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Consciousness, Information, Electromagnetism and Water

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Abstract. There are very few things that modern science does not yet understand. One of them is consciousness; another is water. Our main idea is then that if consciousness and water remain mysteries for science, it may be because the apparently different problems they pose are in fact deeply entangled. Shedding light on one of them may thus have the effect of clarifying the other. In this article we explore the idea that a mirror relationship may exist between an immaterial pair formed by consciousness and information on the one hand, and a quasi-material pair formed by electromagnetic radiations and water on the other hand. It is formally deduced through group theoretical arguments applied to Maxwell's equations, that the so-called material world is not a 4D space-time continuum (named M^4 hereafter), but rather a 5D-space-time-scale hyper-surface (named C^5 hereafter) embedded in a 6D-continuum of consciousness (named V^6 hereafter), identified as the vacuum state of quantum physics (static background) or the ether of general relativity (dynamic background). The new fifth degree of freedom in C^5 is associated with the ability of living beings to grow from small size to larger size by keeping invariant their identity at all scales. The sixth degree of freedom in V^6 is associated with the possibility for living beings to behave either as virtual non-observable entities, or as non-virtual observable ones. In both cases, life is associated with the ability to manage the information stored in the quantum structure of the V^6- ether, or in the water shells surrounding all living cells in the C^5- hyper-surface. Memory capacities and associated bandwidths can be quantitatively evaluated from the theory and compared to experimental observations, hereby comforting the proposed approach. It follows directly from this model that space, time and mass can be considered as creations of consciousness in the form of persistent fields of bits. This strongly supports Eastern philosophical ways of thinking based on Vacuity, the only non-dual material reality. For Western minds, the model has the great advantage to address what life and consciousness could actually be, thanks to a mathematical framework unifying physics, chemistry and biology.

Keywords. Consciousness, Group theory, Information, Water.

INTRODUCTION

In a previous paper, a thought experiment reached the conclusion that consciousness has anteriority over information, energy and matter.[1] In other words, the fact that consciousness pre-exists neurons should be both a philosophical as well as a scientific evidence. In another paper, it was proposed

that at least three levels of consciousness can be identified: a local rationale-consciousness (RC) rejecting contradiction and associated to digital information processing; a meta-consciousness (MC) admitting the existence of a contradiction and associated to analogic information processing; and a non-local supra-consciousness (SC) not assigning any specific status to contradiction, thus transcending the digital/analogic duality of information.[2] The non-local SC unveiled by such a scientific approach has obvious resonances with philosophical concepts such as Brahman in Hinduism or Tao in Buddhism, and with the idea of "oneness" exemplified by the mythical "Ouroboros" in certain religions, and by the Möbius strip or the Klein bottle in topology.

Establishing conceptual and logical links between consciousness and information has also the advantage to give an obvious and simple explanation to the occurrence of quantum physics in the visible universe. Moreover, the three notions of particles, fields and information fit nicely with the three kinds of consciousness (digital, analogic and non-dual). Now, a question having a crucial connection with the understanding of consciousness is: what happens after death? Here, it is worth quoting James Clerk Maxwell, the father of electromagnetism, who said on his death bed:

> *I cannot help thinking about the immediate circumstances which have brought a thing to pass, rather than about any 'will' setting them in motion. What is done by what is called myself is, I feel, done by something greater than myself in me* (Campbell & Garnett 1882).[3]

We will explain below how a fundamental key to the role of consciousness is provided by Maxwell's set of 20 equations (today reduced to 4 equations involving vectors) unifying electricity, magnetism and optics.[4] The mechanism of propagation of light in the universe will help us in finding how many physical dimensions are necessary to qualify the existence of living beings and conscious entities. Having identified the dimensions of our universe, it remains to be shown how information can be read, written and transferred between material/visible structures and immaterial/invisible entities. Concerning the material medium able to store and propagate information, 2D-water layers are the most viable candidates. As for the immaterial storage medium of information, we will propose quantum vacuum (ether), the existence of which is supported by leading physical theories: quantum physics and general relativity. In order to be credible, our approach must be able to give estimates of the different bandwidths associated with conscious processes involving either a watery medium or the ether.

MAXWELL'S EQUATIONS

Our starting point is the fact that, in current physics, any law can be considered a consequence of the existence of a symmetry group. For instance, at the time of Isaac Newton, space and time were seen as separate absolute entities. Then, three laws of motion were formulated to fully account for related mechanical observations. Then, it was realized by mathematicians that Newton's laws were the consequence of the existence of a Lie group named Gal(3,1). In such a notation, Gal stands for the beginning of Galileo's name, the first scientist to have formulated the law of inertia. The two numbers in brackets refer to the fact that movements occur in a space having three dimensions associated to one-dimensional time unrelated with space. Such a Lie group is characterized by ten infinitesimal generators: three spatial translations, three spatial rotations, three Galilean boosts (uniform changes in speed) and one translation describing a 3D-universe with one additional time dimension unrelated with the three spatial ones. It was easy to show that Galileo's group Gal(3,1) has three Casimir invariants corresponding to the laws of conservation of mass (spatial translations), energy (temporal translations) and spin (rotations). The trouble was that such a group is not able to describe electromagnetic phenomena. In other words, the famous Maxwell's equations published in 1865 ruling electricity, magnetism and optics were not invariant through the symmetry operations of Gal(3,1). But, in May 1905 the French mathematician Henri Poincaré (1854–1912), communicating with his Dutch colleague H. A. Lorentz (1853–1928), realized that the coordinate transformations leaving invariant Maxwell's equations form another symmetry group, ISO(3,1), an acronym for "Inhomogeneous Special Orthogonal" group.[5]

In fact, Poincaré's ISO(3,1) group has seven infinitesimal generators in common with Gal(3,1): three spatial translations, three spatial rotations and one translation in time. The difference is the existence of three Lorentz's boosts mixing each of the three space-coordinates with the time coordinate. A direct consequence of such a welding of space with time is that Poincaré's group displays only two Casimir invariants corresponding to the conservation of a single entity called mass-energy (translations in space and time) and another one named spin (rotations in space and time). In group-theory language, mass and energy now belong to the same irreducible representation of ISO(3,1), whereas in Gal(3,1) mass and energy were parts of different irreducible representations. Another consequence of such a welding of space with time was that our observable universe should

be considered as 4D (4 = 3+1) space-time continuum as suggested by the German physicist Hermann Minkowski (1864–1909). The existence of such a 4D space-time entity supported by the mathematical structure of Maxwell's equations, was a major step to establish the full validity of the special relativity theory introduced by the joint efforts of Henri Poincaré and Albert Einstein (1879–1955).[7] According to relativistic physics, speaking of an event requires to locate it in M^4, i.e. specify where it has occurred in space (x = left/right, y = front/back, z = up/down) and in time (t = past/future).

However, just after the introduction of M^4 Minkowski's space, it was realized that Maxwell's equations were in fact invariant under a larger Lie's group, named the conformal group ISO(4,2).[8] Here, in addition to the ten infinitesimal generators of ISO(3,1), five new generators had to be considered, one corresponding to dilatation in space and time and the four others to conformal symmetries that preserve angles between two arbitrary directions. The main consequence of such an invariance was that the universe had better be considered as a 6D-continuum (6 = 4+2) with four space-like coordinates and two time-like coordinates. This meant that by specifying only four coordinates in M^4 (x, y, z, t), some ambiguity remained. Taking for granted the existence of these two extra dimensions, their physical meaning had to be established.

A clue was given by the fact that a M^4 continuum devoid of matter remains invariant after any change in scale 's' (a new coordinate measuring the 4D-spacetime dilatation). This means that besides (x, y, z, t) coordinates, one should also specify a fifth coordinate (s) setting the scale at which an observation is made. Such a fifth coordinate is crucial for living entities that could exist either as a single cell or as multicellular organisms. At each cell division, the living entity gets bigger in space and older in time, suggesting that such a fifth dimension describing the ability to change in size (small/big) at a given space-time location (x, y, z, t) has something to do with the existence of life. One may also understand why a second time dimension is needed, as it is a well-known fact that the time coordinate of special relativity has nothing to do with the time of biology. Accordingly, within Minkowski's space-time M^4, the time reversal symmetry operation is allowed and is used to explain the matter/antimatter duality. Moreover, Noether's theorem clearly states that as soon as energy is conserved, the origin of time has no absolute meaning owing to the symmetry of translation in time. It is thus impossible to describe the events of birth and death, typical of living beings in M^4, because a date of birth or death has an absolute character and meaning.

However, moving to the conformal space C^5, i.e. considering an hyper-surface in ISO(4,2), where an event is characterized by five coordinates (x, y, z, i·c·t, s), the last coordinate (s) referring to a position in scale (small/big), it is possible to speak of birth or death in an absolute sense. From a mathematical viewpoint, by combining the dilatation symmetry operation with translation and rotation symmetries, it was possible to build a quantum-mechanical proper time operator conjugated to mass.[9] In a conformal space C^5, it is thus meaningful to state that a given mass has appeared here (birthplace) at a precise time (birth date) and disappeared there (death place) at a posterior time (death date).

It is worth noticing that if inert matter undergoes evolution in M^4 while living matter undergoes birth, evolution and death in C^5 through the fifth dimension s (small/big), we are still describing the observable universe at an object-oriented level. As the conformal ISO(4,2) group operates in six dimensions, it is logical to assume that the sixth dimension is a dimension allowing us to decide if a given C^5 hyper-surface is observable or not. The existence of such a larger embedding space V^6 where supra-consciousness operates on a virtual information field is thus not only in line with the invariance of Maxwell's equations under the symmetry operations of the ISO(4,2) Lie group, but also allows observing the C^5 object-oriented conformal hyper-surface using an upper level meta-language giving meaning to events, and where logical contradictions occurring in C^5 are resolved. Another crucial point is that the use of dilatation symmetry operators may also be related to the fact that a conscious being is free to operate changes of measurement units without alteration of the observed system.[10]

In such an enlarged conceptual physical frame, scale invariance would be a fundamental attribute of the V^6 information field. This is in line with the fact that information is basically a series of bits taking value 0 and 1, and that the memory holding such an information can be of any size. Accordingly, bits may be stored on a polycarbonate support using pits (bit 1) and lands (bit 0) at a 450-780 nm scale. However, the same information could also be written on ferromagnetic domains at a 0.1-1 mm scale. Typical MOSFET channel lengths were once a few micrometers in size, whereas modern integrated circuits are incorporating MOSFETs with channel lengths of tens of nanometers. In biology, information may be coded on DNA at a nanometer scale or at a micrometer scale in neurons. One could also imagine encoding information on galaxies, one galaxy corresponding to bit 1 and no galaxy to bit 0. A crucial point is that it is the alternation of 0 and 1 that defines an entity and not the

physical size of the memory device necessary for holding strings of bits. Another crucial point is that a string of bits is meaningless unless a starting point is given for reading the chain, together with a fixed step telling how many bits should be loaded in the register memory at each read or write event. For instance, using the same string of bits, different outputs are expected using 8-bit, 16-bit, 32-bit or 64-bit processors. The choice of the starting point and of the step used for reading/writing information from a support should obviously be a prerogative of consciousness. One could then easily understand why a single and unique information field is able to hold a huge number of conscious beings. The identity of a given conscious being would then correspond to a starting point in V^6, while the level of consciousness would correspond to the size of the register. The bigger the number of bits manipulated simultaneously, the higher the complexity and the level of consciousness.

The fact that the information field V^6 is fundamentally scale-invariant is just another way of saying that space, time and matter do not exist by themselves, being just a construction of a supra-consciousness giving different meanings to various pools of information. This was clearly perceived by Henri Poincaré, in a paper written in 1906 and added to French editions of his book "Science and hypotheses":

> *One of the most surprising discoveries that physicists have announced in the last few years is that matter does not exist*. (Poincaré 1906).[11]

GRAVITATION, MASS AND QUANTITY OF MATTER

As explained elsewhere,[2] the M^4 Minkowski's subspace created by the generators of the ISO(3,1) Lie-group has been characterized by a fundamental equation $W = k_B{\cdot}T = h{\cdot}f = m{\cdot}c^2 = e{\cdot}U = (2h{\cdot}\boldsymbol{\alpha/e}){\cdot}I$, stating that inert matter may through thermal, vibrational, mechanical, electrical and magnetic interactions, with a set of universal constants k_B = 0,0138 zJ·K^{-1}, h = 663 zJ·fs, c = 299792458 m·s^{-1}, e = 0.16 aC and α = 1/137. We now understand that the information field of consciousness corresponds to the V^6 space created by the generators of the ISO(4,2) Lie-group. In V^6, nothing is forbidden and everything is fundamentally true. The existence of "forbidden" events is here a consequence of the choice of a particular location in V^6 (identity of the observer) allowing to observe a M^4 space as a projection of a C^5 hyper surface along a line joining a space-time point in M^4 to the fixed point in V^6 and crossing the C^5 hyper surface at a point defining the age of a system since its birth as a physical entity.

For instance it is impossible in M^4 to travel at a speed higher than Einstein's constant c (relativity), impossible to perform an action smaller than Planck's constant $h/4\pi = \hbar/2$ (quantum physics), impossible to have an entropy below Boltzmann's constant k_B (thermodynamics) and impossible to bear an electrical charge lesser than Coulomb's constant e (electromagnetism). Such limitations arise as soon as a conscious entity in V^6 have the experience of living on a particular C^5 hypersurface at a given scale corresponding to the biological age and not to the "time" of M^4 that is just a coordinate for ordering 3D-events. But, in contrast with M^4 space-time coordinates, the scale coordinate in C^5 is a hidden one as direct observation tells us that only the vacuum can be stretched or compressed at any scale. As soon as masses are present, this scale invariance is broken, giving the feeling to live in a M^4 reality involving invariance through translations and rotations, and where dilatations of the C^5 reality are no longer present.

This basically means that in contrast with translations and rotations that are global symmetries of M^4, dilatation symmetries of C^5 are only local, the full symmetry being recovered by introducing forces between masses, explaining the occurrence of gravitation. Alternatively, one may also say that changes of space-time scales preserve the velocity of light. Consequently, only photons are able to perceive the full C^5 space-time symmetry, massive objects seeing a broken symmetry manifested by a clear distinction between inert and living systems. However, from the viewpoint of consciousness able to unfold in a much larger space V^6, such a distinction is meaningless and everything should be considered "living" either as particles, molecules, cells, rocks, plants, animals or humans.

This also explains the existence of a sixth coupling constant $G = c^2{\cdot}R_U/M_U$, related to Newton's gravitational constant, linking spatial extent of the universe R_U to its mass content M_U,[12] taking the value G = 66.7384 pJ·kg^{-2}·m. It then becomes possible to define a quantum of spatial area $A_P = \hbar{\cdot}G/c^3$ (where $\hbar = h/2\pi$ is Dirac's constant) and a quantum of time area $t_P^2 = A_P/c^2$. Alternatively, one may also define a quantum of mass M_P, such that $M_P^2 = \hbar{\cdot}c/G$, allowing distinguishing between observable elementary particles having a mass less than M_P and non-observable elementary particles having a mass higher than M_P. Existence of Newton's constant G also defines a maximum power in nature $P = c^5/4G \approx 9.1{\times}10^{51}$ W reached at the surface of a black hole.

Finally, it follows that one should recognize the existence of two kinds of masses, a conformal non-observable mass m_{00} displaying scale-invariance in conformal C^5 space and linked to the phenomenon of gravi-

tation, and a relativistic rest mass m_0 responsible for the existence of inertia in Minkowski's M^4 space, breaking vacuum's scale-invariance. It also follows that as mass should be considered an attribute of space-time, it cannot be used to measure the amount of matter. However, from observation we know that all matter is made of atoms with a characteristic universal scaling constant $N_A = 6.022\times10^{23}$ mol^{-1}, named Avogadro's constant, relating the mass of atoms and the one of macroscopic bodies. The fact that this constant may be found through the study of unrelated physical phenomena (gas viscosity, Brownian motions, critical opalescence, color of the sky, black-body spectrum, electricity, X-rays or radioactivity) is good evidence that information is propagating in the fifth dimension of our universe.

Accordingly, at a given scale (coordinate s = constant), one retrieves the standard wave function $\psi_s(x,y,z,t)$ of quantum physics insuring coherence between the descriptions of a particle at several different points in space and time. From quantum physics, we know that squaring the amplitude of a matter wave $\psi_s(x,y,z,t)\cdot\psi_s^*(x,y,z,t)$ measures the probability of observing a particle at a particular position (x,y,z) at a given time (t). Going to another higher scale of the same object, one retrieves a bigger mass that should correspond to a bigger number of particles, as matter particles are not scale invariant. But, as we are in the same object, its identity should not change in C^5. This suggests introducing a new scaling wave function $\psi(x,y,z,t,s)$ taking its values not only in space (x,y,z) and in time (t) but also in the scale (s). Now, by squaring the amplitude of such a scaling wave $\psi(x,y,z,t,s)\cdot\psi^*(x,y,z,t,s)$ we should obtain the probability of observing the mass of a system at any scale of observation. Using conveniently scaled quantum operators, it is then possible to write a generalized Schrödinger's equation whose solutions are waves propagating with time in the scale as well as in space.[13] It then follows that the square of the ratio of the amplitudes of the faster couple of such scaling waves (first two harmonics), are related by a constant $N = \frac{1}{4}\exp(4\pi^2/\ln 2) \approx 10^{24}$, giving the right order of magnitude of Avogadro's constant. Including other harmonics in the description changes a little bit the value, but not the exponent.

ELEMENTARY PARTICLES

Physicists may also wonder how the standard model for elementary particles, a well-established description of nature, fits in such a scheme. A possible answer is to go back again to Maxwell's equations that have allowed us to discover the existence of a fifth and a sixth dimension. In fact, it was shown about forty years ago that Maxwell's equations were invariant under the symmetry operations of the highly symmetric ISO(4,2)⊗U(2)⊗U(2) group characterized by $6\times5/2 + 2^2 + 2^2 = 23$ generators.[14] This symmetry escaped notice for a long time because the eight integral-differential generators of U(2)⊗U(2) are associated with symmetry operations of a non-geometric nature. They are much harder to visualize than operations of the Lie algebra in the neighborhood of identity.[15]

The nature of these operators suggests again that it should exist a communication between all scales, from the smallest to the largest and vice versa, whence non-locality and non-separability, which are abundantly confirmed by experiments. The fact that U(2)⊗U(2) has eight generators allows establishing a direct correspondence with the symmetry group SU(3) that has also eight generators (the so-called "gluons") and responsible for the existence of the "strong" interactions between quarks. Focusing our attention to the U(2) sub-group which has only four generators, it is quite satisfying to find that such a group is isomorphous to the product SU(2)⊗U(1). Now, the SU(2) group with its three generators (W^+, W^- and Z° intermediate bosons) is responsible for the "weak" interaction involving leptons, while the U(1) group with only one generator (the photon γ) is responsible for the electromagnetic interaction.

Obviously, the introduction of these new internal degrees of freedom means additional coupling constants in addition to the seven external coupling constants (k_B, h, c, e, α, G and N_A). The best way to introduce these new constants is to use dimensionless numbers in order to comply with the basic scale invariance of the universe. Taking the mass of the electron $m_e = 9.109\times10^{-31}$ kg as a reference then leads to a new constant $\beta = m_P/m_e = 1638$ for the strong interaction between quarks (where m_P is proton's mass), $\gamma = G_F\cdot m_e^2 = 3\times10^{-12}$ (where $G_F = 1.166\times10^{-5}$ GeV^{-2} $= 3.67\times10^{48}$ kg^{-2} is Fermi's constant) for the weak interaction ruling beta-decay and $\delta = G\cdot m_e^2/(\alpha\hbar\cdot c) = 2.4\times10^{-43}$ for the gravitational interaction between masses.

The above approach suggests that consciousness should be compliant with physicalism stating that information may be physically stored in the V^6 space underpinned by the abstract structure of the ISO(4,2) symmetry group. Information would be the "substance" of such a space that could well be identified with the "ether" concept introduced by Aristotle and used in the XIXth century for explaining light propagation in a medium devoid of matter. It is worth noticing that in order to justify the negative result of the Michelson-Morley experiment, existence of such an ether was denied in

1905 by Albert Einstein in his special relativity theory. However, the same Einstein was finally obliged to accept its existence in an address given on 5 May 1920 at the University of Leiden:

> *Recapitulating, we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore,* ***there exists an ether****. According to the general theory of relativity space without ether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of space and time (measuring-rods and clocks), nor therefore any space-time intervals in the physical sense. But this ether may not be thought of as endowed with the quality characteristic of ponderable media, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it".*[16]

These words by Einstein exactly define the V^6-space introduced above: a non-ponderable information field (embedding ponderable C^5 hyper-surfaces) with no parts which may be tracked through time, a concept belonging to the realm of M^4-subspace (reversible mechanical time) or C^5-subspace (irreversible biological time). In other words, V^6 should be viewed as an entity existing beyond space, time and matter and being the ultimate source of any kind of reality as it holds as strings of bits all the past, present and future events of our universe. The ether of general relativity is thus the physical substance of V^6 onto which it is physically possible to write or read bits of information as on any kind of memory. The only difference is that, owing to the lack of motion, it is a non-volatile random access memory (NVRAM) that can be configured in an infinite number of ways. In other words everything is possible within the space V^6, even unphysical things that are routinely visualized during the dreams as chimera, monsters or other absurdities for the conscious "I" undergoing evolution in a C^5-subspace. V^6-ether is also the repository of all mathematical ideas, all scientific theories, all work of art, all music pieces, all deities, i.e. the common source of inspiration for all people involved in art, science or spirituality. As time does not exist in V^6, it is impossible to use bandwidth for measuring a state of consciousness. Instead, one may consider that the V^6 space is covered by a multitude of trails (like footsteps in the snow) made by each conscious being. All these trails are deeply interconnected, forming a unique motif that we may identify as a state of "oneness".

Concerning the mechanism for reading or writing on such an ether, one may refer to quantum loop gravity stating that the ether may exist under two distinguishable states : looped (bit 1) or un-looped (bit 0).[17] From the knowledge of the age of the universe $t_U = 4.3\times10^{17}$ s and the quantum of length $L_P = A_P^{½} = (\hbar\cdot G/c^3)^{½}$, it comes that the memory capacity of our C^5-universe embedded in a V^6-ether is currently about $M = (c\cdot t_U/L_P)^4 = c^{10}\cdot t_U{}^4/(\hbar\cdot G)^2 \approx 10^{244}$ bits. Alternatively, the ether of general relativity may be replaced by the vacuum of quantum theory. At the level of the information stored in V^6 this does not matter. However, after projection in a C^5-subspace, where energy matters, the two viewpoints do not agree. This stems from the fact that mass M scales with length L in general relativity ($M/L = G/c^2$) while it scales with the inverse of a length ($M\cdot L = h\cdot c$) in quantum physics. As a Planck's force may be defined as $F_p = m_P\cdot c^2/L_p = c^4/G$, it follows that vacu-

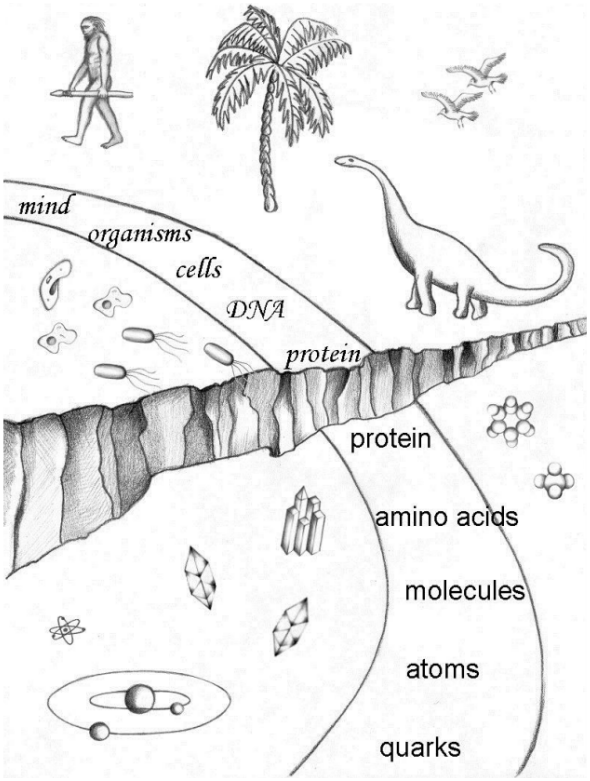

Figure 1. Pictorial representation of the chasm that has opened up in the western scientific description of nature after the advent of molecular biology. The physical sciences are on the southern and biological sciences are on the northern side of the deep divide. In the reductionist landscape of the physical sciences, a road of deterministic logic leads from the most fundamental particles of all, the quarks, through atoms and molecules to complicated chemicals found in living organisms and even in minds, without any gap. This misses the crucial fact that the northern proteins work while the southern ones do not. This strongly suggests that a top-down non-deterministic logic should coexist with the bottom-up logic guiding the road through the northern landscape. Drawing by John Grant Watterson, reproduced with permission. See http://www.thewaterpixel.com/ for a downloadable e-book of the solution proposed by J.D. Watterson for bridging the chasm.

um's energy density may be expressed either as $F_P/L^2 = m_P \cdot \mathbf{c}^2/L_p^3 = c^7/\hbar \cdot G^2 \approx 5 \times 10^{113}$ J·m^{-3} if $L = L_P$ (quantum physics), or as $F_P/R_U^2 = c^4/G \cdot R_U^2 \approx 0.6$ nJ·m^{-3} if $L = R_U$ (general relativity). This huge divergence of more than 120 orders of magnitude is one of the most stunning problems in modern physics.

WHAT IS LIFE?

Our Western scientific mode of thinking is based on a bottom-up approach of reality where big things are thought to arise after aggregation of much smaller components. Atoms are thus made from elementary particles themselves built from quarks and leptons, molecules are aggregates of atoms, cells are aggregates of molecules, tissues are aggregates of cells, bodies are aggregates of tissues, kingdoms are aggregates of bodies while aggregates of kingdoms compose the living world. For the inert world, the dominant view is that solids, liquids and gases are made of atoms or molecules, aggregating into planets belonging to stellar systems, themselves forming galaxies, the clustering of such galaxies defining the observable universe. It thus remains a deep enigma about why molecules should be the bifurcating point between living and non-living things. Figure 1 is a picturing by John Grant Watterson of this strange situation with a chasm separating an inert protein seen as an aggregate of atoms on the one hand, from a living protein being, an entity having a precise function in a cell, on the other hand. Albert Szent-Györgyi who won the Nobel Prize in Physiology or Medicine in 1937 was also quite lucid about such an enigma:

> *One of my difficulties with protein chemistry was that I could not imagine how such a protein molecule can 'live.' Even the most evolved protein structural formula looks 'stupid,' if I may say so.*[18]

In what follows we propose to fill this chasm with water that would then be the material substance making the interface between living beings and the ether. Such a statement directly leads to the conclusion that the conscious 'Me' should somehow be related to water. The fact that a living cell is 99.1 mol% water[19] and that the brain is the more hydrated organ of the body is well in line with such a proposal.

First, in our scheme, the distinction between inert and living things lies in the ability of a given material system to explore the fifth dimension allowing changes in size through a metabolism allowing duplication as well as the sixth dimension by being able to treat information (consciousness). By contrast, an inert thing is limited in its evolution by the M^4-subspace. Such a restriction has the consequence of associating the conscious 'I' to the activity of neurons in the brain. The trouble with such a reductionist view is that it exists other organs in the human body having neurons. For instance it is possible to record electro-gastrograms (EGG) or electro-enterograms (EENG) as well as magneto-gastrograms (MGG) or magneto-enterograms (MENG) for characterizing the electrical activity of the stomach and the gut.[20] It is thus now accepted that it exists an enteric nervous system (ENS) acting as a second brain and able to perform many of its tasks in the absence of central nervous system (CNS) control.[21] Similarly, there is good evidence that the human heart contains a complex intrinsic nervous system comprised of multiple ganglia (clusters of neurons) that network with each other.[22] Neuro-cardiology has thus firmly established that the heart is a sensory organ and an information encoding and processing center, with an extensive intrinsic nervous system that's sufficiently sophisticated to qualify as a little brain.[23] Associating consciousness with electrical activity of neurons then leads to byzantine discussions about the relative roles of brain, gut and heart in the "secretion" of consciousness.

In our hierarchical view, it follows that neurons being made of matter surely holds in M^4 a form of local consciousness (the conscious 'I') embedded in a supra-consciousness that extends in V^6 well beyond the brain, the heart or the gut. Moreover, neurons acting at the level of object-oriented language obeying to classical logic should obviously constitute one channel of expression of consciousness. Accordingly, at least another channel of expression should exist involving the whole body obeying to intuitionistic logic (meta-consciousness). Finally, a third channel may also be identified involving the mind/body combination in the V^6 field and obeying to minimal logic where negation simply does not exist.

WATER, WATER EVERYWHERE

For species living on earth, there is good evidence that water in contact with membranes made of self-assembled lipids could play the role of a hard disk memory.[24] Accordingly, it has experimentally proved that it was possible to convert unobservable virtual photons filling the vacuum into real photons using a mirror undergoing relativistic motion (Dynamical Casimir effect).[25] The existence of such an energy filling the vacuum is granted by quantum field theory through the existence of an operator N whose eigenvalues corresponds to the number of quanta having a pulsation $\omega =$

$\Delta\boldsymbol{\varphi}/\Delta t$, where φ is the unobserved quantum phase angle related to the internal state of each quantum. It is then possible to show that the Hamiltonian of such a quantum system may be written as $H/\hbar\omega = N + ½$, meaning the existence of a zero-point energy $ZPE = ½\hbar\omega$ when the field is in its ground-state (vacuum) characterized by an eigenvalue $N = 0$.[19] Moreover, owing to the non-commutation between the number of quanta operator N and the phase angle operator Θ, $[N,\Theta] = -i$, an uncertainty relationship $\Delta N\cdot\Delta\varphi \geq ½$ exists, responsible for the existence of quantum coherence at all scales and even at a macroscopic scale.[26,27] For an assembly of N similar quanta, the total energy may thus be written $W = N\cdot\hbar\omega$, meaning that an uncertainty ΔN translates into an energy uncertainty $\Delta W = \hbar\omega\cdot\Delta N$. As $\omega = \Delta\varphi/\Delta t$, it finally transpires that the inequality $\Delta N\cdot\Delta\varphi \geq ½$ translates into $\Delta W\cdot\Delta t \geq ½\hbar$. In other words, it is possible in quantum field theory to violate the energy conservation principle for a short duration Δt provided that $\Delta t < \hbar/\Delta W$.

Now the water molecule is a very small entity having a diameter close to 0.3 nanometers with a first excited level rather high in energy at about 1120 zJ and an energy of ionization of 2022 zJ. As low-energy excited levels correspond to O-H anti-bonding states, it seems preferable using non-bonding Rydberg's levels locates on the oxygen atom for performing virtual excitations using vacuum's energy. A good Rydberg-level corresponding to 5d orbitals on oxygen and able to give a coherence gap of the same order of magnitude than the H-bond strength energy is in fact located at an energy W = 1934 zJ above the ground state of the water molecule.[28] This corresponds to a wavelength of self-excitation $\lambda(\mu m) = 198{,}645/\Delta E(zJ)$, i.e. $\lambda \approx 0.1$ μm = 100 nm. As $\hbar = 106$ zJ·fs, the lifetime of such a virtual excitation should be $\Delta t < 106/1937$ fs $\approx 10^{-16}$ seconds. On the other hand, we know that the power radiated by an electron submitted to an acceleration *a* is given by Larmor's formula: $P = F\cdot v = ⅔\alpha\cdot\hbar\cdot(a/c)^2$, where $\alpha \approx 1/137$ is Sommerfeld's fine structure constant (Larmor 1897).[29] For an electron of mass $m_e \approx 10^{-30}$ kg having a speed $v = a\cdot\tau_e$, we may write that $P = (m_e\cdot a)\cdot v = (m_e\cdot a^2)\cdot\tau_e = ⅔\alpha\cdot\hbar\cdot(a/c)^2$, leading to a characteristic relaxation time $\boldsymbol{\tau_e} = ⅔\alpha\cdot\hbar/(m_e\cdot c^2) \approx 10^{-23}$ seconds as $m_e\cdot c^2 \approx 82$ fJ. This means that the virtual photon extracted from the vacuum and having a lifetime $\Delta t \approx 10^{-16}$ s is available for exciting about $10^{-16}/10^{-23} = 10$ millions of water molecules before its return to the vacuum.

As the excitation is delocalized over $N \approx 10^7$ water molecules, it follows according to quantum field principles that coherent domains sharing the same phase angle could form with a maximum uncertainty on the common phase angle such that $\Delta\varphi \approx 1/2\Delta N$ or $\Delta\varphi < 5\cdot10^{-8}$ rad with $\Delta N \approx 10^7$. The size of such coherent domains is given by the wavelength of the photon extracted from the vacuum for excitation of the water molecule, while their stability is insured by the existence of a 2D interface.[30]

Consider now a mammalian cell having a weight of about 1 ng.[31] Assuming a density of 1 $g\cdot cm^{-3}$ into a volume of 10^{-9} cm^3, corresponding to a diameter $D \approx 12$ μm and an area $A \approx \pi\cdot D^2 \approx 500$ μm^2. A well-known fact is that a lipid bilayer covered by a hydration shell delimits such a cell. With an excitation of water molecules at $\lambda \approx 0.1$ μm, it follows that the amount of coherence domains associated to an eukaryotic cell is about $N_{DC} = 2\cdot A/\lambda^2 \approx 2\times500/0.01 = 100{,}000$. The factor two stems from the fact that there is a water shell facing the extracellular medium and another water shell facing the intracellular one. As the coherence gap responsible for the cohesion of a coherence domain has an energy $\delta W \approx 42$ zJ,[28] it is rather easy for the cell to have regions where coherence is on (bit 1) and other regions where the mechanism responsible for coherence is turned off (bit 0). Physically speaking an energy gap $\delta W = 42$ zJ, corresponds to an associated wavelength $\lambda(\mu m) = 198.645/42 \approx 4.7$ μm, falling in the infra-red region of the electromagnetic spectrum. The energy needed for changing the coherence state in aqueous domains is thus readily available and could be furnished by the sun/earth couple owing to an emission at 0.5 μm by the sun associated to a re-emission at about 10 μm by the earth after processing by the biosphere. Such a picture is also in agreement with the observation on any hydrophilic surface of an exclusion zone (EZ-water) allowing converting IR radiation into an electrical potential in order to perform work.[32]

In other words, the water layers around any cell behave as a soft hard-disk upon which information may be written, deleted or read by consciousness with the help of infrared radiation. As each coherence domain stores 1 bit of information and as 1 byte = 8 bits, the memory capacity of the water shells of a eukaryotic cell may be estimated as $M(cell) = N_{DC}/8 = 10^5/8 \approx 10$ kB. Now, the number of cells in a human body is about $3.72\cdot10^{13}$ cells,[31] leading to a static memory capacity of at least $M(membranes) = 3.72\cdot10^{17}$ bytes or 372 PB, as one petabyte (PB) = 10^{15} bytes. Another upper estimate of the watery storage capacity of a human body is to consider a reference value of 36 liters of water, an average value between male and female in adult (20-79) US white population (Ellis 2000).[33] An elementary calculation also shows that water forms in a cell a hydration shell around bio-polymers corresponding to at most four monolayers of water.[19] The diameter of a water molecule being about

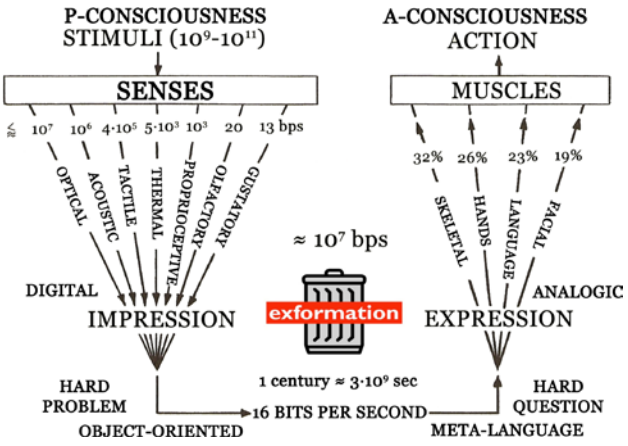

Figure 2. Consciousness, information processing with bandwidths and exformation (non-transmitted information or context).

0.3 nm, this corresponds to a thickness of about 1 nm. A coherence domain having an area of 100×100 = 10^4 nm^2, then occupy a volume $V_{DC} = 10^4$ nm^3 leading to a volume of 8×10^4 nm^3 per byte of information. As 1 L = 10^{24} nm^3, the number of bytes that can be stored in 36 L of intracellular and extracellular water is $36\times10^{24}/8\times10^4$ = 450 EB as 1 exa-byte (EB) = 10^{18} bytes. The recent discovery of a fluid-filled space within and between tissues named "interstitium"[34] is an obvious candidate for being the watery hard-disk of the human body able to hold such a big amount of information.

Besides cell membranes and the interstitium, one may also consider the human gut known to hold about 3.8×10^{13} prokaryotes.[35] We also know that a prokaryotic cell has a diameter ten times smaller than the diameter of a eukaryotic cell, meaning an area 100 times smaller. Consequently, the memory capacity of the hydration shell of a prokaryote could be estimated as $M(prokaryote) = 2\cdot A\times10^{-2}/8\lambda^2 \approx 5/0.04 = 125$ bytes. The memory capacity of the human gut is then $M(microbiote) = 3.8\times125\times10^{13} = 4.75\ 10^{15}$ bytes = 4.75 PB, i.e. about 1% of the memory capacity of the cell membranes. However, if one considers that there are about 5×10^{30} prokaryotes on earth (Whitman & al. 1998),[36] this corresponds to a total memory capacity of 6.25×10^{32} bytes. By comparison, for 7.7×10^9 human beings in 2019 (http://www.worldometers.info for an instantaneous counting), each carrying 4.50×10^{20} bytes in their bodies, the amount of information is only $4.5\times7.7\times10^{29}$ bytes = 3.5×10^{30} bytes. This means that humanity participates in the memory capacity of the earth through its biosphere at a modest level of about 1%.

However, as far as consciousness is concerned, considering memory capacity alone M is not enough. As recently suggested, a good measure of consciousness should be bandwidth BW(t) = dM(t)/dt, i.e. the rate of variation of information content with time.[37] A reasonable bandwidth for information processing by a human being is about 10 millions of bits per second (or 1 $Mb\cdot s^{-1}$) coming essentially from the sense of vision (Nørretranders 1991).[38] As a century is about 3 billions of seconds, the information processed in his life by a human being is thus about $3.2\times10^9\times10^6 = 3.2\cdot10^{15}$ bytes = 3.2 PB. This corresponds to only 1% of the memory capacity of the body membranes. However, assuming an external stimuli bandwidth of 100 $Gb\cdot s^{-1}$ (higher value in figure 2), corresponding to the memorization of all events (even those ignored by the senses) experienced during a whole human life translates into a memory capacity of $32\cdot10^{18}$ bytes = 32 EB, i.e. about 10% of what is available in the body water (450 EB). This means that a human body is able to record and store any kind of raw data without the need to process them with the help of the conscious 'I'. Consequently, consciousness is needed for giving meaning to such raw data memorized in our body and defining what is usually called the "context".[39] As shown in figure 2, during a communication the conscious "I" discards a large part of this context that is not transmitted (exformation).[38]

Knowing that water is the information vector in the body it is now easy to compute a bandwidth for the body, as the average water turnover of a sedentary adult is 3256 mL per day or 37 $\mu L\cdot s^{-1}$ (Leiper & al. 1996).[40] With $V_{CD} = 10^4$ nm^3 and 1 $\mu L = 10^{18}$ nm^3, this translates into a bandwidth of $BW(t) = 37\times10^{18}/8\times10^4 = 460$ $TB\cdot s^{-1}$. By comparison, this is of the same order of magnitude as the global internet traffic estimated for the year 2021 at 106 $TB\cdot s^{-1}$ (Cisco 2017).[41] However, a much larger bandwidth may be obtained by considering water movement inside the body, independently of external losses. Here, we may use the fact that on the one hand blood is distributed to the cells through about 10 billions of capillaries having an internal diameter of D_C = 3.5 µm and accumulating a total cross-section of A_C = 6 m^2 in *Homo Sapiens*.[42] On the other hand, the largest artery of the heart is the aorta with an average diameter D_A = 30 mm[43] (Hager & al. 2002) associated to an average blood flow velocity v_A = 76 $cm\cdot s^{-1}$ (Haugen & al. 2002).[44] Writing the equation of continuity for steady flow of a non-compressible fluid leads to $\frac{1}{4}\pi\cdot D_A^2\cdot v_A = A_C\cdot v_C = 537$ $cm^3\cdot s^{-1}$ corresponding to a blood velocity in capillaries $v_C \approx 90$ $\mu m\cdot s^{-1}$ associated to a quite large bandwidth $BW(t) = 537\times10^{21}/8\times10^4 = 6.7$ $EB\cdot s^{-1}$ (as 1 $cm^3 = 10^{21}$ nm^3).

It should be obvious that the most probable place where such information fluxes occur are cell membranes. This means that any cell membrane could be the host of local consciousness and that primitive intel-

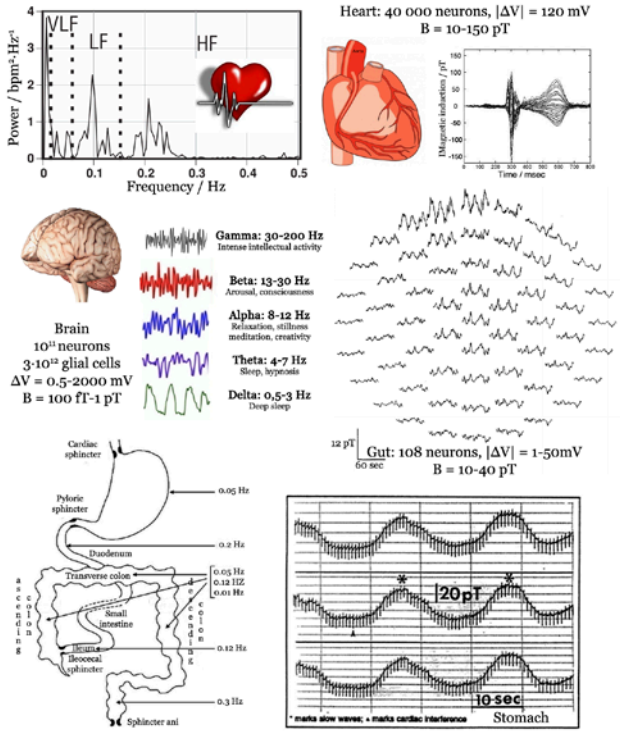

Figure 3. Overview of analogic electromagnetic signals emitted by the heart, the gut and the brain, three organs containing neurons.

ligence is expected in amoebae for instance, as observed experimentally with the plasmodium of the slime mold *Physarum polycephalum*.[45] It has also been demonstrated that this mold was also able to anticipate periodic events.[46] As the permeability osmotic coefficient of a lipidic bilayer for water is about 100 $\mu m \cdot s^{-1}$,[47] we may predict for an area A(prokaryote) = 5 μm^2 a bandwidth $BW(t) = 5\times100\times10^9/8\times10^4 = 6.25\times10^6$ byte$\cdot s^{-1}$ = 6.25 MB$\cdot s^{-1}$. The total bandwidth for all the prokaryotes on earth is then estimated as $BW_{tot}(t) = 5\times6.25\times10^{36} \approx 3.1\times10^{37}$ bytes$\cdot s^{-1}$. By comparison, for the whole humanity we get $BW_{tot}(t) = 6.7\times10^{18}\times7.7\times10^9 \approx 5.2\times10^{28}$ bytes$\cdot s^{-1}$, showing that our contribution to the overall consciousness of the earth is only one part per billion (ppb). In fact, in view of these huge bandwidths, it should be obvious that we are speaking here of consciousness at an object-oriented level, that is largely "unconscious". Consequently, for the blood flowing in our capillaries one may speak of personal unconscious or Freud's "Id",[49] while for the water flowing across prokaryote membranes we are probably facing the collective unconscious.[50]

Concerning consciousness at a meta-level, we are leaving the digital object-oriented mode for landing in an analogical mode associated with muscles movements

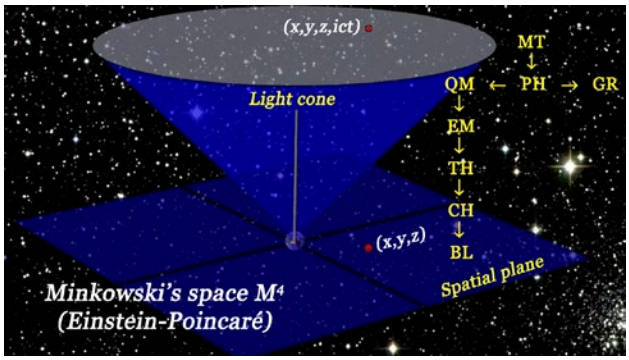

Figure 4. A picturing of the current paradigm concerning the universe according to western science. Reality is manifested in a 4D-continuum called Minkowski's space having inaccessible zones out of a light cone associated to each observer. On the left, a schematic hierarchy for physical sciences according to figure 1 represented here as the progression: mathematics (MT) → physics (PH) → quantum mechanics (QM) → electromagnetism (EM) → thermodynamics (TH) → chemistry (CH) → biology (BL). General relativity (GR) is represented as a separate branch owing to the considerable difficulties met for merging this science with quantum mechanics.

(figure 2) or with electromagnetic signals emitted by the brain, the gut and the heart (figure 3). Here, it is possible, using Shannon's theory, to retrieve an information content $C(t) = -\Sigma P_N(t)\cdot\ln P_N(t)$ using a time-dependent probability function $P_N(t)$ extracted from the correlations functions of such signals observed in measurements at N points.[37] Then, the conscious "I" bandwidth could be computed as the time derivative of this information content D(t) = dC(t)/dt. Unfortunately, such a technique has not yet been applied in practice, but from figure 2, it could be anticipated a very low bandwidth of a few tens of bits.[38] However, focusing heavily on information content or bandwidth miss an essential point that is a direct consequence of our modeling. Accordingly, we know from the invariance of Maxwell's equations under the symmetry operations of the mathematical group ISO(4,2)⊗U(2)⊗U(2) that all electromagnetic reality should be embedded in a V^6-ether. Figure 4 pictures such M^4-reality with its associated pyramidal hierarchy for scientific knowledge represented by eight disciplines.[51] Fitting consciousness in such a M^4 restrictive frame is generally perceived as a "hard problem",[52] while fitting free will of living beings may be referred to as the "hard question".[53]

By contrast, in our proposal (figure 5), there should be no hard problem or hard question linked to consciousness. Here, each conscious being occupies a certain volume in V^6 with highly significant bits that never change and other bits that can be reconfigured according to experiences made on a C^5 hyper-surface at a given

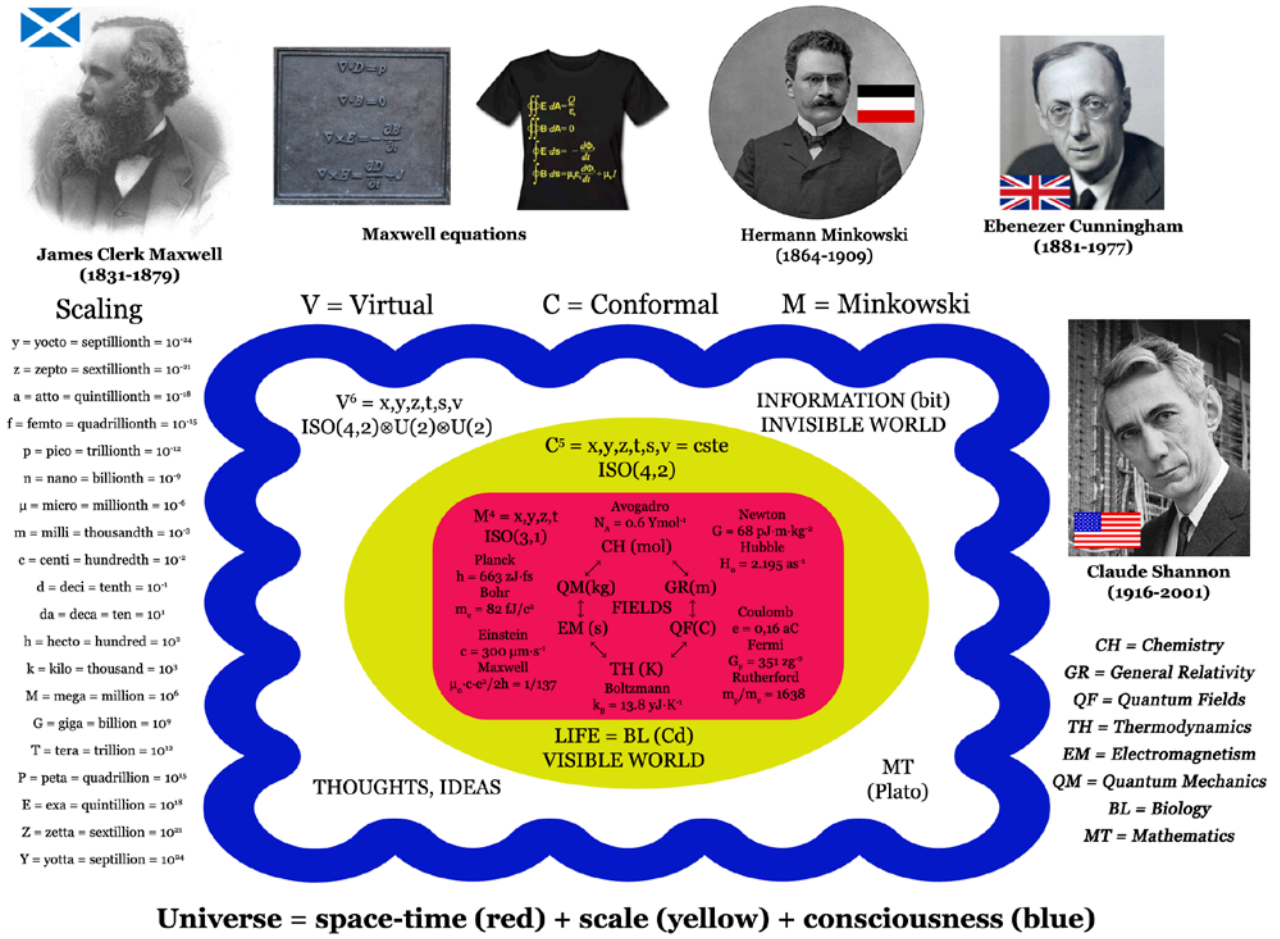

Figure 5. A schematic view for the proposed new paradigm suggested by the invariance of Maxwell's equations through symmetry operations of the SO(4,2)⊗U(2)⊗U(2) group. Same abbreviations as in figure 4.

location (x-,y-,z- coordinates), at a given time (t-coordinate) and at a given scale in space and time (s-coordinate). Using group theory language, reducing the reality to a C^5–space means separating the ISO(4,2) group having infinitesimal generators describing an external world, from the U(2)⊗U(2) group having finite generators and describing the internal world of elementary particles (strong and weak interaction). Consequently, our approach is compliant with physicalism as well as dualism.

As explained above, the s-coordinate in C^5 is crucial for differentiating between living being and non-living things. Accordingly, a rock has an existence in space and time at a given scale, but it is lacking software in V^6 allowing it to grow by itself. In other words, for inert matter, V^6 space and its M^4 subspace appears to be completely disconnected owing to a poor water content. This is in deep contrast with a seed that has also an existence in M^4, but owns in V^6 a little ROM containing down-loadable instructions on how to grow in time, i.e. change in size, using matter and energy (metabolism). At birth, the necessary information stored in the ethereal substance of V^6 is transferred as ROM on DNA and as RAM onto the hydration shells of membranes and bio-polymers. At death, information is transferred to hydration shells of earth's microbiote or of animals after being eaten by them. The same is true for animals, but here the ROM in V^6 can be updated using their metabolism during their life in C^5. This explains why animals, in contrast with plants, have the ability to move in C^5 in order to look for food. Being animals, humans are also able to reconfigure their software in V^6 through their metabolism, but they have the additional capability of doing that after focusing mentally their attention (through meditation for instance) towards a particular pool of bits in V^6 in a state called "mindfulness".

This would mean that humans have the ability to access mentally to the internal world of matter spanned by the U(2)⊗U(2) symmetry, while animals are doomed to use only the ISO(4,2) part of reality. As the generators of the U(2)⊗U(2) group are of integral-differential nature, coupling the macrocosm with microcosm at all scales, more work is needed to understand fully their role in nature.

When exchanging information between the V^6 space and the C^5 hyper-surface, the conscious being has the feeling of being traversed by a pure energy that could be identified with the "Prana" or "Qi" of eastern civilizations and whose flux is oriented by information content perceived as entropy for a western mind. Accordingly, moving in the scale can only be experimented as an energy as presence of matter breaks locally the ISO(4,2) symmetry, reducing it to ISO(3,1) with apparition of a force named gravitation needed to restore the full symmetry on a global scale. Consequently, our modeling of consciousness is intimately linked with gravitation, as proposed in the Orch-R model of consciousness.[54] Such a reduction from ISO(4,2) symmetry in C^5 to ISO(3,1) symmetry in M^4 may be identified with wave-function collapse in quantum physics. As quoted by the cognitive neuroscientist Marcel Kinsbourne: "*What's make any problem hard is that something false but attractive stands in its way*".[53] Here the thing that is false but attractive is obviously the fact that matter exists by itself. As quoted before, the fact that matter does not exist and is an illusion was lucidly perceived by great scientists such as Henri Poincaré, Max Planck, Werner Heisenberg, Erwin Schrödinger and John Wheeler.[2] In our approach, Einstein calls for thinking at a higher level[55] means replacing the group ISO(3,1) by its father ISO(4,2).

Obviously, eastern philosophies have not waited the discovery of group theory or quantum physics to reach the conclusion that matter was an illusion and that consciousness should be the ultimate reality. What is nice is that, as demonstrated here, western science based on powerful mathematical models reaches exactly the same conclusion. Our approach is also fully compliant with the concept of reincarnation typical of Hinduism, the karma being the trails left in V^6 by conscious beings experimenting several forms of life in C^5. It is also compliant with shamanism, V^6 becoming the world of spirits and more generally with all altered states of consciousness where one has a direct access to the invisible V^6-reality without the necessity of experimenting death, the "normal" door to the V^6-ether. Another consequence is that near-death experiences (NDE) or out-of-body experiences (OBE) should be considered real travels in V^6 with the help of consciousness and not as unreal mental images generated by a brain short of oxygen.

Finally, our approach points to at least three different ways of healing. Healing in M^4 using material drugs, healing in C^5 using the ability of water to store or transmit information or by using energy (electromagnetic fields for instance), and also healing in V^6 using information manipulated in a state of pure consciousness for instance.

CONCLUSION

Time is now ripe for science to include the phenomenon of consciousness in a physical description of the universe. According to the proposed modeling, consciousness should be the unique "true" reality of the universe generating through specific strings of bits memorized in the physical ether (ROM) and written of water shells (RAM) material things. Such a proposal is suggested by the structure of the ISO(4,2)⊗U(2)⊗U(2) symmetry group leaving Maxwell's equations through translations, rotations, boosts, scaling and conformal transformations and has the great advantage of being fully compliant with an eastern more philosophical way of thinking. Our proposal also explains why the most prominent component of any living entity should be water. Another important point is that it is a quantitative modeling able computing memory sizes as well as bandwidths for information processing based on the universal constants of physics conjugated with quantitative data accumulated by molecular biology as well as physiology. Consequently, it is a model that is easily falsifiable by making both physical and biological measurements, a prerequisite for being accepted as a scientific model of consciousness. A very satisfactory consequence of the model is that consciousness and life are primitive attributes of the physical universe. This leads to the conclusion that the line of demarcation between physics, chemistry and biology becomes very thin, not to say imaginary. Basically, depending on the hydration state, we have a whole continuous spectrum of material things ranging from inert matter with a very low level of consciousness to living matter able to express consciousness with no limits. This works by going not only from unicellular to multicellular entities, but also from multicellular entities aggregating into species and civilizations. With such a model in hand, it is easy to understand that as soon as dehydration occurs, illnesses first and then death are doomed to occur. This is just because without water bits of information "evaporate" into the ether. However, the most important thing, is that such an information transfer from water to the ether if it alters the body made of matter does not alter conscious-

ness that has always been located from the beginning of space and time in the non-observable V^6-information field and definitively not in the observable M^4-volume or C^5-hyper-surface. We thus sincerely do hope that such a modeling will stimulate a large amount of legitimate scientific research around the phenomenon of consciousness. As with any kind of modeling, the fact of being right or wrong does not matter. This is because if we are right, then we have a possibility of unifying physics, chemistry and biology. On the other hand, if future research in this field would lead to the conclusion that the model is wrong, this would mean that a better modeling have been found whose discovery would have not been possible without first thinking in the wrong way. The best evidence for the necessity for science of being wrong in order to improve itself is provided by Newton's beautiful unification that was in fact based on false ideas that were rectified after the discovery of Maxwell's equations ruling electromagnetic phenomena. Similarly, the marvelous Maxwell's unification was itself based on false ideas that were rectified after the discovery of quantum mechanics. And there is also pretty good evidence that quantum mechanics is probably based also on false ideas… So wrong reasoning seems to be a powerful driving force for improving knowledge of the universe and try elucidating such deep mysteries such as life and consciousness.

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