

Nothingness: a sketch

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The paper claims that certain problems faced by both physical cosmology and quantum mechanics trace back to a misconception of the nature of nothingness. In addressing this challenge, the paper assumes that the physics and the mathematics of nothingness constitute an epistemic complementary pair that lies at the heart of the edifice of the universe. Given such insight, we are able not only to explain how some fundamental physics challenges might be met, but also to reveal that both inanimate matter and living beings are exactly parallel in their attempts to overcome chaos and maintain order.

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Quest for fulcrum

Could the universe come out of nothing? No matter whether you are an inveterate nihilist or a strong believer, the ultimate answer to this question depends on what is meant by nothing. Basically it may have either physical or mathematical meaning: physically, the term “nothing” implies zero-point energy associated with irreversibility and asymmetry of time, while, mathematically, the same term has no physical meaning in itself—it implies sheer abstractness: perfect symmetry and complete reversibility. The question then arises as to what extent these two mutually antithetical claims are relevant to reality, which brings us exactly to the crux of the matter: to resolve that outright controversy, we ought to be able to address both concepts in terms of a common framework.

It was the physicist Migdal who gave us a valuable clue about a way in which such framework might be designed; he assumed that an ultimate frame of reference for the universe as a whole might somehow be connected with the following relation: $\alpha \cdot \ln \xi \sim 1$ [1, p. 184] where α is the fine structure constant $\frac{e^2}{\hbar \cdot c}$,

while $\xi = \frac{\hbar \cdot c}{G \cdot m^2}$ is a typical “large number” which, judging from its order of magnitude, relates to the macro-scale of the universe. Here we should pause to reveal the departure point for the assumption in question; the point 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 physically meaningful independent dimensionless quantities: α and ξ . Next, given that $\alpha \cdot \ln \xi = 1$ is true if $\xi = e^{\alpha^{-1}}$, we have certain grounds to assume that a logically consistent connection between the micro- and macro-scales of the universe may be described in terms of the following α –based entirely completed algebraic recursion:

$$(\alpha) \cdot (e^{\alpha^{-1}}) \cdot (\alpha \cdot e^{\alpha^{-1}}) \approx 10 \cdot \omega \cdot 10^{114} \quad (1)$$

The left-hand terms of Eq. 1 can be interpreted as dimensionless quantities that stand for three pillars of mechanical motion: contraction-extension (α), rotation ($e^{\alpha^{-1}}$) and translation ($\alpha \cdot e^{\alpha^{-1}}$); of particular relevance to the present research is that the product of these terms equals roughly $\omega \cdot 10^{115}$, where $\omega = W(1) \approx 0.567 \dots$ is the omega constant, W is the Lambert function defined as the function that solves the equation $z = W(z) \cdot e^{W(z)}$, where z is a complex number (throughout this paper, z indicates a complex variable, x a real one). Physically, α is considered as a variable that mediates between the electro-magnetic and nuclear forces, but Eq. 1 tells us that α can be thought of as a mediator between the macro- and micro-scales of the universe, which, theoretically, makes it possible to deduce the value of the alpha corresponding to the ultimate equilibrium of the universe from the following strict equality:

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

Solving this equation reveals that it has three real roots, all of them depending purely on the omega constant:

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

where $R_w = \alpha_w \cdot e^{\alpha_w^{-1}} = |\sqrt{10 \cdot \omega}| \cdot 10^{57}$, and W_{-1} is the bottom branch of the Lambert function defined for $x \in [-e^{-1}, 0]$. Expectedly, $x_3 = \alpha_w \approx 7.29739 \dots \cdot 10^{-3}$ is remarkably close to the currently accepted value of the fine structure constant $\alpha_c \approx 7.29735 \dots \cdot 10^{-3}$ (in what follows, low index “c” means “current”, which is interpreted as the running value of a physical quantity in question). Here, we should remark that α_c refers to real physical dynamics, while α_w to its idealized fulcrum, as Eq. 2 describes; in what follows, this fulcrum will be referred to as the genuine equilibrium of the universe, implying the ultimate equilibrium between its micro- and macro-scales. Given such conceptual link, it is logical to assume that the value of the fine structure constant ought to vary as quanta pass from their zero-point energy states to the scale of the nuclear and electro-magnetic forces. Here we should note that the limit of these forces (in micro-realm) is manifest in the speed of light; its appropriate macro-equivalent should manifest itself in an upper limit of translational motion of the universal quantum vortex, which, according to Eq. 2, is $R_w = \alpha_w \cdot e^{\alpha_w^{-1}}$, interpreted as the radius of the universe at its genuine equilibrium. Next, such equilibrium implies that the universe is in the state of complete coincidence with itself, which can be reached via a series of identity transformations, meaning approaching self-similarity (which is exactly what the *modus operandi* of the Lambert function implies, and this becomes perfectly obvious if the function is represented as a series of continued logarithms). Mathematically, self-similarity of a unique specimen can be written formally as follows: $R_w^{-1} \cdot R_w = 1$ (here it is appropriate to talk about the culminating term of the recursion in question, R_w). Since R_w is thought of as representing the upper limiting radius of the universe, its inverse value R_w^{-1} can be thought of as representing the smallest spatial measure of the universe, equivalently, the shortest wavelength contributing to the zero-point energy

associated with a spatial limit of the universe; in what follows, this quantity will be referred to as the radius of the void particle: $|r_0| = |R_w^{-1}|$.

Next, it would be reasonable to shed some light on the “large number” $G_w = e^{\alpha_w^{-1}}$ that mediates between α_w and R_w . Given that rotation is prior to translation, we are able to claim that the electro-magnetic and nuclear forces derive their entire dynamics from the *causal* information encoded in G_w , implying a measure of rotation of the universal quantum vortex linked to the genuine equilibrium of the universe (note that the range of the rotation in question exceeds that of the translation (by $\frac{G_w}{R_w} = \alpha_w^{-1}$), which is a mathematical evidence of a physically indoctrinated claim that it is rotation that causes translational motion, but not the other way round). To make the causal link between rotation and translation both physically and ontologically relevant, we ought to establish an epistemic connection between undifferentiated void (associated with entropy, chaos and disorder) and its ontic opposite—a finely quantified and completely disentangled quantum vortex. Encoded in $G_w = e^{\alpha_w^{-1}}$, such idealized entity implies perfect cosmic order arising from a completely disentangled rotation, and it is physics that allows G_w to be relevantly interpreted: given that gravity is considered to be the first force that split off from the other three fundamental [translational] forces in the early universe, we are able to claim that the exact opposite of entropy is gravity (which, according to our convention, is manifest in pure rotation of the universal quantum vortex).

Now, take a look at the right-hand term of Eq. 2: $10\omega \cdot 10^{114} = \Omega = R_w^2$. Inversed, it can be thought of as the inverse square of the “world radius” ($\Omega^{-1} = R_w^{-2}$), which is relevant to the concept of the cosmological constant, implying certain initial state of the universe. Given that insight, we are able to connect the initial and boundary states of the universe as follows: $\ln\Omega^{-1} = -\ln\Omega$, which can be thought of as the process of becoming of the universe: quantified in terms of r_0 , successive extension-and-contraction of void particles is manifest in a one-to-one correspondence between r_0 and the appropriate limits of the universal

quantum vortex encoded in the numbers R_w and G_w , thus describing a transformation of undifferentiated chaos into cosmic order. As any real process, the motion of the universal quantum vortex is subject to variations and information loss; given that the universe still exists, it would be reasonable to assume that there should also exist a relevant feedback that ensures conservation of the information that underlies all quantum processes occurring in the universe, and it is precisely what continuous mathematics tells: $\ln\Omega^{-1} + \ln\Omega = 0$. However, this mathematically indoctrinated claim raises a question about the ontic meaning of the term “zero”: literally, it means that sum of potentiality of a particular system and perfect actualization of that potentiality is tantamount to nothing, which collides with the logic of becoming, and it is precisely with this mismatch that we shall concern ourselves in the next section.

Null and zero

Thus, pure algebraic reasoning enables us to connect real physical dynamics with what is supposed to be its genuine fulcrum, which, however, is a guess, and accepted as a guess, albeit one which is attended by a certain logic, the construct proposed must be given a more concrete physical footing. With such consideration in mind, it would be reasonable to take a closer look at the Lambert function. Along the real axis at the interval $(-\infty, -e^{-1})$ the function is widely discontinuous, while for $x > -e^{-1}$ it vanishes identically, which means that appropriate function values are considered to be zero, which, as the paper assumes, is relevant to a physical nothingness, implying a primordial quantum dipole: $\pm r_0$. Of particular interest is that the construct suggested is amenable to interpretation in terms of quantum mechanics: at the interval $-e^{-1} < x < 0$ the Lambert function has two values which are always non-integer and anti-symmetric relative to its branch point $(-e^{-1})$, which makes it possible to address primordial void splitting in terms of chirality, from which it follows that the universal quantum vortex can be conceived as an ensemble of mathematically interconnected quantities

consisting of chiral quantum twins: deriving from the same argument, two complementary anti-symmetric function values can be associated with two members of an entangled quantum pair, thus entailing that both members of the pair are identifiable independently via their common *causal* variable—their common argument, implying their common zero-point energy state that is relevant to their common ontic cause (in what follows, the original term “entangled” (implying quantum entanglement) will be used, but it should be perfectly clear that its exact epistemic opposite is meant—completely disentangled quantum information).

Thus, according to our convention, both right- and left-handed physical realms are possible. Clearly enough, no flesh-and-blood observer can exist in both realms simultaneously, so from the standpoint of such observer, void can be extruded from its ground state either through clockwise or counter-clockwise rotation but not through both (which is precisely what Pauli’s exclusion principle tells us—two fermions can occupy the same orbit as long as they spin around their own axes in opposite directions). Deriving, mathematically, from a common argument and exhibiting consistent mirror anti-equality, the members of the same entangled pair have no alternative but to be in opposing quantum states simultaneously, therefore for a hypothetical Schrödinger’s cat the situation is always, literally, half-certain, and the same holds true for his or her fellow-cat marked with opposite handedness and entangled in the same quantum non-locality. Among other things, this explains the matter-antimatter asymmetry paradox: due to the initial conditions species marked with its own initial handedness will ineluctably become dominant, which, in particular, entails that in each realm conventional electrons far outnumber conventional positrons which can be depicted as the electrons that rotate in opposite direction, that is, move as if backward in time; of particular interest is that physics recognizes an epistemic connection between direction of time and direction of rotation of the fermions, which is gives us an obvious clue in our quest to reveal the nature of time.

Now we approach perhaps the most esoteric aspect of ontic knowledge—a nexus between finiteness and infiniteness. It is clear that the construct suggested allows for *infinite* number of causal variables within the *finite* interval $x \in [-e^{-1}, 0]$, which implies that an endless information diversity arising from chaotic void is amenable to constraints, and this is precisely what Eq. 2 tells us: based on a gravity feedback loop, it makes perfectly clear that infinite branching of quantum continuum is mathematically impossible. Of particular relevance for physics is that the pattern described is amenable to consideration in terms of the fermion-like and boson-like behaviours. The point is that the fermions can be thought of as non-integral values the Lambert function takes for the same argument $x \in [-e^{-1}, 0]$, which implies half-integer values of the fermion's spins and single degree of freedom associated with the fermion asymmetric behaviour. However, for the same argument (even if it is not a complex number) there exists an *infinite* number of complex multiple-valued solutions $W_n(z)$, where $n \in \mathbb{Z}$ (all integers positive and negative: $-\infty \dots -2, -1, 0, +1, +2 \dots +\infty$); according to our convention, this algebraic feature of the Lambert function implies integer values of the bosons' spins and multiple degrees of freedom associated with the bosons' symmetric behaviour. Accordingly, the dynamics of the quantum continuum can be depicted as a persistent ramification of causal chains arising via the r_0 –correlated fermion-like finite chiral discrete distribution of primordial quanta amplified by oppositely directed higher order boson-like correlations limited from above by $\mp R_w$ ($\pm r_0$ is its low limit).

Seeking as it does to describe a causal nexus between the finiteness of the past and the infiniteness of the future quantum states, the pattern sketched is fit perfectly to piece together topology, time and cause: the fermion-like distribution implies causality and closure; the boson-like correlations imply openness and a complete set of effects linked to infinite variety of causal variables, describing the plenitude of all possible quantum states arising from the primordial undifferentiated void (not only does this allow us to distinguish between past and

future, this allows us to link such distinction with a concept of individuated will, associated with the fermion's behaviour). Mathematically, we may say, the fermion-boson interaction ensures absolutely gapless causal nexus between the past and the future quantum states of the universal quantum vortex; arising via quantified rotation of void (entropy-gravity coupling), all quantum states are manifest in the appropriately scaled gravitational equilibriums $G_c = e^{\alpha_c^{-1}}$, and all these equilibriums are encapsulated in the Janus-like equation that connects the initial and boundary states of the universe: $\ln\Omega^{-1} = -\ln\Omega$, which is exactly what the concepts of both time and duration imply. Clearly enough, this gives us a perfect clue about a way in which time might be defined: it can be defined as a natural measure of the objective physical process—the duration in which the primordial undifferentiated void passes from the initial (Ω^{-1}) to the boundary (Ω) state of the universe, and specified in terms of the quantum rotation associated with entropy-gravity coupling. Ontologically, we may say, time is a measure of transformation of cause into effect, while, speaking in more general epistemic terms, time is an imaginary mathematical quantity designed to measure the rate of change of real physical processes occurring in the universe (physically, time is manifest in its rate which is associated with the frequency-like variable known as the fine structure constant). Thus, in all quantum systems time is defined in the same way, while difference in the time-rates implies that every system operates in accordance with its own individuated local time, and that local time is linked to the appropriately scaled strength of gravity ($G_c = e^{\alpha_c^{-1}}$), meaning that time and gravity are in mutual exponential dependency.

Topologically, the pattern described is tantamount to behaviour on a twisted surface on which it takes two circuits (4π) to return to the original orientation of the primordial quanta, thus completely compensating the contribution of their zero-point energies; physically, this means that the fermions return to their original orientation after 4π -rotation, which is exactly what Eq. 3 claims: $\mp R_w = -W^{-1} (\pm R_w^{-1})$. Since all ground states are mathematically identifiable, and the

appropriate *individuated* information remains unchangeable under any physical transformations, no information linked to the fermions can be lost in the ultimate reality (the term “ultimate reality” means that left- and right-handed realms are considered in their ontic cohesiveness). Here it is reasonable to note that invariance of a physical quantity under infinite transformations is manifest in the following remarkable feature of the exponent function: $f'(e^x) = e^x$, but, as this paper hopes to explain, continuous mathematics imposes severe limitations on the description of the ultimate reality, so the question remains to be answered: Can every quantum state of the ultimate reality be described in terms of a discrete pattern? And perhaps it is not immediately evident, but it is the octonion numbers that are fit perfectly to meet that challenge; to remind, such numbers are neither real, nor commutative, nor associative, implying time, irreversibility and causality, respectively. According to our convention, the real numbers describe a one-dimensional spatial distribution of primordial quanta over the real axis, the imaginary numbers stand for time, the complex numbers describe two-dimensional quantum distribution over the plane of space-and-time, the quaternions signify rotation, three-dimensionality and irreversibility of that triadic entity, but ultimately it is the octonion algebra that explains how causality pieces all these entities together (the details of that pattern are given in “The physics of nothingness”, see the link: <http://vixra.org/abs/1806.0381>). Here it would be appropriate to remark that, in certain ontic sense, causality is tantamount to the language in which, metaphorically speaking, “time” and “space” talk to each other; in the light of this consideration it is possible to gain a deeper insight into Auden-Brodsky consolidated claim that if time worships language, it means that language is older than time, which, in its turn, older than space as we know it. Given such insight, it is perhaps possible to claim that it is causality disguised as common language that is meant to structure and restructure time with all its historical events, living legends, collective myths, and so forth...

Next, if causality emerges as a result of change from the state of not knowing to the state of knowing arising via quantum distributions, then it is precisely accumulation of quantum information that results in quantum memory, and such memory is objectively prior to ordinary matter. This claim is relevant to Wheeler's "it from bit" hypothesis, assuming that all physical entities derive their entire existence from discrete binary choices; here, it would be appropriate to remark that void can be thought of as an objectively existing physical substance, therefore the inverse proposition ("bit from it") is ontologically relevant, which is the answer to the proverbial chicken-or-egg dilemma: void serves as a spatial container of information, while information serves to build the universe out of void. To complete this thought: undifferentiated void is an inexhaustible source of the quantum information that shapes all material constituents of the universe, and it is precisely the nexus between the radius of the void particle and that of the universe which establishes structural limits to that information exchange, which, in particular, means that a universe cannot be infinite in both time and space; it is either spatially unrestricted timelessness or eternity, implying that the universe is restricted in space and infinite in time.

Thus, we may say, the pattern describes a primordial cosmic womb that gives birth to matter orderliness arising via distribution of the causal variables over the real axis. This, however, is one side of a cosmic dialogue between the fermions that crave infinity and a power that seeks to restrict such craving; what allows this dialogue to be properly appreciated is an epistemic nexus between the real axis and the axis of imaginaries. The point is that a distinct entangled quantum pair can be thought of as representing a completely reversible system in which the information that determines the states of both members of the pair comes for free, that is, acquisition of information in this case does not change the entropy of the quantum system, which implies a complete compensation of contra-rotating quantum vortices linked to different members of the same quantum pair. Clearly enough, in that case all primordial causes (ground states) are simultaneous with their

immediate mutually complementary effects that are encoded in the function values associated with the members of the same quantum pair (note that this *modus operandi* of quanta implies a principle of included third that is fundamentally different from the principle of excluded third which underlies both classical logic and the logic of current physics). Thus, the pattern highlights two modes in which quantum information can be managed; one mode implies simultaneous causation, reversibility, symmetry, homogeneity and continuity, while another implies exactly the opposite: sequential causation, irreversibility, asymmetry, heterogeneity and discreteness. Accordingly, the former is associated with the concepts of null and *spurious* infinity, while the latter with the concepts of zero and *genuine* infinity. It is precisely zero that lies at the core of the quantification of undifferentiated void, thus yielding its sequential quantum distribution that results in the causal order of primordial quantum events, while null is meant to restrict this distribution in time, that is, with regard to entropy-gravity coupling. And it is the conjunction between the real axis and the axis of imaginaries that allows both frameworks and corresponding reference points to be distinguished, and described. In terms of the present research, this is manifest in the following symmetry-and-asymmetry relationship: $W(-e^{-1}) = -1$ vs. $W(e) = 1$ with $W(1)$ vs. 0 at the core of this twist-like mapping. To complete this thought, null and zero constitute a complementary epistemic pair: each member of this pair describes the fundamental aspects of the ultimate reality that the other ultimately misses, and it is precisely the logic of complementarity that allows us to resolve certain paradoxes inherent in the null-based physics of today.

The cosmological constant problem

Now, it is safe to say that it is exactly 0 that is playing a game with physicists. Making no distinction between null and zero, they used to explore reality in a distinctly contradictory manner: in addressing natural phenomena arising from the pattern of sequential causation, physicists rely on its exact opposite—simultaneous

causation coupled to infinitesimal calculus that underlies a dummy model of physical reality. Creating an illusion that both space and time (dx, dt) vary *ad infinitum*, such model leaves physicists no choice but to address both time and space in terms of the same [spurious] infinity, thus making it unfathomable in principle to establish a causal relationship between these entities. Here it would be appropriate to make a historical remark: evolving away from Newton's *Principia*, relativistic physics truncated Newton's concept of time and space, which is manifest, in particular, in putting "time" and "space" on equal causal footing—since then physicists have been destined to simulate time rather than quest for its nature, and origin. All consequences of that historical step have yet to be assessed though the logic of evolution here is obvious, and in a sense, impartial: he who does not appreciate distinction between eternity and infinity will hardly need to distinguish between time and duration (the distinction, though, lies on the surface of infinitesimal calculus: a differential time dt assumes that it is to be integrated into some "total time", as though this "total time" were infinitely divisible, which is true only if this "total time" is supposed to be an unending time-like entity, that is, duration; duration, we may say, is causeless time, timelessness.). It is increasingly clear that physicists of today consistently apply duration (Newton's absolute time) disguised as common time (Newton's relative time), while these two entities are mutually equivalent *only* on an infinite interval on which gravity and entropy are mutually equilibrated with accuracy of 0 at every interstice of that interval, or speaking in more general epistemic terms, such equivalence holds true until one makes no distinction between real and imaginary entities, which is why physicists, in their quest for a final theory, repeatedly end up with nothing (in the sense of null). Such logical blunder may go unnoticed unless one explores the realm of matter where gravity gradients, at least at the scale of the electro-magnetic and strong forces, are finely equilibrated, but nothing (in the sense of zero) backfires entirely when it comes to a connection between the cosmological and

quantum scales of the universe, which is why physicists of today are confronting a big problem—the cosmological constant problem.

The difference ($\approx 4 \cdot 10^{-8}$) between α_c and α_w testifies that the universe is slightly lop-sided relative to its genuine equilibrium which is associated with perfect flatness and absolute motionlessness. Given that difference, we are able to assess the current local curvature of the universe: $\frac{R_c}{R_w} \approx 1.000746 \dots$ given $\alpha_c \approx 7.29735 \dots \cdot 10^{-3}$; from this, in particular, it follows that the universe is very close to being flat but is not completely flat, which is relevant to the following relation:

$$\frac{R_w}{r_0} = \Omega \tag{4}$$

This equation connects the minimum energy quantum (r_0) with its maximum (R_w), which lies at the heart of the cosmological constant problem. It is manifest in impressive discrepancy between observed and theoretically estimated zero-point energy: roughly 120 orders of magnitude, according to theoretical physics, while, according to Eq. 4, it is closer to $\Omega = W(1) \cdot 10^{115}$, which means that physicists, strictly speaking, missed nothing—indeed, they have long been turning a blind eye to the following apparent desideratum: How can it be that *infinitesimal length*, according to Newton, is *smaller than any finite quantity, but greater than zero*? Now, this long-neglected epistemic gap entirely backfires: Eq. 4 quantifies this effect with the accuracy of zero. With this in mind, one readily understands that physicists have long been confronting zero, spatial limit of the universe; marked with chirality and impressively exaggerated in scale, it is manifest at all scales of the universe: from weak interactions that recognize a distinction between left- and right-handedness to cosmic parity violation associated with spiral galaxy spin asymmetry—it is precisely chiral representation of void splitting that allows us to claim that all quantum structures of the universe should ultimately rotate either clockwise or counter-clockwise. Given that insight, we are able to explain why the solar system has the preferential, conventionally, counter-clockwise rotation (also,

the model explains why both clockwise and counter-clockwise rotations inside a star system are possible). Next, since for every “micro” there is a “macro”, there should exist a preferential opposite direction, clockwise rotation, at the cosmological scale: astrophysical observations point to such a phenomenon in the direction of the north pole of the Milky Way. Accordingly, the parity violation inherent in the weak interactions should manifest itself on the cosmological scale; now, we have sufficient grounds to assume that this violation is relevant to entropy-gravity symmetry violation, and, highly likely, the slight lop-sidedness (dubbed the cosmic “axis of evil”) observed on the very large cosmological scale owes its origin to this symmetry violation as applied to the macro-scale of the universe.

Next, given that rotation is prior to translation, we are able to claim that it is precisely rotation that causes the red and blue spectrum shifts associated with translational motion of physical entities, which makes it possible to take a fresh look at the concept of the expanding universe. According to current physics, the red shifts are evidence of galaxies’ recession, and, on the basis of this claim, it is argued that the entire universe is expanding. Though the rationale behind this claim is plain, it nevertheless remains a rather incautious extrapolation, particularly in view of the fact that relativistic physics postulates that everything moves away from everything else... including, in theory, blue-shifted cosmic objects such as the nebula of Andromeda, let alone that an ever expanding universe does not allow ordinary matter to be formed since nuclear fission is inconsistent with unlimited and uncompensated expansion of void—in that case a conflict between entropy and gravity is *always* settled in favour of entropy, implying an ultimate death of the universe, which is null-activity. Empirical evidence and the laws of thermodynamics, however, testify in favour of life and zero-activity: matter exists, atoms split and the masses of the elementary particles are still definable in terms of finite quantities (we assume that matter derives its entire existence from assembly and rarefaction of extremely small but spatially finite void particles). Given that

the universe expands, credible cosmological models have to rely on a non-zero cosmological constant, though, here it would be reasonable to use the term “non-null” since, as the paper hopes to explain, semantics also matters, namely, the semantics of nothingness is fundamental to distinguish between zero (implying genuine infinity linked to the laws of thermodynamics) and null (implying spurious infinity linked to Newtonian mechanics), which is why physicists fail to piece together reality and its simulation created by null disguised as zero. Metaphorically speaking, null hides the horse behind the cart, but once this becomes clear, everything falls into place: Achilles, after all, can catch up and surpass the tortoise, while it is only in the minds of true mathematicians that decimals may continue eternally—mathematician’s meat is physicist’s poison (and vice versa). And until that critical distinction remains unappreciated, cosmologists will have to choose between the three mutually exclusive scenarios: the universe either expands (openness) or collapses (closure), otherwise it is flat and motionless, and neither the logic nor the mathematics of current physics allows this irreconcilability to be resolved. Seeking as it does to convert this incompatibility into complementarity, we consider all three scenarios in their ontic cohesiveness, which, in particular, allows us to claim that cosmic structures neither recede away from each other nor approach each other—basically, they rotate within the boundaries adjusted in accordance with the real fulcrum of the universe, its genuine equilibrium. From this, in particular, it follows that matter-radiation content of the universe is strictly balanced, and this balance is maintained via finely calibrated rotation of cosmic structures—marked with different rates and different handedness, this rotation is manifest in the redder or bluer spectrum shifts occurring at all scales of the universe.

Now, we can state the obvious: in full accordance with Poincaré’s recurrence theorem (if entropy is increasing now it will certainly decrease in the future) all *material* constituents of the universe are destined to die of old age. Exposed to persistent mechanical stress, aging matter persistently splits; this is

manifest in crystal dislocations occurring until a single crystal loses its individuated identity and becomes a polycrystalline specimen; of course, the more diversified a system, the more it is resistant to destruction, but ultimately ageing of matter is irreversible—as the surface of a distinct planet becomes more uniform it needs less entropy supply to stay in equilibrium, accordingly, the planet rotates slower, its information diversity reduces, its gravity decreases as α_c tends to α_w , and once these quantities become equal, the last quantum of once-living matter disappears in the surrounding void where a new star and a new life are to be born, which is what the concept of eternal return tells us.

Thus, the universe can be thought of as a feedback information system in which cosmos and chaos constitute a complimentary ontic pair organized in such a way that gravity compensates entropic effects, which, in particular, allows sentient biological forms in certain spatial enclaves of the universe to emerge and exist for a time. Matter, however, is destructed and formed in a phoenix-like manner, while information is conservable: if it can no longer be linked to matter, it can only be linked to void (which is relevant to the black hole information loss paradox). Since mechanical destruction is restricted to within the radius of the void particle, the spatial container of information can never be annihilated, which, physically, means that no refrigerator can reach absolute zero (null), accordingly, there always exists a possibility of information exchange between void particles: according to our convention, this implies a mutual correlation between the alpha and the omega variables—being irrational numbers, these variables can be combined infinitely often, thus providing a theoretical opportunity for an unending information exchange. However, nothing lasts forever, and if that process runs smoothly, then every consecutive decimal digit arising via that cosmic dialogue implies a new degree of freedom, leading to escape from darkness through a graceful exit to light—until that time, no information inside the void contour can be converted into light signals. To complete this thought, all information required to describe the universe is encoded in the ω — α relationship: arising solely from the omega

constant, it underlies both a spatial limit of the universe, implying its scale invariance, and the fine structure constant that stands for changeability of the universe in time. And it is precisely the ω — α relationship that defines both the genuine equilibrium and the boundaries of the universe.

Nothing matters

If everything is connected to everything, then the logic of complementarity should manifest not only in the theologically meaningful term “alpha-and-omega”, implying the end and the beginning of the world, but also in the semantics of nothingness, and if the objective of the present research were to encapsulate everything in a word, the word would be “nothing”. To clarify this claim, it would be reasonable to take a closer look at the terms “nought” (ought, null) and “naught” (aught, zero); the former is manifest in timeless rationales that are indispensable for mathematics, while the latter is preferred for art and poetry that quest to understand eternal values such as love, beauty, freedom... considered in their cohesiveness, these two guises of nothingness are meant to harmonize the world: “aught” without “ought” is nothing but an endless freewheeling stream of originalities, while “ought” without “aught” threatens a fatal triumph of militant dogmatism, leading to structural degradation that results in self-destruction. Speaking in terms of the present research, the former is relevant to eternal values: originating from the genuine infinity, they are related to the future, while the latter is its ontic opposite: linked to the spurious infinity, it is manifest in ostensible truths that derive their existence from the past. Over time, these two ontic opposites shape both our individual thinking and collective consciousness, which is manifest in our language: in common usage both nought and naught are reduced to the same term “nothing”, so when one claims that nothing exists, this may imply either sheer nihilism or distinctive spirituality, depending on what is meant by nothing: null or zero. Therefore, one ought to be deliberately careful when it comes to nothing: nothing is perfect, nothing is true, nothing is what it seems... Perhaps it

was Socrates who, allegedly, put his finger on the crux of that fundamental epistemic duality: true knowledge is knowing that you know nothing. However, once the appropriate distinction is recognized and appreciated, one readily understands how exactly language and ontic fundamentals relate to each other: not only does this allow us to explain why the single word “ought” stands in for both the totality of the universe and complete absence of matter, this allows us to reveal a way in which the world goes round—ought as it ought to be, and perhaps it is not immediately evident but the semantics of nothingness is fit perfectly to explain an old logical conundrum known as the nothing-and-everything paradox: the lowest limit of the universe (nothing as naught, r_0) defines its maximum (ought as everything, R_w) that can be achieved via becoming (Ω); in words: everything is nothing multiplied by time, in numbers: $R_w = r_0 \cdot \Omega$, where $|r_0| = (|\sqrt{10W(1)}|)^{-1} \cdot 10^{-57} \approx 42 \cdot 10^{-59}$ (which sheds light on the meta-narrative linked to the number “42”).

Concluding remark

What this paper hopes to clarify is that both living beings and inanimate quanta are precisely parallel in their ways of controlling entropy via gravity feedback loop: in such a way both entities seek to escape ultimate information loss. The information feedback allows the universe to be organized in a strictly coherent manner—whether we are speaking of inanimate matter or humans, all things incoherent have one quality in common: they do not hold together in physical or intelligible unity. Perhaps it is clear that it is an ability to manage information diversity that allows sentient and insentient entities to be unambiguously distinguished: ultimately, the former succeed in meeting the challenge of information diversity, while the latter do not. As the paper describes, certain quantum information disguised as gravity prevents the physical world being presented as a purposeless motion of quanta: gravity, literally meaning the dignity of leadership, generates a long-range collective dynamical order of the ultimate reality, which, it must be said, offers no

escape from determinism. However, such physical determinism by no means implies that the future of human civilization is predetermined—given that natural parallel, we are able to repeat that survival of a distinct civilization depends on its ability to manage information. As this paper hopes to make clear, the challenge in question is resolving via a ceaseless dialectical interplay between “aught” and “ought”, both are meant to ensure knowledge evolution, but the former implies its unrestrained diversification, while the latter saves us the trouble of multiplying entities beyond what is necessary. Whether humans are able to succeed in this endeavour remains to be seen.

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