

“THE QUEST FOR THE PRIMAL SEQUENCE”

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“IT FROM BIT OR BIT FROM IT”

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Abstract :

Our perception of reality is in a deterministic way expressed in the choice between extremities. Binary/digital bits : zero and one/ yes or no. Latest research is pointing more and more towards the choice of one PURE State that is one of an infinite number of possibilities between these two extremities. There are more possibilities between Particle and Wave. We argue that in the search for the essence of matter and reality we become more and more aware that : "matter does not matter". Matter is one of the “**Crealities**” * (Creation of Realities) from our consciousness. A quantum computer , where the “Qubit” is the follow up of the “Bit” is one of the new ways to try to understand the layers emerging in our experience of reality. The infinite numbers of vectors of the Bloch sphere ,that represent any possible state of qubit, join the non duality of the particle/wave state. The Creality of time is expressed in "Neural coding" where we discover indications of timeless treatment of information between neurons. The creation of the reality of time and so the Creality of space/time is a direct action of our non-causal consciousness in cooperation with what we call the “Primal Sequence”, the origin of origins. In order to get a better control of our Crealities we have to continue to expand our understanding of this ultimate Primal Sequence, this will however be an asymptotical one.

What is INFORMATION ?

J.A. Wheeler : “It from Bit” (ref.1)

The essence of information is that it is composed of sequences that can be processed and interpreted by a receiving “intelligent” entity, this having available other sequences and so being the origin of a new action, this "action" can be "thinking".

If information is composed of only one bit then it becomes only process able if this bit is added to another bit thus forming a new sequence, or when added to a an already existing string of bits that is until then without "meaning" and then is becoming "new" information. All lose non - interpretable bits together are forming a for the human processor random CHAOS, which however does not mean that they are not containing any information for other entities (interpreters) with different senses. A "bit" (digital) can be any physical entity or a mathematical concept (zero or one) that serves to make calculations. Quantification of the bit or trying to find the Primal BIT of the Primal Sequence of all sequences cannot be realized easily because every emerging state, every layer of reality, has its own specific form of information quanta that are constituting

- We did not want to use the term “illusion” because illusion is a distortion of the senses, it is how the “brain” normally organises and interprets sensory stimulation, so illusion distorts reality. Nor the expression “Gestalt” nor the Hindu “MAYA” are expressing the essence. (<http://en.wikipedia.org/wiki/illusion>) The image of reality we are pointing at originates in our non-causal consciousness, so is created reality : “CREALITY” . .

combined with others to form “new” information/knowledge sequence.

Can this primal bit be detected by our senses and our own form of understanding/intelligence ? This seems to lead us to a top-down deterministic research. Going down in this search we will encounter several levels of information that are leading to several emerging levels of reality. Once a level of reality has emerged it is impossible to continue this top-down research because the essence of its constituents is another as the one of the level researched already., We can also apply the “bottom-up” approach in every layer. (the “reality” of a feeling created by a painting cannot be determined by the number of colors, but by the whole impression).

Trying to understand a Primal Bit (PB) means we have to understand the Primal Sequence (PS), not only in the deterministic way. In the bible we find the gospel of St John (1.1) that gives us some indication of the nature of this Primal Sequence : “In the beginning was the Word, and the Word was God”. Of course this is a metaphysical concept but it gives a good impression of the origin of reality, especially when we interpretate the “WORD” as Logos.

Another approach of the Primal Sequence is Kant's Noumenon (the in principle unknowable) and Spinoza's : “ All physical and mental existents are temporally modified expressions of a single substance, an infinite substance that he called GOD or NATURE”. The question is : what are the constituent elements (the bits) of this Primal Sequence and is it possible to divide it into constituent parts or are we just applying materialistic reductionism here ? It could be that the PS is the ultimate Bit itself and so the origin of ALL other emerging sequences.

When we perceive the Primal Sequence as "**The infinite duration of the present moment**" where there is no before and no after, which is the **upper limit of stability**, we transcend causality. Our non-causal consciousness* being part of this infinity (in a sphere with an infinite radius everyone/everything is the centre) is "touching" this building block of causal deterministic reality , it becomes (virtual) awareness for the causal consciousness.

These building blocks of reality can be compared with a slice of the Block Universe, this slice on its way can be understood as the BIT because it is part of the “IT” which is the sequence of these BITS, forming a so called “time-line” that emerges in causal reality. This means however that in our causal experience each Primal Sequence (with the length of a Planck-time is different from the other, for else our causal part of consciousness would not be able to imagine a finite sequence of time.

The “infinite duration of the present moment” has become the minimal time duration

* In my essay “Realities out of Total Simultaneity” I introduced the non-causal and causal consciousness . Our non-causal consciousness is part of "Total Simultaneity" where (ALL possible and impossible (to us) time lines of ALL universes are AVAILABLE for this part of our Consciousness. From here all our possible causal time-lines can become (virtual) “realities” , into for us prisoners of Time, understandable (?) realities/illusions. (<http://fqxi.org/community/forum/topic:913> (also ref 20)

the Planck-time* , Every Primal Sequence has in itself ALL probabilities because this noumenon is infinite and cannot be devised in parts like before and after. Our imagination, our causal consciousness is able to take a “part” in this infinity, like observing one vector of the Bloch sphere.

I propose to argue that The Primal Sequence cannot only be regarded as the "infinite duration of the present moment" but as the ORIGIN of ALL Infinite Durations of ALL probable Present Moments of All probable and improbable universes, comparable to the essence of the idea of Total Simultaneity. (see footnote * page 2).

NEURAL CODING, the contact with our future past.

J.A. Wheeler : “In any field find the strangest thing and then explore it” (ref.2)

In order to understand the emerging sequences that are forming our “reality” we need the illusion of time. Time is the illusion that our consciousness is creating by processing and interpreting all sorts of information, received by our five senses and represented in the brain by the electrical activity of neurons. It is through time that “Space” can exist, without time it is impossible to imagine even 2 points on a line, because this creates “distance” and distance immediately needs references, to express its "length" . The main causal reference is c, the speed of light (it takes x time for a photon to cover the distance) but also this reference needs a reference. **The ultimate reference is our consciousness.** Our causal consciousness can be imagined as an emerged singularity from the total constitution of the materialistic created reality (Creality) of body and brain.

So "time" is the illusion that our consciousness is creating by processing and interpreting all sorts of information that can be processed by our five senses and as so is represented in the brain by the electrical activity of “neurons”.

The details of this representation called "neural coding" remain mysterious. The question is how pulses (bits) of electricity get translated into thoughts and idea's (Phase transition may explain how brain neurons encode information. In neural coding the neurons generate electric pulses, or action potentials, to encode information and communicate with each other" . : <http://phys.org/print284098429.html> (ref.15) . At this stage information and communication are taking place between neurons who seem to be ordering and processing this information so that the human consciousness being can realize thoughts and become “aware”.

Are these neurons conscious ? Are they ordering via neural coding our future thoughts ? Or is our consciousness already creating our past , being the resulting time-line of the whole operation needed for awareness ?

In my essay "The Consciousness Connection" (see references) I indicated that the processing time from entering data to the conscious awareness is about 200 milliseconds, so the conscious "observer" who is the cause of the “collapse of the wave function” and thus creating (t)his reality, is effectively realising this collapse about 200 milliseconds in the future !

- 5.39121×10^{-44} s

That the lapses of “time” are even bigger as the 200 milliseconds is proposed in the article of Caroline Williams in New Scientist from 18 May 2013 called “The Silent Partner”. The latest tests described indicate that “neuronal activity preceded people’s conscious decision for an activity by nearly half a second” and even “stirrings of the brain’s prefrontal cortex up to 10 seconds (!!!) before someone became aware of having made a decision (PLoS One, vol. 6, p e21612)”!

Our neurons are part of the operative causal chain, taking place in the (our) future (on the time-line) and "managed" by our non-causal timeless part of consciousness that "activates" a vector of the Primal Sequence, this collaboration with our non-causal part of the consciousness we explain as the activity of the sub-consciousness. The question is not if the neuron is conscious and/or is censoring our thinking, no the process is **controlled by our own non-causal consciousness**, and the emerging thoughts are our own. So it seems that our **REAL FREE WILL is residing not in our causal Creality of the universe but in the non-causal infinity.**

THE TWO EXTREMES OF INFINITY

**J.A. Wheeler : “There is no law except the law that there is no law” (ref.3)
Or how our consciousness creates realities (Crealitys) out of infinities.**

The title of the essay contest is pointing to the **BINARY** digital information treatment : ONLY two possibilities are available for the creation of a sequence leading to an IT : zero or one, yes or no, on or off, and the sequences thus created are forming information that is transmitted via the intermediary of digital computer technique to our senses and so provide us with new information that we can implement and can be interpreted. This becomes part of the reality as we are experiencing it. We translated our experience of reality to a binary system, so one creation of reality is transferred to another creation of reality (virtual reality), which does not mean that we have full understanding of the original Creation of Reality!

Is this digital way of creating information sequences the only one that will lead us to understanding our “reality”, adapted to our five senses ? I propose that the application of the idea quantum bit, “the qubit”, can lead us to parallel emergence of other realities and though give a more full approach of the creation of realities. To enable us to see more colours of the rainbow.

Qubits are different, they can either be zero and one, it is a superposition of both. The possible states of a single qubit can be visualized by the representation of a Bloch Sphere. (<http://en.wikipedia.org/wiki/Qubit>) The surface of this sphere is two-dimensional which represents all the “state spaces” of the pure Qubit state. A single qubit “gate” is just a rotation of the Bloch Sphere. An infinity of rotations is possible, the states we are using now (spin states in superposition) are only the beginning of wider applications.

Another great difference between Qubits and digital Bits is that Qubits can be “entangled” : a non-local property that allows a set of qubits to express higher correlation than is possible in classical binary systems. Two entangled qubits that are in “equal

superposition” can hold exponentially more information than their classical counterparts.

Perhaps the interpretation of our “digital information universe” is becoming outdated when we are entering the qubit universe. This new form of representation of information may lead us to the essence of our CREALITY , comparable to a quantum scale from which emerge other scales/layers.

As the introduced “primal sequence” is a representation of the “eternal NOW” it touches the essence of the state of the Qubit in the Bloch sphere, like the holographic principle indicates that any three dimensional universe can be described by information encoded on the two dimensional boundary. The universe has not only the yes or no probability but an infinite number of probable realities, comparable to the infinite numbers of vectors available on the Bloch Sphere.

Towards the essence of Creality : DEMATERIALISATION

J.A. Wheeler : “ If you haven’t found something strange during the day, it hasn’t been much of a day.” (ref.4)

Dematerialization of nature began already with Michael Faraday (1791-1867) who indicated that physical reality consists not of matter but of "fields". The atom of the Greek was still a materialistic entity, like the old fashioned non-illusionary billiard ball.

We are already a long time aware that also the atom exists mostly of empty space, the idea that the constituents : protons ($1,7 \times 10^{-15}$ m) and neutrons (in the core) and electrons that go around this core like “planets”, are pure “matter” is already out of date.

The protons and neutrons are seen as constituted of quarks ($< 10^{-18}$ m) , the electron that was traditionally considered as an infinitesimal small point (!) of “charge” is now to be a “a point that drags a cloud of “virtual” particles around it”. These fleeting particles pop in and out of “existence” and contribute to the “electron’s” mass, volume and magnetic properties. (<http://www.nature.com/news/2011/110525/full/news.2011.321.html>) (ref.17).

So the right mix of quarks and leptons can make up any baryonic atom. However there are already new but not yet "proved" propositions that these quarks and leptons are not actually tiny “balls” (again) , but are containing smaller particles which physicists call "preons". If these preons are indeed made of this "conception matter” is becoming lesser and lesser because they are also considered as “point-like” meaning having no dimension ? The top-down deterministic approach (It→Bit) gives us no solution on the essence of “matter”. Again we can conclude that also what we call real matter is a really a Creality. Electrons are momentary **virtual** elements, this virtuality is depending on the time factor, and time as we have seen is a reality creation from our consciousness/memory. Here the frequency of our Universe , the Planck time (until now) can be at the base of these virtual fluctuations, the essential Primal Sequences of our reality.

It is in our memory that we live (are “aware” of) space, matter and time, once we go to lower limits of space, matter and time, we are meeting with the limits of our so called

materialistic created universe, now limited with the Planck time and length , so it is impossible to do so “ad infinitum” .

AN INFINITE AMOUNT OF TONES OF GREY

J.A. Wheeler : “We live on an island surrounded by a sea of ignorance. As our island of knowledge grows, so does the shore of our ignorance.” (ref.5)

When we thought before that conscious observation just resulted direct in a particle (collapse of the wave function), new experiments (<http://www.newscientist.com/article/mg21728971.600-quantum-shadows-the-mystery-of-math-deepens>) (New Scientist, 5 January 2013, issue 2898, ref.4), however indicate that the particle side and the wave side of physical reality are both just a black and white representation (digital) of reality. As we thought that these two sides were the only possibilities, it seems that between this black and white extremities there are an infinity number of “grey tones”.

This also means that the properties of an (observed) particle fade away like in the evening light is diminishing, so mass, energy and spin from a 100% particle are also the extremities of those properties.

When we apply this theory to the so called “superposition” of quantum states where is assumed that the extremities are “superposed” meaning both present, it should also mean that the states in-between those extremities are “present” so Schrödingers cat is not both alive and dead but **or alive or dead or every state in-between** (he can be dying the moment we look). When we shut again the box the situation of the cat will not change back to alive when we first perceived that he was dead. “Until an experiment is performed, its outcome does not exist (Qbism :Scientific American, june 2013, page 39-43 : Hans Christian von Bayer : “Quantum Weirdness ? It is all in your mind”.) and **all** probable outcomes are possible (not only the two extremities).

It seems as if we are living in a shadow world, we are not able to be aware of the real thing that is the origin of the shadow, we only are aware of the extremities. The real thing is three-dimensional and with full colour, the shadow is two dimensional and with an infinity of grey tones and from an infinity of GREY tones there will never emerge COULOR.

It was Plato in his “Republic”, where he describes the “allegory of the cave”, here Socrates explains to Glaucon (Plato’s brother) that our reality is just an illusion , and describes prisoners in a cave where only the shadows on the walls are available for them. If you would show the original subject to the prisoners they would not be able to recognise or understand them. The same for our “reality”. The origin of the “entities” that are realising or letting emerge our “reality” is unknown to us. Here in this causal Universe we will never be able to touch the Primal Sequence that is at the origin of our existence. The Cave is Time.

The parallel between the comparison of binary “reality” and the qubit way where also the

shades of grey are represented by the vectors of the Bloch sphere is evident, the reality creation is not only of yes or no or black and white. The infinity of the now moment is not only the past or the future, our consciousness is creating out of all the shades of grey in the Primal Sequence a Creality , so the appearance of a materialistic universe.

The grey tones of reality may also include the parallel universes in between the two extremities, Probability(Wave)/Particle. It might be that the grey tones also are at the origin of Dark Matter. The deterministic “idea” of inflation that took place in a time lapse shorter as the Planck length, is an explanatory reality created by our consciousness. Every history is a form of explanation of the “now” but is untouchable and can be rewritten (‘recreated’).

Once we reach the causal length and time limit of our cave universe it is no longer possible to “divide” any more , we are trespassing our “Creality” and entering the origin of the shadows thrown on the walls of our cave. A shadow is non-material, a result of cooperation between the light and the “real thing”. The light can be compared with our non-causal consciousness that passes the “origin” (Primal Sequence/alpha-point in Total Simultaneity, see “The Consciousness Connection”) and so creates one of the shadow realities for our causal consciousness.

The whole story of dematerialisation and the search for the Primal Sequence has become a journey to the understanding of Creation or a further approximation of the TRUTH. In the perception of the Primal Sequence, creation is a process that is taking place every (Planck) moment. The frequency of the creation is the music of our perceived Universe and the conductor of the orchestra of reality is our consciousness.

Every State Space has INFINITELY many PURE States.

J.A. Wheeler : “In order to more fully understand this reality, we must take into account other dimensions of a broader reality” (ref.6)

Quantum mechanics allows us to put a “control photon” not just in an equal mix of two states, but in varying proportions. The old complementary perceptions of digital bits and the duality of wave/particle seem no longer apt to describe the whole construction of our “reality”. The concept of qubits may lead us to the question if “IT” as “it” is coming to us is also constituted of an infinity of “grey tones” from which our consciousness only chooses one pure state, like just one rotation of the Bloch sphere. This is consistent with the latest research from Corsin Pfister and Stephanie Wehner at the center for Quantum Technologies at the national University of Singapore : (quote)

“It has been suggested that nature could be discrete in the sense that the underlying state space of a physical system has only a finite number of pure states. Here we present a strong physical argument for the quantum theoretical property that every state space has INFINITELY many pure states. We postulate that no information gain implies no disturbance or, read in the contra-positive, that disturbance leads to some form of information gain. Furthermore we show that non-classical discrete theories are still ruled out even if we relax the postulate to hold only approximately

in the sense that no information gain only causes a small amount of disturbance.
(<http://arxiv.org/abs/1210.0194>) (ref.19) :

State Space ([http://en.wikipedia.org/wiki/State_space_\(physics\)](http://en.wikipedia.org/wiki/State_space_(physics))) is a complex Hilbert space within which the possible instantaneous states of the system may be described by a unit vector. The resemblance with the Bloch sphere and a qubit is evident. The result of this research can be interpreted as : Every Primal Sequence has INFINITELY many pure states. Our consciousness by gaining information of ONE of the infinite amount of pure states and or quantum states does not effect the non-touched vectors. No information of this “untouched” vectors is gained.

All the rest of the probable observations remain as pure probabilities of possible realities, like parallel universes, they all are still “available” for consciousness. The conscious choice of a specific “grey tone” from the quantum state is realised through the entanglement-like coupling of our non causal consciousness and its causal part. The pure quantum state has like the state space an infinity of choices.

The frequency of time like any frequency created by our causal consciousness indicates a “space” between those moments, like they are flowing in a kind of ether. This “in-between” however is only a product of our causal understanding, where there has to be a before and an after, the essence of space is time and time being the “Creality of our memory” means that also space is a Creality. In what we call the “absolute vacuum” pop up virtual particles because the pure emerging space-time from the Ultimate sequences differs every Planck-time, so every sequence seems to be different from the other in the form of the presence of virtual particles that “apparently” pop up.

THE COLLECTIVE “CREALITY”

J. A. Wheeler : “Consciousness has a critical role in the worlds of self-creation”.
(ref.7)

If we consider one Primal Sequence (further reductionism may not be possible so it can be understood as its “causa sui” and the origin of all later “bits”) that represents the eternal NOW, only one pure state of this infinity is saved by our memory and placed in the life-line we seem to have passed. This from Infinity “extracted” Pure State contains every Planck-moment of ALL our history. The search for the history of our universe is summarised each 10^{-43} sec, and adapted (rewritten) to the “new” visions we achieve by coupling other information carriers.

The propagation and processing of this information is comparable to the conception of decoherence, it can be stopped when isolated but is also the reason of our collective awareness of reality. That is why isolated groups of people still are convinced that the earth is flat, and in their perception they are right , their Creality is a flat earth. When we come to convince them that they are “wrong” the only thing we try to achieve is convincing them that our “temporary creation of reality” is the right one. What will our Creality be in one million years ? (take in account that a time lapse of a million years can also be covered in ONE Planck time). This so called one million years can be stocked up

in our memory any moment “now” like the history (time-line) of this lapse of time. Not only the infinite number of already existing but not yet for us visible futures , but also an infinity of pasts that are NOT archived as memory are still “available”. Every primal sequence has his own infinity of pasts and futures. Being able to visualise one of this infinite number of “futures” and/or “pasts” does not mean that it will occur, it is just one of infinite pure states of “reality” ready to become CREALITY.

CONCLUSION

J.A. Wheeler : “We are participators in bringing into being not only the near and here but the far away and long ago” (ref.8)

The study of the Primal Sequence is a goal for humanity, but it will always be a asymptotic one. Quantum physics offered us new ways of accepting that reality may be not so real as we are used to think, it is only the beginning of a new era. Leaving the black and white binary thinking behind, will lead us to a wider variety of understanding our Creations of Reality. It can make us aware of the fact that between good and evil there is also an infinity of scales and the search for the best history can become the search for the best primal sequence. This will make it possible for our reality to change in order to change for the BEST of the Crealities of billions. The collective Creality of seven billion people brought us communication and the search together for wellness but also because of the “great numbers” a lot of evil. There are better pasts available in other primal sequences, even the best possible is available to us only we have to be able to control our consciousness. Leibniz expression “We are living in the best of all possible worlds” is a defeatist ontology, there is Hope.

One of the features of the future pasts that will be available to our memories is that we will be able to create powerful “qubit consciousness” This consciousness would like our own consciousness be entangled with its Primal Sequences, perhaps without the need of causality and a time-line. In this way we should be able to access more pure states in the Primal Sequence and it should be possible for our collective consciousness to contact/achieve/use/translate other forms of information apt for other senses as the five senses we are possessing.

The NASA has already bought a quantum computer : “D-Wave-Two” from D-Wave of Burnaby (Canada). They understand that once we want to extrapolate our Creality , but cannot sent immediately human beings, instantaneous decisions at long distances that cannot be bridged instantaneous , have to be made on the human level of consciousness. Qubit Consciousness can offer this. The problem of communication of information faster as c (speed of light) might also be resolved, (now c is the limit in our Creality), as the “qubit consciousnesses” may be able to influence our own crealities with theirs and so merge information : “**merging the emerging**”. Using and/or interpreting/understanding parallel universes, that may be the origin of the emergence of the until now named dark matter and force (representing 95% of our Creality) may become possible. We may achieve a whole new form of “knowledge” that can become WISDOM...

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References :

- (1) J.A. Wheeler : “It from bit”. Proceedings of the first International A D Sakharov Memorial Conference on Physics, Moscow, USSR, 1991, may 27-31, ed M Man’ko, Nova Science Publishers, Commack, NY, 1991.
- (2) James Gleick : Genius : The Life and Science of Richard Feynman (1993)
- (3) J.A. Wheeler, in Relativity Quanta and Cosmology, F. de Finis, ed. (Harcourt-Brace-Jovanovich, New York, 1979)
- (4) New Scientist : 5 January 2013, Quantum Shadows, Anil Ananthaswamy.
<http://www.newscientist.com/article/mg21728971.600-quantum-shadows-the-mystery-of-math-deepens>
- (5) Scientific American (1992) vol. 267.
- (6) Energy Grid, The Cosmic Computer.
<http://www.energygrid.com/science/2013/02-ap-zeopointfield.html>
- (7) J.A Wheeler and W.H Zurek. “Quantum Theory and Measurement”. Princeton Series in Physics. January 1984.
- (8) Wheeler satuday 18 february 2006, 12.00 pm. radio interview : The Anthropic Universe. <http://physics-about.com>
- (9) Kate Becker : “A view from the top”. <http://fqxi.org/community/articles/display/180>
- (10) George F. Ellis : “On the flow of time” <http://fqxi.org/community/forum/topic/361>
“Recognising Top-Down Causation” <http://arxiv.org/pdf/1212.2275>
- (11) Julian Barbour : “Bit from It” <http://fqxi.org/community/forum/topic/911>
“The End of Time : The Next revolution in our Understanding of the Universe” 1999. Oxford University Press. ISBN 0-19-511729-8
- (12) Phillip Gibbs: “The universe – an Effect without Cause”
<http://fqxi.org/community/forum/topic/1369>
- (13) Don Lincoln : “What is the Point” Fermilab Today, Friday, Feb 15, 2013.
http://www.fnal.gov/pub/today/archive/archive_2013/today13-02-15-NutshellReadMore.html
- (14) Wilhelmus de Wilde : “Realities out of Total Simultaneity”
<http://fqxi.org/community/forum/topic:913> :
- (15) Phys.org, April 2nd, 2013 : “Phase transition may explain how brain neurons encode information” : <http://phys.org/print284098429.html> .Thibaud TAILLEFUMIER and Marcelo O. MAGNASCO : “A phase transition in the first passage of a Brownian process through a fluctuating boundary with implications for neural coding”
- (16) Wilhelmus de Wilde : "The Consciousness Connection"
<http://fqxi.org/community/forum/topic/1370>
- (17) Edwin Cartlidge : “Rounding the Electron” Nature, published online 25 may 2011.
<http://www.nature.com/news/2011/110525/full/news.2011.321.html>
- (18) Hans Christian von Bayer : “Quantum Weirdness ? It is all in your mind” :Scientific American, june 2013, page 39-43 .
- (19) Corsin Pfister and Stephanie Wehner at the centre for Quantum Technologies at the national University of Singapore : “New principle may help explain why nature is quantum” <http://phys.org/news/2013-05-principle-nature-quantum.html>
- (20) Journal of Consciousness Exploration & Research” by “Quantum Dream, Inc.” Vol.3 Issue 10 . Wilhelmus de Wilde : “Foundation of reality : Total Simultaneity” and “A Metaphysical Concept of Consciousness” www.JCER.com