TWEETS TO THE UNIVERSE: VOLUME I

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Dedications

To three generations of women who support and tolerate me - my mom, Ruth, my wife, Carole, my daughter, Isabella.

Rick

To the love in my life.

Scott

Preface: Scott Douglas Jacobsen

"Necessity is the mistress and guardian of Nature."

Leonardo da Vinci

"I love those who yearn for the impossible."

Johann Wolfgang von Goethe

"I believe that love of truth is the basis of all real virtue, and that virtues based upon lies can only do harm."

Bertrand Russell

"That so few now dare to be eccentric, marks the chief danger of the time."

John Stuart Mill

"When I was young I found out that the big toe always ends up making a hole in a sock. So I stopped wearing socks."

Albert Einstein

Honest enquiry necessitates auturgy, independent activity. Independent activity emerges from the discovery narratives in relation to the self, ourselves, and umpteen consanguinities extant with these and the world requires straightforward queries to enter into the storyline built for over two millennia in the Western tradition; frank questions necessitate the relinquishment of the normal self, the dulled identity, with the beginning of anxiety followed by excitement; an honest answer penetrates the transition between the normal self, its unknown future in abjuration, and its eventual relief followed by renewal and growth.

Since the origin of our species, our story, our cosmology, continually creates or constructs, dissolves or degenerates, and evolves or adaptively transforms, in time and place, and this occurred for multiplicities longer than the Sophists, Atomists, Pluralists, Eleatics, Ephesians, Pythagoreans, even far more deep into the human epic than the Milesians, as far in 'pre-history' as the dreamtime narratives of the Aboriginals around 40,000BCE with slow, steady, and cross-cultural, jagged motions toward unifications and improved fidelity in representation of the Earth and heavens.

Pith ideas of the human backstory come from the improbable, even the implausible, but never impossible, except for the apparent rather than the actual, as far as I can ratiocinate about the matter for the important developments in the history of Eastern and Western philosophy, and natural philosophy or science, including the present unprecedented era with its proliferation of knowledge, skills, and talents, a time of excitement in technological innovation and scientific discovery, or the knowledge era of the Anthropocene epoch, which will transition into an intelligence phase based on command of the natural world through knowledge acquired in its previous period through discovery and mastery of the functional truths about the universe. All operational verities derived from the natural philosophic tradition in physics, chemistry, biology, psychology, economics, politics, and associated disciplines, and wrought to human significance within the frameworks provided by the ever-adaptive to human concerns disciplines of the arts and humanities, *especially* from the coherent clarity of philosophy; natural philosophy means science and remains contained in philosophy, but not vice versa. To quote the inimitable Andre

3000 from Outkast in *Ms. Jackson*, "…forever Forever, forever ever, forever ever? Forever never…"

Knowing *of* Richard Gilligan Rosner, Rick G. Rosner, Rick Rosner, or Rick, came out of some of his moderate fame based on existence as a genius skylark exhibited throughout personal history such as forging documents to enter high school again and again, and again, and again – literal four times, for an opportunity at a better experience in high school, a 'do-over' to use the idiom, for a possibility of being a normal high school kid, which seems, in hindsight, like a fruitless endeavour, or an attempt, to exist as average by a man that is anything but, at least from my experience, and this transitioned into knowing *about* Rosner as a game show contestant on *Who Wants to be a Millionaire?*, as an interviewee with the acclaimed interviewer Errol Morris in the series *First Person* – an hour interview detailing him, as a professional comedy writer for Jimmy Kimmel at *Jimmy Kimmel Live!*, through more than thirty competitive high-range intelligence test performances with some of the highest scores ever achieved by an individual with inclusion of the Titan Test where one would suffice for some modest fame, as a member and editor for *Noesis: The Journal of the Mega Society*, and into *knowing* Rosner in an independent and collaborative professional relationship as an individual, as a person, as an interviewee in 2014 for *In-Sight: Independent Interview-Based Journal*, as a married man and father, and as an eventual friend, each instance, at least a little bit, presenting little tidbits of himself as an upstanding and intelligent person apart from common mis-conceptions about character and appearance of dumb behavior – a crummy disguise by a smart person with marginal reality to it; acting a fool does not a fool make, look closer, observe him.

Throughout these antics, the continued focal point remained the logical extrapolation of digital physics from Konrad Zuse (*Rechnender Raum* or "Calculating Space"), information theory from Claude E. Shannon (*A Mathematical Theory of Communication*), and digital philosophy from Edward Fredkin (*Introduction to Digital Philosophy*, *On the Soul*, *Finite Nature*, *A New Cosmogony*, and *Digital Mechanics*) for the origination and development of informational cosmology with tidbits given here and there by Rosner through minor and improbable publications and on the fringes of the internet, with this sporadic development and incorporation of information about the theoretical and mathematical, even metaphysical, bases of informational cosmology onto the internet over years and decades, without total compilation in one place – as if by caution or disorganization by him, seems like both to me. As described in *The Rick G. Rosner Interview [Academic]*:

> *We discussed mathematics and physics, logic and metaphysics, consciousness and its subcategories, and these conceptualizations' mutual interrelationships. In particular, refinement of digital physics into "informational cosmology."*
>
> *Furthermore, in informational cosmological nomenclature, your definition of consciousness divides into and emerges from two broad ideas: self-consistency and information processing. In brief review, we have identification of minds within universe with consciousness, universe with consciousness, and the interrelation of mind and universe based on isomorphic function and characteristics. What beyond this*

introductory realization of the equivalence? I observe multiple arenas of common discourse – let me explain.

From an informational cosmological foundation, the hyphenated term "self-consistency" and phrase "information processing" divide into further subcategorizations. These subcategories have constraints from definitions. "Self-consistency" and "information processing" contain various definitions because of differing interpretations, but technical and concrete definitions hold most import here.

As a general primer to "self-consistency" – which might have less decipherability than "information processing," we can begin with this informational cosmology expression "self-consistency." German mathematician and founder of set theory (fundamental theory for mathematics), Georg Ferdinand Ludwig Philipp Cantor, defined self-consistency as the inability to derive both the statement and negation of the statement at the same time. Cantor argued, if deriving the statement and its negation, the derivation would self-contradict. (One can transform this into more formal set theoretic language about elements contained in sets – or the language of mathematics, self-consistency holds great weight for mathematicians, and logic, see Law of Non-Contradiction below.) Self-consistency does have other theoretical universes of discourse in addition to multiple practical and applied venues of human venture: logic, set theory, mathematics, physics, computer science, and many others.

In logic, the Law of Identity (A equals A), Law of Non-Contradiction (A cannot equal not-A), and Law of the Excluded Middle (For all A: either A or not-A) all introduced - informally & implicitly by Plato in Theaetetus *&* The Republic *and formally & explicitly by Aristotle in* Metaphysics - *in ancient Greece. Sometimes called "laws of thought." These delineate facets of self-consistency expressed in the formalisms and vernacular of logic. For one similar vein, Gottfried Wilhelm von Leibniz derived Leibniz' Law, 'x = y': if, and only if, x contains every property of y, and vice versa. Moreover, he derived sub-laws from Leibniz' Law such as the Law of Reflexivity, Law of Symmetry, and Law of Transitivity. For one example, Law of Reflexivity, 'x = x': everything is equal to itself. This mirrors the Law of Identity of Athenian philosophers - Plato and Aristotle. Patterns – Platonic Forms and Ideas even - of concepts arise in repeated episodes of the historical timeline - groping towards some unitary definition.*

In set theory, Austrian-born American logician, mathematician, and philosopher, Kurt Friedrich Gödel, had additional fame for formalization of St. Anselm's Ontological Proof for the existence of God. In addition to this, Gödel published Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme *or* On Formally Undecidable Propositions of Principia Mathematica and Related Systems *(1931). Tersely, an axiomatic system capable of describing natural numbers (e.g., 1, 2, 3…) held within it: 1) cannot be both consistent and complete, and 2) if consistent, the consistency of the axioms cannot be proven within the system. He, and modern specialists, call these two incompleteness theorems.*

In mathematics, English logician, mathematician, philosopher, and founder of Boolean Algebra (foundational for digital electronics), George Boole, continued the ancient Grecians work in a facsimile of the earlier laws of thought with some extensions in mathematical language. I call them "Boolean Heresies" for fun. Boole laid these out in An Investigation of the Laws of Thought (1854). The primary extension from Aristotle became the extension of the three classical laws of thought into mathematical symbolisms, formalisms, and terminology. For one example, the '=' or 'equals sign' signals synonymous meaning with the Law of Identity or the Law of Reflexivity between things. Labelled 'A' in the Law of Identity and 'x' in the Law of Reflexivity discussed earlier.

In physics, applied to time travel – the Novikov Self-Consistency Principle, 'laws' of physics must remain self-consistent at a global level in the real universe to prohibit any paradoxes with respect to time travel. In this application, time-travel scenarios must disallow violation of universe's global laws.

In computer science, at least in database management systems, the acronym ACID equates to principles for operation of database transactions. "ACID," from Jim Gray (1981), means 'Atomicity, Consistency, Isolation, and Durability' with the importance of 'consistency' meaning "the transaction must obey legal laws."

In broad definitions provided by Gray (1981) about the "general model of transactions," he states, "Transactions preserve the system consistency constraints -- they obey the laws by transforming consistent states into new consistent states." As noted, Boolean Algebraic (Boole) systems operable in computer science too.

One can see the pattern in numerous fields. Therefore, "self-consistent" or "self-consistency" within informational cosmology means "system without self-contradiction."

"Information processing" will have an easier time of comprehension because of living in the computer age, digital age, or information age. American mathematician and cryptographer Claude Elwood Shannon's article, A Mathematical Theory of Communication *(1948), represented information theory connected to communication. A short paper, experts consider this article foundational to the field of information theory, which allowed many of them to decree Shannon the father of the information age.*

American scientist and mathematician, Warren Weaver, republished A Mathematical Theory of Communication *(1948) and expanded on the Shannon's work in a coauthored book entitled* The Mathematical Theory of Communication *(1949). Specialists remember Weaver for pioneering work in machine translation. Shannon and Weaver laid the framework for information and communication theory up to the present day.*

In it, if we take a human interpretive view of the work, he showed the degree of "noise" – entropy/disorder introduced into the message - entering between the "information source" (brain$_1$/mind$_1$) & "transmitter" (voice/speech) and the "receiver" (ears) & "destination" (second brain$_2$/mind$_2$). Noise enters between the transmitter and receiver to decrease the quality of the message from the information source to the destination.

For an everyday example, if you whisper from a mile away, your friend will have trouble understanding you – too much "noise" to prevent clear receiving and interpretation of the message; if you whisper next to your friend's ear, the message will more likely have appropriate receiving, decoding, and arrival at the destination for your friend's comprehension.

Not clear enough - think of a computer, how does it process information? It processes information according to input, process, and output. You type a symbol on the keyboard - input, the machine runs internal mechanics - process, and produces the appropriate (if functional) symbol on the monitor - output. Hence, the foundation of information theory in informational cosmology.

Input becomes any decipherable piece of data to the system. Process becomes the algorithm for managing the information. Output becomes the final product of input and process. Likewise, this applies to everything in informational cosmology at local and global scales.

In current vernacular, we ask, "What if the material of the universe equals input, process equals laws plus time, and output equals transformations of the material contents (e.g., particles, fields, forces, and so on) of the universe?"

In informational cosmological parlance, we ask, "What if bit units of universe equal input, process equals principles of existence plus time, and output equals transformations of bit units of universe?"

These reflect deep equivalences. As noted by 21 year old Rick, all theories of grandeur and great import start with big equivalences. You shifted the perspective. Subsequent information processing equates to observed universe. Simply put, we need an armature by necessity, but do not observe the armature based on externality to universe.

Armature of universe equates to material framework or processor; universe equates to information processing or processing. We observe the information processing. We call this universe. We do not observe the material framework, but by necessity require processor based on isomorphic geometry between universe and individual localized minds.

Individual localized minds operate from brains, and therefore universe must have an equivalent of a "brain" - aforementioned armature. This deals with information and

universe at the largest scales. In this, we have the rich derivation, i.e. refinement, of digital physics into informational cosmology.

Together, we have the targeted objectives of comprehensive conceptual organization, philosophical and scientific extrapolation, interrelationship incorporation, and dissemination of the ideas relevant to informational cosmology while working towards the deep pursuit of fundamental truths about the forces at work in and forms of the universe, and exterior to itself.

Rosner formulated the grounds of informational cosmology on May 2, 1981. His 21st birthday. An extension of General and Special Relativity. Informational cosmology represents the culmination of about 30 years of spasmodic or erratic independent research, by Rosner, while distracted with stripping, bouncing, perfecting high school, roller-skating and waiting for tables, competitive intelligence test-taking, nude modelling, lawsuits, and comedy writing, in addition to extensive independent research with an undergraduate researcher, me, since August, 2014. Rosner worked on this theory while in pursuit of normality in high schools.

We have refined and incorporated necessary philosophical considerations into the mathematical enterprise. Rosner had knowledge and expertise unknown to me; I had expertise and knowledge unbeknownst to him. Our intellectual productions result from the collaborations and discussions relating the two. Most literary productions - from the modern and popular such as Oprah Winfrey to the old and obscure such as John Stuart Mill - appear to take the form of a monologue *by* the author *to* the, intended or non-intended, audience. Ancient Greek writing, some of the

productions, appear to represent a dialogue between two or multiple fictitious, more often than not, characters or personalities.

A dialogue *from* the author *to* the, intended or non-intended, audience *through* the characters or personalities. An interview improves on philosophical dialogues - such as Plato's written style, ask Charlie Rose, Larry King, James Lipton, Jimmy Fallen, Barbara Walters, Howard Stern, Oprah Winfrey, Jon Stewart, Peter Mansbridge, Ellen Degeneres, David Letterman, or Tavis Smiley - for philosophical enquiry between idealized or fiction-built characters and transforms the thoughts of real people into an actual dialogue on topics of import to those people in reality rather than fiction. A dialogue *from* the author *to* the audience, intended or non-intended, *through* the real people for presentation of the tinctured premises, arguments, and their tentative conclusions. Interviewer and interviewee, in print, become characters such as those found in *The Republic*, but existent and non-Platonic rather than non-existent and Platonic. A rehabilitation amplified by modern electronics.

Informational cosmology amounts to a Grand Unified Theory and Theory of Everything. By definition, a Theory of Everything contains a Grand Unified Theory. Grand Unified Theories operate within the conceptual boundaries of electromagnetism, weak nuclear interaction, and strong nuclear interaction. Theories of Everything operate within the conceptual boundaries of *gravitation*, electromagnetism, weak nuclear interaction, and strong nuclear interaction. Theories of Everything exist as more comprehensive than Grand Unified Theories by these explicit and universal standards in the community of mainstream scientists - most. Informational cosmology

classifies as a Theory of Everything with inclusion of the following: Quantum Gravity, Space Curvature and Standard Model of Cosmology, Electronuclear Force and Standard Model of Particle Physics, and Weak Interaction and Electromagnetism.

Each demarcates the functional descriptors of the universe without spiritual or mystical content contained in or implicated within them, and with technical and digital, or informational, contents and implications for them. Metaphysics does not exist within those contents, except in the implications of the set of cosmological architecture from which the universe exists as a sub-set. Informational cosmology describes the reduction in Planck's constant in proportion to the mass in your space-time locale:

$$h/h' = 1 + GM/[(R + (h/MC)]C^2$$

Rosner wore this on a t-shirt and flew this on an airplane banner. "h" equates to Planck's constant. "h'" equates to modified Planck's constant. "GM" equates to the standard gravitational parameter. "C" equates to the speed of light. "M" equates to the mass of the object. "R" equates to the radius of the massive object. "C^2" equates to the speed of light times the speed of light. In a modified statement with less mathematical symbolisms constructed from the previous mathematical statement:

Planck's constant divided by modified Planck's constant equates to one plus standard gravitational parameter divided by [(radius plus (Planck's constant divided by mass times C)] times C squared

Rosner's first attempt to explain the expansion of space in the presence of mass with Planck's constant as index of space. Novel phrases will come into the conversation for informational cosmology. Phrases such as "active proton centre" and "collapsed neutron matter outskirts" – and their associated derivatives - relate to the expansion of space in the presence of protons and collapse of space in the presence of neutrons, respectively. Protons activate galaxies, galactic groups, galactic clusters, galactic superclusters, and filaments and expand the space around them for the "active centre." Neutrons represent the end result of burning, or activating, the proton filled galaxies to the point of fuel exhaustion, neutron over proton dominance, for the collapse of space where the products move to the collapsed matter outskirts for long-term storage and possible re-activation in the active centre through infusion of protons into the neutron densities.

Informational cosmology builds from the general disciplines into itself, a hierarchical incorporation. Physics studies the motion of matter through space and time. Astronomy studies every non-terrestrial astronomical object and phenomena in the universe. Together, in the field of cosmology, physics and astronomy combine to study the large-scale structure with the precision of applied mathematics in the real world in relation to the motion of matter through space and time. General Relativity describes the convergence of space and time into space-time curvature and its operation in relation to the large-scale universe. Quantum mechanics studies the Planck

length of the universe with the apparent simultaneity of phenomena with phenomena such as Wave-Particle Duality, Heisenberg Uncertainty, Non-Locality, Quantum Coherence, and many others.

Digital physics considers the motion of matter through space-time curvature emergent from quantum phenomena in correspondence with a general information processor. An information processor with self-simulation, self-observation, and self-containment (apology for the abundance of "self-" prefixes), except for the connection through emergence from the armature with the armature as the information processor. The universe exists as an *open information processing system with extensive closure*. Informational cosmology develops this idea farther into the realm of the external universe through implications of valid information processing, in accordance with cosmology, digital physics, and information theory, with conceptualizations such as net self-consistent information processing and an external material infrastructure for the information processor of the universe with the universe as its manifest operations.

Necessities for the mind requiring physical or material infrastructure, the nervous system, appears to mean the universe, as information processing in real-time (its time), requires a material framework, an armature or information processor aligned in structure with the brain. A similarity in form and function, but not utility and ubiquity. Consciousness appears non-mechanistic and non-mystical, but technical and informational, with repeated fractal phenomena incorporated for apparent continuity, diversity, and novelty in tendencies of form, function, and expression. Continuity in form; diversity in function; novelty in expression.

Minds' dotted thoughts linked from each's probable past and set of possible futures through continual re-instantiations, actualizations, of its information processing of reality. Same for the universe as a consciousness. Trees, rocks, waters, comets, and canyons exist as components for the consciousness of the universe, but not conscious components. As our minds remain more or less non-conscious with subsidiary components such as intra-cellular and extra-cellular junk, cholesterol, and cerebrospinal fluid for the central nervous system, the universe remains more or less non-conscious with trees, rocks, waters, comets, and canyons in itself.

Nature amounts to all that exists relevant to the contents and operation of the contents within the universe. Standard science conceives of the natural world as a physico-functional object in operation through whole number additions in time at its micro-most time scale, the Planck scale. Informational cosmology contains the totality of relevant physics to describe this aspect of nature. External to the universe the armature equates to the metaphysical because "meta-" means something higher or of a second-order kind and "-physical" means a material existence, which aligns the basic physicalist with the basic materialist, and this defines something outside the physical and material.

Consciousness, in informational cosmology, equates to a construct. A technical phenomenon constructed from pervasive self-consistent information processing; nothing spiritual or mystical. An armature, as an external-to-universe material object, means a higher-order material existence, and equates to both metaphysical *and* physical - dependent upon referent. Metaphysical in

relation to the lower-order material existence of the universe; physical in relation to its higher-order material existence in the armature world. The universe, as a pervasive closed system with possible openness with the armature and armature world, connects to its physical aspects and its higher-order associated information processor, the armature. By definition, metaphysics instantiates in the physics of information cosmology by implication, and vice versa, with the ordering dependent upon the space-time in reference: universe, armature, or armature world.

The physico-functional definition around informational cosmology makes for an entire field of partially known information in the observed universe and unknown information in the non-observed sectors such as apparent T</=300,000 years from apparent T=0 years or external-to-observed universe information through the means of light, or photons, with possible perception through gravitational waves' after-effects observed between apparent T</=300,000 years from apparent T=0 years.

A metaphysico-functional description of the universe, in another representation of information cosmology within different conceptual frames and neologisms, describes the observed and non-observed sections of the universe – as the universe - or active proton centre and collapsed neutron matter outskirts, and the respective necessitated outside physical infrastructure, which means a description of this material framework's associated armature universe to an operational infinite. Informational cosmology refines methodological naturalism and the epistemological bases of science, extends the convergence of digital physics and cosmology, aims to recalibrate

and extrapolates from General and Special Relativity, and conceives of an informational and technical conscious universe.

Insofar as informational cosmology operates from the core content or essence of nature, which derives from natural philosophical experiments – or questions to the universe in search of intelligible answers (as SETI searches for intelligible signals from advanced extraterrestrial civilizations with some form of electromagnetic communication *a la* Frank Drake in the *Drake Equation* within the Milky Way galaxy; science, in general, searches for intelligible answers from the universe), informational cosmology in its foundations within the universe because of our existence within it implicates the meaninglessness of the conscious cosmos in accordance with much of modern science, but not to individual minds in the universe, if they so choose to create meaning for themselves and others.

Even so, this leaves the possibility for meaning in the armature world for the armature from which the universe arises because the walls upon which we paint our bodies creates the mind and meaning for individuals, and collectives, inside of the universe and, therefore, the armature derives meaning from the armature world in which it exists too. Within these constraints of consideration, the universe exists as conscious and meaningless, but its armature does contain meaning because it will likely have targeted, legitimate objectives or goals in correspondence with the net self-consistent information processing observed in normal (relative to us) consciousness' targeted objectives or goals in the universe in contrast, and similarity, with the armature world for the armature.

Consider: we do not claim the exchange of information in the cosmos as meaningful as a whole except in sub-systems such as ourselves in transaction with the rest of the universe, and the higher-order factorizations from them as containing meaning; therefore, the universe will not equate to the constructor of meaning with minor exceptions, but will equate, in one formulation, as an intermediary between the information-space of the armature and the relevant motion of the armature through space-time in the armature world. The universe amounts to the moment-to-moment information transfer akin to the brain; its information-space contains the higher-order factorization necessary for meaning.

Therefore, the armature, armature world, the universe, and minds internal to the universe, construct every associated information-space or mind-space for meaning in emergent net self-consistent information processing arrays or sub-arrays in transaction with the relevant information in its environment. All that exists, everything, contains a unified property with two valid derivatives with respect to meaning; the universe does not contain meaning, except in its implicational constructions' creation of meaning such as human beings and their variegated narratives and meta-narratives, and the armature and armature world contain meaning through construction of the universe to derive the information-space or mind-space relevant to its existence and actualizations inside of the armature world.

Meaning means transaction, or attribution; persistence provides the bases for continual transactions relevant to a net self-consistent information processor and its net self-consistent

information processing and, therefore, the foundation of each sound - as in valid premises and conclusion with the conclusion following logically from the premises and the conclusion being true - ethic in an informational cosmological ethic necessitates persistence and the consciousness' imperative to continue into the indefinite future.

The foundry of existence begins with the tautological principles about the universe in its inability to not exist; everything cannot not exist; thus, all cannot not persist; furthermore, ethics follows from this with existence and its continuation, or persistence, as the philosophical, or metaphysical, bedrock for an absolute ethic grounded in the reality of necessitated persistence; wherein meaning for every consciousness derives from the functional infinitude of potential narratives and meta-narratives in an actual finite universe erected from the requisite ethic for continued persistence, which sums to necessitated existence and persistence and its associated generalized ethic related to implicated, and necessitated, respect for the narratives and metanarratives of individual minds insofar as these do not interfere with the wellbeing and narrative of another mind, and vice versa: The Informational Golden Rule. Galileo Galilei stated:

> *Philosophy is written in this grand book — I mean the universe — which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures, without which it is humanly impossible to understand a single word of it; without these, one is wandering about in a dark labyrinth.*

For those with literary leanings, with religious ritualism, with metaphoric minds, or swayed by symbolisms, The Word of the conscious universe would appear as the language of mathematics as metaphysics and physics, and the ability to interpret based on mathematical aptitude, or mathematical *linguistic* ability and talent, and the involvement of one's consciousness with the universe dependent on one's interest in and comprehension of the "grand book" of nature, the cosmos, the macrocosm from which our microcosms converge into a blip of awareness, with the privilege to know something about the mind which birthed us – though we do not know the status of its concern for its contents such as ourselves, which leaves us, at a minimum, better to not wander in the dark labyrinth of ignorance and to write out our narrative on the blank pages of the future – and, at any rate, to continue or to persist in as many narratives as possible limited by the informational and, therefore, definitional constraints of the universe.

Introduction: Rick G. Rosner

In mid April, 1981, I was sitting in the Libby Hall cafeteria at the University of Colorado, eating a bowl of cubes of red Jell-O. I was frequently in the cafeteria – it was all-you-can-eat, and I was usually trying to put on weight, thinking that being big and muscular would help me get a girlfriend. I'd just read an article about mechanisms of short-term memory versus mechanisms of long-term memory in the brain.

Chewing on Jell-O, I thought that the article was kinda BS. (It probably wasn't BS, but I was not quite 21 and full of opinions.) You could explain short-term versus long-term memory with a kind of geometry. Things in long-term memory are accessible from a number of different angles – from a bunch of different associations or memory hooks – while things in short-term memory are accessible from only the context in which they happened (unless something establishes more hooks for that memory), so that memory is harder to retrieve, because that specific context is less likely to come up. It's why dreams are hard to remember – the weirdly random context of the dream will likely never come up in your brain again (unless you make an effort to embed the dream in memory – in a waking context – right after awakening from it).

So, in a geometry of memory, long-term memories would be centrally located, accessible from many angles, while short-term memories would be at the periphery, accessible from only a very

limited set of angles. Then I thought, “What if that geometry is the geometry of the universe?” I stopped chewing and froze with spoon in mid-air.

At about age ten, I’d decided that my job should be figuring out the universe. Smart and nerdy, I stayed in at recess, reading, whenever the teacher let me. A decade later, I was a half-assed physics major at CU, reading and thinking on my own and consistently falling asleep in class. At almost age 21, I’d made progress in de-nerdifying myself, getting contact lenses and being all weight-lifty. I was bar bouncing and was a couple weeks away from starting my career as a male stripper. My only decent insight beyond standard cosmology was thinking that nothingness maybe wasn’t the default state of existence – that even in total chaos, it’s unlikely that islands of order won’t show up somewhere.

And now this revelation, mid-Jell-O bite. The geometry of information in the mind and the geometry of the universe might be the same. This was a core insight – my ticket to figuring out stuff. I worked on the theory in between checking IDs in bars, while waiting to go onstage and get naked on Ladies’ Night, while doing volunteer work taking developmentally disabled people roller skating. The discomfort of squashing my flat Fred Flintstone feet into roller skates and the anxiety of dancing in sleazy strip clubs helped focus my thinking.

It became clear that the Big Bang and black holes didn’t work in a universe made of and defined by information. A self-defined universe can’t just pinch parts of itself off. It can build a pinch point, but that pinch won’t be a full-on event horizon – that’s the universe saying, “Well, this

information has absolutely 100% nothing to do with the rest of my information – see ya!" And the Big Bang – that's your pocket calculator blowing up before it can finish even one calculation.

I worked all these crap-but-fun jobs – stripper, bouncer, roller-skating waiter – feeling not very obligated to not make much progress in life, since I was (sometimes) doing my true job – figuring out the universe and how it processes information.

Lots of smart people think we live in a digital universe – a vast computer, processing bits. Which is fine, but what are the actual processing mechanisms of the universe? I think the universe processes information by aggregating, by locking together like fuzzy Legos, by clumping together in stars and galaxies.

Among the things I believe are:
Much of the essential business of the universe is visible to us as the everyday phenomena of the universe.
Proton-electrons are the little aggregation engines of the universe.

The standard model of particle physics contains 61 elementary particles. According to current theories of dark matter and dark energy, only four percent of the universe is visible matter that we see as planets, stars, and galaxies. But what if the function of all this stuff is to process and record information? Then it might be possible to think about the universe in simpler terms.

One interesting thing about the universe is that, over time, the matter in it forms associations and clumps together in ways that are hard to reverse. As matter clumps together, the universe becomes more precisely defined. The clumping creates and records information. And the most visible agents of clumping are five persistent particles – protons, electrons, neutrons, photons, and neutrinos. These particles can last for many billions of years. They're all involved in hard-to-reverse (semi-permanent) changes in the universe.

Protons and neutrons aren't elementary particles. They're made of quarks. But even though protons and neutrons aren't elementary, protons, neutrons, and electrons seem to be the universe's basic aggregation engines. Electrons (loosely) lock into orbits around protons. Protons lock together (with some turning into neutrons) in atomic nuclei. Atoms lock together into molecules. Atoms and molecules come together in intricate forms of matter.

This doesn't mean that the universe's other particles aren't essential. But, if they don't create and store information, they might be considered supporting particles for those that do. Take, for instance, quarks, which, in sets of three, make up protons and neutrons, and gluons, which transmit the strong force that holds atomic nuclei together and which holds quarks together in protons and neutrons. Inside protons and neutrons, quarks and gluons are constantly exchanging forces, changing characteristics, and popping in and out of existence in 1/10^24 of a second. Throughout all this, a proton is very stable, with a lifespan of at least 10^34 years. So, does all the action going on within a proton have any impact on the (macro) information in the universe,

or are quarks and gluons just part of the somehow necessary underlying mechanics of particles that do register long-term change?

Knowledge is relational – everything is defined in terms of everything else. Some philosophers (and brain researchers) like to ask, "How do we know red is red? How do that what we think of as red is what someone else thinks of as red?" We can pretty much assume that two people's ideas of red (absent some deficit in perception) are pretty close based on their associative definitions of red – it's seen on apples, stop signs, one end of the rainbow, and so on. Same for something like "up" – it's associated with the sky, with the parts of trees and light poles farthest from the ground, with the direction opposite the gravitational force vector.

Try reversing your definition of "up." Picture "up" as being in the direction of gravitation, with the ground being up, and trees and buildings forcing themselves down, towards the sky. It's really tough to do. Everything you know, everything associated with "up," makes you want to continue to understand up as up. (Though, once something is as deeply embedded in your awareness as red or up, it doesn't usually trigger a cascade of associations. You're like, "Yeah, that's red," or "That direction is up," or, even more likely, you don't even consciously note red or up – they're just part of the subconscious structure of awareness.)

Like our understanding of the world, the universe is built from associations, some gravitational, some electromagnetic, some via the strong force, in atoms, planets, stars, solar systems, galaxies,

super clusters … . I don't think it's unreasonable to suppose that these associations support meaning, the same way associations in our minds support meaning.

With regard to us and with regard to the universe, I think there are three related structures (well, three-and-a-half):

1. The hardware – the brain and its connections
2. The information contained in the brain as perceived via consciousness – how the various information and thought streams in your brain share content with and influence each other
3. Information seen as an optimized map of itself, with its own apparent space and physics

3 ½. The material world that we experience every day

Observing our minds and brains, we see structures one and two – the hardware and the perceived information. Observing the universe, we see the third structure – an information-space with a physics that seems to operate, via relativity and quantum mechanics, in an information-based way. And we live in the everyday material world (which is part of information-space but which is experienced by us via what seems like classical physics (and without access to meaning of the meaning of the information in information-space)). It's not outrageous to think that the information in each of our minds could be seen as unfolding as an information-space. Nor is it outrageous to think that the information in the universe could have meaning beyond itself and

that the information must be supported by hardware apart from the universe, the same way computers and brains are necessary for the existence of the information they contain.

In 1986, I went back to high school to think about the structure of the universe while crammed into those desk-chair combos. (I didn't go back to creep on girls – that wouldn't have been ethical.) High school senior by day, bouncer and not-great stripper by night.

To be an information processor (I thought as a fake high school senior), the universe has to recycle itself. There has to be a proton-neutron cycle. The first half of the cycle certainly exists. In stars, protons clump together into heavier nuclei, with some of the protons turning to neutrons. (Besides hydrogen, atomic nuclei are about half neutrons, with the neutron-proton ratio gradually creeping upwards as the size of nuclei grow (because protons repel each other, so you need more neutrons to keep a heavy nucleus from throwing off particles).) In nuclei formed from stellar fusion, the majority of neutrons started off as protons.

Then, when stars run out of easily available protons that generate heat through fusion, the stars collapse, which, for sufficiently massive stars, squashes most of the remaining protons (in nuclei) into neutrons, hence the name neutron star. Run-of-the-mill collapsed stars don't put out much energy – they've run out of proton fuel.

So the universe looks like a one-way process – matter coalescing into clumps, protons fusing into neutrons, stars and their galaxies eventually going dark. This doesn't look much like an

information-processing universe – it looks like a universe that does one big, long calculation, and that's it. Well, that's a crappy calculator or computer or universe. You'd expect an information processor to process an ongoing stream of information – a calculator to keep calculating, a computer to keep computing, a mind to have more than one thought.

And so, the universe needs a cycle, to turn those neutrons (and locked-in protons) back into fusible protons, sitting in journalism class or calculus, the back of my chair/desk being kicked by a football player with a Rockin Dio calculator, high school me thinks that old, burned-out galaxies (and the space which contains them) get shoved aside by young, fresh galaxies. Then, at some point, way, way later, the old galaxies can get reactivated by the curvature of space or a flood of neutrinos.

Neutrinos are emitted when a proton turns into a neutron. Neutrinos pass through a crazy amount of matter unscathed, which means a bunch of them should accumulate on the outskirts of the universe, where space might be tighter. Space being tighter on the outskirts would mean that not all of space expanded evenly from a single Big Bang. It would mean that the universe has an active center with somewhat fresh matter that looks expansive, while outside of this, you have collapsed, inactive matter. This matter could be reactivated, which might look like the enormous blackish holes at the center of galaxies spewing out a floor of particles. Perhaps some galaxies manage to stay fresh and in the active center for a very long time via their central blackish holes shooting out jets of matter for a very long time. If there is a neutron cycle, then the 13.8-billion-year age of the universe is only an apparent age, which is based on the amount of information in

the universe, while its actual age is fantastically older. In a neutron-cycle universe, old, collapsed regions function as memory – as stored information to be recalled under appropriate circumstances.

Perhaps the universe has correlational instruments besides protons, but they seem to me to be the most obvious. Each proton seems to me like a little spatial dimension or a variable in an equation. Variables can correlate with other variables. (That's what you want them to do – correlated variables condense information.) In information space, correlation is related to proximity – things that have much to do with each other are close to each other. When two protons are smashed very close to each other, they can fuse into a single nucleus, which, in a way, is saying that two variables are sufficiently correlated with each other that they can function as one. I suspect that each proton is a twist (or perhaps a knot) in space, with the twist putting stress on space (and also giving form to space) which is compensated for by an opposite electrical charge in the form of an electron. Protons and electrons (and supporting particles) are parts of little correlational engines.

After graduating from high school for the last time at age 27, I accidentally became a quiz show writer and then a TV comedy writer, contributing to more than 2,500 hours of programming on all the big networks. But I still thought about physics in between thinking up Kardashian jokes.

Then, a year and a half ago, I was fired from a job on a late-night show I'd had for nearly 12 years. This was bad – it was a great job. But it was also good, because Scott Jacobsen was

interviewing me for *In-Sight Journal*. With all sorts of time on my hands, I could go on at length about the theory. So here it is. There was no single Big Bang. Consciousness is a technical property of large-scale shared information. The universe is an information processor, and the information it processes is about something beyond itself.

Precedent: h/h' = 1 + GM/[(R + (h/MC)]C^2

"If I have done the public any service, it is due to my patient thought."

Sir Isaac Newton

"The fact that all Mathematics is Symbolic Logic is one of the greatest discoveries of our age; and when this fact has been established, the remainder of the principles of mathematics consists in the analysis of Symbolic Logic itself."

Bertrand Russell

"…equations that really work in describing nature with the most generality and the greatest simplicity are very elegant and subtle."

Edward Witten

"Physics is like sex: sure, it may give some practical results, but that's not why we do it."

Richard Feynman

"It is shocking to see what hateful reactions one gets when one defends the speaking of truth, or merely says that truth exists."

Paul Cooijmans

Rick Rosner founded informational cosmology on May 2, 1981, in the Libby Hall Cafeteria in Boulder, Colorado, United States of America. Your 21st birthday. Our formalization in *The Rick G. Rosner Interview [Academic]* (2015) and *An Introduction to Informational Cosmology [Academic]* (2015) presented the independent theorization about the nature of

the universe, namely: a conscious net self-consistent information processing universe with emphasis on its large-scale structure.

A consciousness with improbable concern for us – summarized in the formula: h/h' = 1 + GM/[(R + (h/MC)]C^2. As near as I could determine at the time, the line of reasoning from May 2, 1981, begins with its re-creation in question 24 in *The Rick G. Rosner Interview [Academic]* (2015):

> ***Metaphysics needs logic; logic needs metaphysics. Furthermore, mathematics derives from logic, physics derives from mathematics, and hence – for a more comprehensive framework – physics needs metaphysics and vice versa. At root, we have a deep relation between physics and metaphysics.***

You responded:

> *Compared to science, metaphysics has been very unsuccessful, to the extent that few people, scientists included, do much metaphysical thinking. Science has helped us build the modern world. Metaphysics can't even definitively answer its own questions. Pondering "What is being?" doesn't bring us Apple products. Our era is kind of the reverse of ancient Greece, which was all "Why is everything the way it is?" and not much for doing experimental science. The Greeks should've performed some*

experiments. It's hard to do effective metaphysics if you don't have sufficient information about how the universe works. It's like solving a crime without evidence.

But perhaps by now, we have almost enough information, via physics, to come up with a system which has some "whys" as well as "hows." We've learned a lot of "hows" about the universe: how it transacts much of its business – on a macro scale, via fields and long-distance particles such as photons and neutrinos. We should be able to use our knowledge of these transactions to propose theories of how the universe might benefit from these transactions, asking "Why? – What does the universe gain?"

Via these processes, the universe becomes simpler in some ways – over billions of years, stars boil down – and more complex in others – across billions of years, life arises. The universe becomes more stable in some ways – matter accretes into galaxies and stars which are cradled in fixed orbits and gravitational wells and the universe clusters on a range of scales, adding to stability and informational compactness. As my friend Dave Dameshek likes to ask, "To what end? To what end?!"

Take a look at a business model for a system with "whys" – with goals we kind of understand – thought.

Thought has several related objectives – manage an organism's normal activities, look for exploitable regularities, and avoid error, all within the context of constructing a

model of reality. The brain has a finite capacity, so it wants to compress information to reduce the chance for error and make room for more information. The brain likes finding analogies and shortcuts – they help compactify information.

Thought involves risk. If the brain can figure out how to make knowing fewer things as helpful as knowing more things, it can know those few things with greater certainty and less distraction and chance of confusion. Think of it in terms of sending a message – if you have a 15-word message but can compress it to 5 words, better to send the shorter message 3 times to increase the likelihood the message gets through.

I view laughter as delight at finding a shortcut and as a signal to other people that a shortcut has been found. George Saunders has the same theory. "Humor is what happens when we're told the truth quicker and more directly than we're used to." — George Saunders, The Braindead Megaphone.

So we have a rough idea of the brain's informational priorities and procedures. Similarly, we can speculate about what the universe is up to with regard to information.

The universe does what it does, which I believe is information processing – thinking, even – within some context. It's grappling with – thinking about – some world beyond itself – a world that includes the physical structure that makes the universe's information-processing possible. We can assume that the universe has objectives in that world. We

can assume that the universe has an economy of thought – that its thinking is effective – because some rules of information are in place. We can try to figure out those rules, dagnabbit.

In other words, metaphysics remained dominant in ancient Greece with failure. Science dominates in the present with success.

Thoughts about *purpose* transitioned into *function* of the macrocosm through development across millennia of human philosophy, even into deep human history with the Aboriginal dreamtime narratives (40,000 BCE), and European, Bushman, and New Guinean (40,000 BCE), Indian Bon (30,000 BCE), Yoruba or Berber (9,000 BCE), Melanesian (3,500 BCE), Bantu, Nilotic, and Sami (3,000 BCE), Finnish (2,000 BCE), Polynesian (1,650 BCE), Anisazi and Micronesian (1,200 BCE), Hopewell (200 BCE), Mississippian (800 CE), Inuit and Iroquois (1,000 CE), Pueblo (1,450 CE), Plateau Indian (1,500 CE), and Plains Indian (1,700 CE) animisms. Other conceived of an alive cosmos as a singular God in Nostratic (20,000 BCE), Arabian, Iranian, and Paleo-Indian (12,500 BCE), Kosma (11,000 BCE), and Asian (10,000 BCE) pantheisms. Others anthropomorphized the gods seen in Mesopotamian (4,000 BCE), Vedic (3,500 BCE), Canaanite and Egyptian (3,000 BCE), Indo-Iranian (2,500 BCE), Baltic and Greek (2,000 BCE), Phoenician (1,500 BCE), Aztec (1,300 BCE), Ethiopian and Incan (1,100 BCE), Germanic and Roman (800 BCE), Slavic (600 BCE), and Norse (200 CE) polytheisms. Some mystery cult philosophy seen in the Greco-Romans (550 BCE) and shamanism in the Olmec (1,500 BCE). Each with an

appearance of a winding convergence into the monistic – a tendency in human conceptual history.

Insofar as the thought transition moved from purpose to function, this has a mirroring from the metaphysical philosophies – dream narratives, animisms, pantheisms, polytheisms, mystery cults, and shamanisms – to the natural philosophies for modern science developed in the previous centuries. Now, with respect to physics' natural philosophical or scientific foundation and metaphysical infusion into physics of informational cosmology, we might harbor the capability to develop theorizations about the purposes of the universe through comprehension of the functions – not total knowledge.

Ancient or modern approaches work, but together – not alone, with mutual, beneficial co-existence to the questions about the sub-most stratum of the universe in which life originates, develops, and exists in variegated niches with the possibility for advanced consciousness. The conscious cosmos exists with net efficiency or thought efficacy as opposed to net inefficiency or thought disorganization, flat as opposed to open or closed structure, merged space and time into space-time curvature as opposed to individuated space and time, a Euclidean geometric active centre with proton filled galaxies' expansion of space and a collapsed matter outskirts with neutron filled galaxies' collapsing space as opposed to lack thereof theorized in standard Big Bang cosmology, self-consistent information processing for the technical or non-mystical construction of consciousness as opposed to self-inconsistent information processing for mystical or non-technical

construction of consciousness, ultra-deep cosmic time in a neutron cycle as opposed to cosmic time in a standard singular Big Bang universe, and containment in an armature/armature world which constructs an information-space/mind-space in each universe as opposed to the single universe, multi-verse, 11-dimensional String Theory universe, cyclic universe, or infinite universe (in start or finish). In question 28 of *The Rick G. Rosner Interview [Academic]* (2015), I state:

> ***You describe information processing for universe's substrate of operation. This implies transactions. For precision, this means transactional information processing. I would like to plumb the well of reasoning. For example, ubiquitous information processing within and by universe. Consciousness emerges from self-consistency and information processing. Humans have self-consistency and information processing, and thus have consciousness. Therefore, we can extrapolate to universe based on isomorphism in operation and traits. Operation through time. Traits of self-consistency and information processing. An isomorphic geometry of universe and minds in universe. By extension, universe possesses localized and globalized consciousness. In addition to this, if we could provide an absolute measure of the degree of 1) self-consistency and 2) information processing capabilities of individual localized consciousness, then we could provide an absolute measure of global 1) self-consistency and 2) information processing capabilities of universe. Precision of this metric limited by information quality, computational capacity, and efficacy of calculation methodology. Therefore, we might both 1) consider universe reposed with consciousness at the fundaments and***

2) provide a metric of the universe's degree of consciousness. You call this "informational cosmology." In a way, mind/brain sciences become physics/cosmology, and vice versa. A metric for the mind/brain could extrapolate – within reasonable consideration – into a metric of universe. Only differences in magnitude. Where else does "informational cosmology" lead us?

You responded:

Informational cosmology smashes together two big areas of study – the mind/brain and the universe – in a way they've never productively been smashed together before – they're the chocolate & peanut butter, the Han Solo & Chewbacca, the mac & cheese, the Lennon & McCartney, the Key & Peele, the Beavis & Butt-head, the Spock & Kirk, the Mulder & Scully, the Felix & Oscar, the Holmes & Watson, the Thelma & Louise, the Jonah Hill & Channing Tatum of tough things to think about. Three hundred years ago, Bishop George Berkeley said something like, "The universe is an idea in the mind of God," but this didn't lead to anything. There wasn't yet enough scientific knowledge to work from.

But that was then. Now, linking information maps and thinking and the universe allows you to apply established scientific techniques across the linkage. We can apply physics to thought and information in the mind. We can apply understanding about the purpose and

mechanisms of thought to the universe. We will soon be able to give mushy, loosely defined terms such as consciousness a solid mathematical basis.

And mathematicizing consciousness (developing a mathematical model of information processed in awareness) is the first step to digitizing consciousness (translating moments of consciousness into numbers) – to making it recordable, preservable, and transferable. That is a huge step – maybe the hugest step – towards saving our species and the planet. Storable, transferable consciousness eventually – within 100 or 150 years – frees us from the confines of our biological form. This is a big deal, if earth isn't going to become a giant dump suffering from the effects of a 23-billion-person population. Science fiction writer Charles Stross imagines a future where, among many other things, most people/semi-people/robots are only three feet tall. Half-height people use less than half the resources – maybe less than a quarter of the resources – of full-size people. You can cram a lot more of them on the planet, if that's what you want to do.

But that won't be all that we might want to do. Like-minded people might meld or marry minds and literally live as one. Many people will want to live almost exclusively in cyberspace, renting bodies when they need to go out into the real world. Population growth will slow. Maybe your rich grandma in a failing body offers you $50 million to let her consciousness ride piggyback on yours. (Steve Martin made a movie about something like this 30 years ago – All of Me.) These are pretty unsurprising ideas in science fiction – people who think about this kind of stuff are expecting things to get weird. Even if my

attempt to join thought and the universe doesn't gain traction – even if it takes someone else theorizing similarly, years from now, it's still coming – it's pretty much our destiny. It's the destiny of civilizations to make this connection and figure out the universe. (Just about every civilization figures out that its planet orbits its sun, that it's part of a galaxy, that there are other galaxies, that life evolved, etc. Figuring out that massively shared information-processing is essentially thought is another one of those things.)

There will still be plenty of normal human life. We'll still have the same drives (for sex, food, status, slightly taboo information), until we start messing with them. And then we'll have slightly more efficient and exalted drives, but nothing too terrible – ethical values will survive. People who want to live old-school will still be able to do it. But the drift will be towards control of our destinies via understanding ourselves and the universe – we'll improve consciousness, making it (and us) more informed and more complete, with fewer hidden biases. It'll be weird but also mostly great, and it's where we've been heading without knowing it since apes started using twigs to fish ants out of anthills.

In addition to these core aspects of the discussion around informational cosmology, we derived some general summative principles to provide simple statements about its foundations with the row of reasoning and inter-relationships amongst and between principles – some exist as primary, alone, and others as secondary, as derivations of the primary, principles, which define informational cosmology as follows:

Principle One: universe operates within limits of complexity. Any further complexity will likely deteriorate into optimal simplicity. Universe among logical possibilities of the set of universes bound by optimal simplicity.

Principle Two: relevance/irrelevance, information of relevance will occupy or begin to occupy the active center; conversely, information of irrelevance will not occupy or begin to not occupy the active center.

Principle Three: The Persistence Project divides into The Statistical Argument for Universe and The Statistical Argument for Consciousness. Universe cannot not exist; consciousness cannot not exist. Therefore, the non-absolute high probability for existence, and persistence, of universe and consciousness

Principle Four: informational cosmology implies informational ethics in a progressive argument. Where Ic equals informational cosmology, Su equals Statistical Argument for Universe, Sc equals Statistical Argument for Consciousness, P equals The Persistence Project, C E equals "existence-valuing principles," and Ie equals informational ethics, we can construct one conditional argument to derive informational ethics from informational cosmology: 1) Ic⇒(Su ∧ Sc), 2) (Su ∧ Sc) ⇒ P, 3) P ⇒ C E, 4) CE ⇒ Ie, 5) Ic, 6) ∴, Ie. Therefore, one acquires values consistent with the facts of existence: "existence-valuing principles" or CE. David Hume's is/ought fails. A distinction exists between them, but facts imply values.

Principle Five: universe/mind symmetry, universe as mind based on net self-consistency and information processing. Units of sufficient individuation in universe with self-consistency and information processing as minds too.

Principle Six: universe (Mn) implies armature (An); if armature, universe. Universe equates to information processing; armature equates to material framework/processor: (An⇒ Mn).

Principle Seven: armature and universe construct mind-space: (An+ Mn = Sn).

Principle Eight: net self-consistency and information processing equates to consciousness. This reflects Principle Five. Sigma, ∑, self-consistency, S, times, *, sigma information processing, ∑Ip, would equal mind-space, Sn, where mind-space equals information-space, Is: (∑S * ∑Ip = Sn= Is).

Principle Nine: universe as conscious: (An⇒ Mn); ∴, (An+ Mn); (An+ Mn) ⇒ Sn; ∴, (An+ Mn = Sn). In addition to this, we have the inclusion of Principle Eight to derive the same conclusion about mind-spaces, Sn: (∑S * ∑Ip = Sn). Armature implies universe; therefore, armature and universe; armature and universe imply mind-space; therefore, mind-space; armature and universe construct mind-space, and net self-consistency and information processing equate to mind-space. Consciousness equates

to net self-consistency and information processing; universe equates to these too. Therefore, universe equates to consciousness endowed system.

Principle Ten: consciousness at every magnitude exists in finitude and with non-mystical/technical construction. Informational cosmology lacks infinities and describes finites. Information constructs consciousness based on information processor and net self-consistency with finite capabilities. Subsystems internal to universe partake of this consciousness too, but not to the same degree. Units of sufficient individuation in universe with net self-consistency and information processing have consciousness proportional to sum of self-consistency times sum of information processing. Therefore, universe and multiple subsystems in universe have consciousness or equate to minds.

Based on consistent conversations each week through the previous year, we can re-iterate aspects of informational cosmology as a complete containment of the relevant premises of digital physics, but not vice versa. Digital physics argues for the universe as computer; informational cosmology argues for armature as computer. Differences begin there. By implication, at face value, digital physics comes out of digital philosophy.

Informational cosmology contains digital philosophy and comes out of informational philosophy. Digital physics, akin to non-digital physics, studies the functions through time, the "hows," of the universe without teleology through natural philosophy; whereas

informational cosmology, akin to digital and non-digital physics, studies the functions through time, the "hows," and purposes, the "whys," of the universe without teleology through natural philosophy and incorporation of metaphysics into physics.

Digital Physics

"The belief in a certain idea gives to the researcher the support for his work. Without this belief he would be lost in a sea of doubts and insufficiently verified proofs."

Konrad Zuse

"The old adage 'knowledge is power' is a very cogent truth, both in human relations and in thermodynamics."

Edwin Jaynes

"The more equally attractive two alternatives seem, the harder it can be to choose between them - no matter that, to the same degree, the choice can only matter less."

Edward Fredkin

"Could it be that some place out there in the computational universe, we might find our physical universe?"

Stephen Wolfram

"The usual no-go theorems telling us that hidden variables are irreconcilable with locality, appear to start with fairly conventional pictures of particle systems, detectors, space and time. Usually, it is taken for granted that events at one place in the universe can be described independently from what happens elsewhere…The conventional Copenhagen interpretation of quantum mechanics suffices to answer all practical questions concerning conventional experiments with quantum mechanics…we insist that the axioms for any 'complete' quantum theory for the entire cosmos would present us with as yet unresolved paradoxes."

Gerardus t' Hooft

The transition from digital physics to informational cosmology might appear straightforward. However, digital physics asserts a lot. Informational cosmology, by implication, includes more than digital physics because informational cosmology builds on digital physics. This necessitate formalized arguments. A reader can find these in the *Appendix I: Argument* of *Tweets to the Universe: Volume I*.

Informational cosmology represents a radical departure from digital physics in one crucial aspect about the digital nature of the universe. Digital physics asserts the universe as digital, or binary. Informational cosmology does not argue the universe as binary. At its core, digital physics argues for the discrete/non-continuous, finite, and quantifiable nature of the universe. How do the new discussions related to informational cosmology update this part of its argument?

For continuous, probabilities of (quantum) interaction would have to vary smoothly based on relative positions of potentially interacting particles. Not sure this doesn't happen. For non-continuous, particles and space would have to be locked into overall allowed structures (perhaps).

You have locked-in states among correlated particles. These are spatially discrete - non-continuous. But among non-correlated particles (with the vast majority of particles being non-

correlated with each other (except in a vague, gravitational way), space might act as if it's continuous.

Can ask about continuous or non-continuous in terms of next possible moments. Each moment implies a huge but finite set of next possible moments. Each potential next possible moment has a (tiny) probability associated with it.

Given non-continuous space, the next possible moment probabilities would not vary smoothly, given slightly different configurations of the current moment. Slightly reconfiguring the present moment would mean snapping it into slightly different positions, going from allowed configuration to allowed configuration.

Given continuous space, present moment could be reconfigured smoothly - no snapping into place - and probabilities of next moments would change smoothly.

And mixed up in all this is the fuzziness of everything, which means that there's a finite description of the state of the universe which encompasses a range of possible spatial orientations of its contents. And given that positions are fuzzy, then next possible moment probabilities have an extra layer of uncertainty. (Maybe? Or maybe that's built in.)

So, right now, I'm leaning towards space-time being…

Actually, no.

Leaning towards there being no practical distinction between continuous and non-continuous space-time.

As follows -

Every moment of the universe has a finite description, which is the state of the universe itself (taking into consideration that what constitutes a present moment depends on your location).

Each description of the universe encompasses a range of possible positions of particles, because they're fuzzy.

Particles can be anywhere within their probability clouds, with their positions influencing the probabilities of next moments. But since next moments are themselves fuzzy, you can never capture exact positions.

So I guess instead of calling space-time non-continuous or continuous, I'd prefer calling it incompletely specified.

A principle might be, "the universe as finitely characterizable." A universe with a finite number of components could still require infinite characterization to pin everything in space. But our and

any universe is the result of a series of quantum events, leaving the universe in a finitely characterizable quantum state.

Which opens up a question of inertial motion and gravitational acceleration. An object moving inertially (that is, on a path specified by its own inertia) isn't necessarily leaving a quantum record of its changing position in space. It's not exchanging photons due to bouncing off of other stuff.

Which means that a characterization of the universe at a given moment isn't just a list of particle correlations but must also include when the interactions that created those correlations occurred, because the implications of those interactions are still playing out, often invisibly until they cause a non-virtual interaction.

Of course, the universe itself is the most compact description of the universe.

A brick silently flying through interstellar space is imprecisely specified in space and time. But its wave function is complete (but fuzzy). Exactly where and when it will hit something is unknown. But its wave function, specified between it and the parts of the universe with which it has or may interact, says it exists and it's on its way somewhere. (Unless the information about the brick's existence is somehow lost. Then it may or may not exist. But almost certainly not - the odds of a brick existing when there's no information that it should are nearly zero.)

How does this help answer "How do the new discussions related to informational cosmology update this part of its argument?”

Well, a self-defined universe is a highly implicate universe. The description of the universe that is the universe implies all of its possible futures. Information is added from moment to moment to specify which next moment.

(Implying a variety of possible futures means that the universe lacks sufficient information to specify a specific future.)

Digital physics argues the universe as digital, informational, and computable too. Therefore, it argues for the discrete (with removal of non-continuous based in this and other discussions based on the updates to the discussion: learning and progress), finite, quantifiable, digital, informational, and computable nature of the relationship. How do the new discussions related to informational cosmology update this part of its argument?

The universe is the information contained in calculating hardware, just as a mind is the (moment-to-moment) information (at least the part accessible to consciousness) contained in the brain.

Or, more simply stated, a universe consisting of information implies a support structure external to the universe (with "external" meaning, among other things, "not part of the universe's (self-defined) space").

And the existence of the universe's external hardware - we're calling it the armature - implies the existence of a world - a universe - which the armature is a part of.

Imagining an armature world is disquieting, because it's an enormous assumption/implication, with no justification except by analogy with the mind and brain.

And even more disquieting is the further implication that there's yet another, (most likely) bigger hardware world which supports the information-based universe in which the armature that supports our universe exists.

And then you should probably imagine an infinite hierarchy of hardware universes, each supporting the information out of which the universe below it is made.

So much invisible bigness. Armature worlds all the way up instead of turtles all the way down. Is there any way out of it?

I don't know. But there's a way to not to feel quite so disturbed by it.

And that is the principle of non-bias against size.

We intuitively think that nothingness is the default state of existence - that anything that exists must be earned or bought by some process that makes something explode out of a loaded nothingness.

This is in part because of the success and appeal of the Big Bang theory.

There was nothing - that makes sense - nothing doesn't cost anything - but the nothingness was unstable (okay, well something had to happen) and it turned into this dense explosive (expansive, really) dot that grew into our universe.

But instead of imagining the universe exploding from nothing, imagine the set of all possible universes.

Our universe is big, containing something like 10^80 or 10^85 fundamental particles. So we know that big is possible. Can we assume that a universe of any finite size is possible? Well, yeah - we can. Doesn't mean we're right, but still....

We can imagine things that might limit the size of possible universes - instabilities that become insurmountable beyond a certain size. A tendency for universes beyond a certain size to lose rather than gain information. The rise of malevolent universe destroying civilizations in huge universes.

But we can also imagine that limiters of the size of universes aren't pervasive - that universes can ride the principles of existence up to any finite size.

And the thing about infinity is - any finite number is infinitely less than infinity.

If we imagine that a universe of any finite size can exist, well, then our universe is about zero percent the size of the largest-possible universe. (Under the unlimited size assumption, there is no largest-possible finite universe - you can always go bigger.)

Perhaps we should practice thinking about fantastically large things as if they're possible. To be tautological, anything that can exist (no matter how ridiculously large) can exist.

You'd expect a humongously large universe to be mind-bogglingly old. But that's part of the deal. Universes of any finite age might be possible.

(But a gargantuan universe doesn't have to be enormously old - it could be an engineered universe, created by an entity that itself is either fantastically old or is itself engineered (and so on).

However, due to the nature of information, a mongo universe would at least appear to be pretty dang old - part of arranging information in a mostly closed, self-consistent universe is that that universe appears to have a history that accounts for the situating of matter and space within it.)

Digital Physics to Informational Cosmology

"I think Computation is destined to be the defining idea of our future."

Stephen Wolfram

"One of the things that I've been doing recently in my scientific research is to ask this question: Is the universe actually capable of performing things like digital computations?"

Seth Lloyd

"All physical systems can be thought of as registering and processing information, and how one wishes to define computation will determine your view of what computation consists of."

Seth Lloyd

"Think of all our knowledge-generating processes, our whole culture and civilization, and all the thought processes in the minds of every individual, and indeed the entire evolving biosphere as well, as being a gigantic computation. The whole thing is executing a self-motivated, self-generating computer program. More specifically it is, as I have mentioned, a virtual-reality program in the process of rendering, with ever-increasing accuracy, the whole of existence."

David Deutsch

"I believe that consciousness is the way information feels when being processed."

Max Tegmark

Informational cosmology works from the foundations of digital physics and implies more. Digital physics argues for the universe a discrete, finite, quantifiable, and computable. Informational cosmology commits to the strictures of these premises, but reasons beyond them. Digital physics argues for the universe as a computer. Informational cosmology argues for an external material infrastructure for the universe, an armature, as the computer.

Well, it's pretty obvious to a significant chunk of the physics community that the universe is some kind of quantum computer. (I think - I don't hang with that many physicists, but it seems to be not only a trend, but also a sensible trend.) But given this point of view, there are plenty of ways to go wrong.

1. The universe doesn't have to compute in binary. The universe computes via correlation, through its parts clustering and linking together (and unlinking, when needed). The universe is like a huge quantum Lego computer.

Should specify what quantum computing means. I will probably screw this up.

...but will give it a go.

The particles in the universe have a shared history. (A physicist buddy says it goes even deeper than that - that all particles are manifestations of an overall field. All particles are the same, just little excitations, little plucking-ups, of the fabric of the universe.)

This shared history means that particles are constrained to work together. (To use a very bad and not helpful analogy, it's like going to the supermarket in a small town, knowing that you're going to see some people you've slept with.)

The shared history contains information. Particles with a shared quantum history have more computing power than bits in a computer.

Having a shared history means that particles have to behave consistently with regard to that history and to each other. You may not know the exact history from outside the system, but knowing there's a history can be powerful in terms of some computations (including computing future states of the universe or of parts of it).

2. The universe isn't just computing its future.

The computing processes in the universe are processing information - not information we can read, but information the universe can read. The information is about something - some world beyond the universe.

This sounds weird - how can there be a world beyond the universe, if the universe contains everything we can observe?

Well, a mind contains a world of information, but that information is about a world beyond the mind - the actual world we live in.

Similarly, the information in the universe has to be about something. And when missing information is filled in by quantum events as the universe progresses from moment to moment, those quantum events aren't random - they provide information about some outside world. (These events appear random according to the rules of quantum mechanics because the universe is missing information about them until they occur.)

(Both a mind and a universe contain information which, to a great extent, specifies their future states. But a mind and a universe experience their own information as information about a material world beyond (which, confusingly, can include information about the mind or universe as a manifestation within the outside material world).

However, a mind's consciousness doesn't directly perceive the physics and materiality of the information it contains. It perceives what the information is about without perceiving the physical structure taken by that information (according to the principles of existence in a self-consistent system).

Informational Cosmology

"We live on an island surrounded by a sea of ignorance. As our island of knowledge grows, so does the shore of our ignorance."

John Archibald Wheeler

"It from bit symbolizes the idea that every item of the physical world has at bottom — at a very deep bottom, in most instances — an immaterial source and explanation; that which we call reality arises in the last analysis from the posing of yes-no questions and the registering of equipment-evoked responses; in short, that all things physical are information-theoretic in origin and that this is *a participatory universe*."

John Archibald Wheeler

"Body and soul are not two substances but one. They are man becoming aware of himself in two different ways."

Carl Friedrich von Weizsäcker

"We are not interested in the fact that the brain has the consistency of cold porridge."

Alan Turing

"The question of whether a computer can think is no more interesting than the question of whether a submarine can swim."

Alan Turing

Konrad Zuse argued for the universe as a computer. What strengths and weaknesses exist with this theory?

I agree that the universe is an information processor, which is more or less the same thing as it being a computer. However, computers work in a specific way, processing strings of ones and zeroes. This is not how the universe computes (though it will certainly be possible to translate between the two forms of computation, once we figure out exactly how the universe computes).

Traditionally, to graph the relationships among N variables or dimensions, you need a chunk of N-space. But N-space is mostly empty - the more dimensions, the emptier it is, especially if some of the variables are highly correlated.

We had discussions with an implicit implication about the nature of the universe as digital with the premise about the computability of the universe. Some refinements to "fundamental binary": informational cosmology incorporates information theory and communication theory in addition to digital physics applied to cosmology. Information as binary information units, or bits, operates through transactional communications. If applied to standard physics, in general motion of matter through space and time, it becomes information transactions over time, or information processing. On the grand magnitudes in physics, in cosmology, information processing mimics the operations of human consciousness, and other consciousness, if human brains function akin to general

information processor. A standard view in cognitive neuroscience from the neuro-computational perspective.

In more detail, informational cosmology incorporates information-based views and communication theory in addition to digital physics applied to cosmology to create an information-based perspective on the grand scales of the universe. Information-based views consider the binary, or bits, basis of the universe of discourse. Distinctions and changes of state matter here. Basic distinction of existence and non-existence, and alterations from one state to another. All three possibilities amount to a reduction in possibilities for information creation.

Something can exist and not exist, and the transition from the dual state to single state reduces possibilities for the creation of information. For example, an quark or electron exists and does not exist, and then exists alone (or not). Certainty, this creates information from this uncertain distinction. In addition, a change from existent state, A, to other existent state, B, means a transition for something new, information. Existence, non-existence, and existent state change equate to change of state or reduction of possibilities, wherein the creation of information happens in the system, closed or open.

Communication theory incorporates a model of information transaction with the room for reduction in signal quality with noise between transmitter and receiver. Information creation through the transaction of data for a change of state. System: transmitter, x,

sends information about one change of state, A, through the medium (with possibility for noise), y, to the receiver, z, and A's change into another state, B. Standard physics studies the motion of matter through space and time. Digital physics incorporates a digitized, bits and bytes, or binary framework on standard physics. All matter motion becomes information processing in a massive informational transaction array.

Cosmology and its emphases on the grandest magnitudes in standard physics adapted to the "massive informational transaction array" becomes information processing and cosmology, or informational cosmology, for the study of the universe, its information processing, and the implications in metaphysics, physics, and philosophy based on the "fundamental binary." Where does this leave the nature of consciousness and its finite characterization in an informational theory?

Don't know exactly how two-state situations are reflected in the universe.

Universe's interactions are more information-rich than bit-wise 0 or 1 choices. (They can be translated to that, but so can anything.)

It's the capability for translation that grounds this in the information theory, but vast number of possibilities reduced for more information in the universe is much, much larger.

Computers reduce everything to 1s and 0s, and the universe's information-rich possibilities can reduce to lots of 1s and 0s.

Guessing that among other things, interactions in the universe tend to maximize information per interaction or something.

On and off, yes and no, existence and non-existence seem to amount to possibilities to me. Each conjunction reduced to one option creates information. Concrete example, an electron exists in orbit around a neutron and proton – a nucleus, or does not.

If it does, that amounts to a reduction in possibilities and information. However, as far as I can discern, the enormous possible futures for one electron far outnumbers these too. These can be reduced to binary too. Informational cosmology, in these considerations, would respond, "Both."

You have definite existence once a particle has slid into the active center (either from the outskirts or from a blackish hole). But around these edges, existence is nebulous and uncertain. So, existence in universe isn't binary - has to be built up from zero through history of interaction. (Also why nothing is permanent - erase universe's history, erase the universe.)

Each present moment is an efficient collection of immediate open questions.

Universe uses much of its information to define these open situations and capture the answers. Must be some efficiency there.

Info which frames open questions, with constraints on answers taking the form of history - of info about the past.

What does "nebulous and uncertain" mean here? It is not definite, but not standard probabilities too.

Other names for IC might be the Contextualized Universe or the Narrative Universe. Information in the universe seen as an unfolding narrative (not for us but for the universe-as-understander of its own info).

Nebulous and uncertain means probabilistic - uncertain within the laws of quantum uncertainty.

Particles start off as virtual, only become real through history of interaction. (History because single interactions can be undone - sometimes need a string of them for particle history to become irrevocable.)

A definite information gain for the universe upon crossing the border of the outskirts and the centre.

How much interaction for the virtual particles for the transition for the 'real'?

Depends on the situation, but virtual particles usually blip in and out of existence under the parameters of Heisenberg uncertainty. A field can put pressure on space, making particles more likely to pop out.

These self-annihilate.

Wikipedia talks about it -

> "The probability amplitude for a virtual particle to exist tends to be canceled out by destructive interference over longer distances and times. Quantum tunnelling may be considered a manifestation of virtual particle exchanges. The range of forces carried by virtual particles is limited by the uncertainty principle, which regards energy and time as conjugate variables; thus, virtual particles of larger mass have more limited range. Written in the usual mathematical notations, in the equations of physics, there is no mark of the distinction between virtual and actual particles. The amplitude that a virtual particle exists interferes with the amplitude for its non-existence, whereas for an actual particle the cases of existence and non-existence cease to be coherent with each other and do not interfere any more. In the quantum field theory view, actual particles are viewed as being detectable excitations of underlying quantum fields. Virtual particles are also viewed as excitations of the underlying fields, but appear only as forces, not as detectable

particles. They are "temporary" in the sense that they appear in calculations, but are not detected as single particles. Thus, in mathematical terms, they never appear as indices to the scattering matrix, which is to say, they never appear as the observable inputs and outputs of the physical process being modelled…The amplitude that a virtual particle exists interferes with the amplitude for its non-existence, whereas for an actual particle the cases of existence and non-existence cease to be coherent with each other and do not interfere any more."

Reality is only defined enough to keep virtual particles tamped down up to a point (the foam). I guess this is what Chris Cole means when he says every particle is made of every other particle. (Empty space is made of every particle, too.)

Feynman did a lot of work w/ total particle histories - how to do math/physics when everything can happen/is happening. Have to set up the math so only the real doesn't cancel out.

W/ particles and everything else in the universe, you have conditional existence. Things with long histories have the most definite existence (with everything's existence being dependent on that history). Heat up the universe to the point that the history is erased, and that once-existent history joins the group of all possible (but unsubstantiated) histories.

Any probability amounts to the inclusion of additional binary possibilities. "1 or 0" amounts to a 1/2 chance for 1 or 0. Add more into the sequence, you have sequences of

odds. Think about a hypothetical universe or system as one electron, it will last for two moments of time: present existence, System State: A, and subsequent existence, System State: B, but with three possible future subsequent existent states, Possible System State Set: {x, y, z}, of which, upon selection, equates to B. Probability for A becoming x, y, or z, remain equivalent, which means x's, y's, and z's odds exist as 1/3 of actualization.

The universe does this in an enormous possible future superset. A big set of small odds.

The universe does operate in an information-rich (though highly inadequate as a hyphenated term, more "information-deluged"), or information-deluged, manner based in the ability to count above two-state possibilities, but these possibilities remain *in potentia* for encoding in a two-state or binary paradigm. Fundamental binary should mean translatable binary.

This might bring informational cosmology into the binary paradigm, but builds on it. Hence, it is not a binary theory alone. Rather, a 'tip of the hat' to the binary paradigm with the inclusion of the fuzzier or higher-level probability logic incorporated into the universe's seeming calculations in higher-than-two multi-state calculations.

Of course, we do not comprehend the computational means of the universe based on its contents, arrangement, and motions. However, our best characterization of the universe in mathematics provides the bases for the understanding of the universe in the multi-state

characterization of some calculations, such as its own future and its relevant armature environment, and the direct relation to information theory and communication theory with mathematics, which manage the reduction of greater-than-two-state possibility calculations into two-state, or binary, computations. Anything with more than two-state calculations seem to require and build on two-state computations.

The possibility for the universe as a quantum computer which counts above two, which means in some respect non-binary, non-Aristotelian or classical computation, but at the same time the binary appears to provide the groundwork for the quantum here too. A quantum world remains finite and, at bottom, things exist or do not, and this might be the crux. Either existence or non-existence for parts of a system, and the associated uncertainty with measurement of a system, retrospection of a system, and projection/prediction about its future probabilities or possible futures, in this frame of reference, the binary of existence or non-existence of anything means the penultimate difference of state.

From this groundwork, the "quantum foam" and its associated uncertainties, ambiguities, and creation ex nihilo (modern scientific "nothing" defined by empirically-bound something, not old "nothing" defined by naïvete and philosophical assertion coupled to intuitions and common sense – and intuition's and common sense's associated failings) of virtual particle and anti-particle pairs with sufficient separation and history for transition into a real particle, but this means existence from non-existence. A radical state change, new information. A quantum universe amounts to a classical universe on steroids with lots

of unexpected side effects such as the emergence of “qubit” information unit compared to “bit” information units.

Things do not purely exist or not. They only exist within context, and this context has to be constructed.

And the context, it exists or does not exist here. We seem to talk past one another a bit here. Before this starts to travel to the realm of thud, let’s take a step back: “nothing” means “not something.” What equates to something? What equates to nothing? What equates to context? Does this mean definition's incompleteness define existence? Reality as a dial or knob rather than a switch or button.

I'd say the universe is implicate - doing a lot of business by implication - but Bohm used implicate in a different sense.

Instead, we can borrow from Cher in Clueless and say we live in an "as if" universe. The universe behaves as if events in its history happened (by implication), even though information about those events may have only been shared in virtual ways by virtual particles.

So the universe behaves as if it knows more than it could know via direct, actual particle interactions.

When a photon traversing huge distances loses energy, the energy is lost to virtual interactions. Because the photon was able to travel so far without being captured, the lack of capture conveys information via implication - the universe behaves as if it knows that the interaction which created the photon didn't, I dunno, put a strain on space which resulted in the photon being captured (within the uncaptured photon's expanding light cone).

Gravitation could be an implicate force - a force which is conveyed via implication - with the implication coming from aggregate electromagnetic interactions (both virtual and real, I guess).

Informational cosmology seems like a complicated jigsaw puzzle. If one premise is changed, then the whole infrastructure collapses and needs re-construction. Everything hinges of the truth of the premises of digital physics, except one, and then following through on the logical consequences because the logical consequences follow from the true premises, as with any standard argument. Math seems, in its essence, like an argument with sequential premises for the problem, its various progressions to the solution, and the conclusion of the argument is the solution to the mathematical problem.)

If we're rational, we can't not accept the premises, if supported or reasonable extrapolations, and the conclusion, if the premises lead up to it. Otherwise, we're irrational, pretty much by definition. And if the conclusion is a true statement, no matter how counter-intuitive or weird, or crazy.

Informational cosmology states the universe links to an armature. An armature for the information processing observed as the universe. Digital physics argues "the universe as computer" is true; informational cosmology argues "the universe as computer" is false. Informational cosmology states: "the armature as computer" implicated by "the universe as computable." "The armature as computer" implicated by the computability of the universe because the observational evidence operates from the universe to derive the armature, not vice versa. How do the new discussions related to informational cosmology update this part of its argument?

Existence is crazy. As one gets farther in time and space from daily life, one encounters surprising things - that the earth isn't flat, that we're on a big round planet, that the planet orbits a giant ball of burning atoms, that the sun is one of 10^11 stars in the galaxy, that the Milky Way is one of 10^11 galaxies in the universe.

But no other overall explanation would be less crazy. All the possible explanations for how and what the universe is are nuts. There is no non-mind-boggling explanation. So, mind-boggling isn't a disqualifier.

IC, mind-bogglingly claims this -

Self-consistent information processors share characteristics -

1. Information space - a space-time consisting of information

2. Authentic-feeling, fleshed-out perception of the information within information space - technical consciousness

3. A referent world pertaining to the information. That is, the information in information space is about something beyond itself. The information in our minds is about the world beyond our minds (more than it's about our minds themselves).

4. Some unavoidably consistent physics and principles of existence which include relativity (both kinds), quantum mechanics, four-dimensional space-time (probably), familiar types of subatomic particles (though their specific characteristics may vary depending on conditions in each information space

There are further mind-boggling implications to these shared characteristics of information spaces, with perhaps the biggest one being an infinite chain or hierarchy of supporting material universes - a ladder of armature worlds.

Gravitation could be an implicate force - a force which is conveyed via implication - with the implication coming from aggregate electromagnetic interactions (both virtual and real, I guess), perhaps along with aggregate interactions of other basic forces, especially the weak force.

That is - space-time, including gravitation, is shaped by aggregate particle interactions, so gravitation, which is part of the fabric of space-time, may not need its own particles. (I don't know enough quantum physics to know whether net force mathematically must have its own particle in every instance.)

Space doesn't need its own particles - particles that somehow keep three-dimensional space open. And time doesn't need its own particles - particles that keep time progressing from the present to the future. So perhaps gravitation, which is part of the structure of space-time itself, doesn't need its own particles but instead is the result of particle interactions which transmit other forces and whose aggregate interactions also define the shape and scale of space-time.

The universe can be seen as a history of interactions - handshakes - among particles. As such, one way the universe could be presented is as a list of these handshakes and when they happened (allowing for relativity, according to which the order of interactions can depend on the position and velocity of the observer). I'm sure there are a bunch of ways to present the history of the universe, but

...but probably the most efficient (in some way) to present the universe, is the way the universe presents itself - in four-dimensional space-time. 4-D space-time minimizes something - probably action (the quickest path for interactions) - and/or maximizes something - perhaps something like information or definiteness.

Perhaps the 4-D universe is set up to minimize the action of probable future interactions. Given the universe's history, some particles are more likely to have mutual interactions than others. Likely or frequently interacting particles should be closer together than particles which are less likely to interact.

So space-time reflects particle interaction probabilities in an efficient, compact way. Particles with a history of association and probable future association are close together. Space reflects this history and probability, based on particle-mediated interactions (via photons and neutrinos, maybe gluons, but gluons are very localized, so they probably don't have much to do with the shape of macro space).

And if space-time including gravity represents (is, actually) an efficient arrangement based on particle interactions, you don't necessarily need further space-time-shaping particles (gravitons). Say we're judging a beauty pageant. We arrange the finalists on the stage based on their scores in the various rounds. We don't need to give them yet another score based on their on-stage position. That's redundant.

Either there does or there doesn't have to be a physical context in which the universe exists. That is, there either has to be or doesn't have to be something separate from the universe to support the existence of the universe.

Under Big Bang theory, there doesn't really have to be. There's an explanation rooted in physics about an unstable nothingness expanding from a tiny point to become our universe. But nothingness being nothingness, it doesn't have to be embedded in anything. (That would be somethingness.)

Under many traditional theologies, there needs to be a creator behind the universe. (And the creator either created himself or there needs to be an explanation for the creator. But most theologies stop short of speculating about what might have created the creator. That kind of question verges on impertinence or blasphemy.)

In the latter case, yes; in the former case, no.

In the necessitated external designer of the designer of the designer, or creator of the creator of the creator, and so on, it would be blasphemy by definition; in a self-contained, self-creating entity, it would not be blasphemy by definition. Former case, the question contains content, and was crushed in the past as 'blasphemy'; latter case, an illegitimate question because the answer seems implied in the question.

Yes!

So, the Big Bang, with nothing behind the universe but an unstable primordial void, seems reasonable. But asking what physical (or transcendent) entity created the universe has also seemed reasonable for thousands of years.

At this point in our understanding, it doesn't seem unreasonable to be open to either a nothingness or a somethingness behind the universe. What's a little uncomfortable is that some kinds of somethingness imply an infinity of creators.

If the mind-brain setup AKA a world of pure information in its own space made possible by the hardware of the brain applies to the universe as a whole, then there is a universe outside our universe which contains the hardware that supports the information-world that is our universe.

And the hardware universe behind our universe made of pure information is, by implication, itself pure information supported by yet another hardware universe outside of that universe. And so on, out to infinity, I guess. (Not physically outside, as if on the other side of some fence, but in another space altogether.)

It's a big, clunky framework. But that's probably not sufficient reason to rule it out. Our current most reasonable picture of the universe (the Big Bang) is less than 100 years old, because the ingredients just weren't there before that. To have Big Bang theory, you need general relativity, which turned 100 in 2015.

You need observational evidence of other, red-shifted galaxies, which we didn't get until Hubble (and Leavitt and Lemaître) in the late 1920s. You kind of need fusion-based nucleosynthesis in stars, which was fleshed-out in the 1930s through 50s. And you need evidence of the Cosmic Background Radiation, which came along in 1964.

With such a young understanding of our universe, it’s not unreasonable to imagine that there are still gigantic surprises to come - even that there might be a stoner's ladder of existence, with hardware universes supporting information universes all the way up.

Of course, in an information-based universe, this refines the colloquial premises of the argument in the following form. Information cosmology, its associated processing and processors, the information processing would remain net self-consistent, and the combination thereof (of information processing and net self-consistency) would comprise a technical definition of consciousness, with the implication of consciousness separated into conscious and non-conscious, the universe as conscious (based on the aforementioned definition of consciousness), the similarity in structure (the “big equivalence”) between minds in the universe and the universe, the nest nature of this equivalence, the necessitated armature and the subsequent nesting of this with the universe and its minds, further implications of an armature world which nests the armature, and the total nest set entitled the Tower of Minds with the Tower of Minds nesting the armature world nesting the armature nesting the universe nesting the minds in the universe. A simplification of the general argument in the previous statement.

A hierarchy of embedded consciousness. Each consciousness does not separate from another. No derivation necessitates negated linkage; therefore, these many minds sum to one. Furthermore, minds in the universe equate to conscious. Universe equates to conscious.

Therefore, armature, armature world, and Tower of Minds equate to conscious. Many minds as one means one mind, one consciousness. An absolute construction from the foundations of astronomy, physics, cosmology, digital physics, and digital philosophy for informational philosophy and informational cosmology to implicate an enormous unified mind.

Appendix I: Preliminary Argument

Informational cosmology works from digital physics' implicit, tacit, and explicit premises. Three premises: "the universe as discrete/non-continuous," "the universe as finite," and "the universe as quantifiable." Digital physics states the universe equates to discrete rather than continuous, that is, discrete/non-continuous. Discrete equates to finite; continuous equates to infinite; thus, discrete/non-continuous necessitates finite. Informational cosmology states the same. The Planck spatial and temporal scales demarcate the fundamental discrete/non-continuous, finite, and quantifiable fundament of the universe in quantum mechanics and quantum mathematics and, therefore, digital physics and informational cosmology. If discrete/non-continuous from the fundaments, the large-scale structure of the universe operates on this discrete/non-continuous basis, and if the large-scale structure of the universe operates on this discrete/non-continuous basis, then the universe as a whole, observed and non-observed, exists in discrete packets, and if the universe as a whole, observed and non-observed, exists in discrete packets, then digital physics' premise of "the universe as discrete/non-continuous" is true and, by implication, informational cosmology's identical premise is true too. Planck discrete descriptions of the universe necessitate the finite too. Therefore, "the universe as discrete/non-continuous" and "the universe as finite" are true statements connected to digital physics and informational cosmology. If "the universe as discrete/non-continuous" and "the universe as finite" are true statements, and if discrete and finite sets or objects contain possible numerical

representation, then discrete and finite sets or objects exist as quantifiable, then "the universe as quantifiable" is a true statement in digital physics and informational cosmology. Therefore, "the universe as discrete/non-continuous," "the universe as finite," and "the universe as quantifiable" are true statements in digital physics and informational cosmology.

Three other premises in digital physics and informational cosmology state: "the universe as digital," "the universe as informational," and "the universe as computable." If the universe, observed and non-observed, exists as discrete/non-continuous, finite, and quantifiable, and if the finite and discrete/non-continuous equates to the digital, then "the universe as digital" is true, and if "the universe as digital" implicates "the universe as informational," then "the universe as informational" is true, and if the "the universe as discrete/non-continuous," "the universe as finite," "the universe as quantifiable," "the universe as digital," and "the universe as informational," equates to the foundation for computability, then "the universe as computable" is true. Therefore, "the universe as discrete/non-continuous," "the universe as finite," "the universe as quantifiable," "the universe as digital," "the universe as informational," and "the universe as computable" are true statements. By implication, in part or in whole, aspects of the universe from the fundamental Planck spatial and temporal scales to the large-scale structure of the universe are discrete/non-continuous, finite, quantifiable, digital, informational, and computable.

One other different premise, compared to informational cosmology, exists in digital physics, which states: "the universe as computer." If "the universe as discrete/non-continuous," "the universe as finite," "the universe as quantifiable," "the universe as digital," "the universe as informational," and "the universe as computable" are true statements, then this implicates one computational engine, or multiple computational engines, and if "the universe as computable" implicates one or multiple computational engines, and if the universe seems the best evidenced candidate, then the universe exists as the computer, then "the universe as computer" is true. Therefore, "the universe as computer" is true given that it seems like the best candidate for the processor of the universe's computations. An information processing universe with itself as information processor. Digital physics argues this; informational cosmology does not argue this.

Informational cosmology states the universe links to an armature. An armature for the information processing observed as the universe. Digital physics argues "the universe as computer" is true; informational cosmology argues "the universe as computer" is false. Informational cosmology states: "the armature as computer" implicated by "the universe as computable." "The armature as computer" implicated by the computability of the universe because the observational evidence operates from the universe to derive the armature, not vice versa. We do not live in the armature world for this universe; we live in the universe. Therefore, if every computation requires one or multiple computational engines, and if the universe exists as computable, then the universe necessitates one or multiple computational engines, and if the universe necessitates one or multiple

computational engines, then one or multiple demarcated computational engines exist with sufficient separation from the universe, and if one or multiple demarcated computational engines exist with sufficient separation from and construct the universe, then the armature exists, and if the armature exists, then "the armature as computer" is true. Therefore, "the universe as computable" implicates "the armature as computer" is a true implication and, thus, both are true statements.

I infer more codas, more premises, unstated, from previous unpublished extensive daily and weekly conversations throughout 2014 and 2015. Seven (out of fourteen) novel premises state: "pervasive net self-consistency and information processing in the universe," "consciousness as net self-consistency and information processing," "the universe as conscious," "the universe and its minds as nested," "the armature as nested," "the nested armatures as armature world," and "the total nest set as the Tower of Minds." If "the universe as discrete/non-continuous," "the universe as finite," "the universe as quantifiable," "the universe as digital," "the universe as informational," "the universe as computable," and "the armature as computer" are true statements, then the universe, observed and non-observed, equates to information processing with the armature as the information processor of net self-consistent information, and if the universe equates to information processing, the universe equates to net self-consistent information processing, then "pervasive net self-consistency and information processing in the universe" is a true statement in informational cosmology.

If “pervasive net self-consistency and information processing in the universe,” and if “consciousness as net self-consistency and information processing,” then the universe’s net self-consistency and information processing sum to consciousness and, hence, implicates “the universe as conscious,” and if “pervasive net self-consistency and information processing in the universe,” “consciousness as net self-consistency and information processing,” and “the universe as conscious,” and if the universe constructs net self-consistent information processors internal to it, then consciousnesses, or minds, exist in the universe, and if minds exist in a conscious universe, then the minds nest inside the universe for the nested relationship of the universe and its minds, then ‘“the universe and its minds as nested,” and if the conscious minds have material information processors in the universe and the universe has a material information processor, then this implicates the nested system of minds to universe to armature and the universe’s armature having an associated armature, and if the universe’s armature has an associated armature, then the universe implicates an armature implicates an armature world, and if minds in the universe implicate an armature and the armature implicates an armature world, then minds, universe, armature, and armature world form a nested system. Therefore, “the universe and its minds as nested,” “the armature as nested,” and “the nested armatures as armature world” are true statements in informational cosmology.

If “pervasive net self-consistency and information processing in the universe,” “consciousness as net self-consistency and information processing,” “the universe as conscious,” “the universe and its minds as nested,” “the armature as nested,” and “the

nested armatures as armature world" are true statements in informational cosmology, then these multiple nests become sub-set nests in the total nest set in a non-literal Tower of Minds, and if these multiple nests become sub-set nests in the total nest set in a non-literal Tower of Minds, then "the total nest set as the Tower of Minds" is a true statement in informational cosmology. Therefore, "pervasive net self-consistency and information processing in the universe," "consciousness as net self-consistency and information processing," "the universe as conscious," "the universe and its minds as nested," "the armature as nested," "the nested armatures as armature world," and "the total nest set as the Tower of Minds" are true statements in informational cosmology.

All premises connect in a trivial manner: "the universe as discrete/non-continuous," "the universe as finite," "the universe as quantifiable," "the universe as digital," "the universe as informational," "the universe as computable," "pervasive net self-consistency and information processing in the universe," "consciousness as net self-consistency and information processing," "the universe as conscious," "the universe and its minds as nested," "the armature as nested," "the nested armatures as armature world," and "the total nest set as the Tower of Minds." A discrete/non-continuous, finite, digital, informational, computable, and conscious universe nested in an armature and armature world to form the Tower of Minds. A hierarchy of embedded consciousness. Each consciousness does not separate from another. No derivation necessitates negated linkage; therefore, these many minds sum to one. Furthermore, minds in the universe equate to

conscious. Universe equates to conscious. Therefore, armature, armature world, and Tower of Minds equate to conscious. Many minds as one means one mind, one consciousness.

An absolute construction from the foundations of astronomy, physics, cosmology, digital physics, and digital philosophy for informational philosophy and informational cosmology to implicate an enormous unified mind.

Appendix II: Glossary

Aesthetics: study of beauty.

Aether Error: there's this thing we can't see that does everything we need it to.

Agnosticism: lack of belief or disbelief in the existence of gods or God.

Anaxagorian Universe: cosmos with a non-uniform representation of the all properties of existence in infinitesimally small fragments of themselves in a primordial state. A “nous” or mind set these properties in motion to form the present universe at some point in the historical timeline.

Anisotrophic: having physical properties that are different in different directions.

Anthropomorph: non-human with the attribution of human trait(s).

Anti-Lepton: all leptons including neutrinos have antiparticles. Anti-leptons such as positrons or antineutrinos amount to these.

Apatheism: a pragmatic theism with respect to matters of gods or God with an inherent lack of interest or disregard for those matters.

Applied Ethics: studies professional and public affairs related to morality.

Aristotelian Universe: a geocentric view of the universe with a fixed Earth at the centre surrounded by planets and stars in concentric circles but not for an indefinite span of outward expansion of the concentric circles.

Armature: material framework of universe, or processor.

Armature Universe: a universe which includes the armature that supports an information-space. For instance, our universe includes our brains, which are the armatures of our minds (which are information-spaces).

Asteroid: any of the small planetary bodies revolving around the sun, mainly between the orbits of Mars and Jupiter.

Asteroid Belt: the region between the orbits of Mars and Jupiter where most asteroids are found.

Astronomy: the study of the universe and its contents beyond the bounds of the Earth's atmosphere.

Atheism: disbelief in the existence of God or gods.

Atomist Universe: view of the world composed fundamentally of indivisible atoms in an infinite void in which all of existence amounts to different configurations of atoms within the infinite void.

Autotheism: deification of the self to God.

Baryon: any of the heavier elementary particles (protons, neutrons, hyperons).

Baryon Epoch: an era demarcating the formation of baryonic matter

Baryonic matter: subatomic particles made of three quarks. The most notable baryons are protons and neutrons.

Big Bang Cosmology: consensus view of mainstream cosmologists and physicists on the origin of the universe, with the universe beginning in an explosively expansive phase known as the "Big Bang" approximately 13.77 billion years ago.

Black(ish) Holes: spheres of collapsed matter with extreme gravitational fields. In general relativity, a black hole's gravitational field is so strong that no light can escape and no nuclear

forces can stop gravity from collapsing the black hole to a single point. However, if sufficient concentrations of matter reduce the scale of space, then black holes can stop short of complete collapse.

Brahmanda (Cosmic Egg) Universe: whole universe expands out on single point called Bindu which eventually collapses totally upon itself and expands once more for an infinite span of time.

Celsius: scale and unit of measurement for temperature.

Century of Choice: term describing the 22nd century, when humanity's technical advancement will give humans and whatever turned into or created enormous powers of choice in how to live and what forms to take**.**

Charged Coupled Devices: a device for the movement of electrical charge, usually from within the device to an area where the charge can manipulated.

Classical Logic: a class of formal logic sometimes called standard logic.

Collapsed Matter: bodies of high-density normal matter consisting largely of neutrons formed from fusion which has collapsed under the force of a strong gravitational field. In some instances, the extreme concentration of matter in a collapsed object reduces the scale of space to the extent that neutrons at the center of the object can be unlocked and behave as normal matter within uncollapsed space.

Comet: an icy small Solar System body (SSSB).

Communication Theory: field of information and mathematics that studies the technical process of information and the process of human communication.

Computer Science: scientific and practical approach to computation and its applications.

Consciousness: a technical property of information processors whose subsystems pervasively share information with each other (resulting in a feeling of realness within the processor).

Cosmic Microwave Background Radiation: very low-energy photons which, according to Big Bang theory, are left over from shortly after the beginning of the universe. Can also be seen as noise which has been reduced in volume by the ordering of the universe.

Cosmogony: scientific theory studying the origin or coming into existence of the universe.

Cosmological Constant: a fudge factor added to general relativistic equations so the universe is stationary, neither expanding nor contracting.

Cosmology: study of the origins and eventual fate of the universe.

Dark Age: period of the universe where most photons interacted with electrons and protons to form the photon-baryon fluid in which the universe appeared opaque to future observers. In that, light existed, but could not be seen by future observers based on the opaque barrier preventing passage of light to future observers.

Deism: belief in the existence of a supreme being arising from reason rather than revelation.

Deity: a supreme being expressed in reason and creation of the cosmos without further intervention into creation.

Density: material's mass per unit volume.

Descriptive Ethics: the study of beliefs about morality.

Determinate Universe: a precise, clockwork universe in which knowing the state of the universe at any one time allows you to predict all future states and recover all past states.

Digital Physics: a set of theories which consider the universe to be an information processor.

Distinguishing: characteristic of one thing for the purpose of identification.

Ditheism: belief in two equal and distinct gods.

Dualism: everything as dual or double. Each object or idea contracts into two objects or ideas.

Dwarf Planet: planetary-mass object that is neither a planet nor a satellite. An object of sufficient mass to be controlled by gravitation, but not enough to overcome orbital region of other objects.

Electron: subatomic particle which orbits atomic nuclei and which has equal but opposite charge to the proton and about $1/1836^{th}$ of its mass. Fusion involves the net loss of one proton and one electron when a neutron is created.

Electromagnetism: one of the four fundamental forces of nature to do with electromagnetic fields.

Electroweak Epoch: in standard Big Bang cosmology, early period of the universe in which the electromagnetic and electroweak interaction/force converged into a single force called the electroweak interaction.

Elliptical Space: a non-Euclidean geometry, in which, given a line L and a point p outside L, there exists no line parallel to L passing through p.

Empty Space: space which contains no actual particles (but which contains fields and virtual particles).

Entropy: inevitably increasing disorder within a closed system. The probabilistic tendency of hot and cold regions within an enclosed volume to mix, creating an increasingly uniform lukewarm volume.

Epistemology: the study of knowledge.

Ethics: study of moral conduct.

Euclidian Space: encompasses Euclidian plane and three-dimensional space of Euclidian geometry.

Finite: having limits or bounds.

First Law of Thermodynamics: total energy in an isolated system is constant.

Flat Universe: expanding universe which has just enough momentum to keep expanding forever – any less momentum and it would reach a maximum volume and collapse back into itself.

Free Will: the hypothetical ability of conscious beings to make choices free of material constraints.

Fuzzy Logic: A form of many-valued or probabilistic logic.

Galactic Group: largest known gravitationally bound objects to have arisen in the process of cosmic structure formation.

Galactic Cluster: a structure composed of hundreds to thousands of galaxies bound by gravity.

Galactic Supercluster: large groups of smaller galactic clusters or groups.

Galaxy: a system of dust, interstellar gas, stars, stellar remnants, and (possibly) dark matter bound by gravity.

Gas Giant: a giant planet composed of hydrogen and helium.

General Relativity: geometric theory of gravitation proposed by Albert Einstein in 1915.

Geometry: branch of mathematics concerned with questions of relative position of spaces, shape, size, and the properties of space.

Grand Unification Epoch: in standard Big Bang cosmology, early period of the universe following the Planck epoch, starting at about 10^{-43} seconds after the Big Bang in which

temperature compelled the convergence of three of the four fundamental forces (gravitation apart from electromagnetism, strong nuclear interaction/force, and weak nuclear interaction/force).

Grand Unified Force: A force based on the convergence of electromagnetism, weak nuclear interaction, strong nuclear interaction with the separation of gravitation. A force brought into existence during the Grand Unification Epoch.

Gravitation: attraction among objects with greater-than-average proximity to each other, that is, with the space containing the objects having a greater density than if matter were uniformly spread out through space.

Habitable Epoch: in standard Big Bang cosmology, the period of the formation of the chemistry necessary for known life in the universe.

Hadron: composite of quarks held together by the strong nuclear interaction/force. Hadrons break down into two standard kinds and one non-standard/exotic kind: Baryons (protons, neutrons, and others made of three quarks), Mesons (pions, made one quark and one antiquark) for the main kinds, and the Tetraquark (Exotic Meson) for the non-standard/exotic type.

Hadron Epoch: in standard Big Bang cosmology, the early

Hard polytheism: means multiple gods that do not merge into one being.

Henotheism: belief in the supremacy and worship of one god without the denial of other gods.

Homogeneity: uniformity in character and content.

Hydrogen: a colourless, odourless, tasteless, flammable gaseous substance that is the simplest member of the family of chemical elements.

Hyperbolic Space: a homogenous space characterized by constant negative curvature.

Ic/I~c: information-in-common/information-not-in-common – the amount of information different regions of the universe have in common with each other (as a consequence of the extent to which they share histories).

Idealist Monism: mind or spirit alone.

Ignosticism: belief that all religions are of equal validity.

Indeterminate Universe: a universe which is inherently unpredictable due to having an only finite amount of self-defining information. This is our quantum mechanical universe.

Inertia: resistance of any physical object to its state of motion.

Infinity: without any limit with an emphasis in the fields of mathematics and physics.

Inflationary Epoch: exponential expansion of space in the early universe.

Information: specific states within a system which can take on a variety of states – the accumulated result of a series of choices among possible states.

Information Processing: creating a system which can make and record choices among possible states; making and recording a series of such choices. Choices can be made by the system or through receiving external information.

Information Processing System: a system that takes in one form of information and transforms it into another.

Information Theory: a mathematical representation of the conditions and parameters affecting the transmission and processing of information.

Information-Space: the space including matter consisting of the information in a nearly closed self-defining system of information. Used interchangeably with mind-space.

Informational Cosmogony: the reasons why and processes through which mind/information-spaces form according to informational cosmology.

Informational Cosmology: the related hypotheses that space, time and matter are information within a conscious information-processing system, that the spatiotemporal form of the information within a conscious system shares physical properties with the universe, and that consciousness is a technical property of information widely shared among subsystems of an information processor.

Informational Ethics: ethics through the lens of informational cosmology, which suggests that consciousness is an inherent property of sufficiently complicated systems of information.

Informed Will: having the best-possible information about why you make each of the decisions you make.

Isotropy: uniformity in all orientations.

Gravitational Lensing: distortion of images of stars and galaxies caused by the paths of light emitted by these objects being bent by the gravitational fields of matter located between the light-emitting objects and the viewer.

Gravitons: hypothetical particles which carry gravitational force.

Hubble Redshift: the shift of light from other galaxies towards the lower-energy, red end of the spectrum, with the shift being proportional to galaxies' distance from our own.

Isomorphic: corresponding or similar in form and relations.

Isotrophic: uniformity in all directions.

Kathenotheism: worship of one god at a time.

Law of Motion I: Every body continues in its state of rest, or of uniform motion in a right line, unless it is compelled to change that state by forces impressed upon it.

Law of Motion II: The alternation of motion is ever proportional to the motive force impressed; and is made in the direction of the right line in which that force is impressed.

Law of Motion III: To every action there is always opposed an equal reaction; or, the mutual actions of two bodies upon each other are always equal, and directed to contrary parts.

Law of Thelema: "The word of the law is Thelema [. . .] do what thou wilt shall be the whole of the law."

Laws: precisely defined rules, perhaps stipulated as axioms. More rigid (for our purposes) than principles.

Lepton: an elementary, half-integer spin (spin $\frac{1}{2}$) particle that does not undergo strong interactions. Best known lepton: electron.

Letsism: unspecified belief in a higher force.

Logical Possibility: maximal possible definition of net self-consistency or lack of net self-contradiction.

Material monism: (physicalism or materialism – eliminative and reductive materialism too): everything reduced to physical.

Metaethics: the study of nature of moral theories and judgments.

Mind-Space: the space including matter consisting of the information in a nearly closed self-defining system of information. Used interchangeably with information-space.

Monism: everything as singular. Each object or idea contracts into a singular object or idea. belief in a single fundamental essence, reality, or God.

Monolatrism: recognition of the existence of numerous gods with the consistent worship of one at a time.

Monotheism: the doctrine or belief that there is only one God.

Moral Antirealism: argument for the non-reality of moral truths.

Moral Hierarchy: greatest logically possible criterion for ethics: existence-valuing principles. A referent for every other ethical system, code, creed, law, and principle. “Good” means “maximizes persistent existence.” “Evil” means “does not maximize persistent existence.”

Moral Realism: argument for the reality of moral truths.

Moral Psychology: studies the nature and development of moral agency.

Motion: act or process of changing place or position.

Net Self-Consistency: lack of net self-contradiction.

Neutral Monism: mind and physical reduced to one.

Neutrino: a fast-moving, chargeless particle with extremely tiny mass and an extremely low rate of interaction with matter in normal space. Is emitted when a proton turns into a neutron during fusion and absorbed when a neutron is unlocked, turning into a proton and an electron.

Neutron: a subatomic particle with no electric charge, usually formed from a proton (and positron emission) via atomic fusion.

Non-Baryonic/Exotic/“Dark” Energy: an unknown form of energy which permeates all of space and tends to accelerate the expansion of the universe (in that observations of the universe indicate that its expansion seems to be accelerating). In informational cosmology, any such energy-loading of space is a consequence of the scale of space being determined by the distribution of and interactions among matter.

Non-Baryonic/Exotic/"Dark" Matter: mysterious, hard-to-detect matter thought to be found on the outskirts of galaxies as an explanation for gravitational phenomena not accounted for by visible matter. In informational cosmology, normal collapsed matter created by repeated neutron cycles takes the place of much if not all exotic dark matter.

Normative Ethics: the study of ethics in practice.

Nucleosynthesis:

Objective Ethics: the study of informational ethics on the scale of the universe.

Omnism: recognition and respect for all religions.

Ontology: branch of metaphysics that studies the nature of being or existence.

Order: correlations among particles or variables.

Oscillatory Universe: theory of the universe self-cycling for an indefinite period of time.

Outskirts of the Universe Near T = 0: in informational cosmology, a neighborhood near the apparent origin point of the universe, containing huge numbers of neutron-rich burned-out galaxies. In Big Bang cosmology, the point T = 0 existed (as a point) only at the time of the original Big Bang, since the entire universe expanded outward from the initial explosion – the point became an expanding hypersphere.

Pandeism: belief creator deity of the universe ceased separation from the universe and became the universe akin to pantheism.

Panentheism: God interpenetrates every facet of the world timelessly and expands beyond it.

Pantheism: the belief or philosophy theory that God and the universe are identical.

Pantheity: the embodiment of God in nature; God as nature.

Persistent Particles: subatomic particles which can exist for tens of billions of years and/or traverse billions of light years – protons, electrons, neutrons, photons, and neutrinos.

Philosophy of Science: field of study of the assumption, foundations, methods, and implications of science.

Photon: a particle of light or other electromagnetic energy, the emission of which often reflects a linkage between persistent particles such as protons and electrons.

Photon Epoch:

Physics: study of matter and its motion through space and time.

Planet: astronomical object orbiting a star that cleared orbiting planetesimals without obtaining sufficient mass for thermonuclear fusion.

Pluralism: everything as plural. Each object or idea equates to two or more objects or ideas.

Polydeism: belief in two or more gods which created the universe and ceased intervention upon completion of creation.

Polytheism: the belief in or worship of more than one god.

Principles of Existence: rules which arise from principles of non-contradiction – emergent rules rather than axiomatic rules.

Principle of Relativity: equations for the laws of physics must have the same form in all admissible frames of reference.

Probabilistic logic: many-valued logic.

Probability Theory: branch of mathematics dealing with probability or the analysis of random phenomena.

Proton: a charged particle which can turn into a neutron via nuclear fusion. The primary engine of correlation in an information-space – functions as a dimension or variable.

Proton-Electron Mass Ratio: the ratio between the mass of the proton and the mass of the electron. In informational cosmology, this ratio is an indicator of the amount of order in the active center of the universe.

Quantum Fluctuations:

the temporary change in the amount of energy in a point in space, arising from Werner Heisenberg's uncertainty principle.

Quantum Mechanics: the study of the consequences and phenomena of the universe having only a finite amount of information with which to define itself through self-observation. Quantum mechanical effects are most apparent at the smallest scales of space and time.

Quark: elementary particle and fundamental constituent of matter. Quarks combine to form composites particles such as hadrons.

Quark-Gluon Plasma: a (possible) phase of quantum chromodynamics (QCD) which exists at extremely high temperature and/or density.

Quasar: very distant and highly active galactic nucleus.

Reionization: process that reionized the matter after the dark ages.

Relativistic Doppler Effect: change in frequency of light caused by the relative motion of source and observer.

Rosner Rule: semi-facetious rule of thumb that gives a rough estimate for how weird daily life will feel for the rest of the 21st century - the last two digits of the year give the percent weirdness. 2015 is 15% weird, 2037 will feel 37% weird, 2092 will feel 92% weird, etc.

Science: any system of knowledge that is concerned with the physical world and its phenomena.

Second Law of Thermodynamics: entropy of an isolated system never decreases.

Self-Consistency: lack of self-contradiction in a system or subsystem, which intersects with the philosophical term "logical possibility" – where logical possibility indicates the maximal possible definition of self-consistency.

Self-Contained: with regard to an information-space, forming a nearly closed hypersphere and exchanging most information with itself, defining itself via the exchange of that information.

Set Theory: branch of mathematics that studies sets or collections of objects.

Singularity: a point of zero volume and infinite density.

Social Ethics: the study of informational ethics on the scale of groups of individuals.

Soft polytheism: multiple gods that do merge into one being; gods are aspects of one god.

Solar System: The Sun and its planetary system.

Space: the vast three-dimensional volume occupied by the universe. Space is distorted by matter and on the largest scale is curved to form a four-dimensional hypersphere.

Space-Time: the four-dimensional structure of the known universe, with three dimensions of space and one of time.

Special Relativity: physical theory of measurement in an inertial frame of reference.

Speed of Light: 186,000 miles or 300,000 kilometres per second – the speed at which light (and the information it carries) traverses the known universe.

Star: a luminous cosmic body.

Subatomic Particles: particles smaller than atoms, including indivisible elementary particles and composite particles.

Subjective Ethics: study of informational ethics from the scale of individuals.

String Theory: theoretical framework in which point-like particles in standard particle physics are replaced by one-dimensional vibrating objects called strings.

Strong Nuclear Interaction/Strong Nuclear Force: fundamental interaction of nature that acts between subatomic particles of matter. The strong force binds quarks together in clusters to make more-familiar subatomic particles, such as protons and neutrons.

T=0: the apparent time, about 13.77 billion years ago, of the explosion/expansion which began the Big Bang universe.

Teleology: philosophical stance that holds final causes exist in nature.

Temperature: one of the primary qualities studied in thermodynamics. A quantity of "hot" or "cold" of a body.

The Neutron Cycle: a process taking place over tens of billions of years in which proton-rich galaxies burn up their fuel through fusion, turning into neutron-rich galaxies, which eventually turn into proton-rich galaxies again (probably by absorbing a bunch of neutrinos).

The Persistence Project: the desire to continue to exist, found in naturally evolved beings.

Theism: belief in the existence of gods or a god, esp. one God supernaturally revealed to man [. . .] who created and intervenes in the universe."

Theity: gods or a God revealed to man and intervenes in human affairs.

Theopanism: god becomes equivalent to the universe as in pantheism, but as the ultimate spiritual reality from which everything emanates.

Thermodynamics: natural science concerned with heat and its relation to energy and work.

Third Law of Thermodynamics: entropy of system approaches a constant value as the temperature approaches zero.

Thought: in informational cosmology, a set of information processed, processing, or to be processed.

Time: a linear dimension along which change occurs, divided into the past – events which have already occurred, the present – events which are currently occurring, and the future – events which have yet to occur (though each moment in information-space is a present moment).

Time Dilation: different of elapsed time between two events.

Transtheism: a belief that is not atheistic or theistic, but goes beyond them in absolute faith about the fundamental meaninglessness of the ground of being.

Ultra-Deep Cosmic Time: time scale for a universe which recycles galaxies, with a single moment of cosmic time requiring a galactic lifespan of tens of billions of years, and consisting of an unknown but enormous number of such multi-billion-year moments.

Unique: unlike anything else before it.

Universe: a vast and largely self-contained information-space which is self-defining via the interactions of its constituent particles.

World Line: the path of an object as it travels through space and time (more technically, a time-like curve in spacetime, with time being an explicit axis).

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