OUR ANALOG UNIVERSE

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What is the means by which the speed of light is regulated? It could be said there is nothing present to cause it to vary, but there is equally nothing present to cause it to not vary. To vary or to not vary both require control. Light is controlled throughout the universe with no delay. Its means of control is omnipresent and is evidence of universal control. There is no property of isolation. Continuity is absolute. Lack of control is impossible and, therefore, separateness is impossible. There are only our approximations of separateness. The concept of discreteness is an approximation made by us within a continuous universe. Even different appearing properties such as electric charge and gravity are not truly separate properties. There must be continuity between them so that they may both play their respective roles in ways that are always useful to the universe they share.

The perspective presented is from a new theory based upon a variable speed of light. I include a brief treatment from that theory. The achievement of the Michelson-Morely experiment was that it very accurately demonstrated that there is no detectable variation in the speed of light as measured near the surface of the earth regardless of the relative velocity of the source. The earth's relative velocity within the solar system did not affect the speed of light. By achieving this result, the experiment confirmed the theoretical prediction of Maxwell's equation.

Maxwell's prediction was that the speed of light is a local phenomenon. The specific equation giving this prediction is:

$$C = \frac{1}{(\mu\varepsilon)^{\frac{1}{2}}}$$

The prediction is: The speed of light depends only upon the local permeability and permittivity of the medium through which the light is passing.

The Pound-Rebka experiment result can be predicted by treating light as if it accelerates due to gravity. Therefore, I will allow for this possibility by representing the speed of light as the variable v_c.

$$g = \frac{dv_c}{dt} = a_{ct}$$

Where, a_{ct} represents the acceleration of light due to gravity. The subscript t represents that acceleration is defined as a change of velocity with respect to time. The acceleration of both matter and light are equal:

$$\frac{dv_p}{dt} = \frac{dv_c}{dt}$$

The velocity also changes with respect to distance. For equal distances:

$$\frac{v_p dv_p}{dx} = \frac{v_c dv_c}{dx}$$

An important aspect of these equations is, until proven otherwise, they can be read both forward and backward with equal theoretical validity. This introduces the need to test for both possibilities. Reading them forward, they say that gravity causes the speed of light to change. In reverse they say: The acceleration due to gravity is caused by the change in the speed of light. In other words, if the speed of light is controlled by matter, then the effect we call gravity follows automatically without the introduction of a fundamental gravitational field.

Multiplying by dx and introducing a negative sign for negative change of velocity:

$$v_p dv_p = -v_c dv_c$$

Light slows as it approaches the Earth. The speed that it loses is gained by the falling object.

Setting up the indicated integral and solving yields:

$$v_p^2 = v_{c1}^2 - v_{c2}^2$$

Next I solve for momentum, and, it can be calculated from:

$$P = \frac{dE}{dv_p}$$

So, I set up the increment of energy:

$$dE = mv_p dv_p = m(-v_c dv_c)$$

Since a change in v_c can cause the existence of v_p, then can the reverse also be true? In other words, can the motion of matter through a background value of speed of light cause a decrease in the local speed of light? The velocity squared equation a few steps above can be solved to express the reversed effect:

$$v_{c2} = \left(v_{c1}^2 - v_p^2\right)^{\frac{1}{2}}$$

Taking the differential:

$$dv_{c2} = \frac{-v_p dv_p}{\left(v_{c1}^2 - v_p^2\right)^{\frac{1}{2}}}$$

Substituting this into the dE energy equation:

$$dE = \frac{mv_{c1}v_p dv_p}{\left(v_{c1}^2 - v_p^2\right)^{\frac{1}{2}}} = \frac{mv_p dv_p}{\left(1 - \frac{v_p^2}{v_{c1}^2}\right)^{\frac{1}{2}}}$$

$$P = \frac{dE}{dv_p} = \frac{mv_p}{\left(1 - \frac{v_p^2}{v_{c1}^2}\right)^{\frac{1}{2}}}$$

$$f = \frac{dP}{dt} = \frac{d}{dt}\frac{mv_p}{\left(1 - \frac{v_p^2}{v_{c1}^2}\right)^{\frac{1}{2}}}$$

The normal use of this formula in the calculus derivation of energy will give the equation:

$$E_K = \frac{mv_{c1}^2}{\left(1 - \frac{v_p^2}{v_{c1}^2}\right)^{\frac{1}{2}}} - mv_{c1}^2$$

This result is analogous to Einstein's energy equation. However, it will predict more. For example, there is a connection between this energy equation and the concepts of frequency and wavelength.

I multiply the first term on the right side by an expression equaling unity:

$$E_K = \frac{v_{c1}}{v_{c1}}\frac{mv_{c1}^2}{\left(1 - \frac{v_p^2}{v_{c1}^2}\right)^{\frac{1}{2}}} - mv_{c1}^2 = \frac{mv_{c1}^3}{\left(v_{c1}^2 - v_p^2\right)^{\frac{1}{2}}} - mv_{c1}^2$$

Since:

$$v_{c2} = \left(v_{c1}^2 - v_p^2\right)^{\frac{1}{2}}$$

$$E_K = m\frac{v_{c1}^3}{v_{c2}} - mv_{c1}^2 = mv_{c1}^2\left(\frac{v_{c1} - v_{c2}}{v_{c2}}\right)$$

This form of the energy equation contains an expression within the parenthesis representing the physical origin of our concept of frequency. It says: Kinetic energy is equal to rest energy multiplied by this expression that I suggest is directly related to that which we model as frequency.

The known empirical relationship between kinetic energy and frequency is given by:

$$E_K = h\omega$$

Where ω represents frequency, and h is Planck's constant. Setting the right sides of these two kinetic energy equations equal to each other produces:

$$h\omega = mv_{c1}^2\left(\frac{v_{c1} - v_{c2}}{v_{c2}}\right)$$

Solving for a value I will call kinetic frequency:

$$\omega_K = \frac{mv_{c1}^2}{h}\left(\frac{v_{c1} - v_{c2}}{v_{c2}}\right)$$

The term inside the parenthesis is without units. The terms outside the parenthesis are all constants, and their combined units are inverse seconds; therefore, I represent them with:

$$\omega_0 = \frac{mv_{c1}^2}{h}$$

I will refer to this as the rest frequency of a particle. Substituting this into the kinetic frequency equation:

$$\omega_K = \omega_0\left(\frac{v_{c1} - v_{c2}}{v_{c2}}\right)$$

A photon carries away only an increment of energy equal to an incremental change in energy of the emitting particle:

$$E_{Kc} = \Delta E_{Kp}$$

$$E_{Kp} = mv_{c1}^2\left(\frac{v_{c1} - v_{c2}}{v_{c2}}\right)$$

I allow the kinetic energy of the particle to increase by an incremental amount:

$$E_{Kp} + \Delta E_{Kp} = mv_{c1}^2\left[\frac{v_{c1} - (v_{c2} + \Delta v_{c2})}{v_{c2} + \Delta v_{c2}}\right]$$

$$\Delta E_{Kp} = \left(E_{Kp} + \Delta E_{Kp}\right) - E_{Kp} = mv_{c1}^2\left[\frac{v_{c1} - (v_{c2} + \Delta v_{c2})}{v_{c2} + \Delta v_{c2}} - \frac{v_{c1} - v_{c2}}{v_{c2}}\right]$$

$$\Delta E_{Kp} = mv_{c1}^2\left[\frac{-v_{c1}\Delta v_{c2}}{v_{c2}(v_{c2} + \Delta v_{c2})}\right] = -m\frac{v_{c1}^3}{v_{c2}}\left(\frac{\Delta v_{c2}}{v_{c2} + \Delta v_{c2}}\right)$$

When;

$$\Delta v_{c2} \ll v_{c2}$$

And:

$$v_{c2} \cong v_{c1}$$

The equation can be simplified for most cases giving the result:

$$\Delta E_{Kp} \cong -mv_{c1}\Delta v_{c2}$$

Unlike the solution for relativity theory, this result shows that the approximate form of the energy equation for a photon is analogous to the approximate form of the energy equation for a particle. There is, however, a very significant difference. The form for the particle uses a change in light speed that represents its full difference. The form for the photon uses a change that represents only the incremental change in light speed due to the incremental change in particle speed of the emitting particle.

All of this math can be modeled very simply by a very tiny piece of elastic wire. The wire is the photon. As it moves into areas of different light speeds, it either shrinks or stretches. Electromagnetic effects are modeled by tilting the wire. The tilt results from the photon being ejected perpendicular to the direction of the particle's velocity. The particle's velocity is changing as the photon is leaving causing the trailing end of the photon to become tilted. That tilt forms an approximate right triangle with the direction of motion of the photon. The three sides of the triangle are represented mathematically by the Pythagorean form of:

$$v_p^2 = v_{c1}^2 - v_{c2}^2$$

An incremental change in tilt corresponds to an incremental change of velocity of the emitting particle. The complete description of the photon model is not needed for the purpose of this essay. The principle parts under consideration are the photon and control of the speed of light.

The model is formed to contrast the continuity of the control of light speed with the discreteness of the 'piece of wire' photon. The model could superficially appear to support a universe that is both analog and digital. However, the model does not give us the correct answer. Leaving the picture of the model behind, it is recognized that we know the operation of the universe only through its effects.

Variation in the form of change of velocity is the only mechanical type effect that we experience directly. This variation is not the result of physical separateness. Velocity exhibits variation while remaining wholly continuous in its effects. The effect of an electron interacting with a proton is continuous. The exchange of photons between them does not demonstrate a particulate nature for light. It is our use of approximation that gives the illusion of discreteness. We miss degrees of interaction that are too insignificant for us to observe. We also choose to disregard degrees of interaction that we deem to be insignificant. By incorporating approximation into our reasoning, we lose much information. We lose sight of fundamental universal continuity.

Photons are continuously interacting with electrons and protons. It is only the intensity of interaction that varies. The intensity varies with distance from each particle. The energy of the photon does affect the intensity of the interaction as a whole, but the interaction varies most significantly with distance. In any case, the interaction is continuous. It is important to recognize this because the interaction is the effect. We only know about effects. If effects are continuous then our scientific interpretation of the operation of the universe must recognize this continuity.

For example, gravity is never seen in nature as a property of one particle. It is a property that occupies the entire universe. The particles are noticed to exist by the degree of significance of their local variation of intensity in the gravitational field. The gravitational properties of particles of matter are variations, like peaks or valleys, of one pervasive continuous universal property.

If there were fundamental separation at any point, then the universe would not be predictable. It would not be orderly. There is order and predictability in the universe. This orderly operation requires that unity is a certainty. That is why we can formulate laws and principles. Laws and principles are evidence of order. Evidence of disorder is lack of laws and principles. This order has its roots in the nature of the universe reaching all the way back to its origin. The predictability of the universe is certain evidence for the existence of fundamental unity. Even though this unity has not yet been theoretically described, it is certain it must exist.

The orderly operation of the human mind leads to understanding of the rest of the universe. The ability to discern order is an intellectual property provided to us by the universe. How does individual freedom of thought emerge from universal control? It occurs because the orderliness of the universe is not communicated to us fully intact. We are released intellectually from the control of universal determinism. This results from the method by which we view the universe. We do not see the universe in its continuous form. We see it as discontinuous and incomplete. This results partly from receiving approximately discontinuous and curtailed information via photons. It also results from our incomplete genetic blueprint for intelligence. Then there is our innate inability to sense most of the properties of the universe.

We have physical effects, however insignificant, that connect us all together, but we are most significant as remarkable variations in the operation of the universe. It is useful that we appear to be completely separate individuals. Separateness is a product of intelligence. We make the universe appear in the manner best suited for understanding by intelligent life. The universe does not appear the same to us as it does to the individual particles of matter. Different perspectives are a part of the diversity of the universe.

Even though it is important for us to be able to usefully comprehend the universe, it is not important that we be able to do this directly through our senses. Gravity fills the whole universe, but we do not see its presence. It is completely transparent. We do not receive all of the information communicated by the universe. We purposefully disregard much information. We do this based upon its insignificance to us. The information delivered by photons is often deemed to be insignificant in number or intensity and to lack clear relevance to the goal that our minds seek at that particular time.

The nature of everything that we detect as existing is communicated to us through information. We have no empirical evidence beyond that which we discern from photon information. Everything we know is the result of an intelligent conclusion as to the meaning of this information. However, the physical properties of photons make this an incredible challenge. Photons are fast and very piecemeal. They each indicate very little. Vast numbers of them are necessary for us to piece together the history of the events that sent them on their way.

In a universe that knows how to form intelligence, it is reasonable to expect that intelligence knows how to use the universe. We are the gatekeepers of the fullness of meaning. Our ability to discern meaning is evidence for unity in the universe. Without unity there can be no meaning. Linkage either exists or nothing exists. Cause cannot be plural. Separate, unique, causes cannot co-exist. Any two or more theoretical causes that result in meaning must ultimately be different aspects of the same single cause. Meaning is the fruit of unity, and, we reveal that meaning. We reveal universal meanings about the operation of the universe. The meanings we reveal are those that have always been a part of the evolution of the universe.

The universe evolves, but not because simplicity can generate complexity. Complexity can come only from pre-existing complexity. The greatest possible effects of complexity in the

universe exist right from its start in a potential state. The nature of the universe has never been simple. It evolves from potential complexity. Successive forms of the evolution of realized complexity are different in their results. Yet, they are similar in terms of combined remaining potential and realized complexity. The full capacity to bring forth all forms of realized complexity for all time is first present in potential form.

For new patterns and arrangements of particles to add meaning, meaning must already belong to those arrangements, the meaning having been set before the arrangements take place. The arrangements form the new level of meaning because they carry that meaning. The potential design for life and intelligence arrives with the particles and becomes more and more complete as the particles join together to provide more and more complex properties. Each new union of particles reveals new meaning. The meaning is not new to the universe. It is not new to the particles. It is as old as the particles that communicate it to us. It is as old as the beginning of everything.

There is great diversity in life. There are a great number of levels of quality of life. The possibilities for uniqueness are vast. No two identical, complex objects participated in the development of life and intelligence. There was not an absolute pattern of assembly to be followed for producing life. The set plan for life and intelligence was implemented and succeeded through the use of an inexact method of development. The importance of this is to recognize the universe approximates the forms that life will use.

Each living thing is similar to many others and yet is unique from all others. We are unique from other human beings. We have our own thoughts and feelings. We have these at different times. Uniqueness is a property of all complex objects in the universe. Uniqueness does not represent fundamental discontinuity. Continuity binds us together. We are able to successfully communicate with others. We use communicative tools and processes that are shared among us. This can only happen as a result of a common origin. Throughout our development, chance changes in this process were not permitted. The process is locked into our DNA.

The universe has distributed a great deal of commonality to each of us. We all interpret the same type of information. Our interpretations are very much in harmony. We see much that is very similar. We think much that is very similar. Sometimes we have nearly the same thoughts at nearly the same time. These similarities in human understanding point to a common cause. We are individuals working together to analyze the universe.

Individual intelligence is not isolated intelligence. Each individual source of intelligence exhibits a great many traits in common with other individual sources of intelligence. This is evidence of unity of origin for all intelligence. We perceive interpretations of the information we receive that cause us to reach conclusions in significant harmony. We recognize each other's existence. We see essentially the same view of the universe. We have a common talent of comprehension.

Our macroscopic perspective gives us a limited perspective. As we look closer and closer to the basics of existence we lose our way. We cannot find the unity that must be there. The activity begins to look more and more like disorder. We observe that, from this apparent disorder, order arises. The fact that order exists at all is proof that order exists at every point in space and time during the whole existence of the universe. The point is that while it can appear to us that order arises out of disorder, it is not truly possible for order to arise from disorder. True disorder has never been a part of the operation of the universe. Rather, lack of completeness is involved in our process of comprehension.

The universe is continuous. We do not directly comprehend its continuity. We impose discontinuity into our image of it by truncating data and even ignoring much of it. Then we selectively impose continuity back onto the data. This new continuity is not a re-imposition of universal continuity. We use continuity as a tool to picture the universe according to our needs. Objects, as exhibited by their effects, are infinite in size. However, we place limits on object size and then impose continuity onto the object so that we can imagine it is solid.

Our Intelligence interprets the universe with an artificial interpretation. Discontinuity is inserted, by our intelligence, between the universe and us. The information of the universe is first cut to pieces by our intelligence by interpreting photon information as being discrete. Then, we select some of the pieces and join them together forming a false but intelligent interpretation of reality. That interpretation exists only in our minds. Some information is lost or even misinterpreted. We take what we think we have and connect it back together to form a new kind of continuity. We see limits on the structure of individual objects.

Our intelligence is fueled by information about change. It is through change that we are made aware. It is through change that we learn. We act through change. It is through change that we express our will. Even with all the change constantly occurring in the universe, there is also stability. The properties that cause change are stable. They are the orderly properties of the universe. Their orderliness is what makes change useful. Change makes sense to us because it is the result of orderliness. We require both change and order. We rely upon change for existence, but we seek order for meaningfulness and understanding. We need both change and stability. There is a natural stability in the laws of the operation of the universe. The natural stability of the universe is in its orderliness.

Our individual intelligences are unique by virtue of what they lack. Each of our portions of intelligence is uniquely limited. Inexactness and incompleteness help make human free will possible. Our organically formed intelligence, due to its incompleteness, allows for a simulation of ‘disorder’. Our inexact individual choices produce conflicts in perception among individuals. This makes alternative and even opposing interpretations appear reasonable to different people. The result is that reasonable people can honestly disagree.

It is necessary for us to see events from an approximate viewpoint. We cannot know the exact detail of action in the universe. We analyze events in a step-by-step fashion. We cannot know and do not have to know all information about all events or even about each single event. So, it is convenient for us to analyze particles as if they have their own isolated effects. This limitation introduces separateness into our perspective of the universe.

This process can work efficiently and accurately. However, it is also vulnerable to error. If a significant variation in the pattern occurs with sufficiently short duration that its data is either missing or determined to be insignificant, it will not be considered a part of the pattern. If it is not included in the pattern, then we interpret the pattern as being smoothly continuous when it really is not smooth. In this case we falsely interpret the evidence. We have reached an approximate meaning that is not correct. However, it is usually more useful to us than would be the absolutely correct one.

Our intelligence makes smooth the simulated ‘disorder’ by adding an artificial form of continuity back onto the information received from the universe. So, it is made possible by our intelligence for order to appear to arise from ‘disorder’. This is only possible because the ‘disorder’ is always overseen by an orderly universe. The two-step process of intelligently creating discontinuity and then inserting another kind of continuity is evidence of interconnectedness among our individual

intelligences. Since the apparent disorder is always under control, it is more accurately described as designed disassociation.

We need to see objects as being individually well-defined. We can better appreciate some variations and diversity in the universe by disregarding other variations and diversity. The largest amount of diversity disregarded is represented by almost all of the electromagnetic spectrum. Only a very small amount is visible to us. We receive information from all of it. We disregard this natural continuity and create a very limited effect called visible light. The lost information is of interest to scientists, but it is not important for most living things. In general, life needs to see the universe in a useable, practical sense.

During the evolution of the universe the nature of intelligence has not varied. Our intelligences are of the same source and nature. Intelligence has not wandered from that which was always intended by the universe. That is why life was capable of understanding what was needed for survival at all levels of evolution. The passage of eons of time has not changed the relationship between information and intelligence. The universe sends us information that we understand, whether about today or from billions of years ago.

Laws and principles are evidence of order. Evidence of disorder is lack of laws and principles. This order has its roots in the nature of the universe reaching all the way back to its origin. The predictability of the universe is certain evidence for the existence of fundamental unity. Even though this unity has not yet been theoretically described, it is certain it must exist. If lack of order were a part of the universe, it would destroy order and predictability.

Scientific understanding of the universe requires analyzing the universe as a unified whole. The practice of hanging on to piecemeal, diverse interpretations of various parts of the operation of the universe is the main reason for lack of progress in our quest to achieve understanding. This failure begins at the fundamental level. The theoretical invention of multiple causes is evidence that there is something theoretically wrong at the fundamental level. Since universal control unquestionably exists, then fundamental discreteness cannot coexist.

The analog nature of continuity allows for unlimited information and meaning. Accordingly, the universe evolves without a clear beginning or ending and without ever repeating itself. The model I introduced needed only light as its single original cause for all mechanical effects. However, mechanical light is not enough for this universe to operate. Light must account for the evolution of intelligent life. It must be redefined as illumination in its fullest sense. This new ‘light’ definition includes knowledge, understanding, happiness, love and all other effects observed to occur naturally in the universe. The control of light is analog and illumination in its fullest sense adds its fullness to that analog control of our analog universe.

REFERENCES:

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