^{\frac{1}{2}}$$

The right side of the result is the general form analogous to the mathematical form of Gamma. It is a natural occurrence from the manipulation of the Pythagorean theorem. It shows how the ratio of side B to C varies as a function of the length of side A.

This theorem is directly applicable to vector analysis as in the case of combining velocities. We know gamma contains two velocities. This suggests that it may be helpful to compare relativity's gamma with the properties of what I refer to as the Pythagorean gamma. Relativity's gamma is:

$$\gamma = \left(1 - \frac{v^2}{C^2}\right)^{\frac{1}{2}}$$

I compare it to the Pythagorean gamma:

$$\gamma_P = \left(1 - \frac{A^2}{C^2}\right)^{\frac{1}{2}}$$

I multiply relativity's gamma by unity in the form of C/C:

$$\gamma = \frac{C}{C}\left(1 - \frac{v^2}{C^2}\right)^{\frac{1}{2}} = \frac{(C^2 - v^2)^{\frac{1}{2}}}{C}$$

Here relativity's gamma appears as a ratio of two velocities. The denominator is the speed of light. The numerator is the vector subtraction of the relative velocity of an object from the velocity of light. The numerator combines these two understood velocities to form an unexplained third velocity. The complete numerator represents it. It is seen this third velocity is equal to C when the object's relative velocity is zero. When the object's relative velocity is near C, this velocity is near zero.

Is there really a third velocity? If so, what is the physical significance of it? In order to suggest its identity more clearly, I draw C back out from the numerator:

$$\gamma = \frac{C\left(1 - \frac{v^2}{C^2}\right)^{\frac{1}{2}}}{C}$$

Multiplying both sides by C:

$$C\gamma = C\left(1 - \frac{v^2}{C^2}\right)^{\frac{1}{2}}$$

Can the right side be interpreted as a real velocity? Yes it can. It can be interpreted using the same logic used to interpret length contraction:

$$L = L_0\gamma = L_0\left(1 - \frac{v^2}{C^2}\right)^{\frac{1}{2}}$$

Here relativists conclude that length must be a variable. We say L_o is the stationary length and L_o times gamma is the length due to the relative velocity of the object. In the case of:

$$C\gamma = C\left(1 - \frac{v^2}{C^2}\right)^{\frac{1}{2}}$$

We can, by analogy to length contraction, interpret it to say the speed of light varies for an object that has a relative velocity with respect to a stationary observer. The locally measured speed of light for the object remains C. The remote measurement of that same local light is not C. It is measured from the remote perspective as:

$$v_c = C\gamma = C\left(1 - \frac{v^2}{C^2}\right)^{\frac{1}{2}}$$

Where v_c is the variable speed of light. Solving for gamma yields an equation that says gamma is the ratio of the remotely measured speed of light to the local speed of light:

$$\gamma = \frac{v_c}{C}$$

The remote measurement of the speed of light is a variable. The local speed of light is always the constant C.

The variation of the speed of light is due to relative velocity. This relative velocity is not the same as defined by relativity theory. The meaning of relative velocity in this theory is analogous to Mach's finding that inertial forces are due to the whole mass of the universe. The preferred orientation of the universe from any local perspective is with respect to the gravitational influence of the universe. In the absence of local bodies of matter, relative velocity is measured with respect to the stable background gravitational effect of the distant mass of the universe. The stable universal background effect establishes a constant normal speed of light.

When there is significant local matter present, it can alter the local speed of light. In this case, relative velocity must be measured in relation to the positions of local bodies of matter. This is because the local effect of these bodies of matter overwhelms the effect of the rest of the universe. In other words, relative velocity is most usually measured in relation to the positions of those bodies of matter with the strongest measures of gravitational influence.

Using the new gamma to express length dilation:

$$L = L_0\left(\frac{v_c}{C}\right)$$

The new gamma does not apply to time dilation. The determination that the speed of light is a variable eliminates the need to define time as a variable. The distortion of time resulted from Einstein's insistence on the fundamental constant nature of the speed of light. Mathematically it came about because of the use of transform equations. Transform equations are not safe mathematics for theoretical purposes. The theorist determines what he or she believes is real, and then uses transform equations to establish a relationship between their belief and empirical evidence. The transform equations will do this whether or not the theoretical belief is correct. That is what happened when Lorentz used them. The resulting transforms can be very useful. They were useful for Lorentz; however, his theoretical belief is not accepted as correct.

The formal process of developing theory should never require the use of transforms. It is a sign of disconnection between theory and reality and indicates very probable error. The mathematics of a theory should flow naturally up from the fundamentals with directness and definite connection. There should not be a need to force a result by artificial means such as is done with transform equations. In the case of gamma, the need for the use of transform equations should be removed. Gamma should be, and is, derivable by direct means that help to establish a clear physical cause for the operation of the universe. By this means gamma gains the clear physical explanation described here.

SYMMETRICAL TIME

It is change of velocity of charged particles that produce energetic photons. It is the reception of these photons that informs us of everything we ever learn about the operation of the universe. This reception process consists of causing other particles to change their velocities. What we learn is that there are patterns in how velocities change. Physics is the study of these patterns in changes of velocity. Our theories are interpretations of patterns in changes of velocity. Different perspectives can lead to different choices of interpretations.

When I chose to leave length a variable I was not following the lead of Einstein. My choice does not involve space. Our theoretical choice is not a choice of distorting either space or time. There are no demonstrated changes of velocity for either space or time. We have no empirical evidence as to a physical substance for either of them. We cannot manipulate or observe changes to either of them. My theory accepts that length changes. However, it is the length of photons, and the material objects they effect, that undergo this change. We can observe both photons and material objects in the sense we are made aware of their behavior and its changes.

My choice for length involves a property that effects the measurement of material objects and the speed of light. The distance used in the measurement of the speed of light is not a measurement involving the use of a unit of space. It involves the use of a unit of length of a material body. It also involves light in a very direct way. The length of light itself can change. In other words photons can become longer or shorter. That is what is involved in the change of length causing relativity type effects.

Physical length changes from place to place due to changes in the speed of light. The use of a unit of this variable local length for the purpose of measuring local effects masks changes in the speed of light. Local length changes in proportion to the change in the speed of light. The local speed of light will measure the same everywhere. However, measuring as a local constant and being a universal constant are not the same things. If your local speed of light is different from another observer's speed of light then, when each of you attempts to make measurements of similar events occurring in the other's location, you will measure differences. If you think the speed of light is a universal constant, you conclude that time and distance have changed. If you think time is universally symmetrical, you conclude that distance and the speed of light have changed.

There are three terms involved in the speed of light. There are distance, time and their ratio that gives the speed of light. When Einstein said length is a variable and the speed of light is a constant then, for this concept to fit empirical evidence, time was forced to become a variable. This forcing process was accomplished by the use of transform equations. It is the purpose of transform equations to forcefully adjust whatever is necessary to achieve a mathematical relationship between two unlike concepts. Theory development from the fundamentals on up should not use transform equations.

The measurement of the slowing of atomic clocks is not a measurement of a change in *time*. This is because the clocks are not measuring *time*. They are measuring the effects of a varying speed of light. The variations of the speed of light cause the velocities of photons and atomic particles to vary. When a clock slows it is not measuring slower *time*, it is measuring decreased atomic reaction compared with another standard physical action that occurs in time but is not time itself. Even the standard is at risk for variation.

Consider the new equation:

$$T = \frac{T_0}{\gamma_{new}} = \frac{T_0}{\left(\frac{v_c}{C}\right)} = T_0\left(\frac{C}{v_c}\right)$$

As the local speed of light slows T becomes longer. However T is not a physical representation of *time*. It is a measure of a period of time required for a specific event to occur. When the speed of light slows, it takes longer for an event to occur than it does when the speed of light is C. This is not because time has been warped. It is because the speed of the event has changed.

A variable speed of light works far better than a constant speed of light. It is the key to achieving real unity at the fundamental level. We can develop a new theoretical physics with unity always present. As a part of this fundamental unity, I have found there is a universal unit of time. This period of time is a universal constant. Its magnitude appears in current theory, but with a very different theoretical interpretation. It is the clock of the universe, and it keeps running with absolute precision.