

The Lost Treasure!

By Marcel-Marie LeBel

The lost treasure. That's what it is. Imagine ... a few centuries of Greek philosophy, in a box, left behind, unattended! Greek philosophers pounded many questions with logic and they came up with two fundamental questions: What Substance makes the universe and what is the Cause that makes it work? Those Greek philosophers were very popular in those days and for the next thousand years. But little came out of it. Then, from somewhere between Galileo, Newton and Descartes, these questions were slowly put aside, on a shelf. It was found to be very effective to use an empirical approach by forgetting about the two fundamental questions and by treating the universe as a black box. Our experiences of the black box were now described by measurable concepts of mass, time, length, etc. and theories so formulated would lead to actual predictions. You know the rest.... But! But this "black box", and its unknown content, is still back there, on that shelf where it was left four centuries ago! The content is still unknown, and the two keys to open it, are the two fundamental questions. In order to seriously address the *metaphysical* questions of "flow of time" and "causality", I will have to give it a crack; try to open the box and expose its content. The content of the box is nowhere near what you can imagine or let alone accept! So, for now, just take it as entertainment, because, such a crazy idea can only be left on a table for someone to peak over. This essay explores the Flow of Time, Digital description and causality in the light of a *Substantial Approach*.

One single Substance

In the Substantial Approach or Natural metaphysics (1), we consider what really exist by opposition to any sensorial experience we may have of it. The substance is that which exists and persists, while the experience is just the temporary message produced by senses and brain from the substance. The Substantial Approach addresses with logic the content of the inside of the same black box "universe" that physics studies using only the messages going in and coming out. The empirical approach is very effective in that we can move forward without having the details of the inside of the box. In physics, the proof of a theory is demonstrated in our reality, not in the box. Because of that, physics does not need to know about the content, concepts or language proper to the inside of the box. So, all applied sciences could be done, within limits, without any need of the knowledge of the box's content. But pure science, with a closer and more detached interest in the finer details of this universe is left wanting. Has anyone proven, without a doubt, that the knowledge of the content of the black box "universe" is a) unknowable, and b) of no use or consequence to science? I say, the content of the black box is a forgotten treasure, a lost fundamental dimension of knowledge.

The Substantial Approach is based on the concept of substance and Cause and on the rule of non-contradiction (and excluded middle) recognized as the logical building specification for our universe. The rule of non-contradiction is the most important rule of logic of all (Aristotle). Then, any logical "universe building" process we may think of, must also obey these rules from the very beginning or creation of the universe. Here is such a "creation" process. We will start from scratch or, nothingness. If something, a substance, was to suddenly exist "at the same time" as nothingness, it would be a contradiction i.e. contrary to the rule of non-contradiction. Existence and non-existence at the same time! In order to avoid the "*at the same time*" condition, *Time* must separate the existence of this "substance", from nothingness. Since this substance must in all circumstances also have the property of time so as to avoid the contradiction, we will admit that this substance *is in fact Time itself*. This is a self-contained universe built from internal specifications and "circularity" is normal.

As we know, (14 billions years later) time is dynamic and "flows". A changing dynamic time guarantees the contradiction never occur and therefore protects the identity of things. So, there is no other substance in the

universe but this dynamic substance we have come to call time, for what it is and does. This tells us that, a universe based on these very specifications *had* to have a beginning and it *had* to be, from nothingness.. and, maybe a tiny spark? To put it poetically in contemporary context, the Big Bang is still happening and we live in it, as this incredibly silent explosion of time rushing eternally to avoid the original contradiction. Let's look for some badly needed emerging diversity...

Variation on a Theme

A whole universe made of evolving time; that sounds boring, doesn't it? Not really, since it is "dynamic" it means that it is doing something, at a certain *rate*. This dynamic rate can vary in many ways. Locally, it could be increasing, decreasing etc. It means that the substance "Passage of time" may have variations of itself that exist. These dynamic variations are therefore *time* derivatives (what else?) of the basic rate of evolution of time. These dynamic variations could also form complex assemblage or conjugates and produce pseudo static structures...(later). If a substance has different forms or variations of itself that exist, these variations are said to be "*of the same nature*" as the "basic" substance itself. These variations can undergo logical operations on one another like addition, subtraction, substitution etc. This is because, operational logic in substance requires that all terms be of the same nature i.e no apples and oranges (the Teacher was right!) Because of this, the universe can logically work with only one dynamic substance in it and yet, show a great diversity of forms and processes.

Example of a logical Operation on a Substance

Here I will give an example of a logical operation called "logical substitution." Given that the basic substance is everywhere, if one of its variations exists in one place, it does so by replacing the basic substance in that place. (Read it again!) This is because the rule of non-contradiction is the logical specification for our universe. In one place, the substance can't be both and at the same time, "variation" and "non-variation" of itself. Therefore, the variation replaces the non-variation in that place. In other words, any local dynamic variation of time exists by replacing locally the basic passage of time. Just the original specs and we don't have any choice about it!

The Cause, for Causality

Here, the "cause" is understood as being the "logical reason" for a specific spontaneous transition in a system that is not in a *logical equilibrium* (~physics steady-state). In other words, the spontaneous evolution of a system is the process of resolution of the illogical state of the system.

In the substantial approach, we recognize the passage of time as the only substance making up the whole universe. We also hinted at other variations of time in the form of various rates and dynamic variations of rates of time. One such time variation structure is the time rate gradient around Earth. This gradient, we can infer from General Relativity. Matter is obviously different from time but necessarily of the same nature so we will accept it as a variation(s) of rate of time. So, this time rate gradient around Earth is the result of the *logical substitution* that the matter of Earth effects on local time. In a gravitational field, the *value* of the rate of passage of time increases gradually (gradient) as we move away from Earth. Empirically, what we know is that, when we release something in a gravitational field, it will move in a spontaneous way towards the ground. Why? The *logical* answer, from the Substantial Approach, is that something *exists more* where it effectively stays longer. In every place of the gravitational field, the time of residence is always greater towards the ground. Here is a picture/model to help understand the concept. An object that would normally exist "equally in all direction" (no motion, logical state) finds itself in a gradient of passage of time (gravitational field) where its existence is not equal in all directions anymore, but more probable towards the ground. This leads to spontaneous movement i.e. the illogical state (non symmetric existence vs time evolution) in a process of resolution.

The illogical state of existence of the object is brought about by a differential in the rate of passage of time that induces *the differential existence of the object*. Since this induced differential "existence" is locally *caused* by the differential in the rate of passage of time, we will recognize this differential in the rate of passage of time as the *Cause for the observed motion*. Because all that is required for something to be affected by a "differential existence" is that it "exists", everything that "exists" is equally affected. This is effectively what we observe. Then,

we may formulate the Substantial Approach definition of gravitation as; “Everything that exists replaces passing time (logical substitution) and produces a gradient of time around it, and therefore, everything that exists attract each other”. This is the logical law of universal gravitation. This is “why” logically gravitation works.

Is there more than one logical Cause in a “single substance” system? If two different logical Causes where present, there would be no rule of logic to determine which one overrules the other. My impression is that, all interactions of time variations produce a time rate differential as a solution. The system of operational logic does not allow for more than one substance and one logical Cause in the system. The cause for motion is the same as the cause for non-motion; just different configurations, symmetric and non-symmetric. From the original explosion and ensuing evolution, the standard for “symmetry” is the symmetry of time evolution itself. I guess that the first sphere ever and pi where tossed in at that first moment of time. I *can't* imagine a pre-geometry based on the logic of existence vs non-existence. Maybe someone else could...

Inside the Black Box or, Behind the Scene

The discussion up to now has shown that a universe like ours is made of only one substance, which by its behavior and properties, it is what we have come to call time. The only logical Cause for spontaneous motion in the system “universe” is a differential in the rate of time inducing, in whatever exists, a differential existence or higher probability of existence in one direction. Since everything is made of only one substance and evolving by one logical Cause, it would be interesting to test this approach against the models of modern physics. Let us start with what could be taken as one of the simplest structures in the universe; the photon.

The photon is a “particle” with an energy $E=h\nu$. Because of that, we will also consider the photon as a single wavelet having the prescribed period (wavelength). Sound is a pressure differential traveling in a compressible medium, and pressure is the variable. In the Substantial Approach, the local rate of time evolution is the variable. Then, lets make the photon as a traveling variation or differential in the rate of time. The graphic *and model* in fig.1 represents a single light wavelet, or photon, made of a traveling variation in the rate of passage of time. The vertical axis bears arbitrary values, with the one along the axis of the wavelet as the local value (5). The horizontal axis is the time duration equal to the period T of the wavelet. Here, I do not use the concept of wavelength because in substance, there is nothing else in the universe than time, not even space! On the other hand, a stable (at $v=c$) alignment of points not at the same moment is more than a fair definition for substantial time duration.

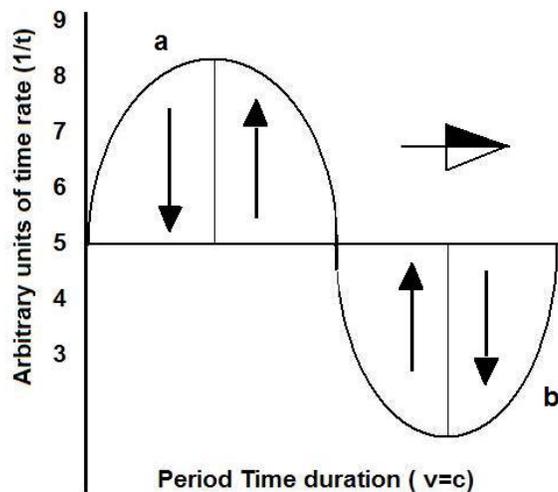


fig. 1 Photon: a wave made of a time rate variation

In order for the wavelet to travel toward the right, the logical construction of the wavelet has to be very specific. The faster rate of time must be at the back (a) and the lower time rate must be at the front (b). This way, the motion of the wavelet is consistent with the logical Cause described above; the higher time rate falls (exists more) toward the lower time rate. It is both spontaneous motion and direction, all in one! This is the logical Cause for the photon wavelet to move in a spontaneous way in one direction. In Fig 1 we have a wave in substance and cause; it's all there. This means that the Planck is in there as well, right in front of us. The Planck is nothing but the sum of the two conjugates **a** and **b**.

We may now compare this substantial wavelet model with the classic electromagnetic model of the photon in fig.2. The overlay of the two models provides us with a correspondence rule because the models of the Substantial Approach and that of classic physics both describe the same subject, from different points of views. We see that as the traveling wave of variation of the rate of time moves forward, the rate of time in (b) first decreases below the local rate 5 and then increases back and above in the local in time rate in (a) before returning down to the initial local rate of 5. The correspondence between the various parts of the classical EM wave and of the substantial wave is as follow. By looking at the overlay, we see that the magnetic field is where the rate of time varies, dynamically, increasing or decreasing. We also see that the line along which the time rate goes from increasing to decreasing, and vice-versa, is where the electric field line located. This is, in calculus, where the second derivative equals zero. From this, we understand what types of time rate *variations*, the magnetic and electric fields *are*. This rule of correspondence is consistent with the laws of induction. We describe photons as an electro-magnetic wave because the electric and the magnetic fields are the time variations whose concepts we empirically have access to...

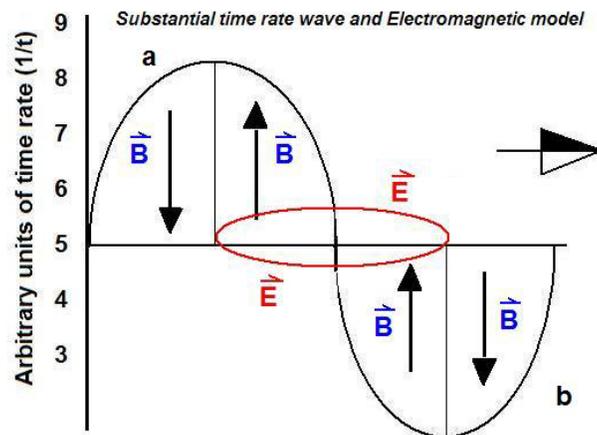


fig. 2 Photon: wave made of a variation of time rate.
 First derivative of time rate (slope) = \vec{B}
 Second derivative of time rate (slope = 0) = \vec{E}

Over integration in concept

...It is interesting to discuss this last statement. Because we eliminate the time background in the process of describing a dynamic event on paper, we could say that our concepts, on paper, are one order over integrated in time. These descriptions, making use of Newton's calculus, are so effective that we have come to almost forget what is real and what is the description. Time duration is an integration that cannot exist without its first derivative, the passage of time. Space is but the integration of motion in time, and energy is the integration of power in time. Because the background of the universe is passing time, how quickly the energy is delivered determines what will really happen. Say, a tera joules is released by a dripping faucet over the course of eons; you may have to change your sink. But a tera joules released in a femto second will change the whole neighbourhood. Power makes the difference. Energy, space and time duration are our own integrated versions, intellectual dimensions, of their intrinsically dynamic equivalent in the universe. For example, all photons contain the same Planck quantum of action h . So, what is the difference between a ultra-violet photon and an infrared photon? With the ultra-violet

photon, the Planck is delivered in a shorter amount time (period T) than that of the infrared photon! The ultra-violet photon is more powerful than the infrared one. In other words, the different photons are just the same quantum of action h pre-packaged in a different delivery time or, different powers. A 100km radio photon effectively has less power than any light photon while having the same Planck content. In this case, you may forget the “wave collapse” concept; there is a no instantaneous delivery time. The photon flies as a pre-packaged power and the delivery is done in time T when absorbed, giving the work or energy. When the photon is free, it is fixed power. When it is absorbed it is “worked done” = energy.

What is the matter?

Here we examine what a particle of matter is from the point of view of the Substantial Approach. In the process of pair creation, in particle physics, we have a gamma ray turning into an electron and a positron. The Substantial Approach requires that both the original gamma ray and the two particles be of the same nature. We will call a “dynamic conjugate” each portion “a” and “b” of the wave in fig 1. A conjugate is a pair of inseparable time variation structures, the sum of which is always back to local time rate, a boundary preserving their identity. Each half of a conjugate is a structure that can never found alone (a bit like Quarks?!) In fig. 3, we illustrate the result of this pair creation. Each conjugate from the original gamma photon curved on itself to form each an electron; a positive and a negative one. (Which one?) Each pair of variations in conjugates “a” and in “b” is not in line anymore but is now adjacent to each other. Instead of spontaneous translation we have spontaneous rotation, with local time rate as the relative higher or lower time rate required for the Cause of spontaneous rotation. The permutation of rotation and direction allows for two positive and two negative types of electrons. (?) This we see in linear confinement, where the *direction* of the motion of the electron *becomes* a quantum number; one way or the other, or, two electrons per saturated level. In that context, they *are* two different electrons that respect Pauli’s exclusion. The sign of the charge of the electron is determined by which one of the conjugates it came from. What creates the charge?

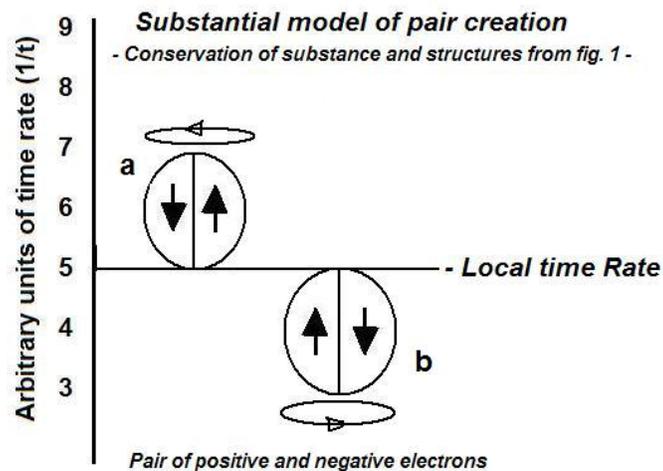


fig. 3 Negative electron: down scale conjugate, along with other massive variations and normal substitution of local time
 Positive electron: up scale, deficit from substitution compensated (?) by higher time rate conjugate = no apparent mass ?? or variable apparent mass ??

The rotation of the electron modulates the time evolving from the particle, like a rotating beacon and it sends ripples “quantizing space” around it (fig 4). The quantized space around two opposite charges amount to a time differential resulting in an existence differential, force/motion. A positive electron in the quantized space of the negative electron exists more towards the negative electron (and vice-versa). In the Substantial Approach, because we are dealing with “substance” or real stuff, there is logical conservation not only of the total “quantity of substance variation”, but also of the number and identity of each the variations present. I called this, conservation of structure. The passage of time, on the other hand, is continually being created and evolving. This is why only the variations of time are subject to conservation laws and because, technically, only them can exist by logical substitution of the passage of time.

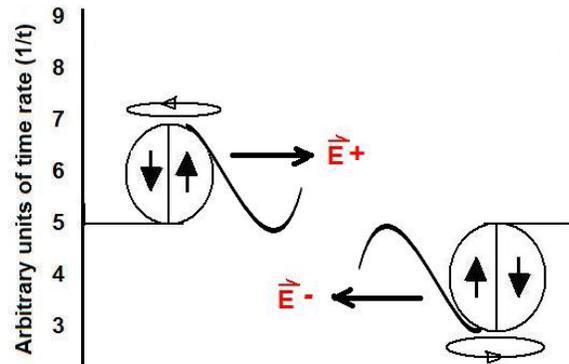


fig. 4 Rotating positive and negative electrons modulate the time rate evolving away from them. Positive, above local time rate and Negative below local time rate, thereby "quantizing space" around them. Causality for attraction is in the relative time rate differential between each "quantized space"

The Question

Most of the essay up to now has been about explaining the Substantial Approach and providing examples meant to show alternate and corroborative models from modern physics. It was also meant as a truly fundamental picture of the universe, in substance.

Digital Granularity

I have already explained "causality", in the local logical *Cause* for a spontaneous change of any sort to happen, by a local differential in the rate of evolution of time, or, Flow of Time. So, "How is a digital description consistent with a "flow of time?" First, the hallmark of quantum mechanics is the **wave function**. Since this wave function describes where particles are more likely to be found, we have to conclude that the wave function actually describe the distribution of the time flow differentials causing a particle to stay longer in some places. The more time it spends in that place, the more chance we have of finding it there!

The **Heisenberg Uncertainty Principle** is at the heart of quantum mechanics that reveals the digital facet of the universe. Let's try to make some new sense with the Uncertainty Principle.. This principle says that it is impossible to determine (measurement) simultaneously both the position and the momentum of a particle with any great accuracy. The product of the uncertainties in these quantities is: $\Delta p \Delta x \geq \hbar/2$. The question is then: "What is Certain about the Uncertainty Principle?". The principle describes an impossibility of making two types of measurement at the same time. First, an impossibility is *a truth*, something certain (1). Secondly, "at the same time" is a sign of an underlying contradiction. I effectively perceive a conceptual contradiction in this inequation that I will illustrate briefly with the "boat" example. What is the intrinsic uncertainty associated with determining the position of a half kilometer long oil tanker? The answer is a *minimum* uncertainty of half a kilometer, because anywhere on that boat "is the tanker". Sure, a tiny GPS antenna on the mast can give better precision but it won't shrink the whole boat to that precision. The idea of a "position x" is a point of view that disregards both the actual existence and size of the object. On the other hand, the momentum is a different point of view where the object exists and has a mass and a size. So, the conceptual contradiction consists in trying to consider *at the same time*, something as existing and non-existing, two very different points of view!

The **De Broglie** (associated) wave ... In fig. 1, the wavelet moves at the speed of light and time is stopped, providing a stable period T and an actual wave. But for a "wave" associated to a particle whose speed is $v < c$, Time is not stopped and therefore, no stable period T can exist and no defined wave as well. It is just a dynamic variation of the time rate from the particle own substituted time i.e. a variation of probability fig.5. The free

moving particle does not have a De Broglie “wave”. The particle’s associated dynamic variation of time only becomes an *actual wave* when we interact with the particle. Interaction means acceleration, positive or negative. The acceleration forces the integration of the lowest order of the time derivatives into a temporary “stable” period T. In the electronic orbital of an atom, the electron is under constant acceleration and the De Broglie wave is present and stable.

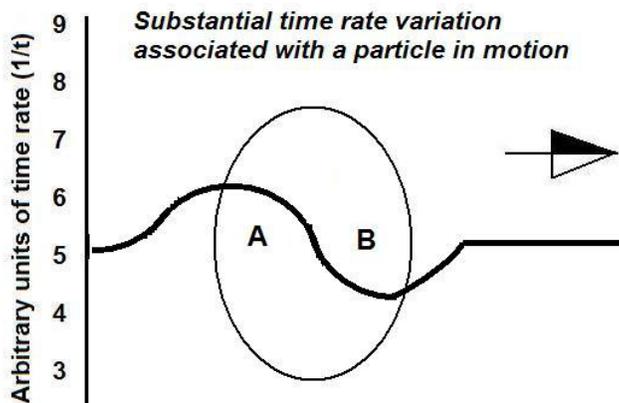


fig. 5 The particle's own time rate substitution is skewed. The time rate differential causes a differential in existence. The particle is somewhere inside the oval shape. The time rate differential causes the particle to always spend relatively more time in B than in A, which is motion in the indicated direction. Because $v < c$, there is no actual wave or wavelength

Discussion

I am satisfied with the results of the Substantial Approach as it provides substance and cause in models similar to those of physics. It may still have loopholes, questions or inconsistencies, but the core approach of Substance and Cause are here to stay. This universe in substance follows the rules of logic of non-contradiction as well as that of the excluded middle. The rule of non-contradiction protects the quantities (conservation of substance variations) while the rule of excluded middle insures sharp boundaries and identity for structures. The universe was born out of a contradiction, existence vs non-existence (1 or 0), and this logical granularity is in everything, in substance. *The universe is digital.*

Go back and read again your favorite books from Hubert Reeves, Brian Green, Stephen Hawkins, Lee Smolin, Richard Feynman, Murray Gell-Mann, Paul Davies etc. and see if they address at all the substance of the universe. Don't they make everything out of what we think and what we see? Can't we figure out that the universe can exist without us? Is this some kind of disrespect to the universe, I mean, to deny its existence? Or is it simply some lazy intellectual honesty? At any rate, this explains my lack of bibliography.

The lost treasure is the concepts of Substance and Cause, as the things required for this universe to have existed and evolved for so long by itself. A logical explanation is causal “understanding”. A description is factually “knowing”. Complete knowledge is both, but *never at the same time*; they are opposite views! The empirical approach and science would have never developed with the opposite quest for “Substance and Cause” around, *at the same time*. The quest for Substance and Cause *had* to be put away, for a while. Thousand years of reflection, half of our collective brains left behind, in a little black box... Almost lost to time itself. I, found it. I believe I found one of the greatest intellectual treasure ever left behind! A lost dimension of knowledge, and a new future...

(1) Physics Stops where Natural Metaphysics Starts by Marcel-Marie LeBel
<http://www.fqxi.org/community/forum/topic/506>