All things are number, the rest is meaning

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The primary focus of this paper is on a connection between imaginary nothing and real nothingness; as the paper reveals, that insight allows us to bridge real physical entities and imaginary mathematical concepts in a manner that may be considered consistent with both causality and complementarity. What makes this nexus extremely relevant to natural philosophy is that it is amenable to addressing in terms of analytical solutions: such construct allows us to interpret asymmetry and symmetry, causes and effects, continuous and discrete, entropy and gravity, matter and time, and other fundamental complementarities in terms of a common conceptual framework. Of interest to broader audience is that that framework suggests that the laws that determine physical conservation and the laws that ensure survival of sentient beings derive from the same logical pattern and obey the same conservation principles.

Today, our knowledge is in principle sufficient to explain how nature is organized. That is, neither new physical experiments nor new mathematical contrivances nor new philosophical concepts nor new theological doctrines are required to meet this challenge. The truly essential question that needs to be answered is how to reconcile today's physical theory with causation. On the bright side, we definitely know the exact cause of the problem; it is calculus. Because of its underlying symmetry, calculus does not differentiate between the past and the future, which makes it mathematically inconceivable for physicists to theorize in terms of effects and causes. Though this astonishing paradox has been haunting physicists since the very inception of their theory, no considerable efforts have been made to disentangle it, that is, to explain whether it is possible to bridge the symmetry of calculus with the asymmetry of causation. As a step towards answering this question, the paper finds it appropriate to begin with one of the most persistent challenges faced by theoretical physicists: a way in which microscopic and macroscopic scales constitute a single whole.

1. Distinguishing null from zero

It was the physicist A. Migdal who gave us an extremely helpful clue as to how we might address the challenge in question. He suggested [1, p. 139] that gravity and electrodynamics might be interconnected as follows: $\alpha \cdot \ln\xi \sim 1$, where $\alpha = \frac{e^2}{\hbar \cdot c}$ is the fine structure constant and $\xi = \frac{\hbar \cdot c}{G \cdot m^2}$ is a typical 'large number.' The departure point for this assumption is that the five fundamental physical constants (Newton's constant G, light speed c, Planck's constant $\hbar$, the electron mass m, and the electron charge e) can yield only two dimensionless physically meaningful independent quantities: α and ξ. Mathematically, $\alpha \cdot \ln\xi = 1$, if $\xi = e^{\alpha^{-1}}$. The question that needs

to be answered is how to turn this trivial identity into a full-fledged analytical framework. As this paper hopes to explain, the answer lies in the following recursion:

$$(\alpha) \cdot \left(e^{\alpha^{-1}}\right) \cdot \left(\alpha \cdot e^{\alpha^{-1}}\right) \approx \omega \cdot 10^{115} \qquad (1)$$

Explicitly, this equation connects α and ω ($\omega = \mathrm{W}(1) \approx 0.567\ldots$ W is the Lambert function defined as the function that solves the equation $z = \mathrm{W}(z) \cdot e^{\mathrm{W}(z)}$). To appreciate the physical meaning of that connection, it would be helpful to take a brief look at the Lambert function. Along the real axis at the interval $(-\infty, -e^{-1})$ this function is widely discontinuous. For $x > -e^{-1}$ it vanishes identically. Of particular interest to physical theory is that between $-e^{-1}$ and 0 the function has two values $y, \bar{y}$ that exhibit consistent mirror anti-equality (Fig. 1), implying both chirality and complementarity (we say that two mutually exclusive entities complement each other if they constitute a complete physical and logical system and each entity has a unique property that another ultimately misses, e.g., right and left). Given that argument always precedes its function value, $x \in [-e^{-1}, 0)$ can be thought of as a causal variable that yields two mutually complementary outcomes: y and $\bar{y}$. Physically, this triad describes an idealized equilibrium at which a physical process ($x \mapsto y$) and its exact reverse ($x \mapsto \bar{y}$) completely cancel each other out; that is, x can be thought of as a common root that gives rise to two mutually complementing clockwise and counter-clockwise rotating quantum objects, y and $\bar{y}$. Mathematically, the states of these objects are determined in a simultaneous manner (if x is known, then y and $\bar{y}$ are definitely known). Certain questions arise when it comes to reality: a physical entity (e.g., the spin of an elementary physical particle) cannot be clockwise and counter-clockwise at once; it is therefore impossible to foreknow which spin will be left-handed and which right-handed, which is why quantum mechanics relies fundamentally on probabilistic method. Central to that method is the branch point of the Lambert function $(-e^{-1}, -1)$. In mathematics, the number $-e^{-1} (\approx -0.368)$ is relevant to the probability $1 - e^{-1} \approx 63.2\%$ that a permutation of many elements will have at least one fixed point (an element equal to its image), which means that a physical quantity remains invariant under scale transformations, implying self-similarity (self-identity). In physics, the number $|-e^{-1}|$ determines the time constant ($\approx 36.8\%$) that is used to measure the thermal responsiveness of a physical system while $1 - e^{-1}$ describes change in the energy state of the physical system: this quantity determines the time it takes the output of an electric process to change by $\approx 63.2\%$ of the peak-to-peak amplitude on every phase transition. The above gives us certain grounds to assume that the number $-e^{-1}$ somehow connects electrodynamics, invariance, probability, self-similarity, thermodynamics and time. Then, the question arises: how exactly does this

connection work? In addressing this issue, it would be helpful to take into account that the number $-e^{-1}$ can be thought of as underpinning the number 0. The point is that 0 lies exactly between the numbers $+1$ and -1 and these numbers are full (additive and multiplicative) inverses of each other; of particular relevance is that it is the Lambert function that highlights this connection in a sufficiently convincing manner: $-1 = \mathrm{W}(-e^{-1})$, $+1 = \mathrm{W}(e)$. Given the above, it makes sense to take a further look at the branch point of the Lambert function $(-e^{-1}, -1)$. If the causal variables $x \in [-e^{-1}, 0)$ describe a statistical behaviour of quantum objects, then the branch point $(-e^{-1}, -1)$ can be thought of as describing a chiral twist in this behaviour. Mathematically, this twist describes a bifurcation into two fundamental singularities. The bottom branch of the Lambert function W_{-1} tends to $-\infty$ as x tends to 0^- (negative singularity) while, at the same time and for the same $x \in [-e^{-1}, 0)$, the principal branch of the function W_0 tends to $+\infty$ (positive singularity).

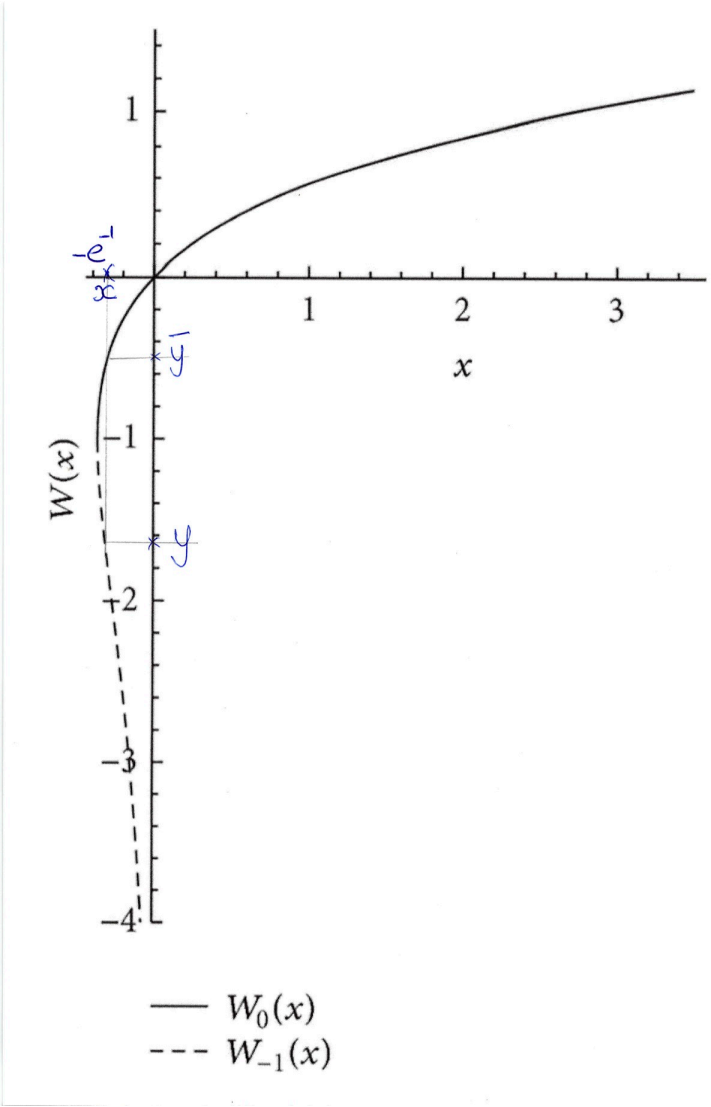

Fig. 1. The Lambert function and its two branches

Mediating between $\pm\infty$, the twist in question is necessarily relevant to the sign interchange $\pm$, which is manifest in 0 that lies at the heart of an absolutely symmetric construct known as the Cartesian coordinate system. The above gives us certain clues as to how 0 and a physical limit of the universe may relate to each other. That is, the Lambert function describes a physically meaningful statistical distribution of mathematical variables (the causal variables); the core of this distribution is the branch point of the function $(-e^{-1}, -1)$; this point yields 0 and, by the same token, determines the boundaries within which the causal variables $x \in [-e^{-1}, 0)$ are allowed to vary; mathematically anchored to 0, one of these variables, an exceptional one, is necessarily relevant to the physical limit in question.

To reveal this limit, we need to return to Eq. 1. Given that this equation describes an approximation of equilibrium, its exact solution can be written as the following strict equality:

$$(x) \cdot \left(e^{x^{-1}}\right) \cdot \left(x \cdot e^{x^{-1}}\right) = 10 \cdot \omega \cdot 10^{114} \tag{2}$$

Solving this equation reveals that it has three real roots; all of them derive from the omega constant ω:

$$\mp x_{1,2} = \mp R_w = -\,\mathrm{W_0}^{-1}\,(\pm R_w^{-1}) \text{ and } x_3 = \alpha_w = -\,\mathrm{W_{-1}^{-1}}(-\,R_w^{-1}) \tag{3}$$

where $R_w = \alpha_w \cdot e^{\alpha_w^{-1}} = |\sqrt{10 \cdot \omega}| \cdot 10^{57}$ (in what follows, upper-case letters denote the macro-scale of the universe while lower-case ones its micro-scale). Of specific relevance to physical theory is that the third root $x_3 = \alpha_w \approx 7.29739\ldots \cdot 10^{-3}$ is remarkably close to the currently accepted value of the fine structure constant $\alpha_c \approx 7.29735\ldots \cdot 10^{-3}$ (in what follows, the low index '*c*' reads 'current,' which is interpreted as the running value of a physical quantity; therefore, $\alpha_w = \alpha_c$ means that the universe is in stasis, implying a state of perfect equilibrium). Here it is appropriate to remark that equilibrium, by its very nature, implies complete coincidence of an object with itself. Theoretically, such state can be attained via a series of identity transformations, implying approaching self-similarity (which is precisely what the modus operandi of the Lambert function implies and this becomes perfectly obvious if we represent the function as a series of continued logarithms). Mathematically, self-similarity of a unique specimen (say, R_w) can be written formally as the following relationship between the specimen and its pre-image: $R_w^{-1} \cdot R_w = 1$, where R_w is the final term of the recursion in question. The physical meaning of this self-similarity reveals itself via the fine structure constant. Given the frequency-like nature of this quantity, the left-hand terms of Eq. 2 can be

thought of as describing three pillars of mechanics: contraction-extension (x), rotation ($e^{x^{-1}}$) and translation ($x \cdot e^{x^{-1}}$). The latter ($R_w = \alpha_w \cdot e^{\alpha_w^{-1}}$) can be thought of as describing an upper limit of translational force; accordingly, its reciprocal R_w^{-1} can be thought of as describing its lower limit; that is, the minimal wavelength, contributing to the zero-point energy and implying the lowest energy state of physical void, or, we may say, the spatial limit of the universe.

2. Twisting symmetry and asymmetry together

In physics, all particles are either asymmetric fermions or symmetric bosons. It is considered that fermions make up matter and take up space; they have half-integral spins and obey the exclusion principle, implying that fermions can have either left- or right-handed spin, but not both at once. Bosons carry energy; they neither make up matter nor take up space; they have integral spin and do not obey the exclusion principle, implying that physical conservation bases itself on symmetry. Of relevance to quantum mechanics is that $x \in [-e^{-1}, 0)$ yields two non-integer values y, $\bar{y}$, which can be associated with non-integer single-valued spins, describing the asymmetric behaviour of fermions. The Lambert function also tells us that for the same real argument there exists an infinite number of complex multiple-valued solutions $\mathrm{W_n}(z)$, where $\mathrm{n} \in \mathbb{Z}$. These solutions can be associated with the integer values of spins and multiple degrees of freedom, which is in line with the bosons' behaviour. Central to quantum theory is that that construct maps the asymmetry of fermions into the symmetry of bosons, making it possible to depict quantum dynamics as arising from particle-like asymmetric distribution of the causal variables (associated with fermions and the past), amplified by oppositely directed higher order field-like symmetric correlations (associated with bosons and the future). According to our convention, the lower limit of this process is $\pm R_w^{-1}$ and its upper limit is $\mp R_w$. What should be perfectly obvious here is that the sign interchange does not mean that physical energy can be negative or positive; what it (the sign) means is that physical energy arises from clockwise or counter-clockwise spin rotation, resulting in two counter-rotating quantum domains of the universe. Which is but natural: since left and right are equally consistent with nature, both right and left ought to be part of a more unified structure. These two domains are mathematically interconnected via the branch point of the Lambert function $(-e^{-1}, \mathrm{W}(-e^{-1}))$ that describes both 0 and the physical equilibrium at which two fundamental statistics (Fermi-Dirac and Bose-Einstein ones) converge with each other (this claim traces its roots back to a long-standing idea of physicists that all physical forces derive from a common ancestor). Thus, 0 (implying the symmetry between ± 1) and its underpinning asymmetry (between $-e^{-1}$ and e) determine the initial boundaries of the phase transitions via which quantification and amplification of fermions occur, shaping what is commonly

referred to as the space-and-time continuum. Summarizing, the causal variables $x \in [-e^{-1}, 0)$ describe quantum information, associated with fermions; the end-points of this interval correspond to a chiral twist via which this information increments and bifurcates in a discrete manner; the resulting energy fluxes are mutually compensated, so that the total entropic balance within the system remains constant; a series of the resulting successive equilibriums ensures a smooth variation in the order of magnitude, standing behind the energy transfer within the space-and-time continuum.

Today, the doctrine of continuity is the mainstream view within theoretical physics. Enchained with calculus, this doctrine leaves physicists no choice but to address both 'space' and 'time' in terms of the same mathematical infinity. In contrast to that view, the construct just sketched requires us to distinguish between two mutually complementing concepts of infinity: spurious (secondary) mathematical infinity, implying reversibility and symmetry, and its underpinning genuine (primary) physical infinity, implying irreversibility and asymmetry. Accordingly, the former exists only in imagination; it owes its origin to the concept of the mathematical nothing 0 (null, nought) while the latter derives from the physical nothingness R_w^{-1} (zero, naught) and exists in reality. It is therefore possible to say that in certain existential sense continuous mathematics borrows infinity from discrete physical reality and both are equally relevant to nature, making it possible to distinguish between real and imaginary. Of particular relevance to natural philosophy is that that logical construct allows us to draw a clear-cut conceptual distinction between asymmetry and symmetry. Fundamentally, such distinction is bound up with the question of whether time is reversible or irreversible, which gives us a perfect clue as to how this question can be answered.

3. Telling time from clocks

It is a long-standing tradition in both science and philosophy to associate time with change. According to our convention, change takes its rise in the time-rate of the electron (α_w), resulting in both rotational and translational motions of quantum particles. In an idealized realm of perfect forms, change can be thought of as occurring between $\pm R_w^{-1}$ and $\mp R_w$, implying a transition from cause to effect. Given that it takes duration to bridge cause with effect, it is possible to conceptualize time as an imaginary (mathematical) quantity that determines the rate of change and direction of rotation of real (physical) objects as they pass from cause to effect. Given the physical meaning of the roots of Eq. 2 (α_w, $\mp R_w$), we are able to see that physical processes that occur in differently rotating quantum domains are anchored to the same mathematical variable α_w; that is, α_w synchronizes translational motion in both the left- and right-handed quantum domains of the universe. Since these

domains are interconnected in a chiral manner, a hypothetical observer in either domain recognizes physical processes in the counter-rotating domain as occurring in opposite direction. Thus, from the perspective of the observer, time flows as if in two directions at once; and if the observer does not distinguish between clocks and time, he inevitably falls victim to the following contradiction: mathematical physics depicts time as reversible and symmetric, but time as we perceive it is asymmetric and irreversible; it always passes from cause to effect and never in the reverse, as our life experience and the second law of thermodynamics tell us. In what follows, the paper explains how exactly that paradox can be resolved.

Associated with the branch point $(-e^{-1}, \mathrm{W}(-e^{-1}), 0$ concurs with a twist at which differently rotating quantum particles spiral into two mutually compensating counter-rotating quantum vortexes. The causal order of that process is determined by the causal variables $x \in [-e^{-1}, 0)$ in an irreversible linear fashion. If we assume that all these variables take the value of null ($x = 0$) and do not change, then we should adopt the concept of spurious time, as is currently the case in physics. Invariably anchored to 0, this pattern describes a cause-free world in which seconds, minutes, hours, days, weeks… only mark time, which is why spurious time is commonly referred to as clock-time. In that world, entropy increases when clock hands are moving; accordingly, when clock hands stay put, it is considered that entropy remains constant, which is completely at odds with reality. The evident problem with clock-time is that it is conceptually insensitive to cause-and-effect distinction, which gives rise to the following paradox: if entropy increases towards the future, then it symmetrically increases towards the past, which is at odds with the thermodynamic asymmetry that is observed in reality: actually, we observe that entropy monotonically increases with time and it cannot be otherwise, because time, genuine time, irreversibly passes from cause to effect, unceasingly turning unbounded quantum information into bounded one, giving rise to energy. As is perhaps already obvious, this paradox arises because physicists do not distinguish between clocks and time; if properly interpreted, the concept of clock-time makes it possible to discern that the past and the future indicated by clock hands imply the clockwise and counter-clockwise rotations of the universal quantum vortex, which traces its roots back to the notion of physical spin from which the entire concept of energy conservation derives its existence. Given such insight, we are able to see that, for all its conventionality, clocks convey the meaning of time in an exact manner, implying that the mechanism of physical conservation is essentially two-dimensional, cyclical, multilayered and counterbalanced. What should be perfectly obvious is that clock-time is strictly limited to equilibrium situations: it depicts a real dynamical process as an idealized approximation of successive equilibriums. So, it is but natural that no clock tells us about the cause of its existence, that is, no clock

tells us that real physical processes derive from and occur in non-equilibrium environments: each of these processes is guided by its own internal time-rate, implying that the causal variables $x \in [-e^{-1}, 0)$ cannot but change; otherwise, physical motion as such could not be possible (and physics could not exist). To discern the meaning of time, we need two contexts: genuine time and its spurious complementarity. It is only when the asymmetry of the former and the symmetry of the latter are considered in their cohesiveness that it becomes possible to see that genuine time implies irreversible cyclical information increment while its spurious guise implies the point of equilibrium at which this information yields energy. Associated with the term 'now,' this point makes it possible to distinguish between the past, the present and the future, which is recognizable at the level of sensitive minds. Sensory information is processed in an individual fashion, therefore, the intrinsic time of a human, implying a sensitive mind, depends on specific individual scenarios; such time runs at different rates, because humans identify causes and effects in a subjective manner. Associated with individual experience, the internal time of humans flies, creeps, stands, fades… transforming ones' senses into tangible actions and shaping an irreversible asymmetric individual path of one's life while external order creates a sense of common clock-time that can only flow, indifferently turning the future into the past in accordance with clock hands.

4. Revealing the roots of conservation

On further reflection, it becomes obvious that the roots of Eq. 2 are fit perfectly to explain the provenance of certain conservation laws, adopted by physics. Given such insight, we are able to discern that the invariance of α_w can be thought of as bearing relation to the law of conservation of energy and homogeneity in time (translation symmetry); the invariance of $\mp R_w$ implies the law of conservation of linear momentum and homogeneity of space (the symmetry of translational forces). As Eq. 2 describes, the former (time) and the latter (translational forces) are bridged via rotation ($e^{\alpha_w{}^{-1}}$), which perfectly conveys the meaning of the law of conservation of angular momentum and isotropy of space. Perhaps it is not immediately evident, but in order to interpret these laws in terms of quantum mechanics, we need to consider all four remarkable algebras in their cohesiveness (these algebras are the one-dimensional real numbers, the two-dimensional complex numbers, the four-dimensional quaternions and the eight-dimensional octonions). It is true that physical conservation is manifest in symmetry, but it is also true that in order to conserve something, one must first create something. According to our convention, the real numbers describe a one-dimensional distribution of the causal variables over the real axis; that is, these numbers can be thought of as describing the potentiality of real physical objects, implying that space is real. Then, the imaginary

numbers can be thought of as describing a change of these variables in time, reflecting the imaginary nature of time. Given that the information that describes the space-like and the time-like constituents of physical energy originates from the same point-zero, it is natural to bridge them via the complex numbers, entailing that physical conservation is effectively two-dimensional. On the basis of this claim, it becomes possible to appreciate why the complex number multiplied by its conjugate (squaring) always yields a non-negative real number—energy remains real under any transformations, which is what the first law of thermodynamics states: energy can be neither created nor destroyed, but only changed from one form to another. The next mathematical milestone in that description of physical reality is the algebra of quaternions. This algebraic structure adds three-dimensionality, rotation and irreversibility, but the quaternions are irrelevant to causality. It is the algebra of octonions that extends the quaternions to causality; and that is where the non-associativity of the octonions is indispensable for describing the causal nature of reality (the octonions are neither real nor commutative nor associative, implying imaginariness, irreversibility and causality, respectively). In what follows, the paper shows how exactly that eight-dimensional algebraic structure bridges the cosmological (macroscopic) and quantum (microscopic) scales of the universe.

The mathematical formalism provided by the eight-dimensional algebra allows us to define a quantum state of a distinct physical object as follows:

$$\pm \Delta + \alpha_w i + G_w j + R_w k + \Omega l + m_w il + l_w jl + t_w kl = \psi_w \qquad (4)$$

To further appreciate Eq. 4, it makes sense to address, once again, the roots of Eq. 2. The time-like microscopic α_w and the space-like macroscopic $\mp R_w$ constitute an algebraic triad that synchronizes rotation and translation of physical forces via time (the time-rate of the electron). Given that the macroscopic and microscopic physical units are full inverses of each other, we are able to determine the microscopic unit of rotation via its macroscopic quantity $e^{\alpha_w{}^{-1}}$; that is, $\alpha_w = \ln^{-1}(e^{\alpha_w{}^{-1}})$. To interpret that connection in terms of current physics, it would be helpful to remind that current physical theory claims that gravity is essentially a curve in the geometry of the space-and-time continuum caused by mass. Given that claim, it is logical to associate $e^{\alpha_w{}^{-1}}$ (rotation) with gravity; accordingly, its micro-equivalent α_w can be thought of as the gravitational mass of the electron. From the above, it follows that the time-rate of the electron α_w uniquely specifies its gravitational mass: $\alpha_w = m_w$, which establishes a *mathematical* identity between time and matter (the word 'mathematical' is italicized to make it perfectly obvious that the identity in question reflects a syntactic aspect of information; semantically speaking, time and matter are not identical to each other). As Eq. 2 tells us, time (contraction-extension) precedes

gravity (rotation) and both precede translational (inertial) forces. Given that causal connection, we are able to see that the identity of time and matter ($\alpha_w = m_w$) is parallel to a viewpoint that inertial mass is proportional to gravitational mass, known among physicists as the equivalence principle. As is perhaps already obvious, it is conceptually impossible to differentiate the effects of inertia-translation from those imposed by gravity-rotation until time and clocks remain undistinguished from each other; that is, until time and duration are undifferentiated from each other, the physical essence of time remains hidden and so does a connection between gravity and inertial forces. It is perhaps not immediately evident, but it is the fourth term of Eq. 2 ($\Omega = R_w^2 = \omega \cdot 10^{115}$) that makes it possible to complement time with duration and therefore to turn the time-rate into a full-fledged concept of time—time as we know it. Given the physical meaning of the alpha constant, the fourth term Ω can be interpreted as the duration it takes gravity to shape the physical structure of the universe; that is, to bind the quantum information that underpins a transformation of quantum particles as they pass from $\pm R_w^{-1}$ to $\mp R_w$. Standing apart from all its constituents and fully accounting for their contributions to the total energy content of the universe, Ω is ideally suited for the role of a cosmological constant, implying that physical integrity of the universe is ensured by the counter-rotation of differently directed physical spins. What makes this constant particularly relevant to the concept of physical conservation is that it bridges the zero-point energy of void (the 'micro') and the total energy content of the universe (the 'macro') in an explicit and unambiguous manner: ${}^{R_w}/_{R_w^{-1}} = R_w^2 = \omega \cdot 10^{115}$, which explains the essence of what is known among physicists as the cosmological constant problem.

Logically, our next concern is to define the microscopic units of mass, length and time. Given the physical meaning of the cosmological and other constants, it becomes possible to define these units as follows: $m_w = \ln^{-1} G_w$ (mass), $l_w = \ln^{-1} R_w$ (length), $t_w = \ln^{-1} \Omega$ (time), where $\Omega = R_w^2$, $G_w = e^{\alpha_w^{-1}}$, $R_w = \alpha_w \cdot e^{\alpha_w^{-1}}$. It is worth remarking that in terms of quantum mechanics the quantities G_w, R_w and Ω are interpretable as the elements of the main diagonal of the quantum chromo-dynamics (QCD) matrix; physicists consider that these elements are functionless because they lack 'colour' (which is true, but it is also true that that trueness reflects the main conceptual restriction of today's physics: darkness is the absence of light—full stop—either light or darkness, but not both at once, which, in particular, makes it conceptually inconceivable for physicists to bridge classical laws of conservation with their quantum underpinnings). Further, the term $\pm\Delta$ (Eq. 4) implies that the universe comprises two counter-rotating quantum domains $\pm R_w$; this delta stands for the value of displacement (relative to 0, the only exact middle between R_w and $-R_w$) while its sign indicates direction of rotation of the physical object in question; the terms *i*, *j*, *k*, *l* are imaginary units such as $i^2 = j^2 = k^2 = l^2 = -1$; and ψ_w denotes

state of the object. Thus, Eq. 4 translates classical laws of physical conservation into the language of quantum mechanics, namely, α_w implies conservation of energy and homogeneity in time; m_w implies conservation of angular momentum and isotropy of space; l_w implies conservation of linear momentum and homogeneity of space. The fourth term t_w is the microscopic equivalent of the cosmological constant; this term synchronizes the microscopic scale with the absolute time Ω, implying that all physical interactions are synchronized via these quantities across the entire universe. From the perspective of geodesics, Eq. 4 describes how exactly time causes matter to gravitate towards the point of their common origin in the shortest way possible, which allows us to consider the principles of causality, least time and least action in their ontic, mathematical and physical cohesiveness. Speaking in terms of topology, Eq. 4 describes a rotation of quantum objects on a double twisted surface on which it takes two circuits to compensate the contribution of their zero-point energies, which is what Eq. 3 tells us: $\mp R_w = -\mathrm{W}_0^{-1}(\pm R_w^{-1})$. Given the above, we are able to appreciate why electrons, and other fermions, return to their original orientation after 4π −rotation in space: it is such type of rotation that strikes an exact balance between the identities shared by coupled objects, such as fermions and their chiral quantum twins. To this, it may be added that 'space' and 'time' are united through and via the following self-similarity: $R_w^{-1} \cdot R_w = 1 = \alpha_w^{-1} \cdot \alpha_w$, implying $4\pi -$ rotation in space and 2π −rotation in time, respectively. Summarizing. Time runs at different rates. Every quantum system operates at its own time scale, but due to the perfect synchronization between the time-rate of the electron, gravity and translational forces, the universe as a whole rotates in a deterministic manner. Time and gravity are in inverse exponential dependence, which is what the following equation tells us: $G_w = e^{\alpha_w^{-1}}$. Gravitational mass causes inertial mass; the time-rate of the electron α_w plays an exceptional role in setting a mathematical identity between time and matter ($\alpha_w = m_w$). Gravity precedes all three translational forces (the electro-magnetic force and the two nuclear forces: the strong and the weak ones). From the above, it follows that whenever one claims that the masses of the elementary physical particles create gravitational fields, this should not be understood in the sense that mass causes gravity; quite the opposite: it is gravity that causes inertial mass. Gravity operates in the quantum domains that are unreachable for translational forces: the operational range of gravity exceeds that of translational force by $\alpha_w^{-1} = {}^{G_w}/_{R_w}$. The quantity α_w^{-1} is amenable to interpretation in terms of Boltzmann's entropy formula: $S = k \cdot \ln W$. Given that (i) $W = G_w$ is the number of all possible quantum states at the state of equilibrium of the universe and (ii) void itself produces neither translational motion nor action ($k = 1$), the term $S = \alpha_w^{-1}$ can be interpreted as the free entropy of the electron or, we may say, its gravitational

potential, implying a measure of the quantum information that is to be bound to produce the energy that gives rise to translational forces.

5. Untwining quantum entanglement

It is increasingly evident that in order to meet certain fundamental challenges faced by physics, we ought to distinguish between the terms 'null' and 'zero.' Which, in particular, allows us to disentangle physics from quantum entanglement. To remind, a quantum pair is said to be 'entangled' if each object of the pair cannot be described independently of the other and these objects are perfectly correlated to each other, no matter how distant they are from each other (e.g., if one object is right-handed, then its paired object is invariably left-handed). This phenomenon has long been a stone of stumbling for physicists, because no information can travel faster than the speed of light. The point is that no information transfer is required to know the quantum states of the entangled pair, because these pairs derive from that very information: it is embedded into the gravitational contour of the universe at the fundamental level of the causal variables $x \in [-e^{-1}, 0)$. That is, if neither y nor $\bar{y}$ causes each other and the two are mutually correlated, then there must exist their common cause, which is what their common argument x implies: x determines y and $\bar{y}$ simultaneously and independently from each other. Physically, the states y and $\bar{y}$ cannot be *measured* simultaneously, but this impossibility in no way entails that they cannot be *known* simultaneously. Understandably, similar difficulties arise when it comes to the principle of quantum superposition. Loosely speaking, it claims that until a quantum object remains unobserved, it is in a state of superposition, implying that it exists in all possible states at once. Which is a logical nonsense: no one can be dead and alive at once. It is true that until certain quantum information is not actualized, it is impossible to observe which spin is left-handed and which is right-handed, but this does not entail that the spin rotates in all directions at once. The exact direction of that rotation becomes observable and measurable when quantum separation occurs. Such separation implies that certain statistical condition has been fulfilled and certain quantum information has been released. When such release occurs it becomes possible for physicists, and other observers, to observe what is observable in the domain of their original handedness. Once that connection between quantum information and physical observables is properly appreciated, then it becomes possible to reveal a way in which quantum information comes to light. It comes to light or, we may say, becomes actualized via a quantum twist that is amenable to conceptualization in terms of the branch point of the Lambert function $(-e^{-1}, \mathrm{W}(-e^{-1}))$. Logically, this twist concurs with a state of the ultimate confrontation within a quantum system, implying that the quantum objects described by y and $\bar{y}$ are fully polarized relative to each other. Physically, this event

describes quantification and separation of primordial formless void into two counter-rotating quantum domains, which is manifest in a turn (π −turn) between 1 and $\overline{1}$ ($e^{2\pi i} = 1$ and $e^{\pi i} = -1$) or, we may say, between two mathematically indoctrinated infinities $\pm\infty$. Concurring with the point of bifurcation in question, such twist necessitates both asymmetry and symmetry at once (entry condition: y and $\bar{y}$ and exit condition: 1 and -1, respectively). Current null-based physics has to interpret this quantum event exclusively in terms of calculus, which hides a causal connection between the symmetry of calculus and its underpinning asymmetry: 0 relates to symmetrically arranged $\overline{1}\,(-1)$ and 1 $(+1)$ in a way similar to which its underpinning ω relates to asymmetrically arranged e and $-e^{-1}$ (to remind: $-1 = \mathrm{W}(-e^{-1}) = e^{\pi i}$, $+1 = \mathrm{W}(e\,) = e^{2\pi i}$). Philosophically, the entry condition (asymmetrically arranged y and $\bar{y}$) implies contradiction while the symmetry between 1 and $\overline{1}$ does its resolution. It is therefore logical to associate conflict resolution with quantum disentanglement, implying that certain quantum information is actualized and certain amount of energy is released, which, it may be remarked, accords with what current physical theory tells us: a transition from potentialities to actualities occurs via the mechanism of wave function reduction (ψ −collapse). Such reduction is natural: responding to discontinuity, any continuous function necessarily fails to evince its continuity. The reason for that is causality: it is cause (zero, naught) that precedes effect (null, nought); that is, the effect consistently declines to be identified as the cause, which is exactly what the reduction of the wave function highlights.

To the above, it may be added that it is a common practice for physicists to describe the probability of a quantum event as the modulus squared of its amplitude ($|\psi|^2$). Certainly, it is tactically correct to exclude negative probability from the equations of quantum mechanics, but the reverse side of that move is that by doing so physicists evade, albeit unknowingly, the key question of that very mechanics: what is the physical meaning of the negative quantum probability? Seeking as it does to ensure mathematical convenience, physicists have missed the opportunity to reveal that the $|\psi|^2$ rule holds because of the strict statistical relationship that underpins fundamental quantum chirality (-36.8% versus 63.2% or $(\mathrm{W}(e) - e^{-1})$ versus $(-\,e^{-1})$). It is of course null-based mathematics that gives physicists no choice but to interpret this relationship in terms of the sign interchange $\pm$; and therein arises a tricky challenge for mathematical physicists: null encourages them to choose between $+$ and $-$ while the genuine, strategic, choice lies between syntactic and semantic interpretations of null; and the same is true of infinity: physicists go to great length to expunge the symbol '∞' from their equations, but this tactically right move remains strategically self-defeating without inquiring into the semantics of both null and infinity.

6. Substantiating syntax with semantics

Today, the global tendency in exploring the universe is for physicists to seek for appropriate clues not so much in its initial conditions as in the structure of the physical laws governing the universe of today. Which is understandable: there is no physical footing for appropriate concepts in the very early universe, let alone a pre-time universe. In what follows, the paper hopes to explain that that gap is amenable to addressing in terms of both semantic and syntactic constituents.

If a microscopic quantum system starts with its initial R_w^{-1} −state, then the probabilities of ending up in all possible states $G_w = e^{\alpha_w^{-1}}$ add up to 1, which means that the gravitational constant G_w determines the amount of information that completely reduces uncertainty in the quantum system with the initial (free) entropy α_w^{-1}. The same holds true for the counter-rotating quantum domain ($-R_w^{-1}$), so that in each domain the probability of ending up in all possible states remains one, which is what the self-similarity of space-and-time implies: $R_w^{-1} \cdot R_w = 1 = \alpha_w^{-1} \cdot \alpha_w$. The information contained in this message lies at the heart of the physical structure of the universe, but, astonishingly enough, current scientific theory considers that this message carries no information at all. Formally, mathematical theory of communication defines information as the negative logarithm of its probability ($I = -\ln P$; here scientists use the negative logarithm with the same aim as in quantum mechanics: this tactical trick allows negative probability to be avoided). That is, the informational value of a message is proportional to the degree to which the content of the message is surprising: if an event is highly probable, it is considered that the message carries no surprise Thus, mathematical theory of communication tells us that the message $R_w^{-1} \cdot R_w = 1 = \alpha_w^{-1} \cdot \alpha_w$ carries neither surprise nor information: $\ln 1 = 0$. Which needs to be explained: how is it possible that the emergence of the universe is put on the same footing as, for example, a stone falling? The catch here is that scientific theory in general, and theory of communication in particular, focuses exclusively on correlations (syntactic information) while the meaning of these correlations (semantic information) remain beyond its scope. Therefore, semantically speaking, the result in question comes as no surprise, because its underpinning theory is about surprise (unexpected event), but not about astonishment (miraculous event). To give the message in question its genuine meaning, we should re-address it as follows: the more probable the message, the less information it gives; the minimal syntactic information about the universe is zero ($|R_w^{-1}|$); therefore, it is zero, but not null (0), that gives rise to the most probable message; mathematics substitutes real zero with imaginary 0, which makes it possible to address correlations in an extremely efficient manner, but the reverse side of that trick is that it completely masks both the provenance of null and its physical meaning; as a result, physicists consistently confuse imaginary null with

real zero, using the former disguised as the latter. Obviously, such 'system error' makes it conceptually inconceivable for them to bridge observables with their meanings, which comes as no surprise, though leaves room for astonishment.

The above gives us sufficient grounds to think that syntactic information makes sense only against its meaning, which, in particular, entails that physical theory needs to be conceptualized in terms of both nought and naught. This claim, however, remains severely unappreciated among physicists; and therein lies the rub: until nought (null, mathematical nothing) and naught (zero, physical nothingness) remain semantically and mathematically undifferentiated from each other, we are doomed to an endless battle with nothing. One does not need to look very far in order to find evidence of that: endowed with the 'unreasonable effectiveness' of mathematics, several generations of physicists have been struggling to build what they call a theory of everything, and… nothing comes out. However, this is not to say that physicists are totally ignorant of these difficulties; from time to time they receive sufficiently discernable signals that something goes wrong in their realm; for example, in 1918 Schrödinger [2] and Bauer [3] highlighted, independently of each other, a striking incongruity underlying Einstein's relativistic theories, namely, the energy-momentum takes the value of 0 in one frame of reference while in another coordinate system the same quantity escapes to ∞, which alone might be sufficient to motivate physicists to start thinking about a re-conceptualization of their theory, but none of that happened. The signal was blocked; and it could not be otherwise, given that the collective mind of mathematical physicists was and is rigidly anchored to nothing, both literally and conceptually. Until the nature of that connection remains hidden from physicists, they are doomed to run their equations from 0 to ∞, and back again, truly believing in what they do.

The concept of nothing is a sheer logical construct that is woven into both the fabric of our consciousness and the physical structure of reality, which makes it possible to recognize that mathematical nothing (nought) and physical nothingness (naught) are two mutually complementing components of the same reality. It is therefore obvious that in order to grasp the language of nature a sensitive mind needs both. To be as clear as possible: physical observables derive from naught; calculus addresses naught as nought; both are semantically relevant to the way in which the physical universe goes round, and so does the sensitive mind. Mathematics has proved remarkably efficient in natural sciences because it reflects the universal modus operandi of nature that is prior to the human mind that explores nature and her laws. These laws base themselves on meanings, and it is our mind, or we may say, our language that bears potential to reveal how exactly correlations and their underpinning meanings constitute a semantic unity. Which is why semantics matters: if the term 'zero' is used in the sense of naught, as it ought to be, then everything falls into its place. Once the meaning of zero is appreciated,

then division one by zero becomes physically and mathematically meaningful, it yields neither infinity nor indefiniteness, it yields aught or, we may say, everything: $R_w = (R_w^{-1})^{-1}$. Given such semantic insight, it does not take much acumen to discern the modus operandi of nature: nought ought to twist naught and aught together. To complete this thought, it is perhaps appropriate to show how the language of nature deals with the nothing-and-everything paradox: physical nothingness (nothing as naught, R_w^{-1}) specifies the maximum of physically realizable force (everything as aught, R_w) that is actualized in the process of becoming (time as absolute time, Ω). This connection can be written as follows: $R_w = R_w^{-1} \cdot \Omega$, that is, aught is naught, multiplied by time.

7. Piecing number and meaning together

With the above in mind, it should be perfectly obvious that to argue that the universe emerged from nought is tantamount to claiming that physical space is imaginary. Here we ought to note that this paper firmly hews to the view that the physical world around us exists in reality, even though we have sufficient grounds to believe that that reality was first created in someone's imagination. Given that physical space is real, it is logical to claim that physical container of information can never be annihilated. This entails that there always exists a physical possibility for information exchange, implying that everything in space is in motion, which is what the third law of thermodynamics states: the absolute zero (implying null) is physically unattainable. Mathematically, the entire dynamics of the universe derives from the alpha constant α_w (that, in its turn, derives mathematically from the omega constant ω). Because of irrationality, one can combine these numbers infinitely often, which creates an apparently harsh challenge to physics: infinity is not amenable to measuring. In addressing this challenge, the only right strategy is to fight fire with fire: negate infinity with infinity, implying double negation. Which is what the self-similarity of space and time $R_w^{-1} \cdot R_w = 1 = \alpha_w^{-1} \cdot \alpha_w$ implies, thus making it possible for physicists to address their theory in the terms of finite measurable quantities.

It is the idea of an originary numeric nature to the world order that lies at the heart of the present research. In principle, this idea is not antithetical to scientific reasoning though the suggestion, of course, is foreign to current physics. Physicists traditionally investigate nature through external order that is manifest in the motion of material bodies, which forces the investigators to give epistemic priority to syntactic information rather than its semantics. However, all syntactic information that describes physical structure of the universe is encoded in numbers, the rest is meaning. In particular, it is the meaning of self-similarity that is central to the interaction of fundamental physical forces. To remind, self-similarity means that a physical quantity remains invariant under infinite scale transformations of the space-and-time continuum (which is manifest in the following remarkable feature of the

exponential function: $f'(e^x) = e^x$). The self-similarity of the space-and-time continuum ($R_w^{-1} \cdot R_w = 1 = \alpha_w^{-1} \cdot \alpha_w$) derive from the same invariant ω, which allows us to address space-like and time-like constituents of that continuum in terms of a common framework; central to that framework is the identity of time and mass $\alpha_w = (\alpha_w^{-1})^{-1} = m_w$ (owing its origin to double negation, this message reads formally as follows: the reciprocal of α_w^{-1}, implying both the free entropy of the electron and its gravitational potential, gives meaning to both time and matter). Formally, a parity between two mathematical variables, say, α_w and ω can be written as follows: $\frac{\alpha_w \cdot \omega}{\alpha_w} = \omega = \frac{\alpha_w \cdot \omega}{\alpha_w}$. Mathematically, the numbers ω and e are interconnected as follows: $\omega \cdot e^{\omega} = 1 = \omega^n \cdot e^{n\omega}$ *($n \in \mathbb{Z}$).* At the state of an idealized equilibrium, the time-rate and the mass of the electron are indistinguishable, presenting two physically meaningful mathematical equivalents ($\alpha_w = m_w$). It is exactly this identity that allows us to deduce an analytical relation between the time-rate and the mass of the electron as follows:

$$\frac{\alpha_w \cdot \omega}{\alpha_w} \cdot e^{\alpha_w \cdot \omega / m_w} = 1 = \frac{\alpha_w \cdot \omega}{m_w} \cdot e^{\alpha_w \cdot \omega / \alpha_w} \tag{5}$$

The logic of the present research allows us to claim that the middle term of Eq. 5 exactly equals the macroscopic radius of the electron $R_e = 1$ (to remind, upper-case letters denote the macro-scale of the universe while lower-case ones its micro-scale). Here we should clarify the line of reasoning underpinning this deduction, and those that are to follow. The macroscopic units are associated with their microscopic equivalents; in particular, the macro-equivalent of the quantum of action is thought of as the maximum of physically realizable action of translational force R_w, which can be associated with the speed of light. In classical physics, the radius of the electron is calculated as follows: $r = \alpha \cdot \lambda$, where $\lambda = \hbar/mv$. Given that the macroscopic equivalent of the speed of light is $v = c = R_w$ and $\alpha = \alpha_w, m = \alpha_w$, $\hbar = R_w$, we can determine the macroscopic radius of the electron as follows: $R_e = \alpha_w \cdot \alpha_w^{-1} = 1$. Next, the parity of reasoning allows us to extend Eq. 5 into the field of other elementary physical particles as follows:

$$\frac{\alpha_w \cdot \omega}{\alpha_p} \cdot e^{\alpha_w \cdot \omega / m_p} = R_p = \frac{\alpha_w \cdot \omega}{m_p} \cdot e^{\alpha_w \cdot \omega / \alpha_p} \tag{6}$$

where α_p, m_p, and R_p are the time-rate, the mass and the radius of an elementary physical particle (p). Logically, one can calculate the time-rates and radii corresponding to the unique masses of distinct elementary physical particles by substitution into Eq. 6 of appropriate values given in the units of the electron-masses. As it follows from these substitutions, each value corresponding to the

unique mass has two real roots; that is, any elementary physical particle can be thought of as constituting an algebraic pair, consisting of two conjugated quantities interconnected through the electron joint $R_e = 1$ (Table 1).

Table 1. The time-rates (α_p, A_p^D) and radii (R_p, R_p^D) of certain remarkable elementary particles (R_e and r_e are the electron radii at the macro- and micro-scales, respectively)

The elementary particle	α_p	R_p	A_p^D	R_p^D
…			…	…
'Dark' proton			≈ 0.00039…	≈ 10.43…
'Dark' pion			≈ 0.00049…	≈ 8.59…
'Dark' gamma-quantum			≈ 0.00055…	≈ 7.67…
Electron (e) and its 'dark' twin	$= \alpha_w$	= 1 (R_e)	≈ 0.00256…	≈ 2.84…
Gamma-quantum (γ)	≈ 1…	≈ 0.00414… ($2r_e$)		
Pion (π^+)	≈ 2…	≈ 0.00207… (r_e)		
Proton (p^+)	≈ 13.4…	≈ 0.000309…		
…	…	…		

Mathematically, Table 1 describes an inverted algebraic pattern designed in such a way that for every elementary physical (quantum) particle its time-rate increases as its radius decreases in one realm while in the other realm the time-rate decreases as the radius increases, so an action in one realm reciprocally induces a counter-action in the other, in such a way that these realms unceasingly induce each other. Thus, two mutually conjugated differently rotating microscopic luminous worlds exist simultaneously, affecting each other through and via the electron joint $R_e = 1$ (the terms 'through' and 'via' are used to refer to space and time, respectively). In bridging these worlds, this Janus-like connecter serves as an attractor towards which differently rotating quantum particles tend to evolve. Step by step, physicists explore the luminous material world we live in (left lower part of Table 1) while its inverse remains a dark side of the universe amenable only to crude approximation (right upper part of Table 1). What makes that pattern particularly relevant to physics is that it allows us to deduce major dimensionless quantities of the electron (Table 2).

Table 2. Major dimensionless quantities of the electron

Quantity	Macro-scale	Micro-scale	Source formula
Quantum of action ($R_w, \hbar_w$)	$\alpha_w G_w$	$\alpha_w \omega$	See below
Classical radius (R_e, r_e)	1	$\approx \frac{\hbar_w}{2}$	$r = \lambda\alpha$
Gravitational radius (R_g, r_g)	2	$\approx \frac{\hbar_w}{2}$	$R_g = \frac{2Gm}{v^2}$
Compton wavelength (Λ_w, λ_w)	α_w^{-1}	$\approx \frac{\omega}{2}$	$\lambda = \frac{\hbar}{mv}$
Charge ($-, e_w$)	$-$	$\approx \pm\sqrt{2\alpha_w^2\omega}$	$\hbar = \frac{e^2}{\alpha v}$
Bohr radius (A_0, a_0)	α_w^{-2}	$\approx \alpha_w^{-1} \cdot ½\omega$	$a_0 = \frac{\hbar}{mv\alpha}$
Angular momentum (for a circular Bohr's orbit, L_e, l_e)	G_w	ω	$L_e = mva_0$
Ratio 1: quantum of action to angular momentum	α_w	α_w	
Ratio 2: classical radius to Compton wavelength	α_w	α_w	

Here we should pause to explain how the microscopic velocity v and the microscopic quantum of action $\hbar_w$ are defined. The microscopic velocity is defined as follows: $v = \frac{l_w}{t_w} \approx 2.000264$ ... further referred to as ≈ 2, which is the classical representation of velocity of a material body moving in Euclidean space: distance divided by time. The micro-quantum of action is defined as follows: $\hbar_w = \alpha_w \cdot \omega$, which can be interpreted in the following way: given that α_w is the reciprocal of the Compton wavelength of the electron $\Lambda_w = \alpha_w^{-1}$, its frequency-like equivalent α_w can be thought of as describing the changeability of the universal quantum vortex in time while the angular momentum of the electron ω (Table 2) stands for its rotational invariance, implying the angular momentum conservation. Given that interpretation, it is safe to say that the micro-quantum of action sets a one-to-one correspondence between individuated ($\propto \alpha_p$) values of the time-rates of the quantum particles and the angular momentum of the electron. Accordingly, the quantum of action of a microscopic quantum participle is defined as follows: $\hbar_p = \alpha_p \cdot \omega$. The gravitational radius of the electron (Table 2) is deduced from the substitutions in Schwarzschild's equation: $G = G_w, m = \alpha_w, c^2 = R_w$ (the macro-scale) and $G = \omega, m = \alpha_w, v^2 = 4$ (the micro-scale), respectively. Note that Schwarzschild's solution is relevant to stasis, which is exactly what the concept of the idealized equilibrium $\alpha_w = \alpha_c$ implies.

In principle, if the Compton wavelength (λ_p) of an elementary physical particle is known, one can calculate its microscopic radius as follows: $r_p = \lambda_p \cdot T_p \cdot R_p$, where the right-hand terms are the Compton wavelength (microscopic dimensional), the time-rate and the radius of the elementary physical particle (macroscopic dimensionless), respectively. Given Table 1 and the data obtained through empirical research [4], one can calculate the radii of any elementary physical particle, for

example, for proton $\approx \frac{0.842\ldots}{1000}$ fm, pion $\approx \frac{0.585\ldots}{100}$ fm, electron $\approx \frac{2.818\ldots}{1}$ fm, which makes it possible to bridge dimensional physical quantities with their dimensionless equivalents (note, the factor of ten should be taken into account). Also, note that two ratios (the lower part of Table 2) are put in the table to highlight the exceptional role of the alpha constant in bridging physical fundamentals: $\frac{R_w}{G_w} = \alpha_w = \frac{\hbar_w}{\omega}$; since the alpha derives from the omega constant, the role of the latter should also be appreciated: $\frac{\hbar_w}{\alpha_w} = \omega = \frac{\hbar_w}{m_w}$.

Commonly, physical interactions are thought of as arising from differences in energy levels between quantum particles with a universal tendency to the lowest energy level of the universe, implying equilibrium. Given that $R_e = \alpha_w \cdot \alpha_w^{-1} = 1$ is a mathematical manifestation of physical equilibrium, and drawing on Table 1, it is logical to assume that the fundamental physical interactions should be based on the following reciprocation: if the value of the Compton wavelength α_c^{-1} increases then the value of the time-rate α_c decreases (in this case, the strong forces prevail: they conserve atom's integrity and provoke gain in gravity); the weak forces act in a reciprocal manner: they stimulate nuclear decay and compensate gain in gravity. To give the above a concrete physical footing, it is reasonable to take a closer look at the four remarkable elementary physical particles (Table 1). These particles specify the ranges of action of the fundamental forces that are manifest in the time-rates and their corresponding radii for: (i) the electro-magnetic forces that act within the electron *e* and the gamma-quantum γ layers (α_w, 1 and 1, $2r_e$); (ii) the strong forces that act within the γ and the pion π^+ layers (1, 2 and $2r_e$, r_e); and (iii) the weak forces that act beyond the Yukawa potential that is restricted by the π^+ and the proton p^+ layers, where the latter (the proton-layer) can be thought of as closing the gravity loop via the radius of the proton and the zero-point energy R_w^{-1} as follows:

$$R_{proton} \approx \frac{\alpha_w}{R_w} \cdot 10^{56} = \frac{1}{G_w} 10^{56} \qquad (7)$$

Thus, the electro-magnetic and nuclear forces can be thought of as constituting a single translational force. Acting within different energy layers, these forces are manifest in different time-rates and therefore in different quanta of action. The above makes it clear that it is the weak interactions that constitute the weakest link in the gravity contour of the universe as against the strict determinism inherent in the electro-magnetic and strong forces, which is manifest in the symmetries inherent in the attractor $R_e = \alpha_w \cdot \alpha_w^{-1} = 1$. Given the above, it is safe to say that quantum chirality underlies asymmetry at all scales of the physical universe: from weak quantum interactions that recognize a distinction between left- and right-

handedness to cosmic parity violation, associated with spiral galaxy spin asymmetry. With that in mind, it is but natural to expect that the parity violation inherent in the weak quantum interactions should manifest itself on the cosmological scale; and we have sufficient grounds to assume that the slight lop-sidedness (dubbed the cosmic 'axis of evil') that is observed on the very large cosmological scale owes its origin to this symmetry violation as applied to the macroscopic scale of the universe, and, as astrophysical observations show, there exists the macroscopic attractor (dubbed the 'great attractor') on the other side of the Milky Way (the chirality in question also explains why the solar system has the preferential, conventionally, counter-clockwise rotation while both clockwise and counter-clockwise objects are possible within a star system). Here it would perhaps be appropriate to remark that the power of the universe, literally meaning 'everything rotated by one,' resides in the permanent twist-like physical interactions via the attractor, implying a perfect order that lies as if outside physical reality. Which needs to be explained: dynamics, in its physical sense, is distinguished only if it is measured up against a fixed frame of reference being at absolute rest; clearly enough, such unmoved mover cannot be physical part of its physical environment—such ideal point of reference can exist only in imagination.

The concept of unmoved mover is relevant to a state of absolute equilibrium, implying that $\alpha_c = \alpha_w$. Physically, matter can emerge only in a non-equilibrium environment, implying that quantum particles ought to move ($\alpha_c \neq \alpha_w$), making it possible for matter to emerge and to exist for a time. In certain existential sense, α_c can be thought of as describing realities of the world (aught as it is) while α_w as describing its ideal state (aught as it ought to be); that is, if a process spins out of control (as it ought not to be), it is inevitably returned to self. Cosmologically, the difference between α_c and α_w ($\approx 4 \cdot 10^{-8}$) determines the curvature of the universe: ${}^{R_c}/_{R_w} \approx 1.000746 \ldots$ given that $\alpha_c \approx 7.29735 \ldots \cdot 10^{-3}$. This means that the universe is very close to being flat but is not completely flat. Geometrically, the energy that ensures physical conservation of the universe at the state of its idealized equilibrium is associated with its surface area, but surface area increases at lower rate as compared to its volume. Since the universe is restricted in space, such irreconcilability can be resolved either through an irreversible collapse or through a canalization of excess energy into nuclear fission. Which is what the fermion-boson coupling implies: this process runs through a series of cycles, organized in such a way that quantum information exchange intensifies, implying the decrease of the time-rate of the electron and coherent increase of its macroscopic angular momentum ($G_c = e^{\alpha_c^{-1}}$), equivalently, the radius of the universe ($R_c = \alpha_c e^{\alpha_c^{-1}}$); due to the asymmetry of the fermions' behaviour, the quantum information exchange irreversibly intensifies while the universe is becoming more inhomogeneous.

Logically, formation of matter runs via a series of recursive thermal relaxations in the course of which appropriately scaled local equilibriums are sequentially settled and the mechanical peaks of translational forces are sequentially localized as the quantum fluxes are twisted and reversed. Associated with the branch point of the Lambert function $(-e^{-1}, \mathrm{W}(-e^{-1}))$, this modus operandi of nature is manifest in the peaks of the nuclear reaction: $\mathrm{H} \ldots \rightarrow \mathrm{C} \leftarrow \mathrm{N} \rightarrow \mathrm{O} \ldots \leftarrow \mathrm{Fe} \rightarrow \ldots \leftarrow \mathrm{Ag} \rightarrow \cdots \leftarrow \mathrm{Au} \rightarrow \cdots \leftarrow \mathrm{Tl}\ (\mathrm{P}(\mathrm{Tl}_{208}) = \mathrm{W}(e) - e^{-1} \approx 63.2\%) \leftarrow \mathrm{Bi} \rightarrow \mathrm{Po}\ (\mathrm{P}(\mathrm{Po}_{212}) = |-\ e^{-1}| \approx 36.8\%) \ldots$ where $\mathrm{P}\ (\mathrm{element})$ is the probability of the element decay bracketed. Of particular interest is the bismuth twist (peak); given the construct suggested, we are able to assume that bismuth (Bi) serves as a critical threshold through and via which the time-rate of the electron yields a qualitative shift in the process of nuclear formation, which is what a connection between r-process (rapid neutron capture) and s-process (slow neutron capture) essentially implies: Bi −twist terminates the slow neutron capture so that all heavy nuclei after bismuth are built via the rapid neutron capture only.

To gain a further insight into the mechanism of nuclear formation, it would be helpful to address the following recursive construct:

$$\begin{array}{ll} -x^{-1} & \mapsto \mathrm{W}(-x^{-1}) = -1 \mapsto \mathrm{W}(-1) \mapsto a\text{–}point\ (\rho \approx 137 \cdot 10^{-2}\ and\ \varphi \approx 103°) \\ \updownarrow & \\ x & \mapsto \mathrm{W}(x) = 1 \mapsto \mathrm{W}(1) = \omega \mapsto \omega\text{–}point\ (1 + \omega i) \end{array} \tag{8}$$

where $x = e$ is the base of natural logarithms; $\mathrm{A} \mapsto \mathrm{B}$ reads as A gives rise to B; the two different forms (polar and rectangular) that describe the endpoints of the α − and ω −based branches of the recursion are used for a clearer representation of the following double helix pattern:

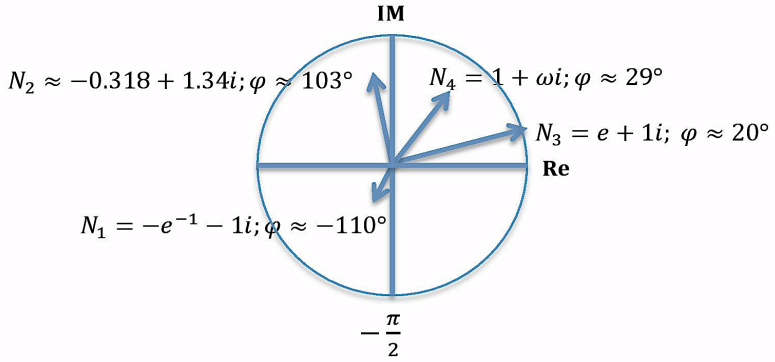

Fig. 2. The initial twist of the double helix pattern

The upper $\alpha -$ branch yields the time-rate of the proton ($\Im(N_2) = T_{proton} \cdot 10^{-1}$) and the gravitational potential of the electron ($\mathrm{mod}(N_2) = \alpha_w^{-1} \cdot 10^{-2}$); multiplying the boundary numbers yields the radius of the proton: $N_1 \cdot N_3 = (-e^{-1} - 1i) \cdot (e + 1i) = -(e^{-1} + e)i$, or in terms of polar coordinates, $\rho \approx 3.09 \ldots \approx R_{proton} \cdot 10^4$; $\boldsymbol{\varphi = -\pi/2}$ (emphasis added; to remind, R_{proton} is the point of reverse of the universal quantum vortex, as Eq. 7 describes). Thus, the pattern immediately yields the time-rate and the radius of the proton, scaled in accordance with the factor of ten (the logic of this research assumes that this factor is an arithmetic simplification of π^2, interpreted as an arc length corresponding to the central angle of $180°$ given that $r = \pi$, which is the shortest way to connect diametrically opposite quantities, implying a physical condition of perfect equilibrium). Also, that pattern yields the radius of the 'dark' electron: $R_e^D = T_0 \cdot e^{T_0^{-1}} \approx 2.84 \ldots$, where $T_0 = \alpha_w^{-1} \cdot 10^{-2} \approx 1.37 = \mathrm{mod}(N_2)$, that is, the pattern describes the structure of both the ordinary and 'dark' hydrogen, which assumes that the hydrogen atom was the first shape drawn from the primordial physical void. This, in particular, means that the hydrogen atom is an indivisible whole underlying the physical structure of the entire universe, and it is precisely in that conceptual sense that we should understand the claim by Democritus that atoms are indivisible structures, but not in the sense that no atom can be broken into smaller parts.

According to the construct suggested, R_{proton} describes the proton-neutron contact area, characterized by an anomalously huge gravitational steepness (Table 1). Logically, this steepness emerges in response to an influx of free neutrons that are drawn into the gravitational contour of the universe, implying the maximum of the mechanical pressure arising from that influx and corresponding therefore to the maximum value of the magnetic-mechanical momentum of translational forces. As the model explains, this neutron influx is sequentially compensated via a series of successive equilibriums as the whole process is consistently orchestrated by the proton-electron relationship, equivalently, by the asymmetry–symmetry parity, correlated with the magnetic-mechanical properties of atoms, as pointed out long ago by Pierre Curie. The above allows us to explain why electric and magnetic fields move at right angles; that is, perpendicular to each other. This orthogonal property is predetermined by the mutual arrangement of the time-rate of the electron and the radius of the proton (Fig. 2). Which is central to the polarization of the primordial neutron influx; this phenomenon is amenable to interpretation in terms of Brewster's law, stating that perfect polarization occurs only if reflected and refracted rays are set orthogonally to each other; that is, the perfect polarization of the incoming neutron influx should be expected at $\cos\varphi_d = 10 \cdot T_{proton} \cdot \alpha_w = \Im(N_2)/\mathrm{mod}(N_2)$, which can be thought of as the primordial angular displacement φ_d against the symmetry ensured by the attractor (Fig.2).

Because of the individuated values ascribed to every quantum of action, physical, chemical and bio-chemical couplings are amenable to arranging in a translation invariant fashion, that is, individually canalized quantum information is strictly related to the bismuth twist and, accordingly, to other elemental twists (peaks), arising via the same modus operandi of nature (this information is strictly related to the Curie temperature, which is manifest in the appropriate individuated thermal measure for every chemical element or molecular entity, for example, $0℃ \div 100℃$ for water). According to this pattern, these local twists are synchronized to the angular momentum of the electron; therefore, all elemental abundances in the periodic table, including the iron peak, are invariant under spatial rotations, which is why a compass needle always points to the same direction, determined by the electron-proton alignment, that is, by the attractor; and, as the twist-like nature of the attractor requires, the magnetic poles of the Earth are necessarily reversed, implying that lithospheric plates of the Earth constantly rotate.

In physics, the mechanism of mass formation is conceptualized and addressed in terms of the standard model of particle physics. According to this model, the masses of all physical particles arise from the interactions with the so called Higgs field that generates the Higgs particle; the standard model claims that this particle is a zero-spin super-massive boson that mediates with translational forces through a mass-less particle with the spin of 2. It would perhaps be appropriate to remark here that mass-less (and spin-less) particles cannot exist in reality: everything in the physical cosmos is affected by gravity and therefore all quantum particles have a mass and a spin. From the standpoint of semantics, mass-less mass (and spin-less spin) is an oxymoron: either mass or its absence, but not both at once. Logically, zero-spin implies equilibrium or, we may say, a complete identity of a physical object with itself, which allows us to fully appreciate the physical meaning of the radius of the electron: $R_w^{-1} \cdot R_w = 1$. Given that it is gravity that twists all translational forces together, one has no other option but to agree that the mysterious mass-less particle with the spin of 2 and the long-sought super-massive zero-spin boson are two complementary guises of the same quantity—the gravitational radius of the electron: $R_g = 2R_e = 2$ (macro-scale) while its micro-equivalent exactly equals the classical radius of the electron: $r_g \approx \frac{\hbar_w}{2} = r_e$, that is, the gravitational and classical microscopic radii of the electron concur with each other (Table 2). The former relationship ($R_g = 2$) tells us that the macroscopic gravitational radius of the electron contains twice the physical degree of freedom of the electron, implying that the universe comprises two quantum domains, right-handed and left-handed ones. The latter relationship ($r_g = r_e$) implies that the shape of every quantum particle, in each domain, is determined in terms of gravity via the classical radius of the electron $\frac{\hbar_w}{2}$, equivalently, via the quantum of action of the electron

$\hbar_w = \alpha_w \cdot \omega$ or, speaking in terms of electrodynamics, via the electric charge of the electron $\pm\sqrt{2\alpha_w^2\omega}$.

Because of the fundamental chirality inherent in fermions, conventional electrons outnumber conventional positrons, which is why positrons can be conceived as the electrons that rotate in reverse; so, it is quite natural to associate positrons with the electrons that move as if backwards in time; accordingly, any physical process exists only in parallel with its chiral counterpart that evolves as if backwards in time. It is true that the electro-magnetic force has never been observed to flow backwards, but it is also true that physicists consistently distinguish between the negative and positive electric charges. Given that time is associated with counter-rotation of quantum particles, it becomes possible to appreciate why today's physical theory associates time reversal with changing the positive mass of an elementary physical particle into the negative one. Here, we have to repeat that negative masses cannot exist in reality; that is, the term 'negative mass' is physically meaningless, which is why current physics cannot explain why the universe is full of matter and lacks so called antimatter. To disentangle theoretical physics from the phantom of antimatter, we should take into consideration the modus operandi of time and gravity: time synchronizes rotation of the left- and right-handed quantum domains via gravity; gravity gives rise to mass in both domains; each domain operates on the basis of its initial handedness; as for everything else, each domain works as well as the other. Interconnected via their common causal structure, any two agents of quantum coupling have no alternative but to be in chiral opposition to each other. Both physically and mathematically, this opposition is manifest in the bi-polarity of the electric charge of the electron $\pm\sqrt{2\alpha_w^2\omega}$, allowing the negative and the positive electric charges to be differentiated from each other (as is perhaps already clear, the plus-minus sign traces its roots back to the fundamental quantum chirality inherent in fermions, implying that physical spin can be either left- or right-handed). To this, it may be added that some atoms are marked with positive (such as bromine) and some (such as lithium) with negative charge domination; different charges attract each other, which results in the formation of *almost* neutral molecular structures. The universe however has not so far collapsed into a state of complete sameness; quite the opposite: the energy of void does not dilute over time, because the individuated quantum information inherent in fermions is canalized into the gravitational contour of the universe at different rates and it is time that accounts for this process, sustaining enduring existence of the universe as a whole. And perhaps it is already obvious why all three fundamental symmetries (C, particle-antiparticle interchange; P, parity reversal and T, time reversal) hold only at once: these symmetries arise from the same logical pattern via which they are synchronized to

the gravitational radius of the electron, anchored, in its turn, to the physical limit of the universe.

8. Gravitating around oneness

Thus, two perfectly zeroed counter-rotating quantum domains induce each other in a deterministic manner: figuratively speaking, the dice are thrown day and night, but what really matters is that for the universe as a whole it does not matter whether the outcome of the toss is heads or tails. That is, the $-e^{-1}-$ based probability relationship holds in both the right- and left-handed quantum domains; either domain works as well as the other, but due to the initial conditions one species sooner or later become more numerous than the other, and then the more numerous species, marked with the same handedness, ineluctably become dominant in the domains of their original handedness, which, in particular, is manifest in a huge imbalance between left- and right-handers among general human population.

All physical interactions are synchronized to each other via the macroscopic angular momentum of the electron G_w, implying multiple degrees of freedom, and its microscopic complementarity ω, implying single degree of freedom. All quantum particles are characterized by individuated quanta of action ($\propto \hbar_p = \alpha_p \cdot \omega$) that are strictly anchored to the physical limit of the universe R_w^{-1}. It is precisely the individuated values of the quantum of action that allow all physical particles to be kept apart as they pass through the attractor $R_e = 1$ that bridges differently rotating microscopic domains, which, in particular, explains why the universe unfailingly avoids the so called ultraviolet catastrophe. Also, it is worth remarking that that pattern makes it obvious that when we look at the stars we see their double twisted accurate images: the starlight is twisted and untwisted as it passes through the 'dark matter' of interstellar void, which, it may be accentuated, bears relation to semantics: the Greek word 'cosmos' means both decoration and orderliness. Of interest to general knowledge is that in the neighbourhood of the attractor the strength of gravity steeply increases as the time-rate of the electron decreases in the same abrupt manner (Table 1), which is why observers on the Earth have good reasons to claim that in the neighbourhood of the attractor time dramatically slows down. Since gravity permeates through and via the entire universe, it necessarily reveals itself in our daily life. Because of the discrete individuated nature of the quanta of action, all physical interactions are controlled via the activation quantum barriers that ensure a metastable dynamics, protecting human's organism from immediate changes, first and foremost, from age-related ones; and it is that modus operandi of gravity that accompanies us throughout our lives. Take, for example, how it works in abnormal situation when we suffer a near-ultimate physical or psychological load; seeking to restore a disturbed equilibrium, the time-rates of the

organism decrease, forcing the 'intelligent eye' to fix upon the surrounding media as a slow-motion picture—this mechanism provides our organism with a delay to make a vital decision, thus conferring an additional chance to survive: self-organization within the system intensifies, implying that time slows down as gravity increases.

There is a growing body of evidence suggesting that that modus operandi of gravity is ubiquitous in nature, underpinning all physical processes, irrespective of their particular external manifestations. Take for example our everyday experience, say, when kids break a double-glazed window with a soccer ball; if the blow is sharp enough, only the inside pane is broken while the outside, as against immediate apparentness, is not. The same modus operandi of gravity also explains, for example, the phenomenon of so called negative pressure in trees: as if against the law according to which an apple fell, allegedly, on Newton's head, liquids rise from roots to shoots. One can easily continue this list, including in it capillary attraction; hurricanes that rotate counter-clockwise in the northern hemisphere and clockwise in the southern hemisphere; solar storms that are switched so that the same coronal mass ejections that heat the upper atmosphere of the Earth also trigger chemical reactions that quickly cool it… Of particular interest is that the most informative of all sensations inherent in humans (sight) also draws on that twistedness: sight pattern relies on adaptive flipping involving two perception modalities running as if in the opposite directions simultaneously: the direct perspective ensures inevitable convergence of eyebeams to a single point on the horizon while the reverse perspective allows a viewer to conceive the polycentric aspect of reality; that is, the sight pattern is exactly parallel to the way in which the macroscopic angular momentum of the electron G_w (implying multiple degrees of freedom) and its microscopic equivalent ω (implying single degree of freedom) are synchronized to each other.

Because of that interconnection, the universe is perfectly synchronized to its physical root: arising via a finely synchronized cascade of repulsions and attractions of differently rotating quantum particles, the self-referential universe invariably alternates clockwise and counter-clockwise rotations, remaining strictly anchored to its physical limit $|R_w^{-1}| = \left(\left|\sqrt{10\omega}\right|\right)^{-1} \cdot 10^{-57} \approx 42 \cdot 10^{-59}$ (science-fiction fans are well aware of the number 42: it is the ultimate answer to the question about life, the universe and everything). What may perhaps be appropriate to remark here is that physicists reportedly believe that the observed red shifts are evidence of galaxies' recession and on the basis of this claim they argue that the entire universe is expanding. Which is a rather incautious extrapolation, particularly in view of the fact that the theory of relativity, adopted by the mainstream of physicists, postulates that time moves relative to the observer, including, in theory, blue-shifted cosmic objects such as the nebula of Andromeda—not to say that an ever expanding universe

excludes any possibility for matter to emerge; let alone that physical science does not differentiate between clocks and time; and let alone that current mathematical physics relies conceptually on improbable stories: in the world of continuous mathematics, swift-footed Achilles, in defiance of evidence and good sense, has no chances to catch up the tortoise.

The above makes it possible to gain a fresh insight on the creation ex nihilo argument. If one claims that ex nihilo cosmological solutions have or have no relevance to physical reality, it is expected that one understands the meaning of the term 'nihilo.' If it means 'nothing,' then the initial conditions of the universe remain undefined or, we may say, they are defined in terms of uncertainty. In that realm, Achilles is unable to catch up the tortoise. The same holds true for physical cosmology: current physics gives us three mutually exclusive scenarios, and neither the logic nor the mathematical apparatus of physics allows us to reconcile these scenarios with each other (their universe is either open and expands or close and shrinks; otherwise, it is completely flat and neither expands nor shrinks). It is only when nought (null) and naught (zero) are distinguished from each other that it becomes possible to piece these scenarios together; that is, the order across the universe is ensured via a combination of openness, closeness and flatness, implying, respectively, the future, associated with bosons' symmetric behaviour, the past, associated with fermion's asymmetric behaviour, and their connecting zero-twist transition, associated with the present and flatness. Accordingly, if the term 'nihilo' means zero (naught), then the initial and boundary conditions of the universe are definitely certain, which makes it possible for Achilles to catch up and to surpass the tortoise. And it is only in the minds of true mathematicians that decimals may continue ad infinitum, creating a field of infinite possibilities for physicists to run their equations as far as they can: from 0 to ∞, and back again.

The doctrine of continuity teaches us that nature does not make jumps, whereas our life experience tells us otherwise. Nature jumps high ($\pm R_w$) and low ($\mp R_w^{-1}$), but her jumps are finely squared with each other, which is exactly what the following relationship tells us: $\ln\Omega^{-1} = -\ln\Omega$, where $\Omega = R_w^2$ and $|R_w^{-1}|$ is the minimal syntactic information that underpins the entire semantic content of the universe. Semantically, this relationship tells us that the cause $\pm R_w^{-1}$ and its effect $\mp R_w$ are ultimately bound to each other via time, implying $\alpha_w^{-1} \cdot \alpha_w = 1$, and through space, implying $R_w^{-1} \cdot R_w = 1$. Which is what the concept of the fullness of time means: an instant of self-identity, implying ultimate coalescence of individual identities, deriving from the same causal pattern. As repeatedly noted, this state of self-similarity implies physical equilibrium; so, the assumption that has given rise to the physical part of this research comes off with flying colours: $\alpha \cdot \ln\xi = 1$, where $\alpha = \alpha_w, \xi = G_w$. Of specific relevance to physics, the above entails that the law of

physical conservation of the universe can be written compactly as follows: $(\pm R_w^{-1})^0 = 1$, implying that the zero-point energy of void is conserved via the attraction and repulsion of differently rotating spins of quantum particles around the attractor of the universe; and exactly the same can be formulated explicitly in terms of the mathematical nothing: $\ln\Omega^{-1} + \ln\Omega = 0$, where $\Omega = R_w^2$. That is, the initial and boundary states of the universe are reciprocally squared with each other or, we may say, fundamental physical constants are perfectly tailored to square the initial and boundary states of the universe, which is what the fourth term of Eq. 2 tells us: $\ln\Omega^{-1} = -\ln\Omega$, where $\Omega = R_w^2$. In classical physics, this conservation law reveals itself via a relationship between centrifugal and Coulomb forces: $\frac{mV^2}{r} = \frac{e^2}{r^2}$. Appropriate substitutions (Table 2) yield $\frac{8}{\omega} = \frac{8}{\omega}$; re-written as $\frac{8}{\omega} \cdot \frac{\omega}{8} = 1 = \frac{8}{\omega} \cdot \frac{\omega}{8}$, this identity aptly accentuates that mathematics is certain and it is that certainness that lies at the heart of physical knowledge. Of relevance to semantics is that that identity rests on the number 8 and the letter ω. Symbolically, the former epitomizes infinity and symmetry while the latter is central to a metaphysical hypothesis of eternal return, stating that everything returns to a hypothetical omega point. Which is what the present paper is about: mathematically, the omega constant gives rise to every quantum particle and guides it in its inevitable return to its original oneness. And it is perhaps already clear that it takes only one mathematical constant to describe the physical structure of the universe: the omega constant, the rest is a matter of semantics.

9. Returning to the origin

To give the concept of eternal return a physical footing, it makes sense to reflect upon eternity. Schematically, a rotational motion of a material object, say a distinct planet, results in irreversible matter splitting, which is manifest in crystal dislocations, occurring until a single crystal loses its individuated identity and becomes a structure-less specimen. Of course, the more complex a system, the more it can resist to decomposition: sophisticatedly twisted information channels allow excess energy to be dissipated in a more effective manner, for example, heterogeneous forests demonstrate more ability to cool themselves as compared to homogeneous deserts, but ultimately decomposition of matter is irreversible. As time does its work, the surface of the planet becomes more uniform; as it becomes more uniform, it needs less energy to stay in equilibrium. This process occurs until all matter of the planet completely transforms into uniform radiation ($\alpha_c = \alpha_w$), which is what Poincaré recurrence theorem essentially claims: if entropy is increasing now it will certainly decrease in the future. Of relevance to the second law of thermodynamics is that any physical process that reduces entropy incurs thermodynamic costs; as the present research explains, it is gravity that serves this entropic debt via creating the

cosmic order in advance of thermodynamic processes, and does it in an uninterrupted manner (which is why it is mathematically impossible for gravity to take the value 0: there is no x to satisfy $e^x = 0$). Thus, entropy (unbounded information) and gravity (bounded information) are bridged via time (the time rate of the electron); as long as the time-rate of the electron and its gravitational potential are reciprocally interconnected, their product remains constant, implying equilibrium ($\alpha_w \cdot \alpha_w^{-1} = 1$, where α_w is the time-rate of the electron and α_w^{-1} its gravitational potential, its free entropy). It is therefore plausible that time and gravity control entropy throughout both the aeon of ascent ($\alpha_w \mapsto \alpha_c$) and the aeon of descent ($\alpha_w \hookleftarrow \alpha_c$). The difference between the ascending and descending phases of a cosmic cycle is that in the former case entropy sustains genesis of matter while in the latter case it sustains decomposition of matter; in both cases, the rate of the incoming entropy is synchronized to gravity via time; from this, it follows that the unity of time and space $\alpha_w \cdot \alpha_w^{-1} = 1 = R_w \cdot R_w^{-1}$ holds across the whole universe, allowing the time-rate of the electron and its space-like complementarity (wave-length) to be synchronized to each other in a self-referential manner: when α_c and α_w become equal, change and stasis become one (but only in a distinct spatial enclave of the universe). That is, everything originates from and comes back the omega point, which is exactly what the concept of eternal return implies (to remind, $\alpha_w = -\mathrm{W}_{-1}^{-1}\left(-R_w^{-1}\right)$, where $R_w = |\sqrt{10 \cdot \omega}| \cdot 10^{57}$). At the moment of that ideal concurrence of time and matter ($\alpha_c = \alpha_w$), the last quantum of once living matter dissipates into nothingness where a new star and a new life are to be born, but in a new time—if the time of a distinct planet comes to end in one spatial enclave of the universe, it will certainly arise in another one, which, in particular, means that cosmos as the entire physical universe can never reach a state of ultimate stasis. Physically, it is true that time and matter systematically nullify each other, but what reconciles this annihilation with life is that life perpetuates itself via meaning and its underlying information, implying that there is no material force that is able to destroy all life in the universe: if information becomes disconnected from its material carrier, it remains connected to its underlying pre-material void, which ensures an enduring possibility for meaning to be preserved. Of specific relevance to the second law of thermodynamics is that meaning confers no entopic burden, because meaning is intangible: it has no mass and occupies no space. However, in order to preserve meaning one must first create it.

10. Giving meaning to everything and nothing

All indications are that nature favours parsimonious solutions, which, in particular, makes it possible to explore differences and similarities between sentient and insentient beings. According to the construct suggested, the world derives its

material existence from quantum information; this information is amenable to addressing in terms of the causal variables $x \in [-e^{-1}, 0)$; these variables can be thought of as underpinning thesis (y) and antithesis ($\bar{y}$). Given such insight, it is possible to depict the causal variables as describing distinct individual entities, existing by virtue of mutually opposing senses that, in their turn, exist by virtue of mirroring each other (e.g., pain and pleasure, which is essentially the simplest binary opposition for discerning right from wrong). In an attempt to find energetically favourable positions, these entities either repel each other or gravitate towards each other. In choosing certain positions that fit them best, they necessarily create informational connectivity between action and reaction, accumulate sensory information and sooner or later become reciprocally synchronized to each other ($x \cdot x^{-1} = 1$), implying self-identity. Passing through contrarieties, these entities necessarily switch their roles; that is, they change perspectives: thesis and antithesis synthesize into a unity via self-identity in a way similar to which quantum particles disentangle themselves from uncertainty. Thus, these entities transcend their apartness and integrate into a synergetic structure in which all its constituents benefit from information sharing, which ensures energetically favourable positions for all of them. Essentially, the above is what love is about: what is good for one individual is reciprocally good for its opposing individual, implying a harmonious union between the two. Given that construct, we are able to assume that insentient quantum particles and sentient beings are fundamentally parallel in making choices: up or down, right or left… Therefore, the sensory information is actualized via the transcendental twist that reconciles the opposing senses, thus resolving their underlying contradictions; which results in a self-referential pattern that sophisticatedly exploits the infinite sematic potential of these entities, creating their collective macrocosm, commonly referred to as the universe. A question arises as whether the microcosm is able to identify itself as part of the collective whole, which is central to distinguish sentient from insentient. The parallel between these categories ends when a distinct individual being starts to reflect upon itself and goes so far as to ask itself whether its choices are meaningful. And therein lies the central opposition between inert matter and sentient life: their ability to generate meaning.

Logically, the transcendental twist in question gives meaning to all things: when the fullness of time is attained, it becomes possible not only to differentiate between naught (R_w^{-1}) and aught (R_w), but also to assess them, and everything between them, in terms of both meaning and number, which, in particular, entails that we are able to quantify both semantic and syntactic components of information and therefore to conceptualize them in terms of a common mathematical framework. To this, it may be added that continuous mathematics allows for infinite

number of variables within the finite interval, which pre-determines an infinite semantic potential of the universe. What is also worth noting is that that construct implies both certainty and uncertainty at once (because when we extend the concept of number to include the fractions we immediately confront infiniteness and uncertainty). In serving as a bridge between finiteness (certainty) and infiniteness (uncertainty), 0 necessarily exhibits both at once, which is manifest in its remarkable mathematical properties: multiplying any number by 0, we are always certain that this operation yields 0, whereas division by 0 always yields uncertainty. Thus, owing its entire origin to reciprocity and inversion, 0 has neither an external reciprocal nor an external inverse, which makes this number a perfect point of reference, and not only in hard sciences.

Both syntactically and semantically, it is the concept of nothing that is central to meaning generation. The point is that the term 'nothing' bears potential of twisting any thing. For instance, if one genuinely thinks that chaos and cosmos are two inseparable parts of a unified whole, then one may say that *nothing* separates chaos from cosmos. Lexically, the same form may be used to convey the reverse, namely, the term 'nothing' may be used to draw a clear-cut distinction between cosmos and chaos, that is, one may claim that 'nothing' *separates* chaos from cosmos. This 'naughty' trick never fails, because 'nothing' allows one to twist out of any restriction, though only in one's imagination. If quoted, 'nothing' may be interpreted as the only standard of rightness; if unquoted, the same term may be interpreted in the reverse: there is no thing that is always right. Acting in a joker-like manner, such game-changing construct is able to twist any claim, which works perfectly because both mathematically and semantically 'nothing' is its own inverse and reciprocal. Because of that remarkable feature, 'nothing' can be thought of as constituting an absolute frame of reference in which no judgement is privileged or preferred to another; that is, such absolute oneness can be thought of as existing as if outside the realm of meanings, which allows any judgements to be assessed as if from beyond; that is, nothing is sacred to that absolutely impartial mediator or, we may say, its only sacred thing is 'nothing.'

Because of its uniqueness, each mind twists senses in an individual fashion so that each individual mind builds its own realm of meanings; such uniqueness makes it possible for dialogic communication to occur, which, as earlier noted, is central to generate meaning: in serving as an attractor to which opposites tend to evolve, such twist-like construct bifurcates sensory information, enabling emergence of meaning. Having infinite degrees of freedom, such logical construct actualizes semantic potential of sentience in the best way possible, allowing a sentient being to perceive the world in an infinite variety of ways via perspective switching, ensuring both meaningfulness and boundlessness of thinking process. Central to that mechanism is

discernment: it takes discernment to catch meaning. To illustrate, when one individual claims for example that he is right, his opponent with reversed point of view may always be able to make a reciprocal claim that he is left, and would be absolutely right, because his claim is also true. At the intersection of these perspectives a new meaning is generated: it is the change of the context that makes it possible for both addresses to acquire the sense of discernment, resulting in meaning, namely, the right becomes aware of what it means to be left and vice versa so that the full truth is necessarily attained. It is therefore possible to associate such semantic twist with the moment of truth: it synthesizes thesis and antithesis in an absolutely truthful manner, revealing the true identities of both sides. Since the antipodes coincide with each other without loss of their identities, both sides are able to appreciate each other's ego and to recognize that their uniqueness is inseparable from their oneness. The same holds true for other opposites, such as past and future, inferior and superior, individual and collective, infinite and eternal, internal and external, and many others, which is commonly associated with consciousness, understood, at its simplest, as awareness of opposites. Thus, at least two conditions should be fulfilled to generate meaning: different contexts and a possibility of switching between them, implying double negation; that is, meaning is generated via perspective switching at the intersection of two different contexts, at its simplest, two different languages. Which is what the story of the tower of Babel tells us: the builders started to speak different languages, because it is exactly at decussate intersections of different semiotic systems where and when a cross-cultural dialogue emerges, making it possible for meaning to be generated and, metaphorically speaking, the heavens to be attained (the third condition of meaning generation is of course discreteness: there must be hiatus to ensure branching and choosing, which, however, does not entail that information is lost or nullified—it continues to perpetuate itself via the branching structures, giving rise to all subsequent choices (a child combines information inherited from both parents), which is central to dissemination of information across the universe).

Speaking in terms of philosophy, the twisted semantics in question bridges the principle of excluded middle and that of included one, implying that these two mutually complementing principles can be thought of as constituting a single logical construct. One may opine that nothing is true and false at once, implying that not a single entity can be true and false at once, which is what the principle of excluded middle means. Reciprocally, one is free to reverse this claim by saying literally the same: 'nothing' is true and false at once, which brings into the effect the principle of included middle: deriving from a common cause, all contesting opposites are necessarily reconcilable via that very cause. Considered in their cohesiveness, these two principles necessitate that contraries are either reconciled or brought to

nothing. As time tells us, 'nothing' evidences that no third is given or, we may say, nothing evidences that third is given.

Technically, that construct is able to incorporate a negation into everything, which is double-edged in its consequences. All senses, whether they may seem positive, negative or neutral, have equal possibilities to be synthesized into the intangible mental images, known as the realm of meanings. A way in which sentient beings address these images affects their future: the world itself is neither good nor evil—it is our choices that bring both, twisting meanings into tangible actions that force the world to go round. All depends on how one sees the world. It is one thing when you believe that there are no true entities in the world and say that nothing is true; following this extreme, one tends to choose finitude and self-destruction: if nothing is true, then everything is permitted. It is another thing when you say that 'nothing' is true to point out that there is at least one true entity in the world, and this entity is completely specified by the moment of truth, as noted above; in addressing this extreme, one tends to choose eternity and self-perpetuation: if 'nothing' is true, then everything is possible. Obviously, these two mutually exclusive worldviews embrace the full range of choices available to sentient beings: the truth itself and an infinite number of its inverses—an infinite number of ways in which one can deceive and be deceived. It is worth noting that lie comes in many guises, but all of them are discernible through a mirror of truth. Unable to pass through this barrier, lie thrives on ignorance and intellectual shallowness, and a lie believed remains a lie; therefore, it does not matter whether one sells or buys lie. It is the moment of truth that serves as a litmus paper to discern true identities, because only true identities and true senses deserve to be referenced. If those are trumped-up, then the perspectives cannot be switched, because there exists no real pivot on which the participating identities might fall back on; accordingly, the contradictions remain unresolved, making it impossible for the incoming information to be bounded; therefore, cognitive pressure within the system increases: time and energy are wasted, whilst gestalt is pending; being unable to generate meaning, semantically unbounded information degenerates into an uncontrolled energy release, as a rule, with devastating consequences.

If we talk about sentient beings, then we should note that the perspectives are switched only on the basis of free choices; otherwise, the whole endeavour neither makes sense nor produce meaning. Conceptually, it is 'nothing' that ensures such freedom: it conveys certainness and uncertainness at once, implying that it is in principle impossible to foreknow whether a free individual will choose 'yes' or 'no' or maybe nothing will come to his mind: all scenarios are covered. It is true that freedom makes behaviour of sentient beings unpredictable, but it is exactly this freedom and this unpredictability that give them an absolute evolutionary

advantage over other species—sentient beings are able to make free individual choices and to switch perspectives in a manner of completely informed choice, which, in particular, distinguishes humans from animals: animals fail to change perspectives in a conscious manner, which is why for example fishermen still catch fish, but not the other way round. As repeatedly noted in this paper, insentient quanta are strictly enforced to preserve meaning: the primal physical opposites $\pm R_w^{-1}$ are perfectly squared to each other to ensure that the past and the future states of the physical universe are in perfect sync with time. In the realms of thinking creatures, the things may be different, because sentience exists and survives by virtue of freedom; so even if the initial conditions of a sentient system and all equations that describe its behaviour are known, we cannot calculate its ultimate dynamics because sentient beings are free in their choices. What is absolutely certain is that that system either survives or collapses.

11. Separating strategy from tactics

Arising from the same logical pattern, insentient substance and sentient beings are essentially parallel in their attempts to wage turf battles, fighting against each other until at least one is dead. What makes them conceptually different from each other is their ability to meet the challenge of transcendence. When a being comes to a certain level of complexity, it either transcends this limit (via meaning generation) or fails in this endeavour, implying sentience and insentience, respectively. Clearly enough, in order to generate meaning, one ought to be able to discern meaning from its opposite; otherwise, it is inconceivable to make meaningful choices. Meaningful choices are based on cause, even if we are choosing between right and left. Both physically and metaphysically, such choice is traceable back to a primordial separation of void into two quantum realms: one derives its existence from right-handed spins while another from left-handed ones. Accordingly, original handedness serves as a prime cause in one world and the same is true for another world with respect to its primordial handedness. Symbolically, the right hand (controlled by the left hemisphere of the brain) is commonly associated with rightness and right behaviour while the left hand (controlled by the right hemisphere of the brain) with wrongness and wrong behaviour. Given such connection, we are able to distinguish between two fundamental patterns of reasoning: nought-based and naught-based ones, without and with reference to cause, respectively. Associated with line-like thinking, the former accords with the principle of excluded middle: it does not require us to think in terms of causal loops; the latter is in line with the principle of included middle, necessitating causation and encouraging recursive holistic thinking. It may be remarked that holistic thinking is deployed when we enter the world (approximately the first five years of life when we crave to

know everything), and only then we learn to obey the logic of excluded middle. This method eliminates ambivalence in communication, which facilitates our life; on the other hand, it prompts us to exclude dialogue from that very communication. Loosely speaking, the logic of excluded middle is fit perfectly to address syntactic information, reducing all thinking to what is known from experience, implying tactics. The apparent problem with that method is that it becomes conceptually self-defeating when it comes to the unknown, which is essentially the art of dealing with new challenges, implying strategy. Between these patterns lies a profound conceptual abyss: at its simplest, one pattern presupposes unquestionable obedience to orders, whereas another requires us to question whether the orders bear relation to meaning, which reflects a difference between a one-way communication that is used for example to train animals or raw recruits and dialogic communication that remains central to generation of meaning. In cybernetics, the principle of excluded middle is manifest in the feed-forward processing when signals travel one way only; such processing makes no difference between causes and effects, requiring neither feedback nor recursion nor memory nor meaning. Obviously, if one were to rely exclusively on this method, one would face an endless crisis of meaning and could never distinguish tactics from strategy. It is feedback processing that cultivates the sense of discernment without which no meaning can be generated; feedback loops impel signals to travel in both directions at once; the states within such systems are changing until an equilibrium is found; that is, until a contradiction is resolved, a new meaning is acquired and an old gestalt is completed; then, the input condition changes, implying that a new equilibrium needs to be found. This recurrent process results in a logical chain of semantic connections that fall back on a real cause in order to twist back on itself; such processing requires memory: the initial conditions of a system cannot be forgotten, which is the fundamental prerequisite for strategic thinking and evolution in general. Nature relies upon both patterns: for example, the antagonistic signals that activate or deactivate certain areas of the human organism are alternatively blocked, excluding each other, but this does not entail that their common cause is also blocked; quite the opposite: a way in which these signals are alternated is determined by that very cause; cause is actualized in time, time in meaning, meaning in action, action in reaction, reaction in feedback.... In principle, the modus operandi of gravity gives us a good opportunity to appreciate the essence of this method. Both mathematically and semantically, gravity acts as a mediating agent between time and matter, which is what the meaning of the identity of time and matter implies (to remind, this meaning emerged at an intersection of two conceptually different contexts: one is associated with chaos, implying entropy, another with cosmos, implying gravity). Physically, gravity manages unbounded

quantum information (entropy) via a compartmentalization of this information and setting order in advance of translational forces (note that the very word 'gravity' means both dignity and thoughtfulness). If gravity suddenly disappeared, all physical systems, whether sentient or not, would be steadily running down, as it is required by the second law of thermodynamics. As quantum information circulates throughout the layers of the universe, old equilibriums fade and new ones emerge—the universe records its chronicle in which it includes only true histories, that is, only those histories that connect the past and the future in the shortest way possible. Combining the principles of least action, least time and causality, the concept of gravity bridges tactics and strategy, making sense of both and giving meaning to both.

Seeking as it does to pursue the strategy provided by nature, a distinct sentient being creates its own realm of meanings, which determines the ability of that being, such as human, to discern things. This ability is manifest, first and foremost, in language: if one senses and thinks differently, one speaks differently. Language is necessarily sensitive to time, which is manifest not only in the category of tense, but also in certain specific terms coined by language, such as the 'Golden Age,' the 'Dark Ages,' the 'Age of Enlightenment,' the 'Time of Troubles' and many other zeitgeists that reflect a way in which the collective consciousness of humans reveals its content, albeit in a retrospective manner (so, it becomes clearer why time, in the words of a poet, worships language and forgives everyone by whom it lives). Not only does language mirror meanings and senses, it also conveys, analyze and preserves meanings, allowing individual minds to make informed choices. Of course, language unites individual minds, but, fundamentally speaking, the world is perceived in an individual fashion: some appreciate freedom and diversity while others idealize restrictions and worship sameness. If an individual mind is semantically balanced, it makes use of both, entailing that the collective mind is in principle able to do the same.

12. Conceptualizing the problem of Cain

To further appreciate the above, it would be appropriate to inquire into the meaning of the first fratricide. To remind, Cain, a down-to-earth tiller, killed his starry-eyed brother Abel, a shepherd. Symbolically, the firstborn brother emanates from the unharnessed vibrancy of infinite chaos, epitomizing the spirit of competition and immediate desire; Abel is his exact reverse, epitomizing cosmos, eternity and compromise. Both are equally relevant to nature. Figuratively speaking, Cain without Abel loses touch with the realm of meanings, engorges upon himself and inevitably collapses; Abel without Cain is unable to produce any tangible outcome, remaining completely absorbed in his blue-sky thinking. As the myth tells

us, God favoured the *gift* of Abel and rejected the *offerings* of Cain. Which is in perfect accord with law of causation: chaos is prior to cosmos, but it is love and compromise that cause the meaning that bridges chaos with cosmos, which made it possible for cosmos to emerge and chaos to actualize itself. Cain responded to God's move in an apparently tactical manner: he attacked and killed his brother, choosing a senseless energy release over reflection. Before the murder God said to Cain: if you do not do what is right, sin is crouching at your door; it desires to have you, but you must rule over it. This means that all humans, like Cain, are free to choose their ways, but the reverse side of their freedom is responsibility. At the heart of this story lies an idea of reciprocal complementarity between the appetite soul and the spirited soul, implying a harmonious union between the brothers or, we may say, between the language of eternity and that of infinity. The murder eliminated the very possibility for that union to emerge. The fratricide cut Cain off from hope and eternity: he became an endless wanderer with no prospect of finding his final destination. From the perspective of a strictly competitive scenario, the fratricide meant the end of the game of life. It was Seth who was given to replace Abel in order to continue the game. Cain was protected for the same reason: since matter is the flesh of time, it is natural that mankind manifests itself first through tangible and physically appreciable things (aesthetics), implying form and syntactic structures, and only after that via intangible time and immaterial entities (ethics), implying content and semantic structures. Such existential asymmetry creates an internal tension in every single soul, which arises because one part of the soul gravitates towards materiality and immediate needs while another towards spirituality and eternal values. So, in choosing between the appetitive soul of Cain and the spirited soul of Abel, the only meaningful choice is the logic of transcendence, which makes sense of both infinity and eternity.

13. Transcending the boundaries of infinity

In addressing the phenomenon of transcendence, it is helpful to rely on Eq. 2. Interpreted in terms of transcendence, this equation can be thought of encapsulating the following metaphysical formula: one becomes two, two becomes three and out of the third comes the one as the fourth. Known among metaphysicians as the axiom of Maria, this formula conveys the following message: the omega constant gives rise to the alpha constant; intertwisted in a recursive manner, these two variables set a feedback loop that ensures that cause and effect are reciprocally interconnected via time. Physically, this formula describes a way in which time (the time-rate of the electron) and gravity (rotation) form mass that gives rise to all translational forces, creating a self-referential feedback between these forces and the point of their origin, which ensures physical integrity of the universe.

Speaking in more general epistemic terms, the formula in question reveals the meaning of a connection between information and action, implying that oneness (individual, cause) and many-ness (collective, effect) are interconnected via the same cause, which makes it possible to bridge semantics (primary unquantifiable entity) and syntactic information (secondary quantifiable entity), which ensures semantic integrity of the universe. The above brings us back to the thought that there ought to exist a point of absolute reference with respect to which aught and naught, discreteness and continuity, ethics and aesthetics, finiteness and infiniteness, one and many, objective and subjective, individual and collective…. anything in fact can be conceptually separated from one another, quantitatively determined and measured up against each other (of specific relevance for humans is that that point also serves as a bridge between corporeality and non-corporeal existence). As earlier noted, it is the concept of nothing that is fit perfectly to serve as an absolute oneness, associated with the moment of truth. This moment can be thought of as antithetical to modality, entailing that it is insensitive to sense; and sense, it must be said, is the greatest existential enemy of death. Such inherent insensitivity makes that construct absolutely free, which has certain peculiarities when applied to living souls. Of relevance to life is that it is not so much freedom of will as a will to the truth and meaning that becomes indispensable as a factor of choice: only meaningful solutions bring their makers closer to their freedom, but as they approach this goal it becomes increasingly obvious that their freedom is nothing but a freedom to choose between the truth and many lies. In theory, this process yields knowledge and it is knowledge that brings us closer to freedom, but in practice the process itself varies greatly, because humans differ in their levels of discernment: some think about the challenge of time while others are far from thinking about a distinction between time and clocks.

Crucial to transcendence is that it is not so much corporeality as a possibility of existence beyond its locus that is able to change one's mind. Since all flesh-and-blood intelligent individuals face a challenge of transcending the limits of their material existence, we are able to draw a clear-cut distinction between those who think that that transcendence is possible and those who think differently, which brings us back to the proverbial gap between the brothers. When this gap is becoming an abyss, they say that the time is out of joint, which actually means that it is their minds that are out of joint. For that very reason, time abhors intellectual shallowness: unable to discern cause from effect, shallow minds clang and only mark time. So it is but natural that time worships the sense of discernment and despises those who despise it. It is the sense of discernment that makes it possible to understand that it is time, but not clocks, that turns senses into meanings, meanings into choices, choices into actions, actions into reactions; and it takes time to reverse

and to bring this process back to the point of its origin—aught as it ought to be. Accordingly, any rupture between the brothers widens the gap between 'aught as it ought to be' and 'aught as it is' scenarios. As the myth tells us, this gap owes its origin to lie: am I my brother's guardian? In responding that way, Cain definitely sought to twist the truth and thus to evade the question of God. Thus lie entered the world of humans and since then has been widely used: the sellers and the buyers of lie encourage and motivate each other via their common spurious attractor—it arises because their minds are out of joint, which disallows them from understanding that the farther away from the genuine attractor they are, the more chances they have to be scattered and stamped out of existence. So if you genuinely think that *nothing* can reconcile freedom of choice with obligation to think, then it is the right time to wonder whether your sense of discernment is not playing tricks on you. To this, it may be added that to twist truth is tantamount to steal time from eternity; which creates a specific obligatory relationship between the time stealer and eternity; given the obvious existential asymmetry between the two, it makes sense to pay off the debt in good time and in good faith; that is, during one's own lifetime and of one's own free will.

As time tells us, neither the sword of justice nor common ethics stop liars: they keep on twisting truth, not least because it is law that derives from love, but not the other way round, implying that it is the language of love that is prior to all other languages, including the language of law. Love faultlessly distinguishes what is true and what is not, which remains crucial to conflict resolution. Love resolves contradictions in a manner that allows the identities of the conflicting parties to be preserved rather than eroded; revealing the true colours of the counterparts, the language of love bears potential to generate meaning and therefore to bring knowledge to the world. Love hides nothing, making it impossible for lie and knowledge to be reconciled with each other; accordingly, the power of truth is in meaning generation while the power of lie is in ignorance. In certain existential sense, it is the strength of love that determines the extent to which a particular sentient system is able to sustain its continuous existence—seeking as it does to maximize semantic content and thus to minimize chaotic effects inherent in all living entities, love remains indispensable for continuation of life. Without love, all senses fade away. As senselessness gains momentum, intellectual shallowness becomes a norm, making it possible for 'resounding gongs' and 'clanging cymbals' to turn the world into a fool's paradise.

As is perhaps obvious, the contest between the brothers is amenable to interpretation in terms of the principle of excluded middle and that of included one. In serving as a bridge between the domain of infinity, implying syntactic information, and that of eternity, implying its semantics, these principles are

meant to ensure a perfect continuous circularity between these domains—acting in tandem, they aim to turn infinity into eternity in a manner that may be considered both pressing and conciliatory. The domain of infinity exists by virtue of tangible entities and its ultimate certainty is that all its material constituents are decomposable, which is a boundary condition of all material worlds. The domain of eternity exists by virtue of intangible entities that are meant, first and foremost, to motivate sentient flesh-and-blood beings to sustain their sense of self-existence via transcending the boundaries of materiality: to keep itself existing a sentient being ought to maintain and to enrich its semantic potential; otherwise, it ceases to be both sentient and eternal.

14. Bridging myth and reality

Some believe that genuine love lives in the heavens, which assumes that the love that lives in our hearts and the starry sky that sparks about us are somehow interconnected. It is an ancient myth of the four star-guardians that gives us a good opportunity to appreciate this assumption. According to the myth, four remarkable stars constitute the following existential pattern: the fearless and impetuous Lion ($\alpha\ Leo$, the Northern guardian) and the sagacious and peaceful Fish ($\alpha\ PsA$, the Southern guardian) confront each other in a way similar to which matter and time couple with each other; this mechanism is embedded into the following broader context: the spirit of individuality versus the sense of community, epitomized in a contest between the alpha Scorpio and the alpha Taurus ($\alpha\ Sco$ and $\alpha\ Tau$, the guardians of the Western and the Eastern realms, respectively). From the perspective of that cross-shaped mythological worldview, the pattern that describes a connection between quantum and cosmological scales (Eq. 4) is essentially the same pattern that describes a way in which the microcosms of individuals is synchronized to their collective macrocosm, constituting a logos-like existential construct, as just sketched. What may be learnt from the above is that myth can be thought of as an essential element of transcendental consciousness: it preserves meaning in a sufficiently adequate way, and perhaps the message $\mathrm{A\Omega}$, implying the beginning and the end of the universe, gives us sufficient grounds to appreciate this claim.

15. Appreciating the sense of reciprocity

All indications are that the universe and all its inhabitants emerged as a result of a primary intellectual impetus; therefore, in certain existential sense, all material beings, whether sentient or not, are inevitably indebted to that impetus for coming into being. Because of that indebtedness, the giver and the recipients are in an unaltered asymmetric relationship. For those endowed with free will, this

fundamental asymmetry imposes a permanent existential challenge: for sentient beings, there is no ethical way to decline what has already been accepted—the gift of life. Central to that challenge is the idea of reciprocity from which the logic of transcendence derives its entire existence. The point is that reciprocation necessitates both freedom and equity, which complements the construct in question with symmetry: freedom holds the same meaning for both the giver and the recipient; therefore, each of them is free to choose what fits him best. To complete this thought, it is worth noting that whatever the choice may be, the mechanism of transcendence consistently sifts out ashes from cinders, faultlessly separating viable grains from clutter while equally giving each grain a fighting chance to survive.

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