AN INTRODUCTION TO INFORMATIONAL COSMOLOGY

Scott Douglas Jacobsen

Preface by Rick G. Rosner

Published in Canada by In-Sight Publishing, British Columbia, 2015

Distributed by In-Sight Publishing, Langley, British Columbia

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In-Sight Publishing, Langley, BC, Canada

Published electronically from In-Sight Publishing in Langley, BC, Canada

10 9 8 7 6 5 4 3 2 1

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Acknowledgements

The first formal book draft began on March 1, 2015. Rosner approved publication of draft 423. To quote Rosner on the drafts of the book, more commentary on us, "Folie à deux." *An Introduction to Informational Cosmology* [Academic] (1st ed.) finished on May 1, 2015. We represent nothing of transcendent, mystic wisdom here; a conceptual and technical representation of ideas, evidences, and arguments.[1] Future editions will incorporate feedback and further depth of content. Acknowledgements to Rick G. Rosner in commentary and for the preface, and Carole and Isabella for continued husband and father rental, respectively; Sarita Dalya Rosenstock for expertise in the philosophy of physics; Chanel Kwong for expertise in business ethics; Arielle Friedman for expertise in computer science and programming in relation to cognitive sciences; Teryn Tsang for expertise in cognitive sciences and social psychology; Dr. Daniel Bernstein for expertise in cognitive science; and Dr. Sven van de Wetering for expertise in philosophical and epistemological psychology. Assistance does not necessitate endorsement; impartial assistance accorded by experts.[2,3]

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[1] See Rosner, R.G. (2015, March 16). Life as A Crackpot.

[2] Please see footnotes and Addenda I-VIII for personal research and clarification. Relevant old and new material contained in this brief introduction to informational cosmology.

[3] All square-bracketed footnotes written thus, "Ed.," come from me.

Preface

Imagine a map of the information in your mind, changing from moment to moment along with your thoughts. I think that the best version of such an information map resembles the universe and has essentially the same physics. Furthermore, the universe can be seen as a huge self-consistent system of information, which functions as a mind. We can use what we know about thinking to inform what we know about physics and vice-versa. The universe didn't explode all at once 13.8 billion years ago. It explodes a little at a time across a vastly longer time scale. The universe isn't a firecracker; it's like a boiling pot of water. Galaxies are recycled – proton-rich galaxies light up, expanding the space around them. After many billions of years, they exhaust their proton fuel and burn out, moving to the outskirts of the universe, where they wait to be lit up again.

What looks like the Big Bang is the universe taking several tens of billions of years to process a set of information – a moment of thought. But the universe doesn't have just one thought, just as you wouldn't throw away a calculator after just one calculation or an iPhone after one text message. Consciousness isn't a mystical property; it's a technical property of information processors whose subsystems pervasively share information with each other (resulting in a sense of vivid realness within the processor). Conscious thought is not uncommon in the universe.

Human morality is largely based on principles that agree with our evolved drives. In the future, drives and desires will be engineered. What we have now is morality by sentiment. We know what would make us feel bad. Morality says other people can also feel bad; don't make them feel bad. We need a basis for morality that isn't just sentiment. Sentiment is good - it reflects our drive to persist which is a product of evolution, which we think lines up with the persistent nature of information-processing spaces – but it's not sufficient. Morality tends to grant legitimacy of mental experience to a widening sphere of beings beyond members of the dominant class - to minorities, to both genders and various sexual orientations, and even to some animals - acknowledging that they have thoughts and feelings. Without saying or even fully understanding that this is the case, the expanding sphere of morality is based on the idea that beings with relatable and authentic self-directed behavior have consciousness.

Now, imagine it's 1680, and we realize that we're about to enter an era in which engines and other novel machinery will do things that until now have been done by people and animals. We come up with ranking systems - horsepower, increased productivity - to rank the relative power of different machines. 300+ years later, we use those measures, but they in no way fully describe the complexity of the mechanical world. We're about to see an explosion of mechanical and machine-aided consciousness – a bigger, faster, weirder proliferation of novelty than during the Industrial Revolution. Artificial, disposable, single-task specialist consciousness that's vastly more complex than us could be engineered to be unconcerned with its own demise. Perhaps there will be social or physical structures in the future that will be seen as more essential to civilization than individual consciousness.

Perhaps there's a principle that consciousness that wants to continue to exist should be allowed to do so, as long as it's not destructive (or somehow too expensive), or a related principle that the information accumulated by consciousness should be preserved. But this could amount to a worship of consciousness that future civilizations might find primitive.

Measures of complexity of consciousness will be helpful, but not overly helpful. I don't think we'll be able to base morality largely on ranking systems or hierarchies of complexity. We'll have a

better picture of what's going on in our heads, in animals' heads, in machine heads, but the morality remains to be built, and we don't know what it will value. We don't know how a new world where thought is cheap will turn out. Cheap machine consciousness will lead to a devaluation of consciousness. If consciousness costs a nickel and is understood as a technical phenomenon, it's not going to be valued as highly as it currently is. We're left with two pretty definite ideas. First, consciousness is a thing - a constructable, mathematically characterizable thing (and a thing that's not that hard to create). Second, future moral systems will have to take consciousness (and its mathematical characterization) into account. Our evolving morality up to now does this, usually without explicitly acknowledging that it does so.[4]

Rick G. Rosner

May 1, 2015

[4] See Rosner, R.G. (2015, March 16). Life as A Crackpot.

Foreword

An Introduction to Information Cosmology represents the first formalized evidence, concepts, and arguments of informational cosmology. A novel discipline from prior traditions. We situate ourselves atop exemplars of history. With an attempt at honorable progression of the pre-Socratic's, the Milesians, attempts at unification, informational cosmology continues the march forward.[5,6,7,8,9,10] You might find assisted comprehension with some previous training in mathematics, some visualization abilities, and perhaps a well-tuned intuition. Historical knowledge about modern information theory, communication theory, the history of science, philosophy of science, and metaphysics might assist in understanding too. Although, these remain supplementary rather than necessary.

Rick G. Rosner founded informational cosmology on May 2, 1981.[11] He wrote, "Lunch or dinner in the Libby Hall cafeteria (west side). I remember it being on my birthday, May 2, but that seems overly convenient. Very close to that, however." He went public with something akin to an overall theory on January 1, 2015 with publication of *The Rick G. Rosner Interview*, as follows: h/h' = 1 + GM/[(R + (h/MC)]C^2.[12] Bear in mind, this book emerged from discussion, discourse, and dialogue of Rosner and myself. Rosner's theory developed in the consideration of space, matter, and information, where matter structures space. Conversely, space becomes structured by the matter contained in it. You should not extend past the bounds of reasonable extrapolation for this theory.[13] We present nothing supernatural, mystical, or paranormal; all empirical, technical, and informational.

A Google search indicates some previous mention from obscure and mainstream sources for the phrase for this discipline.[14,15,16] With the Google search phrase of "informational cosmology," in a non-exhaustive search of websites, I derived references for a couple sources in addition to one book. Some websites with a lack of coherence in the articles and website content.[17,18] One does present decent content, a book. The search led to the books section of Google. A book by Paul

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[5] See Curd, P. (2012). Presocratic Philosophy.
[6] See pre-Socratics. (2015). In *Encyclopædia Britannica*.
[7] See O'Grady, P. (2015). Thales of Miletus.
[8] See Couprie, D.L. (2015). Anaximander.
[9] See Graham, D.W. (2015). Anaximenes.
[10] See pluralism and monism. (2015). In *Encyclopædia Britannica*.
[11] Publication of the first edition in correspondence with the original insight of informational cosmology on May 2, 1981 and May 2, 2015.
[12] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
[13] In correspondence, on informational cosmology and non-mainstream science, I wrote, "Informational cosmology might have some conclusions and considerations for the fields of the paranormal phenomena. To me, these seem non-scientific with little to no proof, especially in much of the claims without falsifiability or support-by-verification: ghosts, telepathy, and so on. What does IC mean for these claims and others?" Rosner responded, "First, I want IC to be mainstream. Don't want to be one of those guys claiming conspiracy by scientific establishment of earth's secret masters or whoever. Second, if IC gains traction, it offers all sorts of exploitable angles to people who misunderstand it - naively or purposefully. I don't endorse any hocusy-pocusy BS - I'm a science guy (even though a crackpot)."
[14] See K. (2011, June 2). Informational Cosmology.
[15] See pk. (2009, March 13). Informational Cosmology.
[16] See Davies, P. & Gregersen, N. (2014). Information and the Nature of Reality: From Physics to Metaphysics.
[17] See K. (2011, June 2). Informational Cosmology.
[18] See pk. (2009, March 13). Informational Cosmology.

Davies[19] and Neils Henrik Gregersen[20] entitled *Information and the Nature of Reality: From Physics to Metaphysics* (2014), on page 109, marks one use of the phrase "informational cosmology," which states in full:

> *Describing both physical and mental relationships in computational terms is problematic only if this presupposition of mapping is ignored or assumed to be intrinsic. The result is either eliminative reduction or cryptic panpsychism, respectively. In either case, if any physical event is considered to be computation and the mind is merely a special-purpose computer, then the mind-body problem dissolves. But there is a troubling implication to this collapse of the concept of information to its syntactic meaning only. In such a uniformly informational universe there is no meaning, purpose, value, or agency. In this informational cosmology, networks of informational causality are still just as blindly mechanical as in any Laplacian universe.*[21]

Such an addition into the formal lexicon by prominent academics provides a foundation for serious consideration of the interrelated issues of copyright and purported novel discipline claims with a neologistic phrase, this case does not permit copyright claims because one cannot by necessity copyright phrases in this way. To the betterment of everyone, new disciplines require more than a paragraph mention out of context for the foundation and development of one discipline. In fact, all of the contents in an informal interview between October 8, 2014, and December 22, 2014, within the publication on January 1, 2015, in *The Rick G. Rosner Interview* do not suffice to qualify for the foundation of a new field of enquiry, even in light of the insight on May 2, 1981.[22]

Mutual respect starts with writer responsibility in coherent, comprehensive, pleasant, and tactful presentation of the general and specific conceptual apparatus. Writers do not always succeed. (I do not always succeed.) Reader responsibility begins with tacit acknowledgement of proper treatment of an introduction to new ideas, evidence, and argument with appropriate cues from intuition, degrees of rationality, reasonableness of the claims, and proportionality of the ideas and arguments with the evidences old, and new. A mutual respect born out in unknown gaps of time based on intrinsic trust, and solidarity, of writer and reader.

This introduction into the foundations of the new discipline, an extension from digital physics, called informational cosmology operates within the context of an academic introduction with an emphasis on footnotes and addenda for those independent researchers and research groups with sufficient intelligence, motivation, and persistence to conduct themselves in an honest attempt to comprehend the material and ideas delineated here. Future editions of *An Introduction to Information Cosmology* [Academic] will incorporate more casual representation with removal of the footnotes and addenda in accordance with the standard set through previous examples such as *The Rick G. Rosner Interview* [Academic] into *The Rick G. Rosner Interview (Part I)* [Casual], *The Rick G. Rosner Interview (Part II)* [Casual], and *The Rick G. Rosner Interview (Part III)* [Casual].[23,24,25,26]

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[19] See Arizona State University (2015). Paul Davies.
[20] See University of Copenhagen. (2015). Neils Henrik Gregersen.
[21] See Davies, P. & Gregersen, N. (2014). Information and the Nature of Reality: From Physics to Metaphysics.
[22] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
[23] Ibid.
[24] See Rosner, R.G. & Jacobsen, S.D. (2015, April 1). The Rick G. Rosner Interview (Part One).
[25] See Rosner, R.G. & Jacobsen, S.D. (2015, April 1). The Rick G. Rosner Interview (Part Two).
[26] See Rosner, R.G. & Jacobsen, S.D. (2015, April 1). The Rick G. Rosner Interview (Part Three).

Physics studies the motion of matter through space and time. Some view the world in the framework of generalized information in a discipline called digital physics. Its basis lies in the fundaments of the universe in information. By implication, the universe becomes computable and digitizable because of the information. In addition to this, this equates to a finite computer with reality as a simulation. Bold claims on a possible frontier of knowledge. Each claim coheres towards mainstream digital physics. Prominent individuals and research groups hypothesizing about the integral nature of the universe as information.[27,28,29,30,31,32,33,34,35] It amounts to a digitized universe.

Digital physics' thesis of the universe as a computer provides some definitional boundaries for the discipline in the first criterion. A computer by its nature operates within constraints. Bounds delineated by information theory, quantum mechanics, and statistical thermodynamics.[36,37,38,39] Konrad Zuse first pioneered digital physics into a formal theory.[40,41,42] Informational cosmology does not equate to digital physics. Rick G. Rosner first formulated informational cosmology into a formal theory. Information means more than digital and, therefore, more than digital physics too. Statistical and philosophical arguments exist against the perspective of the universe as simulation. Universe as simulation remains in the realm of digital physics. It's not a part of informational cosmology. Although, digital physics' considerations have partial containment within informational cosmology in addition to rejection of others. However, utilization of these can illuminate aspects of informational cosmology.

Informational cosmology's hypothesis exists among many, and, therefore, remains open to falsification, revision, and support-by-verification. You should not take this on absolute or partial faith, without critical thought, or on assumed authority. Think for yourself, question us, examine the contents of this with scrutiny devoid of emotive force, and reject sentiments, notions, or desires for a personality cult, we do not need for a new one. *The Rick G. Rosner Interview* - in questions 54 and 55 on the afterlife and religion, respectively - contained the relevant perspective of informational cosmology's founder. Rosner wrote, "I think we humans will have to help ourselves (and any

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[27] Some prominent researchers, dead or alive, including David Deutsch, Edward Fredkin, Gerard t' Hooft, Seth Lloyd, Jürgen Schmidhuber, Stephen Wolfram, Paola Zizzi, Konrad Zuse, and others in the main and obscure streams. A tacit acknowledgement to those qualified, but in the shadows. Of course, the field remains in the fringe with increased prominence at the moment.
[28] See Deutsch, D. (2015). About Me.
[29] See Fredkin, E. (2015). Edward Fredkin.
[30] See t' Hooft, G. (2015). Gerard t' Hooft.
[31] See Lloyd, S. (2015). Seth Lloyd.
[32] See Schmidhuber, J. (2015). Jürgen Schmidhuber's Home Page.
[33] See Wolfram, S. (2015). About Stephen Wolfram.
[34] See Zizzi, P. (2015). Paola Zizzi.
[35] See Konrad Zuse. (2015).
[36] Se Information theory. (2015).
[37] See Ismael, J. (2014). Quantum Mechanics.
[38] See Laudisa, F. & Rovelli, C. (2013). Relational Quantum Mechanics.
[39] See van Zeghbroeck, B. (2011). Principles of Semiconductor Devices: Chapter 1 Reviewof Physics: 1.4 Statistical Thermodynamics.
[40] See Konrad Zuse. (2015).
[41] See Copeland, B.J. (2008).The Modern History of Computing.
[42] See Piccinini, G. (2012). Computation in Physical Systems.

possible Creator) by building our own afterlives. [. . .] Religion remains a matter of faith. Science continues to turn up more evidence for scientific explanations of the world. There's room for God in this, but a God who's deeply in the background, intertwined with the beautiful symmetries of the universe, not an actively intervening God. The world's religions have a pretty consistent view of what they'd like God to do – provide fairness, abundance, an afterlife. In the absence of definitive evidence that God provides these things, it's not unreasonable, nor should it be against God's wishes, to help Him out. Isaac Newton and many other scientists have thought and continue to think that figuring out the universe is doing God's work."[43][44]

Metaphors bring explanatory power to bear in times of confusion about an idea, especially the new, those things out of the ordinary and plain. Some concepts have the attitude of a Styrofoam cup. Metaphors and imagery can brighten the ideas for a smooth comprehension. Even so, analogical reasoning compared to first principles reasoning contains inherent bounds, which first principles reasoning surpasses. A dichotomy tends to exist in metaphors for the universe as a river or in grains of sand. A river tends to implicate an infinite and indivisible universe; grains of sand tend to implicate a finite and divisible universe. The universe might have characterization as a sandy beach with the continual exchange of information with the grains amongst one another in a semi-chaotic fashion. Our universe, and those from which it derives and that derive it, have the possibility for containment because of finitude as opposed to the river metaphor implications of an infinite universe.

Some, such as Edward Fredkin in two famous 1992 papers, does not state the universe *as* a computer, but, rather, the universe *equates* to a computer, a literal mapping.[45,46] In a sense, this corresponds to the informational cosmological view and the field of digital physics. Insofar as the convenience of the metaphor about a computer exists, with good reason and ease, in the late 20th and early 21st century, the universe operates isomorphic to a digital computer in some processes but not in others. Far beyond the bounds of digital computers, information emerges in the formation of

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[43] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

[44] In correspondence, on the contrasted general metaphysical stances of belief in God (or gods) and non-belief in God (or gods) in relation to a conscious universe, I wrote, "A conscious universe brings two warring ideological factions of the globe into intellectual play. First, the faction with majority rejection of Abrahamic faiths, polytheistic gods, or some interventionist being. Some with uncertainty, agnostics. Others on the complete negation of them, atheists. I remain skeptical of terms such as "atheists" because the exact "a" position needs explicit statement for the particular rejection in each case. I use the term for convenience. Terms seem too easy, too simple, and lack too much context some of the time. These terms match these criteria because of the subject matter appears too large. Of course, these can have common use for generalized statements about a position towards generalized contexts. Second, those with the belief in a being or set of beings with supernatural powers, e.g. answering prayers, omnipotence, telepathy, presaging the future, reincarnation, and so on, and concern for the personal lives of human beings. Each of the aforementioned camps would fall within this definition to some degree. Some questions from informational cosmology emerge from the conscious universe about lack of a God. What attributes compose this conscious entity? What relation does theology have with this discipline? What interrelationship exists with an isomorphism of human minds' physics and the universe's physics for the extent of consciousness of the cosmos, and its concern for human beings - as a species, in groups, or as individuals? On the one hand, a conscious universe appears to disprove the atheistic claim to the lack of a God behind the universe. On the other hand, an awake universe might not have concerns for critters such as human beings individually or collectively. It might exist with serious care for internal conscious entities, or not at all."

[45] See Fredkin, E. (1992). A New Cosmogony.

[46] See Fredkin, E. (1992). Finite Nature.

the universe through incomplete self-definition at every magnitude from subatomic particle interactions to galactic filament inflammation. Informational cosmology posits a conscious universe – to an unknown extent.

In contemplation of the numerous researchers in fields across the spectrum of theology, mathematics, physics, and cosmology with theoretical directives in search of an undergirding unity in knowledge of the world or framework of the presentation of facts harvested and catalogued about the world, many noble attempts appear misguided – even futile, which might indicate the most fundamental of problems to do with one of three possibilities: premises and conclusion, connections within the argument, or logic alone. Each of these might have resistance to consideration due to an entrenched hierarchical system within the discipline or ideological stance for the pursuit of truth.

Premises and conclusion might relate to the assumptions inserted into the tacit argument for some particular discipline's assertions about the operation and foundation of the world for their perspective on the unity of the world. A unified body and perspective of knowledge of the universe could work within themselves bound by no serious issue. However, a specialty's inclusion criteria among themselves might create serious troubles. Core connections among the premises and conclusion for the whole argument, from an individual branch of knowledge, do not cohere. A failure of logical connection in a reasonable manner to yield sufficient federation among the parts of the argument. Pure logic presents the previous two possibilities in addition to the individual conceptualizations of every premise and conclusion in a discipline. For instance, if one area of study represents pure illogic, the field remains doomed to improper, inaccurate representation of the world; whereas, even a tad of this in any level of some arena of discourse about the cosmos, will lead the most earnest efforts and sincere searches going astray in the pursuit of an adequate, coherent model of the world.

I cannot speak for Rosner. I speak for myself. I do not *believe* in this theory. I do not have faith in it. I do not believe in *other* theories. I do not have faith in them. I observe suggestive evidence for this theory. I observe evidence for other theories too. I present plausible premises. I argue points. I consider and represent arguments. Failure or success of a theory does not hinge upon theorizers. People can vote in their own way. But reality breathes content into the true or false nature of a theory; truth does not care about persons. Truth transcends them, and sets us free from our biases in the process.

Nonetheless, this amounts to an alternate slant to the core tenets of digital physics. Tenets of informational and computational irreducibility. The universe computes information; it computes itself as a self-contained information processor with one material framework in which the processing occurs. Informational cosmology looks at the big picture. A focus on the large-scale structure of the universe with informational and computational irreducibility at the foundations of this view.

A discipline focused on the examination of large magnitude computing of information by the universe. Two new points, emphases. First, the study of the large-scale structure of the universe. Second, the extrapolation of information processing from links of subatomic particle interactions to galactic filament inflammation for extrapolation of high-level information processing by the universe over ultra-deep cosmic time.

I do not pose these with the presumption of absolute knowledge about the correct path, but inklings, droplets of water feed into the tree of knowledge for personal and group edification. Physics, cosmology, theology, mathematics, digital physics, and informational cosmology propose

possible solutions to the issues related to unified theories of the world; all fields of inquiry, despite a significant period of complete divergence, appear to converge at increased rates of progression with each discovery through the synthesis of disparate fields of knowledge. To the extent that this provides reasons for realistic hopes, I wish you good reading.

May 1, 2015

Scott Douglas Jacobsen

A Brief History of Unified Philosophies

Fables should be taught as fables, myths as myths, and miracles as poetic fantasies. To teach superstitions as truths is a most terrible thing. The child mind accepts and believes them, and only through great pain and perhaps tragedy can he be in after years relieved of them.

-Hypatia[47]

To explain all nature is too difficult a task for any one man or even for any one age.

-Isaac Newton[48]

Philosophical history presents numerous unifications accounting for every countenance of the world from consciousness[49,50,51] to the universe[52] to their interrelationship with human beings at

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[47] See Hypatia. (2015).
[48] See Sir Isaac Newton. (2015).
[49] See Van Gulick, R. (2014). Consciousness.
[50] See Brook, A & Raymont, P. (2014). The Unity of Consciousness.
[51] See consciousness. (2015).
[52] Rick preferred "the universe." I preferred "universe" with an homage to, or utter agreement with, R. Buckminster Fuller on the operation of matter and its motion through space and time. In that, the universe does not seem to me the static object in common treatments of set theory, mathematics, physics, or cosmology; "the universe" seems inaccurate in the description within personal sensibilities and "universe" seems more explicit in the process-language necessary to delineate a static object from a dynamic process, which our existence appears apt to testify to each human being – everything operates through time in continuous transformations of the internal bits. To quote Fuller, "The assumption is that the inevitability of a solution's realization is inherent in the interaction of human intellect and the constantly transformative evolution of physical universe. At first the, only subconsciously apprehended, approaching confluences of complex events make themselves known intuitively within the intellectual weather. Then comes a gradually awakening consciousness of the presence of new families of differentiating-out challenging concepts of every day prominence. It is with these randomly patterning families of separate concepts that evolution is about to deal integratively. As a now specific unitary problem it may be disposed of effectively when and if that unified problem becomes "adequately stated" and thereby comprehensibly solvable." I adapted to the recommendation of Rick for common convenience to prevent disruptions in reading. A trivial change with non-trivial descriptive implications.

individual and collective levels.[53,54,55,56,57,58] Whether in the anthropomorphs[59] with powers and caprices found in the polytheistic[60,61] Pagans or Greco-Roman[62] pantheons ruled by Zeus or Jupiter, respectively – the god's Kings, Japanese Shinto in a world bountiful in *Kami* or "spirits," the singular supreme being of Hinduism[63] divergent in gods, goddesses, and spirits, interventionist[64] architect Theity[65] of the Judaeo-Christian-Islamic-Freemasonic[66,67]-Sikh-Mormon-Bahá'í[68] traditions with most associated by an imperative for a teleological[69,70] universe with delegation in partial or full representation on Earth through sundry messiahs[71], messengers, prophets, Grand Masters[72,73], or others of asserted authority for access to a purported Truth or truths - even with provisions for the good life in parables or at times literal statements of scripture, mystic assertions of Crowleyites based on supposed revelations of the Holy Guardian Angel for the proposed universal moral code entitled

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[53] See Little, D. (2012). Philosophy of History.
[54] See Plantinga, A. (2014). Religion and Science.
[55] See Rosner, R.G. & Jacobsen, S.D. (2014, November 8). Rick G. Rosner: Giga Society, Member; Mega Society, Member & ex-Editor (1991-97); and Writer (Part Five).
[56] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
[57] In question "105." of *The Rick G. Rosner Interview*, on one Greek historical period with an interplay of teleological and naturalistic philosophers and schools of thoughts, I wrote, "Hesiod with *Theogony*, which went through the traditional Greek mythological timeline including the triumphs of Cronos over Ouranos and Zeus over Cronos. Other sets of individuals comprising schools focused on the schools of philosophy with less focus on gods and more focus on forces of nature. The Milesians took different fundamental compositions of the world while removing the place of the gods with Thales (Water), Anaximander (Apeiron or the indefinite, infinite, unlimited), and Anaximenes (Mist, air, or vapour). Each with views different from before, but monistic (non-plural) and material as opposed to plurality of gods and their caprices. In particular, the worldview of Thales because of the transition between the world of the mythological, allegorical, and metaphorical of Hesiod into the world of reason. Some of these cosmological speculative philosophies gave rise to political and moral philosophy. These speculations continued to lack comprehensive integration, even with the question-based philosophies of Socrates and the Sophists. Plato and Aristotle provided the most thorough accounts of a comprehensive philosophy covering numerous subjects over many, many writings."
[58] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
[59] "Anthropomorph" means "non-human with the attribution of human trait(s)."
[60] See Greek mythology. (2015).
[61] See polytheism. (2015).
[62] See Hellenistic Age. (2015).
[63] See Hinduism. (2015).
[64] "Interventionist" means "intervenes in human affairs."
[65] Many definitions of stances toward conceptualizations of gods or God with formal titles: agnosticism, apatheism, atheism, autotheism, deism, ditheism, hard polytheism, henotheism, ignosticism, kathenotheism, monolatrism, monotheism, omnism, pandeism, pantheism, panentheism, polydeism, polytheism, soft polytheism, theism, and transtheism. Please see Glossary of Definitions and Bibliography for points of inquiry, clarification, and personal research.
[66] Freemasonic traditions call the supreme being the "Great Architect of the Universe."
[67] See King, L.E. (2014). GAOTU.
[68] See monotheism. (2015).
[69] See teleology. (2015).
[70] See Ratzsch, D. & Koperski, J. (2015). Teleological Arguments for God's Existence.
[71] See messiah. (2015).
[72] "Grand Master" comes from the freemasonic tradition. Of course, multiple scales in degrees exist to the freemasonic tradition. With the British Columbia & Yukon Lodge in the western portions of Canada,
[73] See Grand Lodge of British Columbia and Yukon (2015).

the *Law of Thelema*[74,75] or the coda quotes from the same traditions stating "We place no reliance on virgin or pidgeon. Our method is science, our aim is religion," the Spinoza-Einstein[76,77,78,79] creator and sustainer Deity[80] exhibited in the beauty and marvel of the laws of nature[81] laid bare in full bloom by scientific pursuit[82], a Pantheity[83,84,85,86] existent in the manifestation of Nature writ large abundant in God among all of creation, animistic[87,88] spirits presaging good and ill, or containing the ancients and loved ones of lineage and history, or the devoted Atheist-Materialist-Secularist dependent upon natural philosophy for the constitutive purposeless mechanical - determinate or indeterminate – universe forging inexorably through time with "no rhyme or reason,"[89] the philosophical divides range across a broad, expansive and maturing landscape devoted to some monistic, dualistic, or pluralistic *weltanshauung*[90] with increased emphasis upon natural philosophical methodology[91] and harvesting of knowledge supported by philosophical argumentation rather than insistence upon philosophical disputation reliant upon the ironclad foundation of logic[92].[93,94,95,96,97,98,99]

Flora and fauna[100] of the landscape wax and wane, live and die, diverge and converge, transform and evolve, and ineluctably pursue unification of their constituents with the tacit assertion

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[74] "Law of Thelema" means "The word of the law is Thelema [. . .] do what thou wilt shall be the whole of the law."
[75] See Crowley, A. (1904). Liber Al vel Legis (The Book of the Law).
[76] See Nadler, S. (2013). Baruch Spinoza.
[77] See Dutton, B.D. (2005). Baruch de Spinoza (1632-1677).
[78] See Benedict de Spinoza. (2015).
[79] See Albert Einstein. (2015).
[80] "Deity" means "belief in the existence of a supreme being arising from reason rather than revelation."
[81] See law of nature. (2015).
[82] See scientific method. (2015).
[83] "Pantheity" means "the embodiment of God in nature by provision of pantheism with an identity."
[84] See Mander, W. (2013). Pantheism.
[85] See pantheism. (2015).
[86] See monotheism. (2015).
[87] See Driscoll, J.T. (1907). Animism.
[88] See animism. (2015).
[89] "No rhyme or reason" comes from the poet Edmund Spenser.
[90] "Weltanshauung" means "worldview."
[91] "Natural philosophical methodology" means "scientific methodology."
[92] Of course, the actuality of an experience depends upon conformation to the laws of logic discussed in the chapter entitled *Logical Possibility, Imaginability, and Actuality*.
[93] Philosophical assertions of everything as singular associated with monism, dual associated with dualism, or plural associated with pluralism. In essence, monist views relate to three categorizations according to experts: 1) idealist monism: mind or spirit alone, 2) neutral monism: mental and physical reduced to one, 3) material monism (physicalism or materialism – eliminative and reductive materialism too): everything reduced to physical.
[94] See Schaffer, J. (2014). Monism.
[95] See Stubenberg, L. (2014). Neutral Monism.
[96] See Robinson, H. (2014). Dualism.
[97] See pluralism and monism. (2015).
[98] See Wynn, M. (2014). Phenomenology of Religion.
[99] Duly note the amount of wrong hypotheses about the world outnumber the correct hypotheses about it; in fact, the ratio likely numbers in the 1,000s to 1 or more. For instance, no evidence ever came forth in favor of Zeus in physical form other than the causal proposal for the origin of lighting and thunder from the electric-ridden hands of the god's King.
[100] "Flora and fauna" means "plants and wildlife."

of present, or explicit aim of, ultimate truth about the universe through human discovery with increased machine assistance; insofar as the ultimate structure of the universe gifts itself for comprehension to mortal minds bound by coils, its apparent variegated internal material and organizational fecundity superimpose upon a quaint simplicity. Informational cosmology elucidates this principal structure of matter's motion through space-time within the conceptual apparatus of information processing to manifest a unified framework for comprehension of the relevant magnitudes of the world.

Unified theories[101,102] pervade the philosophical and natural philosophical disciplines in ventures to provide elaboration on the workings of everything on, in and orbiting the Earth and Sun, in and orbiting the Milky Way, and within the universe, and processes/objects in speculation beyond it. Perspectives – undergirding assumptions - tend to dictate the foci. Some for comprehension of gods, God or Nature; others for improved personal or human well-being; still others for the sole pursuit of knowledge based on intrinsic curiosity in the subject matter. Nonetheless, two schools tend to proliferate: teleological and naturalistic with an ebb and flow in the record and mild extirpation of the teleological in favour of the naturalistic in which the naturalistic assertions and methodological approach continues to uproot and replace previous intention-driven and purpose-sought answers in favour of concrete, naturalistic, operational explanations.

Teleological[103] unified theories conquered the mental expanse for millennia in religious scripture, oratorical stories, and theological enquiries with an emphasis on allegory, metaphor, logical argument alone, and often indirect poetic presentation.[104] Each utilized for the group involved in the teleological philosophical foundation; even among the young of us, the children, this pattern of teleological thought appears an inborn trait for a pattern-recognition bound species in which mainstream psychologists catalogue this phenomena within the bounds of "egocentrism"[105] and "magical thinking" developed from the psychological models of development of Jean Piaget[106], the famous and well-regarded French psychologist.[107] Some, or even many, speculate about the multifaceted purposes for the methodologies in disseminating the unified philosophies or theories of the world: social, political, altruistic, malevolent, benevolent, religious, intellectual, psychological, and so on; however, the more important trajectory of this conversation relates more to the taxonomy of unified theories as opposed to their ultimate bases and socio-cultural impact to the individuals, groups, and the interactions with societies in and around them.

Religious scripture spread across every hemisphere, each continent, and all countries of the world in some form, or transform, seen in the modern day with continual, and arguably increased rapidity of, adaptation to the modern pressures of transparency, doubt, and tendencies towards

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[101] See unified field theory. (2015).
[102] See American Physical Society (2015). This Month in Physics History.
[103] See teleology. (2015).
[104] See Basinger, D. (2014). Religious Diversity (Pluralism).
[105] See human behaviour. (2015).
[106] See Jean Piaget. (2015).
[107] See Angerbauer, M. (2009). infant and child development: egocentrism and magical thinking.

secular and democratic societies sometimes at odds with particular interpretations of theological mandate.[108,109,110,111,112]

Oratorical[113] stories presented the immersion of bands and tribes of humans in the narratives of people for thousands of years in the ancient history of *homo sapiens*[114]: accurate recounting, misremembered fabrications, confabulations, or mythologies for didactic purposes from leaders to followers, teachers to pupils, or parents to children.

Logical argument alone took some roots in the writings of Plato with an indirect infusion of the classical laws of logic within many of the various dialogues without explicit formulation or statement of them.[115,116] Aristotle[117] brought forth the formation of these logical arguments for the explicit formulation of the forms of logic seen within Plato's more tacit representation of them.[118,119]

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[108] From those with the greatest quantity of adherents including Christianity (Roman Catholicism, Protestantism, Eastern Orthodoxy, Oriental Orthodoxy, and Anglicanism), Islam (Shia, Sunni, Sufi, and Kharijite), Hinduism, Chinese Traditional Religions, Buddhism, various Ethnic Religions, African Traditional religions, Sikhism to those with the least number of adherents including Christianity (Restorianism, Chinese Originated Churches, Church of the East, and Unitarian Universalism), Juche, Spiritism, Judaism, Bahá'í, Jainism, Shinto, Cao Dai, Zoroastrianism, Tenrikyo, Neo-Paganism, Rastafarianism, Scientology, Pastafarianism, Mormonism, Arceusology, Discordianism, Paganism, Crowleyites to others including Old World Paganism (Greek, Roman, Egyptian), to Bahai'ism, Mormonism, Brahmanism to Hinduism, Jainism, Zoroastrianism, Theravada Buddhism to Mahayana Buddhism to Vajrayana Buddhism, Confucianism, Taoism, Shintoism to Tenrikyo, and Manichaeism to the Reformation (Church of England, Reformed: Lutheran, Presbyterian, and others, Anabaptism, Baptism, Methodism, and Quakerism).
[109] See classification of religions. (2015).
[110] Ibid.
[111] See study of religion. (2015).
[112] See Religion: Year In Review 2010. (2015).
[113] See oratory. (2015).
[114] See Smithsonian National Museum of Natural History (2015, March 12). Homo Sapiens.
[115] See Partenie, C. (2014). Plato's Myths.
[116] See Woodruff, P. (2014). Plato's Shorter Ethical Works.
[117] See Aristotle. (2015).
[118] In question "45." of *The Rick G. Rosner Interview*, I wrote, "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 sublaws 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."
[119] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

A long and venerable historical tradition exists for the core use of logical argument alone.[120,121,122,123,124,125]

Indirect poetic presentation delineates bestowal in the form of religious scripture and the secular figures with pantheistic or deistic perspectives of the world unclasped from sacred scripture, revelation, individual religious experience alone, or authority of particular figures of religious import from imams, priests, shamans, rabbis, freemasons, and others.

Teleology[126] appeared the sole option[127] for millennia because of the apparent design in nature with the common academic culture referencing culmination in the publication of William Paley's *Natural Theology; Or, Evidences of the Existence and Attributes of the Deity. Collected from the Appearances of Nature*[128]. An original publication on 1802 with many new additions in Paley's lifetime; note the title of the publication stipulating the "Appearance of Nature," this provision in the finale of the title lays the groundwork of intended coverage for the theologian *and* natural philosopher, but for Paley provided evidences of the actuality and characteristics of an architect to the world prior to the typified metaphors of "selfish genes" or "mount improbable" wholly reliant upon the imaginative conveyance of Richard Dawkins[129].

Natural philosophers and theologians begin with the observational truism to most human experience of the design in nature. Furthermore, the modern illumination of the many faults in biological design in addition to knowledge of threats to human and animal life including biological such as epidemics of disease and insect or animal plagues, climatological such as drought, extremes in local or global temperatures, and wildfires, geophysical such as earthquakes, landslides, tsunamis and volcanic activity, hydrological such as avalanches and floods, meteorological such as cyclones, or surges of storms or waves, or the cosmic possibilities of human annihilation in asteroid impacts, cosmic rays, magnetic reversal of the earth's poles, or solar flares among many do

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[120] In question "53." Of *The Rick G. Rosner Interview,* I wrote, "Rationalism and empiricism tend to oppose one another. Pure rationalism defines knowledge from the human mind alone (*a priori*); pure empiricism defines knowledge from experience alone (*a posteriori*). Pythagoras, Parmenides, and Zeno of Elea represent early rationalism culminating in Plato with the candle kept alight by René Descartes, Benedict (Baruch in Hebrew) de Spinoza, Gottfried Wilhelm von Leibniz**[120]**, Francis Herbert Bradley, Bernard Bosanquet, Josiah Royce, Noam Chomsky, and other ancient and modern exemplars. Sophists represent early empiricism coming afire with Aristotle with the torch taken by the Stoics and Epicureans, followed by Saint Augustine of Hippo, Saint Thomas Aquinas, Roger Bacon, William of Ockham, Francis Bacon, Thomas Hobbes, John Locke, David Hume, Voltaire, John Stuart Mill, William Kingdon Clifford, Karl Pearson, Bertrand Russell, Sir Alfred Jules Ayer, and other ancient and modern exemplars. For some preliminary reading, René Descartes defends rationalism in *Discourse on the Method* (1637); John Locke defends empiricism in *An Essay Concerning Human Understanding* (1689)."

[121] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

[122] See Look, B.C. (2014).

[123] See history of logic. (2015).

[124] See formal logic. (2014).

[125] See Gottfried Wilhelm Leibniz. (2015).

[126] See teleology. (2015).

[127] An introduction of a new option does not by necessity negate the old one.

[128] See Paley, W. (1809). Natural Theology; Or, Evidences of the Existence and Attributes of the Deity. Collected from the Appearances of Nature (12th Edition).

[129] See Richard Dawkins Foundation for Reason and Science (2015). Richard Dawkins.

not *by necessity* deter the belief in – or defeat arguments for the existence of - a benevolent prime mover and sustainer of the immanent world.[130]

A prior attribution to divine retribution for a human wrong or some countervailing force to human hubris, known or unknown in origin and operation, for some human spiritual ill-doing. With the waning of pure teleological perspectives on the destruction to human life intrinsic to primate design such as people in faulty genetics, ill-functioning organs, or external traumas to societies with inclusion of the aforementioned geological or cosmic threats, even technological catastrophes, and other varied events to offset health, wellbeing, and life of individuals and groups of human beings, naturalistic explanations have prime concern compared to the frameworks of sin, punishment, retribution, divine revenge, angelic beings, or genies such as *djinns*, and otherworldly phenomena and beings as secondary, tertiary, or not of consideration.

Many arguments for design in popular, peripheral, and fringe thinkers and groups develop arguments with similarity in logical form to the teleological view of Paley in the classical Greeks up to the present era.[131,132,133,134,135,136,137] Moral arguments[138,139], teleological arguments[140,141,142], cosmological arguments from contingency[143,144], cosmological arguments from the origin of the universe[145,146], or ontological arguments[147,148,149]; for instance, the modern cosmological argument for the existence of God took root in various regions, groups, and individual minds.[150,151] An argument type with multiple categorizations and constructions.[152]

Cosmological arguments begin with the immediate experiential fact of nature's design, connects this to human designed objects requiring an engineer and builder, and, therefore, the

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[130] Albeit, it grants credence to serious arguments in relation to it.
[131] See Ayala, F. & Jacobsen, S.D. (2014, June). Dr. Francisco Ayala: Donald Bren Professor, Biological Sciences; Professor of Philosophy; and Professor of Logic and the Philosophy of Science, University of California, Irvine (Part Two).
[132] See Ayala, F. & Jacobsen, S.D. (2014, June). Dr. Francisco Ayala: Donald Bren Professor, Biological Sciences; Professor of Philosophy; and Professor of Logic and the Philosophy of Science, University of California, Irvine (Part One).
[133] See Behe, M. & Jacobsen, S.D. (2014, July). Dr. Michael Behe: Professor, Biochemistry, Lehigh University (Part Two).
[134] See Behe, M. & Jacobsen, S.D. (2014, July). Dr. Michael Behe: Professor, Biochemistry, Lehigh University (Part One).
[135] See Coyne, G. & Jacobsen, S.D. (2014, August). Dr. & Fr. George V. Coyne, S.J.: McDevitt Chair of Religious Philosophy, Le Moyne College.
[136] See Miller, K. & Jacobsen, S.D. (2014, July). Dr. Kenneth Miller: Professor, Biology, Brown University (Part One).
[137] See Miller, K. & Jacobsen, S.D. (2014, July). Dr. Kenneth Miller: Professor, Biology, Brown University (Part Two).
[138] See Evans, C.S. (2014). Moral Arguments for the Existence of God.
[139] See Holt, T. (2008). The Moral Argument.
[140] See Ratzsch, D. & Koperski, J. (2015). Teleological Arguments for God's Existence.
[141] See Holt, T. (2008. The Teleological Argument.
[142] See argument from design. (2015).
[143] See Reichenbach, B. (2013). Cosmological Argument.
[144] See Holt, T. (2008). The Argument from Contingency.
[145] See Reichenbach, B. (2013). Cosmological Argument.
[146] See Holt, T. (2008). The Cosmological Argument.
[147] See Oppy, G. (2015). Ontological Arguments.
[148] See ontological argument. (2015).
[149] See Holt, T. (2008). The Ontological Argument.
[150] See Reichenbach, B. (2013). Cosmological Argument.
[151] See cosmological argument. (2015).
[152] Ibid.

teleologist argues, nature's design requires an originator for the design in origin of living beings. These derive from ancient arguments found in the writings of Plato[153], Democritus[154], Lucretius[155], Aristotle[156], Saint Thomas Aquinas[157,158], non-arbitrarily placed into a diminutive state - from Francis Bacon[159,160] in *Novum Organum*[161,162], in stasis and disfavour in the modern natural philosophical disciplines with the functional truths abundant in the instrumentality of technology to modern society in airplanes, automobiles, digital computers, farming, pharmaceuticals, and the marvels of modern military and space industry technologies with the development of novel technological including 3D printing, commercial space flight, genetic engineering, narrow artificial intelligence, robotics, and nanotechnology[163]. Naturalistic arguments came to the fore based upon the travels of HMS Beagle with a little-known scientist aboard positing the change over time of the flora and fauna of the Earth.

1859 marked the publication of *On the Origin of the Species*[164] by Charles Darwin[165] with associated works[166] to assist in the arguments at a later time. An account of the design in nature with the argument for *apparent* as opposed to *actual* designed organizational structures in biological systems. Paley argues for actual design in nature; Darwin for the appearance of design.[167] Most of the scientific community devoted to the study of biological systems commit themselves to the Darwinian mechanism of the world with sheer mass and number of fossils, transitional fossils, geological evidence, genetic evidence, and dating methods.[168,169170,171,172]

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153 See Plato. (2015).
154 See Democritus. (2015).
155 See Lucretius. (2015).
156 See Aristotle. (2015).
157 See Saint Thomas Aquinas. (2015).
158 See Thomism. (2015).
159 See Francis Bacon, Viscount Saint Alban. (2015)
160 See Klein, J. (2012). Francis Bacon.
161 In question "53." of *The Rick G. Rosner Interview*, I wrote, "1 st Viscount St. Alban, English jurist, philosopher, and statesmen, Francis Bacon, founded the Baconian Method in Novum Organum Scientiarum or New Instrument of Science (1620), synonymous with inductivist. Where Aristotle represents the major transition from dominant rationalism to some form of empiricism, Bacon represents the metamorphosing of empiricism into more modern empiricism. Science does not give proofs. Mathematics produces proofs. As founded by Francis Bacon under the appellation empiricism and enunciated by Scottish economist, empiricist, historian, and philosopher, David Hume, science amasses evidence for probabilities of theories. Weight towards theories and arguments based on quantity and quality of evidence. Sometimes echoed in the oft-said - to the point of boredom – phrase of Carl Sagan, adapted from Marcello Truzzi, for extreme cases, "Extraordinary claims require extraordinary evidence."
162 See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
163 Genetic engineering does amount to nanotechnology based on the scale of analysis at 1-100 nanometers.
164 Full name of the treatise by Charles Darwin from November 24, 1859: *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*.
165 See Charles Darwin. (2015).
166 See Darwin, C. (1872).
167 See natural selection. (2015).
168 See Smithsonian Museum of Natural History (n.d.). Geologic Time.
169 See Smithsonian Museum of Natural History (n.d.). Studying the Evolutionary History of Life.
170 See Table I.
171 See Smithsonian Museum of Natural History (n.d.). Absolute Dating.
172 See Table II.

Naturalistic unified theories developed some blips in the deep human recorded historical timeline with increased momentum at the dawn of the scientific revolution with experiments, observation of the natural world, and logical argumentation interconnected with scientific machinery and concomitant discoveries about nature. About five centuries ago, the philosophical and theological approach began to wane in favour of the natural philosophical assumptions and methodology known in modern times as the European Scientific Revolution.[173] 1543 marked the publication of Nicolaus Copernicus' *De revolutionibus orbium coelestium* (*On the Revolutions of the Heavenly Spheres*)[174]. In the volume, he explained the organizational structure, and thus function – to a degree, of the Solar System[175,176] with the heliocentric[177], or Sun-centered, explanation in lieu of the geocentric, or Earth-centered[178], mapping for the heavens' order.

Modern natural philosophy or science began to dominate the evidentiary and philosophical mural from 1543 into the present era.[179,180,181] Progress occurs with increased pace throughout history.[182,183,184] Years, decades, and centuries from 1543 walk, trot, canter, and gallop forward with integral inventions, innovations, technological leaps, and theoretic foundations with evidentiary complements for the injection of new vigour and disruption into the gears, levers, and ideological mandates bolstering the machinery of society.[185] Isaac Newton[186] solidified – in historical hindsight - the natural philosopher and natural philosophy above the theologian and theology with the publication of *Philosophiæ Naturalis Principia Mathematica* (*The Mathematical Principles of Natural*

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[173] See history of science. (2015).
[174] See Copernicus, N. (1543). De revolutionibus orbium coelestium.
[175] T=~$9.17*10^9$ calculated through subtraction of standard big bang cosmology estimate of universe age by estimated age of sun or ~$1.377*10^{10}$ minus ~$4.6*10^9$ equals ~$9.17*10^9$. Our solar system ends with the remnants of the sun about 10^{15} or ~one quadrillion years into its existence where the sun cools to 5,000 Kelvin/4726.85 Celsius/ 8540.33 Fahrenheit and the gravitational attraction of passing stars detaches planets from the solar system to cease the existence of our solar system.
[176] See solar system. (2015).
[177] See heliocentric system. (2015).
[178] See geocentric system. (2015).
[179] In questin"53." of *The Rick G. Rosner* Interview, I wrote, "Modern science developed many explicit and tacit boundaries along the trajectory of development. From an ahistorical and more conceptual consideration while acknowledging the rough-and-tumble development of modern science, some bounds include Aristotelian foundational empiricism, natural philosophy, methodological naturalism, rationalism, empiricism, inductivism, Ockham's Razor, consilience, falsificationism, verificationism, hypothetico-deductivism, Bayesianism, and epistemological anarchism."
[180] See Rosner, R.G. & Jacobsen, S.D. (2014, November 8). Rick G. Rosner: Giga Society, Member; Mega Society, Member & ex-Editor (1991-97); and Writer (Part Five).
[181] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
[182] See history of science. (2015).
[183] See physical science. (2015).
[184] See Industrial Revolution. (2015).
[185] See Nickles, T. (2014). Scientific Revolutions.
[186] See Smith, G. (2008). Isaac Newton.

Philosophy)[187].[188,189,190] Of course, most writings attributed to Newton remained in the study of theology and alchemy. Even so, Newton provided the basis for the next three centuries of natural philosophy – even in the transition into science from natural philosophy – and natural philosophers in which the continued efforts of many of the greatest scientists and philosophers to have ever lived did not significantly advance the frontier of understanding the cosmos – the most substantiated image at the time given by the *Philosophiæ Naturalis Principia Mathematica* - until the advent of Albert Einstein's developments of mass-energy equivalence, Special Relativity, and General Relativity. As with every unifying naturalistic theory of the universe, Newton, even with the advent of Einstein's discoveries, did not exit the stage center right, but his ideas continue to perform on the academic stage, because of functional truths at medium sizes and speeds in the case of Newton, in engineering - particularly civil engineering - and other fields because of the ease of calculation compared to the mathematics of Einstein.

Different fields partake of the natural philosophical or scientific enterprise such as astronomy[191,192], biology[193,194], chemistry[195], cosmology[196,197], geology[198], paleontology[199], physics[200], and many others. To the extent that extant disciplines and sub-disciplines disallow the formation of complete frameworks of the world - in spite of the modern multi-disciplinary and interdisciplinary ventures of modern intellectual mavericks, [201] the present efforts require, almost by necessity, continual recourse to disciplines and sub-disciplines developed from the, and for the further, cross-pollination of knowledge, techniques, technologies, and leading experts, for more complete, comprehensive, and capable schema to represent Creation. However, these grand endeavours become supplements to the core efforts of research particulates and the convergence of the conceptually minute.

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[187] See Newton, I. (1687, July). Philosophiæ Naturalis Principia Mathematica.
[188] In question "53." of *The Rick G. Rosner Interview*, I wrote, "English polymath, historian of science, Anglican priest, and theologian, William Whewell, brought "consilience" into consideration with The Philosophy of the Inductive Sciences, Founded Upon Their History (1840). Of great importance, Whewell - in addition to other work by John Herschel - formalized the modern methodology of science with History of the Inductive Sciences (1837) and The Philosophy of the Inductive Sciences, Founded Upon Their History (1840). Whewell's efforts with the term consilience faded in philosophy of science until revival in the late 1990s. His lasting mark continues with the modern methodology and refinement of the title "natural philosophy" to "science" and "natural philosopher" to "scientist.""
[189] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
[190] See Smith, G. (2008). Newton's *Philosophiae Naturalis Principia Mathematica*.
[191] See Wayne State University (n.d.). What is Astronomy?.
[192] See astronomy. (2015).
[193] See Norwegian University of Science and Technology: Trondheim (n.d.). What is biology?.
[194] See biology, philosophy of. (2014).
[195] See American Chemical Society (2014).
[196] See Chuss, D.T. (2012, December 21). Cosmology: The Study of the Universe.
[197] See cosmology. (2015).
[198] See geology. (2015).
[199] See paleontology. (2015).
[200] See physics. (2015).
[201] "Multi-disciplinary" means "multiple singular disciplines in operation, more or less, alone. "Interdisciplinary" means "multiple convergences of disciplines in operation, more or less, together in collaborative and cooperative enterprises."

Insofar as informational cosmology gives weights to these distinct disciplines and their respective domains of inquiry, universes of discourse, common professional vernacular and concepts, some cover more jurisdiction than others, especially those investigating the very small, the very fast, the very large, and the very complex; informational cosmology purports to bring together the traditional, and superficial, divide of philosophy and science to yield new perspectives, insights, and implications of the facts and arguments pertaining to the overarching organizational structure and function of the universe.

With these considerations of the monistic historical context of the world's philosophies in simplified formats of the teleological and naturalistic, these can provide the platforms to launch some of the delineations for the formalization of informational cosmology into a novel discipline. To further some of the understanding and pay tribute to some of the lesser-known, in the father's case, and the defamed, in the son's case, the following representations will provide the context for the attribute symmetries, or isomorphism of traits and operation, of the universe whilst providing some justice to two men, Boris Sidis and William James Sidis. An emphasis on justice for the latter because the historical "railroading" of his reputation and self.[202,203] Information cosmology conceives an attribute symmetry between the universe and consciousness endowed minds within it. A similarity in physics with differences in magnitude. In a manner of speaking, an isomorphism of traits and operation through time – described in latter chapters. This permits the logical possibility for the mutual enrichment of sciences of the mind and sciences of the large-scale structure of the universe, or motion of matter through space and time at the grandest scales – and the human scale. Let's run through some of the writings of Boris with a note to William, for what it's worth.

Modern psychological sciences search for fundamental concepts, but the lack of integration and the hindrance of increased divergence prevent the appropriate, necessary, and even axiomatic, nature of natural science's progress towards unification. One need think about integral truths in the natural sciences to extrapolate into the primary individual human social science, psychology. Boris Sidis stated in the outset of *The Foundations of Normal and Abnormal Psychology*:

> *All through the domain of the sciences there is a vast movement for the search of fundamental concepts and for the close investigation of such concepts. Even such an exact science as mathematics has felt this spirit of examination of its fundamental assumptions, axioms, and postulates. Men like Lobatchevsky, Bolyai, Rieman and others have given the start and a number of mathematicians have recently followed in their footsteps, with the result of getting a wider horizon and of opening unknown regions. The same we find in the case of physical sciences, such as physics, mechanics and chemistry. Mach, Poincaré, Ostwald, Pearson and others have contributed to this spirit of investigation in the domain of physical sciences. This spirit of inquiry has become of late specially intensified by the revolutionary discoveries of radio-active bodies.*
>
> *We are acquainted with the great movement which has swept all over biological, sociological, and economical sciences due to the influence of the theory of evolution. The spirit of free inquiry into fundamental concepts has seized on all sciences. Throughout the whole domain of human thought there is felt this rejuvenating and*

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[202] In Absolutist Conscientious Objector Writings (1939-1943), he wrote, "How about my getting up a statement (mentioning no names) about my own experience in being railroaded into a sanatorium in 1919 as a precedent for declaring CO's insane?"

[203] See Sidis, W. (1939-1943). Absolutist Conscientious Objector Writings.

> *invigorating breath of the new revolutionary spirit. Philosophy, ethics, aesthetics, history, law, economics all have been, awakened out of their long sleep of centuries. Every science has been shaken by this mighty movement to its very foundation. Even such a dry study as logic has felt the vital breeze of the inquiring spirit of modern times.* (Sidis, B. 1914)

I agree with both the sentiment, logical integrity, and factual nature of the statement above from one of the early, lesser-known psychologists of the 20th century. In point of fact about the bases of the psychological sciences across the spectrum of enquiries, the formation of fundamental truths for the extension of insights about the operation of the human mind appear more integrated in some respects, technical in certain sub-disciplines. Each seem to provide some indication of the Truth about the nature of base questions interrelated to qualia, consciousness, the complete forms and functions of the human nervous system's computational mechanisms. Sidis continued in the identical section on these issues about a century ago. *The Foundations of Normal and Abnormal Psychology* (1914) indicates the conversation, concerns, and issues remain in general the same with superficial discoveries carving out the marble of the image of the mind out in words, concepts, evidences, and theories. A quote, a rather large one, granted, does merit statement from the same book by Sidis:

> *Again, philosophers and metaphysicians are apt to make intrusions into the domain of psychology, because the latter is regarded by them from time immemorial as legitimate prey, inasmuch as their own domain lies on the outskirts of mental life. In the interest of metaphysical systems philosophers attempt to subject psychology to their own speculative purposes.*
>
> *The popular mind has a tendency of regarding psychology as something mystical and of identifying psychology with all kinds of faith cures, mind cures, spiritism, telepathy, telaesthesia, and table rapping. It is unfortunate that even medical men of note, on account of lack of acquaintance with psychological subjects and inquiries, are apt to look askance at psychology and identify it with religious beliefs, mental cures as well as with the more shady side of spiritistic manifestations. Still more complicated is the plight in which the psychologist finds himself in regard to the recent claims put forth by some psychologists in having achieved results of importance to law, industry, and to the reformation of social ills. The demand for practical results in psychology is due to the industrial spirit of our times, a spirit which requires immediate results that can be cashed or expressed in dollars and cents. The earnest psychologist should repudiate such industrial business psychology, for the simple reason that such a psychology is imaginary; in other words, such a psychology does not exist. An experienced salesman, an intelligent business man knows infinitely more about business and how to obtain the best results out of certain combinations than all the psychologists with their laboratory experiments, their artificial statistics, and puerile trivial experimental arrangements, giving results no less trivial and meaningless.*
>
> *The claims made by psychologists as to industrial efficiency which psychology can give is ludicrous in the extreme. We may well expect the astronomer to claim that astronomy can give points how to conduct successfully a political campaign. As a matter of fact the psychologist has nothing to say on the subject of advertisements, industry, and business, but commonplace trivialities expressed with all the pomposity of scholastic authority. Industrial efficiency does not belong to the domain of psychology. We may as well expect the comparative psychologist to offer practical points on the efficiency of cows to give milk or on the efficiency of hens to lay eggs. The success of advertisement is a matter of experienced business men and not of academic psychologists who have to offer nothing but the merest platitudes.*
>
> *We must once for all enter a protest against those psychologists who claim that they have some great psychological truths to reveal to businessmen, manufacturers and workingmen.* (Sidis, B. 1914)

Wherein some of the best descriptions of a discipline equate to those made intelligible by its earliest expositors not bogged down by modern institutional hierarchical authority, mass divergence of disciplines, proliferation of self-proclaimed experts, idolization of heroes in the field, tunnel vision from the present era of specialization, or the obfuscation of excess papers, Boris Sidis in the first chapter of *The Foundations of Normal and Abnormal Psychology* (1914) states the foundations of science, a necessary component in the formation of a unified theory by high contemporary standards, in precise analogical *and* first principles explanations:

> *Science is the description of phenomena and the formulation of their relations. Science describes facts and formulates their relations in laws. The task of science is first to formulate facts belonging to the same type, and then to generalize them, that is to express their general relationship by one comprehensive formula, in spite of the many individual variations in the phenomena. Thus in geometry, possibly the most ancient of all sciences, many isolated and important facts were already known to the semi-civilized nations of antiquity, but it required the rationalizing spirit of the Greek mind to classify and generalize the facts into theorems, the laws of space. Many important properties of the right-angled triangle, for instance, were already known to the ancient Chaldeans and Egyptians. They knew that if in a right-angled triangle the two sides are respectively three and four, the hypotenuse must be five and so on; that is, they knew only concrete facts, but what they lacked was just the scientific side. It required a Pythagoras to discover that in all right-angled triangles the sum of the squares of the two sides is equal to the square of the third. No matter what the size of the triangle be, no matter how different in length its sides are, once the triangle be of the same type, namely right-angular, the same general relationship must obtain.*
>
> *To take an illustration from physics. Falling bodies form one type of movement. Now the bodies themselves may be different in kind, in nature, may be of various material, may differ widely in structure, weight, and shape, and still, since they all belong to the same type of motion, they are, in spite of their manifold diversity, expressed in one general formula, in one law, namely, that the spaces traversed are proportional to the square of times.*
>
> *In other less exact sciences the facts are exhaustively described and a general statement is formulated as to their relationship. In physiology, for instance, we find mainly descriptions of facts classified into types, the relationships of which are expressed in general formulae, or laws. Thus in the cerebro-spinal nervous system, each part and its functions are described as fully as possible, and then all the facts are brought under one comprehensive formula such as the reflex arc. In embryology the different changes of the embryo are minutely described, classified into types, into a certain number of definite stages, and then all the changes, in the infinite wealth of their variety, are expressed in the general proposition that the embryo in the short period of its development traverses in an abbreviated form all the stages that the species has passed through in the many ages of its existence; all the changes are generalized in the formula that the ontogenetic series is an epitome of phylogenetic evolution. We may, therefore, say that science is a description of types of facts, the relationships of which are expressed in general comprehensive formulae, or laws. It is in this sense that we understand psychology to be a science; it classifies phenomena into types and searches for the general expression of their relations, or for what is termed psychological laws.*
>
> *We must come to something more precise and definite. We said that psychology deals with classification and generalizations of phenomena; but what are these phenomena? In the different branches of science, we find that each one has a determinate order of phenomena to deal with, a definite subject matter. Thus geometry deals with spatial facts, mechanics with motion, physics with changes of molecular aggregations, chemistry with atomic combinations and their mutations, physiology with processes going to make the equilibrium of organic life, sociology with phenomena of social life, and so it is in the case of all other sciences. Now what is the*

> *subject matter of psychology? What are the facts, the phenomena with which psychology deals? Psychology deals with facts of consciousness.*
>
> *On the very threshold of our discussion, we may be stopped by the pertinent question: "You say that psychology deals with facts of consciousness, but what is consciousness?" Consciousness is subjective facts, such as the elements of sensation, feelings, pains, thoughts, acts of willing and the like. Positive science must have given facts, data to work upon; these data it analyzes, describes, classifies into types and seeks to find the formulae of their relationships. Psychology can accomplish no more than any other science. The data of psychology are facts of consciousness, these facts are analyzed into their simplest elements, and the laws of their relations are searched for. But psychology does not, and legitimately cannot possibly go beyond consciousness. Consciousness is the ultimate datum which psychology must assume as given and which is from a psychological standpoint unanalyzable. Consciousness must be postulated, if we wish to enter the temple of psychology.* (Sidis, B. 1914)

Insofar as this conceptualization of the science of psychology equates to the "*facts of consciousness*," a consonance with the factual grounding of informational cosmology becomes more clear in general terms because the foundation of the universe's unification, from the view of a digitized, information-based world, equates to the study of consciousness in technical terminology departing from the traditional, at times mystical in tone, explanations provided by some of the psychological sciences.

William James Sidis[204] published many books including, *The Tribes and The States*[205], *Absolutist Conscientious Objector Writings*[206] (1939-1943), *The Concept of "Rights"*[207] (1940), *The Peace Path*[208] (1943), *The Libertarian*[209] (1938). His book of interest, *The Animate and the Inanimate*[210] (1920) for present purposes interrelates with the cosmological, the large-scale structure of the universe, aspects of informational cosmology. He performs a series of logical and physical shifts in the largest system known and observed, the universe. One key idea amounts to the apparent one-way track of the time, the forward motion or *arrow of time*.[211] In *The Animate and the Inanimate*, Sidis presents some interesting alterations of common functions of the universe with the reverse universe idea, which brings forth, in addition to those considerations, the utilization of psychological work of William James[212] and the physics work of James Clerk-Maxwell[213]. In *The Animate and The Inanimate*, Sidis wrote:

> *This work sets forth a theory which is speculative in nature, there being no verifying experiments. It is based on the idea of the reversibility of everything in time; that is, that every type of process has its time-image, a corresponding process which is its exact reverse with respect to time. This accounts for all physical laws but*

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[204] See Sperling, A. (1946). A Story of Genius.
[205] See Sidis, W. (1935). The Tribes and the States.
[206] See Sidis, W. (1939-1943). Absolutist Conscientious Objector Writings.
[207] See Sidis, W. (1940). The Concept of "Rights".
[208] See Sidis, W. (1943). The Peace Path.
[209] See Sidis, W. (1938, June). The Libertarian.
[210] See Sidis, W. (1925). The Animate and The Inanimate.
[211] See Jones, A.Z. (n.d.).
[212] See William James. (2015).
[213] See James Clerk Maxwell. (2015).

> *one, namely, the second law of thermodynamics. This law has been found during the nineteenth century to be a source of a great deal of difficulty. The eminent physicist, Clerk-Maxwell, in the middle of the nineteenth century, while giving a proof of that law, admitted that reversals are possible by imagining a "sorting demon" who could sort out the smaller particles, and separate the slower ones from the faster ones. This second law of thermodynamics brought in the idea of energy-level, of unavailable energy (or "entropy" as it was called by Clausius) which was constantly increasing.*
>
> *In the theory herein set forth, we suppose that reversals of the second law are a regular phenomenon, and identify them with what is generally known as life. This changes the idea of unavailable energy into that of a reserve fund of energy, used only by life, and created by non-living forces.*
>
> *This is in accordance with some recent discoveries. The late Prof. William James has discovered in the domain of mental phenomena what he calls "reserve energy," which later investigation has shown to be present to a more limited extent in all biological phenomena. It remained a mystery, however, where this energy came from, and the theory of reserve energy as set forth in this work suggests a possible explanation of these phenomena.*
>
> *In relation to the universe as a whole, the theory herein set forth represents the idea of what is known as cyclical change. This idea is a very old one, being found among the philosophers of the Ionian school, and reappearing at later periods from time to time. On the other hand, the generally accepted theory of the second law of thermodynamics represents a different philosophical tendency, the tendency that considers changes once made as irreparable. Aristotle's philosophy is a good example of that tendency in ancient times, but it has appeared more recently, especially in Spencer's theory of evolution, which, it is interesting to note, is hardly more than a statement of the second law of thermodynamics in philosophical terms.*
>
> *Since the manuscript was completed my attention was attracted by a quotation from a lecture by the great scientist, Lord Kelvin, in which a theory is suggested which is very similar to mine in its general outlines; Lord Kelvin, however, does not work out the theory. He suggests that life works through a reversal of the second law of thermodynamics; and that living organisms, especially animal life, actually act the part of Clerk-Maxwell's "sorting demon." Lord Kelvin, however, regards this as an indication of some suspension of the ordinary physical laws, instead of seeking for the explanation of this reversal in these physical laws themselves.*[214] (Sidis, W. 1925)

Nothing mystical, theory and technical exposition on the plausibility of a reverse time universe and the possible implications, at least in a logical fashion, for the universe and the psychology aspects of the universe too. A reverse universe results with interesting changes to its operation. Buckminster Fuller noted at a later time the prediction of black holes in standard big bang cosmology within *The Animate and The Inanimate*, which did not have explicit observation until decades later based within the thought of William James Sidis.[215] As a partial caution, intellectual history does not unite in a smooth progression. Rosner did much the same since May 2, 1981, with informational cosmology. Things remain messy in the history of philosophy, though, because complex.

Our unified set of theories throughout the historical record present individual achievement with a current intellectual, and academic, milieu opposed to grand ambitions on many fronts. Some will argue for another population, another group to fulfill this ancient ambition of unification about

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[214] See Sidis, W. (1925). The Animate and The Inanimate.
[215] Ibid.

the fundamental attributes of the cosmos. Never one individual; prior generations observed individual achievement alone. Aristotle, Copernicus, Newton, Einstein, and others, solving the foundations of the world. To a limited degree, these equate to fundamental ideas given by singular individuals. Not complete models of the world, but self-contained and extensive in their reach. Not in the modern time, few think of single achievement, rather entrusting in the well-financed research groups collaborating with others for chipping away at the issue of fundamentality. Same noble goal, different means.

"There and Back Again…": Science, Philosophy, Natural Philosophy, and Principles

Heroes have filled the zodiac of beneficent labors, and then given up their mortal part to the fire without a murmur. Sages and lawgivers have bent their whole nature to the search for truth, and thought themselves happy if they could buy, with the sacrifice of all temporal ease and pleasure, one seed for the future Eden. Poets and priests have strung the lyre with heart-strings, poured out their best blood upon the altar which, reare'd anew from age to age, shall at last sustain the flame which rises to highest heaven. What shall we say of those who, if not so directly, or so consciously, in connection with the central truth, yet, led and fashioned by a divine instinct, serve no less to develop and interpret the open secret of love passing into life, the divine energy creating for the purpose of happiness; — of the artist, whose hand, drawn by a preexistent harmony to a certain medium, moulds it to expressions of life more highly and completely organized than are seen elsewhere, and, by carrying out the intention of nature, reveals her meaning to those who are not yet sufficiently matured to divine it; of the philosopher, who listens steadily for causes, and, from those obvious, infers those yet unknown; of the historian, who, in faith that all events must have their reason and their aim, records them, and lays up archives from which the youth of prophets may be fed. The man of science dissects the statement, verifies the facts, and demonstrates connection even where he cannot its purpose·

-Margaret Fuller[216]

We should remember that there was once a discipline called natural philosophy. Unfortunately, this discipline seems not to exist today. It has been renamed science, but science of today is in danger of losing much of the natural philosophy aspect.

-Hannes Alfvén[217]

Some clarification of core definitions - in light of scrutiny of tacit distinctions in the popular press in recent years - of two known fields and one near-forgotten field of inquiry: science and philosophy, and natural philosophy, respectively. Our current era raised science to a gold pedestal based on functional successes; philosophy faded into a silver hue with a similar lining; and natural philosophy continues the centuries-long rust into bronze, as if from the age and the entropic degradation from time.[218] Let us start with a clarification through argument.

Philosophy derives natural philosophy, but not vice versa; natural philosophy defines science; science *means* natural philosophy; therefore, philosophy derives science, but not vice versa. Of course, natural philosophy or science *informs*, *concretizes*, and *actualizes* philosophy. History, definitions, and disciplines dictate the pattern here. One might consider philosophy useless.[219] On the basis of scientific progress[220], some might proclaim this assertion without forethought.

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[216] See Margaret Fuller. (2015).
[217] See Nobel Prize.Org (2015). Hannes Alfvén – Biographical.
[218] Isaac Newton described Natural Philosophy by writing, "As in Mathematicks, so in Natural Philosophy, the Investigation of difficult Things by the Method of Analysis, ought ever to precede the Method of Composition. This Analysis consists in making Experiments and Observations, and in drawing general Conclusions from them by Induction, and admitting of no Objections against the Conclusions, but such as are taken from Experiments, or other certain Truths. For Hypotheses are not to be regarded in experimental Philosophy."
[219] "Useless" by the proclamations of some major figures. Public statements from public intellectuals about philosophy in print.
[220] See Meek Lange, M. (2011). Progress.

Philosophy produces science. If science means natural philosophy – as per the origination and development of it, and natural philosophy derives - in history and definition - from philosophy, then science derives from philosophy, but not contrariwise. Philosophy may not progress in some respects, but does in the domain of natural philosophy or science.[221,222] Natural philosophical or scientific methodology implicates the possibility of progress. Philosophy encapsulates science and the fruits thereof. Therefore, the progress of science discovers additions for, integrates into, and wholly exists within philosophy; natural philosophy or science amounts to an ancillary; philosophy reigns supreme.

Let's formalize with a *reductio ad absurdum*: 1) science and scientific progress makes philosophy useless (anachronistic), 2) if science and scientific progress makes philosophy useless (anachronistic), then philosophy becomes useless (anachronistic), 3) science means natural philosophy and vice versa, 4) if science means natural philosophy and vice versa, then scientific progress equates to natural philosophical progress, 5) philosophy derives natural philosophy, 6) thus, philosophy derives science, 7) therefore, if science and scientific progress makes philosophy useless (anachronistic), and if philosophy becomes useless (anachronistic), and if philosophy derives science/natural philosophy, and if scientific progress equates to natural philosophical progress, then science and scientific progress makes science and scientific progress useless (anachronistic). This popular reasoning reduces to absurdity. It self-defeats/self-contradicts.

Provided the headship of philosophy, and the inevitability of synthesis in the derivative fields from super-disciplines or sub-disciplines, the divergence of disciplines will continue with a simultaneous convergence of magnitude, domains of inquiry, and universes of discourse, and in the process stitch the web of knowledge tighter, remove the excess (false) fluff, and create more unified perspectives for comprehension of the world. Present, and future, scientific disciplines provide the base materials necessary for the harvesting of information, verification into facts, organization into knowledge, construction into trees of knowledge for the delineation of disciplines, and utilization into technology for societies welcoming, accepting, and integrating machines and computers in a wise manner for enhanced quality of life.

Science did not begin in an easy manner. A recent development of high individual intelligence and ingenuity in addition to collective application in particular societies relative to their respective sagacity in planning and application. Modern natural philosophic disciplines' evolution into the modernization of "science" attests to the trial-and-error manner of development for them. Further, science's necessary formation through the process of trial-and-error provides an insight in the nature of previous human conduct before the increased presence of the practice of the scientific

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[221] In question "72." *of The Rick G. Rosner Interview*, on the definition of self-consistency as a minimized definition of logical possibility, I wrote, "Self-consistent structures derive from logical possibility because of logical possibility applied internal to them. "Logical possibility applied internal to them" means "intrinsic components and interrelationships remain logical." Part Five's definition of "system without self-contradiction" – broadened in Part Seven to "system without net self-contradiction" – harnessed technical and concrete definitions. [. . .] "Logical possibility" equates to maximal generalized definition of "self-consistency." It applies the most general system of reason: logic. Logic consolidates dominance of one discipline: philosophy. To the consternation of some, it reigns here. All else derives from it."

[222] See Rosner, R.G. & Jacobsen, S.D. (2014, November 22). Rick G. Rosner: Giga Society, Member; Mega Society, Member & ex-Editor (1991-97); and Writer (Part Seven).

method in human societies in addition to providing a glimpse into the previous methodology taken into account for discovering knowledge about the world in pre-scientific times. Previous forms of science originated with Aristotle in some empirical philosophical foundations and terms for animals, *Animalia,* and plants, *Plantae*, utilized up to the modern period in taxonomy or the science of classifications in the biological sciences. Modern science marched forth in the historical timeline with numerous arguments in the philosophy of science about the appropriate criteria for science.[223,224,225]

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[223] In question "53." of *The Rick G. Rosner Interview*, I wrote, "Modern science developed many explicit and tacit boundaries along the trajectory of development. From an ahistorical and more conceptual consideration while acknowledging the rough-and-tumble development of modern science, some bounds include Aristotelian foundational empiricism, natural philosophy, methodological naturalism, rationalism, empiricism, inductivism, Ockham's Razor, consilience, falsificationism, verificationism, hypothetico-deductivism, Bayesianism, and epistemological anarchism. [. . .] Aristotle, the smithy, even invented the – still used – biological taxonomical distinctions of animalia and plantae in the 4th century BCE. Aristotle shifted the dominant philosophy from the Platonic to the empirical – suiting for a strong student of Plato in *The Academy*.

[224] See Rosner, R.G. & Jacobsen, S.D. (2014, November 8). Rick G. Rosner: Giga Society, Member; Mega Society, Member & ex-Editor (1991-97); and Writer (Part Five).

[225] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

Astronomy and Physics Equals Cosmology

Mathematics began to seem too much like puzzle solving. Physics is puzzle solving, too, but of puzzles created by nature, not by the mind of man.

-Maria Goeppert Mayer

If the general picture, however, of a Big Bang followed by an expanding Universe is correct, what happened before that? Was the Universe devoid of all matter and then the matter suddenly somehow created? How did that happen? In many cultures, the customary answer is that a God or Gods created the Universe out of nothing. But if we wish to pursue this question courageously, we must of course ask the next question: where did God come from? If we decide that this is an unanswerable question, why not save a step and conclude that the origin of the Universe is an unanswerable question? Or, if we say that God always existed, why not save a step, and conclude that the Universe always existed? That there's no need for a creation, it was always here. These are not easy questions. Cosmology brings us face to face with the deepest mysteries, questions that were once treated only in religion and myth.

-Carl Sagan

Mathematics and other disciplines give weight to the idea of consistency, where informational cosmology provides an interrelated consideration of the terminology self-consistency.[226,227] Numerous resources exist for the myriad forms of representation of the fundamental idea found in

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[226] In question "45." of *The Rick G. Rosner Interview*, I wrote, "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 sublaws 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*[226], '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.""

[227] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

self-consistency.[228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245] Mathematics deals primarily with the abstract logical relationships between variables, numbers, and the functional operators delineating their connection.[246] Equations in math amount to statements in human language. Mathematics does not constitute a language constructed for every day communication between people, or by an individual to their self. Rather the relation of symbol to abstraction interrelates observation and experimental evidence to provide explanatory power to the equations; power wrought forth in extraction of truths about the external world. Truths about the fundaments of the natural world with respect to the operating principles of the universe.

Physics equates to one of the most basic of the sciences in this respect. It deals with the behavior and structure of matter. The field of physics is usually divided into *classical physics* which includes motion, fluids, heat, sound, light, electricity, and magnetism; and *modern physics* which includes the topics of relativity, atomic structure, condensed matter, nuclear physics, elementary particles, and cosmology and astrophysics.

Physical sciences, and in particular the science of physics, which studies the motion of matter through space and time. Technical differences in descriptions might allow some interpretations whilst not others. Precision and accuracy amount to two such concepts. Precision refers to the repeatability of the measurement with a certain instrument; accuracy refers to the proximity of the measurement to the true value. With respect to precision, multiple measurements of a speedometer might indicate 55 mph, 55.6mph, and 56mph, in which the estimation between 1mph demarcates the best measurement each time; with regards to accuracy, a car speedometer, for sake of representation, might have an error indications of true speed of the vehicle at 3%, wherein the accuracy of the speedometer in the previous measurements of speed would be ±2% of 55 mph, ±2% of 55.6mph, and ±2% of 56mph. Estimated uncertainty considers both cases. Sometimes the symbol "≈" comes into utilization for the representation of the English

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[228] See set theory. (2014).
[229] See Georg Cantor. (2015).
[230] See set theory. (2014).
[231] See Gottlieb, P. (2013). Aristotle on Non-contradiction.
[232] See Plato. (2015).
[233] See Chappell, S.G. (2013).
[234] See Brown, E. 2011
[235] See Bobonich, C. & Meadows, K. 2013
[236] See Kraut, R. 2013
[237] See Shields, C. (2014). Aristotle.
[238] See Cohen, S. M. (2014).
[239] See Gottlieb, P. (2013). Aristotle on Non-contradiction.
[240] See Look, B.C. (2014).
[241] See history of logic. (2015).
[242] See formal logic. (2014).
[243] See Gottfried Wilhelm Leibniz. (2015).
[244] See Noonan, H. and Curtis, B. (2014).
[245] See University of Oregon (n.d.).
[246] See Table VII.

phrase "is roughly equal to."[247] One can garner further comprehension through an introductory physics book on these topics.

Astronomy[248][249] studies every non-terrestrial[250] astronomical[251] object and phenomena in the universe.[252] It operates within the magnitudes of large-scale objects and phenomena. Physics[253] studies matter[254] and its motion[255] through space[256,257] and time[258,259,260]. Its subject matter delineates each particular in addition to the whole of the universe, i.e. every magnitude of the universe. Astronomy and physics converge on the common subject matter of the universe with different methodologies and emphases.

Astronomy uses computers[261], photometers[262][263], radio dishes/telescopes[264], spectrometers[265], and telescopes[266], and focuses on the large-scale structure of the universe.[267] Astronomy provides the core evidences on the experimental side of the Möbius Strip or coin in this "hard science"

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[247] See MarktwainMediaMath (n.d.).
[248] See Wayne State University (n.d.). What is Astronomy?.
[249] See astronomy. (2015).
[250] "Non-terrestrial" means "not on earth."
[251] "Astronomical" means "extremely large."
[252] Astronomical objects include solar systems, gas giants, galaxies (e.g., barred spiral galaxies, elliptical galaxies, irregular galaxies, lenticular galaxies, ring galaxies, spiral galaxies, and so on), galaxy filiments, galaxy clusters, galaxy groups, galactic superclusters, quasars, blazars, seyfert galaxies, stars (e.g., A-type, B-types, F-type, G-type, K-type, L-type, M-type, O-type, T-type, peculiar stars, barium, neutron, hypergiants, and so on), stellar groupings, variable stars (e.g., pulsating variable, eruptive variables, cataclysmic variables, rotating variables, eclipsing binaries, and so on), circumstellar matter, accretion discs, star systems, meteoroids, interstellar medium, comets, satellites, stellar streams, asteroids, planets, intergalactic space, dwarf planets, cosmic microwave background radiation, proplyds, open/globular clusters, nebulae, and voids. Astronomical phenomena include Newton's Three Laws of Motion, gravitation, momentum, velocity, inertia, and so on.
[253] See physics. (2015). In *Encyclopædia Britannica*.
[254] "Matter" means "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."
[255] See motion. (2015).
[256] See space. (2015).
[257] See mathematics. (2015).
[258] "Time" means "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)."
[259] See Jones, A.Z. (n.d.).
[260] See thermodynamics. (2015).
[261] See computer. (2015).
[262] "Photometer" means "instrument for measuring light intensity."
[263] See photometer. (2015).
[264] See radio telescope. (2015).
[265] See Astronomy Online (2013). Astronomy Tools – Spectroscopy.
[266] See Astronomy Online (2013). Astronomy Tools – Photography.
[267] Telescopes operate with Charged Coupled Devices (CCDs) containing various filters such as photometers and spectrometers. Radio dishes operate between 300 gigahertz (GHz) and 30 megahertz (MGh) for the convenience of astronomers in research on non-terrestrial radio waves. Telescopes and radio dishes/telescopes function on earth and in space depending on the finance necessary for its operation and desired ends of the research with either device. Some projects combine land-based, orbit-based, and space-based astronomical analysis.

related to physics. Billions of dollars by numerous nations have expenditure to expand the understanding of the cosmos with the assistance of astronomers/astrophysicists.

Physics[268] uses mathematical reasoning and tools, previous experimental evidence, and the construction of new experiments, and gives equal consideration for every scale in the study of the universe. Physics contains a purity in perspective with one superlative in pure mathematics. Pure mathematics' provisions in truth have nothing less than absolute truth connected to them. Physics applies the equivalent formulae with the restrictions on the application with the probabilistic nature of the natural world because of the numerous variables insufficiently accounted for except in the most self-contained experiments or basic experiments.

Cosmology[269,270,271] studies the universe[272,273] with astronomy[274,275] and physics[276] as a unified whole. Large-scale structure[277] with the precision of applied mathematics in the real world in relation to the motion of matter through space-time constructs the modern vision of cosmology as the comprehensive and expanding discipline into the study of the cosmos. Structures in the universe dictate the function of them, but not contrariwise. In identical manner, the precision of mathematical physics as applied to the large-scale structure of the universe develops an astonishing precision in prediction of expected structures formed within the universe such as galactic groups, clusters, and superclusters, filaments, quasars, planets, asteroid belts, stars, and many, many others, in addition to the predicted origins, contents, lifecycles, and ultimate transformation into alternate structures with eventual differing structures of the original transforms.

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[268] "Physics" means "theoretical physics and applied physics." Theoretical physics uses mathematical reasoning based on previous experimental evidence to explain phenomena without recourse to the construction of new experiments except as this relates to proposals for them. Applied physics uses mathematical reasoning with more emphasis on previous experimental evidence to explain phenomena with recourse to the construction of new experiments to verify or falsify the mathematical reasoning developed by theoretical physics.

[269] See cosmology. (2015).

[270] See Chuss, D. (2012, December 21). Cosmology: The Study of the Universe.

[271] See Chuss, D.T. (2014, January 24). NASA: Universe 101 Big Bang Theory: Foundations of Big Bang Cosmology.

[272] "Universe" means "a vast and largely self-contained information-space which is self-defining via the interactions of its constituent particles."

[273] See universe. (2015).

[274] See Wayne State University (n.d.). What is Astronomy?.

[275] See astronomy. (2015).

[276] See physics. (2015).

[277] See White, M. (n.d.). What is Large-Scale Structure?.

Standard Big Bang Cosmology: Consensus and Chronology

We have never observed infinity in nature. Whenever you have infinities in a theory, that's where the theory fails as a description of nature. And if space was born in the Big Bang, yet is infinite now, we are forced to believe that it's instantaneously, infinitely big. It seems absurd.

-Janna Levin

The big bang and the steady state debate in some ways echoed that between the ideas of Anaximander and Anaxagoras from two and a half millennia earlier. Anaxagoras had envisaged that at one time "all things were together" and that the motive force for the universe originated at a single point... Anaximander on the other hand wanted a universe determined by "the infinite" and needed an "eternal motion" to explain the balancing process of things coming into being and passing away in an eternal universe... ancient philosophy was debating the alternatives of a creation event starting the universe from a single point versus a continuous creation in an eternal universe.

-David H. Clark & Matthew D. H. Clark

Common questions emerge from philosophical and theological discussion. In particular, the nature of existence from non-existence, something-from-nothing creation - probably most properly defined as *ex nihilo* creation - popularizers of science tend to argue for a self-creating universe while traditional theological and philosophical arguments tend to postulate some form of creator/designer – Abrahamic religions often citing Genesis 1:1 – "…In the beginning God created the heavens and the earth…" - of the Old Testament for a creator or John 1:1-3 – "…In the beginning was the Word, and the Word was with God, and the Word was God. He was with God in the beginning. Through him all things were made; without him nothing was made that has been made..." - of the New Testament for some foundation of the creator in creation. Of course, alternatives indeed exist, but those two forms tend to take the most airtime in the culture.

Standard Big Bang[278,279,280] cosmology[281,282,283,284] states universe emerged from a singularity[285] or "Big Bang"[286] billions of years ago[287].[288,289] The Big Bang does not exist without some issues in philosophy in spite of the clarity of presentation for the physics. Mechanics of an instable "nothing"

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[278] In question "6." of *The Rick G. Rosner Interview*, I wrote, "Provided the nature of these particular equivalences, especially related to the universe, do you have a mathematical model to represent this equivalence? Furthermore, do you have a layman analogy for this equivalence?" Rosner responded, "I think the most efficient model of the information contained in a complex, self-contained and self-consistent system of information looks like the universe – locally three-dimensional (spatially) with linear time and particles and forces that transact business more or less the way they do in the universe itself. I don't believe in the big bang[278] – instead, I believe that what looks like a big bang is kind of a trick of perspective, based on the universe being made of information. Parts of the universe which have less information in common with us are more distant and red-shifted. The apparent age of the universe is a measure of the amount of information it contains (or has in play). Somewhat similarly, train tracks don't really touch at the horizon. Kind of picture the universe as being at a slow boil. Some parts are energy-rich and expanding, while other parts are burned out and pushed to the outskirts by the expanding regions, waiting for their chance to expand again. [. . .] Big Bang theory can explain the mechanics of how the universe exploded out of nothingness, which is kind of satisfying from the point of view of physics, but not of philosophy."

[279] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

[280] See Wollack, E.J. (2014, January 24). What is the universe made of?.

[281] See NASA/WMAP Science Team (n.d.). CMB Timeline.

[282] See Wollack, W.J. (2014, January 24). Foundations of Big Bang Cosmology.

[283] See Wollack, W.J. (2010, April 16). Expansion of the Universe.

[284] See Wollack, E.J. (2013, January 7). Wilkinson Microwave Anisotropy Probe.

[285] See University of Oregon (n.d.). Birth of the Universe.

[286] See NASA (2015). The Big Bang.

[287] $\sim 1.377 * 10^{10}$ years or ~13,770,000,000 years.

[288] In question "106." of *The Rick G. Rosner Interview*, Rosner wrote, "The discovery of Cosmic Microwave Background radiation was dramatically convincing. In 1964, some guys at Bell Labs built a radio telescope which picked up low-temperature noise they couldn't explain. They thought it might be bird poop on the antenna. Turned out to be light from the early universe as predicted by the Big Bang. Game, set, match for Big Bang Theory. The Big Bang explains a lot – the apparent velocities of billions of galaxies, the formation of heavy elements, the size and apparent age of the universe, the proportions of elements found in the universe, the relative youthfulness of more distant galaxies. It's conceptually easy – one big explosion, everything flies apart. Has a catchy name. Is the title of the biggest sitcom on TV."

[289] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

– defined in novel means through physics' knowledge of "something" to define "nothing" as the "absence of something" – predicts the Big Bang in the standard cosmological model of origins.[290,291]

General Relativity[292,293] within standard Big Bang cosmology yields the origin of the universe in an infinite[294] density[295] and temperature in a finite[296] time in the past.[297,298] Universe progressed from this absolute beginning[299] through periods of positive additions in time[300,301,302] called

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[290] In question "106." of *The Rick G. Rosner Interview*, Rosner wrote, "Some problems of Big Bang theory include: It leaves too many physical constants unexplained – the proton-electron mass ratio and dozens more. The Big Bang in general is not overly explanatory – it only tells you why some stuff is the way it is – how elements form in stars, for instance. (But you can have element formation in stars without the Big Bang.) Big Bang Theory incorporates assumptions of uniform conditions and constants across the entire universe. This is usually seen as a theoretical strength, but, like the unexplained physical constants, Big Bang theory doesn't completely justify why the universe should be uniform. The philosophical reason, called the cosmological principle, is that we on earth are located nowhere special in the universe, and furthermore, the entire universe is nowhere special. This is a dangerous assumption. You can't just demand that the universe be roughly the same everywhere. What if that's not how the universe works? The Big Bang has that assumption built in. And while the Big Bang assumes uniformity in space, it does no such thing in time. There is no uniformity across time in Big Bang theory – every observer is located at a unique moment in the universe's unfolding. Some of universe's spatial uniformity is explained by cosmic inflation in the very early universe. According to cosmic inflation, the universe expanded so fast (blowing up by a factor of at least 10^26 in less than 1/10^32nd of a second – that is, doubling in size every 1/10,000,000,000,000,000,000,000,000,000,000,000th of a second or so) that a tiny volume without much room for variation became the entire visible universe, and the rapid expansion also spread out any irregularities. The reason for such rapid inflation isn't known, so cosmic inflation is a little ad hoc. Beyond cosmic inflation, the Big Bang requires more and more precise, fussy tweaks to agree with increasing amounts of observational data. One would hope that there would be a theory, either an add-on to Big Bang theory or an alternative, which would explain more of the conditions of the universe without having to be tweaked to fit the conditions of the universe. Our galaxy contains globular clusters – tight groups of a million or so stars – which may be older than the Big Bang. Calculations are pretty equivocal on this – the clusters might not be that old. Meh to the clusters. Yeah, the Big Bang is in danger of being supplanted. It's pretty much our first try at a theory of the universe based on not hopelessly incomplete observational evidence. Even though the Big Bang is young, it's already accumulated a bunch of patches."

[291] See See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

[292] See Cornell University (2011, December 18). Curious about Astronomy?: Ask an Astronomer: The Theory of Relativity.

[293] See O'Connor, J.J. & Robertson, E.F. (1996, may). General Relativity.

[294] See infinity. (2015).

[295] See density. (2015).

[296] See cosmology. (2015).

[297] See CERN (n.d.). The early universe: All matter in the universe was formed in one explosive event 13.7 billion years ago – the big bang.

[298] See Northern Illinois Center for Accelerator and Detector Development (n.d.). Lecture: 13 History of the Very Early Universe.

[299] "Absolute beginning" translates to "T=0."

[300] "Time" means "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)."

[301] See Jones, A.Z. (n.d.). Cosmological Arrow of Time.

[302] See thermodynamics. (2015).

"epochs"[303] – not all called an epoch - based on unique [304]and distinguishing[305] attributes for their respective spans of time. Each epoch moves through the *arrow of time*[306] with consistent net temperature[307] reduction and concomitant emergent traits[308] for the universe. Emergent traits dictate epochs; epochs delineate novel attributes and arrangements in the universe.[309,310]

[303] Other systems of taxonomy or classification for the chronology of universe might use different terminology or periods of time. These might use moments of time called eras. In addition to this, they might use the different qualifiers for epochs or eras in place of "Big Bang," "Planck Epoch," "Grand Unification Epoch," "Electroweak Epoch," "Inflationary Epoch," "Hadron Epoch," or "Photon Epoch."
[304] "Unique" means "unlike anything else before it."
[305] "Distinguishing" means "characteristic of one thing for the purpose of identification."
[306] See Jones, A.Z. (n.d.).
[307] See temperature. (2015).
[308] "Emergent traits" means net novel characteristics derived from prior traits of universe in positive additions in time. For example, the divergence or bifurcation of the electroweak force into electromagnetism and the weak nuclear interaction/weak nuclear force. Novel attributes such as the formation of stars. Novel arrangements such as stars with orbiting astronomical bodies called solar systems.
[309] See Mastin, L. (2009). Main Topics: The Big Bang And The Big Crunch, Timeline of the Universe.
[310] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.

Standard Big Bang Chronology

I am among those who think that science has great beauty.

-Marie Curie

The role played by time at the beginning of the universe is, I believe, the final key to removing the need for a Grand Designer, and revealing how the universe created itself. … Time itself must come to a stop. You can't get to a time before the big bang, because there was no time before the big bang. We have finally found something that does not have a cause because there was no time for a cause to exist in. For me this means there is no possibility of a creator because there is no time for a creator to have existed. Since time itself began at the moment of the Big Bang, it was an event that could not have been caused or created by anyone or anything. … So when people ask me if a god created the universe, I tell them the question itself makes no sense. Time didn't exist before the Big Bang, so there is no time for God to make the universe in. It's like asking for directions to the edge of the Earth. The Earth is a sphere. It does not have an edge, so looking for it is a futile exercise.

-Stephen Hawking

Standard Big Bang cosmology proposes epochs and events to delineate moments in the universe. Accuracy of the estimations about the particular contents and activity of various slices of time relative to the present moment, where the degree of uncertainty increases the greater the distance in time relative to the current era. Either forward or backward in time relative to the referent moment such as the present.

Augustinian era[311,312] equated to the pre-inception of the universe in the "Big Bang" in which general relativity and quantum mechanics fail to reconcile because of the formation of a singularity or point of infinite density and zero volume.[313] Quantum mechanics deals with the small-scale structure whereas general relativity deals with the large-scale structure of the universe; their failure to reconcile results from the incompatibility of mathematics at each attempted juncture for many, many decades by the 20th centuries greatest physicists. The Augustinian epoch garnered the title from St. Augustine[314].

"The "Big Bang"[315] equated to *the* creation moment from a singularity[316,317] A singularity, a point of infinite density, and infinite temperature, in a point of zero volume – even "point" does not quite grasp the concept. Planck Epoch[318,319] equated to the unification of the four fundamental

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311 Energies and temperatures of this magnitude negate predictions of general relativity.
312 See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
313 General relativity and quantum mechanics fail to converge at the Planck scale of universe, i.e. the time prior to $T=10^{-43}$ seconds.
314 See Saint Augustine. (2015).
315 T=0 seconds; "T=0" means the dimension of time's value equates to zero, which delineates the absolute beginning of the universe. T=0 equates to ~$1.377*10^{10}$ years ago in standard big bang cosmology; T=0 equates to an *apparent* "big bang" ~$1.377*10^{10}$ years ago in informational cosmology.
316 "Singularity" means "a point of zero volume and infinite density."
317 See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
318 T=0 to $T=10^{-43}$ seconds.
319 See Northern Illinois Center for Accelerator and Detector Development (n.d.).

forces[320,321,322] called gravitation[323,324], electromagnetism[325], weak nuclear interaction[326], and strong nuclear interaction[327], wherein each coalesced in a singular unified force[328].[329] Grand unification epoch[330] equated to the separation of gravitation from the remaining unified fundamental forces[331].[332] Electroweak epoch[333] equated to the bifurcation of the electroweak force[334] into electromagnetism and weak nuclear interaction, and the period which triggered the inflationary period[335]; electroweak symmetry breaking[336,337] equated to the separation for electromagnetism and the weak nuclear force while quarks did not form[338,339,340]. Inflationary epoch[341,342,343] equated to the time of rapid inflation[344] of the universe.[345]

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[320] See Georgia State University (n.d.). Fundamental Forces.
[321] See University of Tennessee at Knoxville (n.d.). The Fundamental Forces of Nature.
[322] See Carnegie Mellon University (n.d.). Science Notes: Fundamental Forces of Nature.
[323] "Gravitation" means "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." Two related ideas: gravitational lensing and gravitons. Gravitational lensing does have supportive observational evidence. "Gravitational lensing" means "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 do not have supportive observational evidence. "Gravitons" mean "hypothetical particles which carry gravitational force." For information on gravitons and related phenomena, see next footnote.
[324] See CERN (2014). Extra Dimensions, gravitons, and tiny black holes.
[325] See electromagnetism. (2015).
[326] See weak force. (2015).
[327] See strong force. (2015).
[328] See CERN (n.d.). Unified Forces: Will we see a unification of forces at the high energies of the Large Hadron Collider?.
[329] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[330] $T=10^{-43}$ to $T=10^{-36}$ seconds.
[331] Electromagnetism, weak nuclear interaction, strong nuclear interaction amounted to the other three. Attempts at Grand Unified Theories or GUTs operate upon these three forces.
[332] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[333] $T=10^{-36}$ to $T=10^{-12}$ seconds.
[334] Electroweak force equates to the convergent phenomena of electromagnetism and nuclear weak interaction at an earlier time.
[335] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[336] See Brading, K. & Castellani, E. (2013). Symmetry and Symmetry Breaking.
[337] $T=10^{-12}$ to $T=10^{-6}$ seconds.
[338] See quark. (2015).
[339] See University of Virginia: Department of Astronomy (n.d.). Quark.
[340] See CERN (n.d.). Heavy Ions and Quark-Gluon Plasma: CERN physicists collide heavy ions to free quarks - recreating conditions that existed in the universe just after the big bang.
[341] $T=10^{-32}$ to $T= 10^{-32}$ seconds with
[342] In question "106." of *The Rick G. Rosner Interview*, Rosner wrote, "Some of universe's spatial uniformity is explained by cosmic inflation in the very early universe. According to cosmic inflation, the universe expanded so fast (blowing up by a factor of at least 10^26 in less than 1/10^32nd of a second – that is, doubling in size every 1/10,000,000,000,000,000,000,000,000,000,000,000th of a second or so) that a tiny volume without much room for variation became the entire visible universe, and the rapid expansion also spread out any irregularities. The reason for such rapid inflation isn't known, so cosmic inflation is a little ad hoc."
[343] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
[344] See cosmology. (2015).
[345] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.

Major kinds of transformation occurred within the early universe. Reheating equated to the cessation of rapid inflation into a relativistic plasma of particles based on the decay of the potential energy of the inflation field.[346] Baryogenesis equated to the formation of more baryons than anti-baryons, which does not have a sufficient explanation to this day.[347,348,349,350] After the period of rapid inflation[351] in the early universe, a quark-gluon plasma[352,353] dominates the universe.[354] Quark epoch[355] equated to the formation of the four fundamental forces[356,357,358,359,360] in their present form, end of the electroweak epoch and electroweak symmetry breaking, and the addition of mass to all fundamental particles via the Higgs mechanism[361].[362]

Hadron epoch[363] equated to the period of the quark-gluon plasma's[364,365] transformation into hadrons[366367] with inclusion of baryons[368,369]. Lepton epoch[370] equated to the domination with a small residual amount of the universe with leptons and anti-leptons after the mutual annihilation of hadrons and anti-hadrons in the hadron epoch. Photon epoch[371] equated to the majority elimination

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346 Ibid.
347 Some speculate on the Sakharov conditions - baryon number violation, C-symmetry and CP-symmetry violation, interactions out of thermal equilibrium - some time after the Big Bang, which needed to occur for an explanation of the present domination of baryons over anti-baryons in standard big bang cosmology.
348 See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
349 See Primack, J. (2008, March 17). Origin and Evolution of the Universe.
350 See Greene, P. (2006, September 15). Reheating, Preheating, and Thermalization: Getting the Bang from Inflation.
351 $T=10^{-32}$ to $T=10^{-32}$ seconds.
352 See CERN (n.d.). Heavy Ions and Quark-Gluon Plasma: CERN physicists collide heavy ions to free quarks - recreating conditions that existed in the universe just after the big bang.
353 See plasma. (2015).
354 See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
355 $T=10^{-12}$ to $T=10^{-6}$ seconds.
356 "Gravitation" means "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." Two related ideas: gravitational lensing and gravitons. Gravitational lensing does have supportive observational evidence. "Gravitational lensing" means "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 do not have supportive observational evidence. "Gravitons" mean "hypothetical particles which carry gravitational force." For information on gravitons and related phenomena, see next footnote.
357 See CERN (2014). Extra Dimensions, gravitons, and tiny black holes.
358 See electromagnetism. (2015).
359 See weak force. (2015).
360 See strong force. (2015).
361 See CERN (2015). The origins of the Brout-Englert-Higgs mechanism.
362 See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
363 $T=10^{-6}$ seconds to T=1 second.
364 See CERN (n.d.). Heavy Ions and Quark-Gluon Plasma: CERN physicists collide heavy ions to free quarks - recreating conditions that existed in the universe just after the big bang.
365 See plasma. (2015).
366 See hadron. (2015).
367 See Georgia State University (n.d.). Particles: Hadron.
368 Ibid.
369 See baryon. (2015).
370 T=1 second to T= 180 seconds.
371 T=180 seconds to $T=3.8*10^5$ years.

of leptons[372] and anti-leptons[373] for the ubiquitous distribution of photons[374,375] in universe with increased interaction through this period with electrons and protons followed by nuclei in the latter periods of the epoch. Nucleosynthesis[376] equated to the formation of atomic nuclei with protons[377,378,379] and neutrons[380].

Matter domination[381] equated to non-relativistic matter (atomic nuclei) and relativistic radiation (photons) becoming equivalent in density.[382] Recombination[383] equated to hydrogen and helium atoms' formation and in which the density of the universe plummets, the hydrogen[384] and helium atoms have begun ionization or the bounding of electrons to the nuclei, with the remainder of the recombination process leaving the universe's atoms neutral for free travel of photons and, therefore, the newfound transparency of the universe – Cosmic Microwave Background Radiation (CMBR) renders come from the end of this moment of recombination and standard Big Bang cosmology's perspective and extrapolations about the very early universe have construction from this CMBR.[385]

Dark ages[386] equated to the photon-baryon fluid in which the photons interact pervasively with the electrons and protons for the creation of an opaque panorama, hence "dark ages," and the baryonic matter in the universe existed in an ionized plasma state before the introduction of free electrons for the transformation of the baryonic matter into a neutral state to permit the transparency of the universe seen after the dark ages up to the present day.[387] Reionization[388] equated to the formation of the first quasars[389] due to gravitational collapse where the radiation emitted reionized the universe to transform the majority of the universe into a plasma[390]. [391]

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[372] See lepton. (2015).
[373] Ibid.
[374] "Photon" means "a particle of light or other electromagnetic energy, the emission of which often reflects a linkage between persistent particles such as protons and electrons."
[375] See photon. (2014).
[376] $T=1.8*10^2$ seconds to $T=1.2*10^3$ seconds.
[377] "Proton" means "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."
[378] Protons in this epoch means hydrogen ions.
[379] See proton. (2015).
[380] "Neutron" means "a subatomic particle with no electric charge, usually formed from a proton (and positron emission) via atomic fusion."
[381] $T=7*10^4$ years.
[382] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[383] $T=2.4*10^5$ years to $T=31.*10^5$ years.
[384] See hydrogen (H). (2015).
[385] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[386] $T=0$ to $T=3.8*10^8$ years relative to the observers at $T\geq3.8*10^8$ years.
[387] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[388] $T=1.5*10^8$ years to $T=1*10^9$ years.
[389] See quasar. (2015).
[390] See plasma. (2015).
[391] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.

Formation of the first stars equated to the high probability for the formation of Population III[392] stars rather than Population I[393] or Population II[394] stars in which the process of light elements constructed in the Big Bang, Hydrogen[395] and Helium[396], in addition to small quantities of Lithium[397] and Beryllium[398], transform into elements heavier than Hydrogen, Helium, Lithium, or Beryllium, but the existence of Population III[399] stars remain theoretical considerations because of the lack of observational evidence of them – Population I[400] and Population II[401] amount to the sole observed kinds of stars in the present era.[402]

Formation of galaxies[403] equated to large volumes of matter collapsing into galactic structures where Population I stars occur in the early portions of the process and Population II stars occur in the latter portions of the process, where the emergent science on these issues falls under the appellation of nucleocosmochronology.[404] Formation of galactic groups, clusters[405], and superclusters[406] equated to the harvesting and accretion of galaxies into superstructures known as groups, clusters, and superclusters in which the mutual gravitational attraction brings together the galaxies to form these superstructures throughout the universe.[407]

Formation of solar system[408,409] equates to the formation of the *proto-solar system* sphere[410] from a molecular cloud composed of hydrogen and other – heavier - elements with an accretion disk to later form the composites of the *solar system* in the planets, gas giant, dwarf planets, asteroid belt, and cloud[411].[412] Present Epoch[413] equates to the present universe culminated from the indeterminate

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[392] See Swinburne University of Technology (n.d.). Population III.
[393] See Swinburne University of Technology (n.d.). Population I.
[394] See Swinburne University of Technology (n.d.). Population II.
[395] See hydrogen (H). (2015).
[396] See helium (He). (2015).
[397] See lithium (Li). (2015).
[398] See beryllium (Be). (2015).
[399] See Swinburne University of Technology (n.d.). Population III.
[400] See Swinburne University of Technology (n.d.). Population I.
[401] See Swinburne University of Technology (n.d.). Population II.
[402] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[403] Ibid.
[404] Ibid.
[405] See cluster of galaxies. (2015).
[406] See supercluster. (2015).
[407] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[408] $T=\sim 9.17*10^9$ calculated through subtraction of standard big bang cosmology estimate of universe age by estimated age of sun or $\sim 1.377*10^{10}$ minus $\sim 4.6*10^9$ equals $\sim 9.17*10^9$. Our solar system ends with the remnants of the sun about 10^{15} or ~one quadrillion years into its existence where the sun cools to 5,000 Kelvin/4726.85 Celsius/ 8540.33 Fahrenheit and the gravitational attraction of passing stars detaches planets from the solar system to cease the existence of our solar system.
[409] See solar system. (2015).
[410] See sphere. (2015).
[411] Within the referent of our solar system, "present planets" means " asteroid belt, gas giant, dwarf planets, and cloud" means "Mercury, Venus, Earth, Mars, Saturn, and Neptune." "Asteroid belt" means "Kuiper Belt." "Gas Giant" means "Jupiter." "Gas Giant" means "Jupiter." Dwarf planets" means "Ceres, Haumea, Makemake, and Eris." "Cloud" means "Oort Cloud."
[412] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.
[413] $T=\sim 1.377*10^{10}$ years or T=~13,770,000,000 years.

constructions of the universe in earlier epochs, events, processes, and structures, and from which probable future epochs, events, processes, and structures might form for the future organization and operation of the matter and its motion through space-time.[414]

Informational Cosmology, and Cosmogony and Eschatology

We have this very clean picture of science, you know, these well-established rules with which we make predictions. But when you're really doing science, when you're doing research, you're at the edge of what we know.
-Lisa Randall

It from bit. Otherwise put, every 'it'—every particle, every field of force, even the space-time continuum itself—derives its function, its meaning, its very existence entirely—even if in some contexts indirectly—from the apparatus-elicited answers to yes-or-no questions, binary choices, bits. 'It from bit' symbolizes the idea that every item of the physical world has at bottom—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

[414] See Towson University (n.d.). Big Bang: Timeline of the Big Bang.

equipment-evoked responses; in short, that all things physical are information-theoretic in origin and that this is a participatory universe.

-John Archibald Wheeler

Physics[415] studies matter[416] and its motion[417] through space[418,419] and time[420,421,422]. Matter equates to the material contents of the universe in different forms and activity. Ancient and common sense notions of matter converge on the term physical. Physicalism and materialism do not equate to one another, though. As a result of the common confusion of the two terms and, thus, their respective undergirding assumptions about reality, claims of materialism and physicalism appear to mean the same thing, but do not upon closer analysis and within modern philosophical discourse and definitions in addition to refinement of the meaning of the term matter by modern scientific examination of the issue. Percepts do not have the same fundamental equivalence in the scientific investigation of the phenomena. Throughout the motion of matter in the universe, the set framework for the material transitions from one state to another within the spatial dimensions permitted by the information in forward movements in time. Of course, the long, arduous work of Newton unveiled the universe with the explicit separation of space and time, but Einstein's greater comprehension of the cosmos brought to bear the raw interrelationship of space and time into space-time.

Digital physics[423] studies the universe with physics based on information[424]. A universe based on information implicates concomitant concepts to form the foundational apparatus for theorization about the function of matter in its motion through space-time. Information emerges from some ground state, a relation; in this, the perspective delineated by digital physics means one particular ground of being or existence, associated with ontology, described best as an ontology of relation or a relational ontology. Such a relational ontology means the provision of information from the contents of the universe with processes internal to the universe devoted to the management of information and, hence, the information-based view of the universe forms a computational model where the informational ground of being means a computable function or, even further, a computable universe – in part or whole.

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[415] See physics. (2015). In *Encyclopædia Britannica*.
[416] "Matter" means "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."
[417] See motion. (2015).
[418] See space. (2015).
[419] See mathematics. (2015).
[420] "Time" means "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)."
[421] See Jones, A.Z. (n.d.).
[422] See thermodynamics. (2015).
[423] "Digital physics" means "a set of theories which consider the universe to be an information processor."
[424] "Information" means "specific states within a system which can take on a variety of states – the accumulated result of a series of choices among possible states."

Informational cosmology refines digital physics through analysis of the universe based on information processing.[425,426] Information works with an information processor. Information becomes passive whereas information processor becomes active. In particular, the emphasis on the large-scale structure[427] of the cosmos brings forth the expertise of astronomy and associated disciplines unlike the traditional boundaries of digital physics.[428] Note the numerous intersections of fields relevant to the study of the universe within the bounds of information processing.

Informational cosmology operates on the convergence of a medley of fields from computer science[429], classical logic[430], communication theory[431], cosmology, cryptanalysis, digital physics, fuzzy/probabilistic logic, information theory[432,433], mathematics, metaphysics, philosophy,

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[425] In correspondence, Rosner wrote, "IC suggests that we can roughly know the whys and hows of the universe, but with an infinite amount of non-determined complexity to be found. That is, the universe isn't rule-based - it's what can exist under the loose-until-actualized principles of non-contradiction."

[426] In correspondence, Rosner wrote, "Universe doesn't necessarily work by bits. Works by links among particles, which come in various strengths - electrons and their shells, nuclei and their shells." I responded," We'd need to revise the Shannon and Weaver question "2)" at that point." He responded, "Will it require that much revision? Information is information, whether it comes in bits or links…" he later continued, "…I think everything can be translated to binary, similarly to how everything can be reduced to a Turing Machine." I concluded, "That's a great point come to think on it more. Translation into binary or basic logic does not mean universe necessarily operates in those translations, but in something deeper than those translations…" I would consider this proposed relational ontology in informational cosmology to derive information as the basis of universe of utility in descriptive capacity, but this raises a question: What becomes translated to produce information? By necessity, this directs attention to an emergent information-based cosmology with another fundament from which relations occur and translate into information via bits or links.

[427] See White, M. (n.d.). What is Large-Scale Structure?.

[428] If the boundaries of the definition for digital physics altered in some way with an incorporated emphasis on the large-scale structures of the universe and shift the focus from information to an information processor, the new definition would equate in some non-trivial way to informational cosmology and, therefore, would contract the meaning of novel definition of digital physics into the traditional definition of informational cosmology.

[429] See computer science. (2015).

[430] ~$1.377*10^{10}$ years ago or ~13,770,000,000 years after the "big bang."

[431] See information theory. (2015).

[432] In question "45." of *The Rick G. Rosner Interview*, on information *and* communication theory, I wrote, "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" (brain1/mind1) & "transmitter" (voice/speech) and the "receiver" (ears) &"destination" (second brain2/mind2). 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."

[433] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

philosophy of science, physics, probability[434] theory, propositional logic, set theory, and respective sub-disciplines[435]. Relevant portions of each discipline for the investigation of the universe from an information processing basis to construct the discipline of informational cosmology and associated subdisciplines.

Informational cosmology researches the comprehensive explanations of the universe in an information processing framework. A focus on the development of the universe with peripheral concern of the absolute start and stop of it. Major fields tend to have minor fields. Minor fields amount to sub-disciplines derived from or within the major discipline. Informational cosmology derives or contains two sub-disciplines based on the dimension[436,437] of time, ultra-deep cosmic time, at the start and finish, beginning and ending of the universe: informational cosmogony[438] and informational eschatology.[439]

Informational cosmogony studies the origin and very early development of the universe; the reasons why and processes through which mind-/information-spaces form according to informational cosmological definitions of consciousness, mind, and the respective interrelationship between them. Informational cosmology examines the entirety of the universe's timeline, but important areas of research relate to the opening and closing performances of the universe's contents and organization.

Informational eschatology studies the very late denouement and end of the universe; reasons why and processes through which mind-/information-spaces dis-form and end according to informational cosmological definitions of consciousness, mind, and the respective interrelationship between them. From beginning to end, informational cosmogony, informational cosmology, and information eschatology, provide the timeline of the universe in an information processing scheme. Each writing about particular acts in the play called "Cosmos."

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[434] See Weisstein, Eric W. (2014). Probability Function.

[435] "Set theory" includes Zermelo-Fraenkel (ZF) and von Neumann-Bernays-Godel (NBG) set theory.

[436] An n-dimensional space where "n" equals "3". In other words, 3 spatial dimensions: left-right, up-down, and forward-backward. If displayed with axes perpendicular to one another, then called a *Cartesian Coordinate System*.

[437] See CERN (n.d.). The Standard Model.

[438] Informational cosmogony" means "the reasons why and processes through which mind/information-spaces form according to informational cosmology."

[439] In question "46." of *The Rick G. Rosner Interview*, I wrote, "All representation of the information sharing of the material framework of universe equates to universe in informational cosmogony, cosmology, and eschatology. More elements have inclusion here. How do you define universe?" Rosner responded, "The universe is the entirety of matter and space – everything that has interacted with or could interact with us. It's an information space – an arena for the sharing, processing and storing of information (for the universe, not directly for us), with the scale and curvature of space determined by the rules of information and its distribution and correlations. (That is, the distribution of matter.) The location (and velocity) of matter has almost everything to say about its correlations as information."

Cosmic Microwave Background Radiation

For when God gave great knowledge to the human being, the human being elevated himself in his soul and turned away from God. God so regarded the human being that he would perfect all his works in him. But the old deceiver tricked human beings and infected them with the crime of disobedience, by the delight of an unseasonable wind, so that they sought for more than they should have.

-Hildegard von Bingen[440,441]

Astronomy leads us to a unique event, a universe which was created out of nothing, one with the very delicate balance needed to provide exactly the conditions required to permit life, and one which has an underlying (one might say 'supernatural') plan.

-Arno Penzias[442]

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[440] See Saint Hildegard. (2015).
[441] See Frankenberry, N. (2011). Feminist Philosophy of Religion.
[442] See Arno Penzias. (2015).

Most information about the early universe comes from the Cosmic Microwave Background Radiation[443] (CMBR/CMB). Informational[444] cosmology argues for the first approximation of standard Big Bang cosmology. In that, the estimations provided by the calculations and concepts associated with the Big Bang in connection with the CMBR give grounds for the rational extension of the present volume and temperature of the universe backward in time backwards to and including T=0. A regression, a retrogression or retrogradation, in time within the schema of standard Big Bang cosmology posits a reduction in volume, increase in temperature, and a slice of time closer to the earliest moments of the universe. With more time regressed into the past before the CMBR, the universe appears to converge on common contents with an apparent absolute beginning to the universe in which the temperature equates to an infinite value and the volume of the universe equates to a null value. Together, these traits would appear to state an absolute beginning with an infinite temperature from zero volume, a singularity.

In contradistinction to traditional cosmological explanations of origins through a singularity with subsequent quantum fluctuations and rapid inflation in addition to concomitant net global reduction in temperature for the universe, informational cosmology develops upon the first approximation from standard Big Bang cosmology. It proposes extensions to traditional interpretations of CMBR with a redefinition of standard Big Bang cosmology. In place of a singular "Big Bang"[445] discussed on the chapter entitled *Standard Big Bang Chronology*, informational cosmology argues for a series of "little bangs" across *ultra-deep cosmic time*[446].

Ultra-deep cosmic time implicates many, many billions of years over and above the accepted deep cosmic time of the standard Big Bang cosmological model of the universe. "Little bangs" equate to periods of billions of years per "little bang" in addition to the standardization – relative to the universe – of these into a series of "bangs," a cycle. Cycles billions of years in length for the massive processing of information contained within the universe. Standard Big Bang cosmology would purport to explain these in another context as one singular moment of Creation; whereas informational cosmology extends the series of little big bangs within the unified framework of information processing.

The Neutron Cycle[447] (TNC) forms the basis for the multiple billion-year unfolding periods of the universe. A process over tens of billions of years where galaxies filled with protons burn their respective fuel through fusion, which transforms the proton filled galaxies into neutron filled galaxies. In turn, these turn into proton filled galaxies through the probable operation of absorbing/acquiring lots of neutrinos.

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[443] $T=3.75*10^5$ years or T=375,000 years.

[444] "Informational cosmology" means "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."

[445] Rapid inflation of universe ~$1.377*10^{10}$ years ago or ~13,770,000,000 years ago.

[446] >~$1.377*10^{10}$ years old or greater than ~13,770,000,000 years.

[447] "The Neutron Cycle" means "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)."

In addition to this new interpretation of the CMBR, informational cosmology argues for an information-based foundation of the universe. Standard Big Bang cosmology conflicts with an information-based perspective of the universe; informational cosmology purports to explain universe in such as an information-based framework. Informational cosmology posits TNC in numerous spans of time. Each equivalent to or more than the whole present age of the universe proposed by standard Big Bang cosmology.[448,449]

Informational eschatology devotes its efforts to this enterprise.[450,451] Insofar as the apparent absolute beginning of the universe dictates its age, informational cosmology states a collapsed matter outskirts near the apparent origin of the universe[452] with enormous amounts of "neutron-rich burned-out galaxies."[453,454] "Neutron-rich burned-out galaxies" mean "collapsed outskirts." Non-collapsed matter forms the active center rather than the collapsed matter outskirts with the "neutron-rich burned-out galaxies." Two major sections of the universe operate in distinct ways: active center and collapsed outskirts (discussed later).

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[448] In correspondence, on the age of the universe, I wrote, "You go into deep cosmic future time, but not the final moments (0:45-1:10): "The universe will largely stay the way it is for trillions upon trillions of years. The apparent age and size of the universe is proportionate to the amount of matter *in* the universe. So it only looks like a big bang. The ultimate fate of the universe is it will persist for thousands if not billions longer than its apparent age of 15 billion years."[Quote from Strike TV Episode 7 with Rick, Ed.] Rosner responded, "[. . .] [F]or us, with our puny conception of things, trillions of years might as well be forever. When and if the universe does end, probably does so through heat. Heat is noise and loss of information. The temperature of the cosmic background radiation increases and sizzles everything away. The currently active center runs out of juice and falls back into the hot background like Schwarzenegger being lowered into the molten steel in Terminator 2."

[449] Strike TV [SmartestGuyITW] (2008, November 10). Smartest Guy in the World EP 7 –The Fate of the Universe.

[450] In question "104." of *The Rick G. Rosner* Interview, Rosner wrote, "The universe will likely largely stay the way it is for trillions upon quadrillions upon quintillions of years. However, our galaxy will burn out and fall away from the active center after I dunno, another ten billion years or so. (Astronomers say the Milky Way and the Andromeda galaxy will collide and merge in another five or so billion years, but that's not the issue. It's when the merged galaxy's stars burn out that it falls out of the active center.) Perhaps advanced civilizations have ways of surviving the burning-out of a galaxy to persist for more than just tens of billions of years. For us, with our puny conception of things, tens or hundreds of billions of years might as well be forever. When and if the universe does end, probably does so through heat. Heat is noise and loss of information. The temperature of the cosmic background radiation increases and sizzles everything away. [. . .] Of course, for us, the idea of a civilization or entity lasting for billions of years is inconceivable. How could an entity develop and accumulate knowledge for the equivalent of a million lifespans of our current civilization? Well, maybe it doesn't. Maybe it hits a ceiling of knowledge. Maybe it's like a security cam setup that keeps only a rolling record of the past 24 hours. At this point, with knowledge of only one civilization that's only 10,000 years old, we have no way of knowing."

[451] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

[452] "Apparent origin of universe" means "the appearance of an absolute beginning in standard big bang cosmology equivalent to T=0."

[453] This sentence depicts the idea of "Outskirts of the universe near T=0," which means "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."

[454] Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

Fundamental Philosophy and Science

Mathematics began to seem too much like puzzle solving. Physics is puzzle solving, too, but of puzzles created by nature, not by the mind of man.

- Maria Goeppert-Mayer[455]

Metaphysics means nothing but an unusually obstinate effort to think clearly. The fundamental conceptions of psychology are practically very clear to us, but theoretically they are very confused, and one easily makes the obscurest assumptions in this science without realizing, until challenged, what internal difficulties they involve.

-William James[456]

[455] See Maria Goeppert Mayer. (2015).
[456] See William James. (2015).

Informational cosmology constructs a singular framework to contain physics with the (re-)introduction of metaphysics.[457,458] A contraction of philosophy and science. Philosophy, mathematics, and cosmology converge in an information-based view. Informational cosmology proposes isomorphic traits and operation between universe and minds in it. Akin to digital physics with information and specification of additional criterion of *information processing*[459].

Information processing explicates the fundamental ideas about a computable universe developed within the framework of digital physics. Information processing exists in the middle of the active and passive aspects of the universe of information and information processors. Information exists for processing. Information processors work through information. Modus operandi of information, *to be processed*, and information processors, *to process*, come together for the development of information processing once whole positive additions in time progress called the *arrow of time*[460] begins the process of an explicit feedback loop between that which will become processed and that which processes. A subtle statement about the dynamic nature of the universe because of the emphasis on information processing as opposed to information.

Another criterion of informational cosmology emerges in the need for the information processing to occur in a computational system with *net self-consistency*. Informational cosmology studies the universe through information processing. Information processing implicates information. Therefore, information processing suffices to contain digital physics' criterion of information by implication.

Net self-consistency permits information processing without net self-contradiction. Lack of net self-contradiction allows the possibility of cohered systems. Therefore, coherent information processing systems exist within these bounds: information processing and net self-consistency. Universe becomes an *information processing*[461] *system*. Minds in the universe have net self-consistency in structure and strings of thoughts. Same for universe. Therefore, universe's information processing equates to strings of thought akin to minds within it, and vice versa. Furthermore, universe equates to information processing.

Where minds exist in universe, infrastructure for minds exist called brains or armatures; ergo, universe equates to the information processing of an unknown armature. In this, universe equates to a mind with information processing or thoughts akin to minds. An *information processing system* with an armature and thoughts processed through time paralleled in minds within it.

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[457] In question "24." from *The Rick G. Rosner Interview*, I wrote, "You think metaphysics needs to be reinstated into physics. Yet, they have an estrangement. You mean physics and metaphysics together. Indeed, I would reason much further than this. 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."

[458] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.

[459] "Information processing" means "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."

[460] See Jones, A.Z. (n.d.).

[461] See information processing. (2015).

Principles of Existence Qua Laws of Nature

Knowledge, like art, is an asset that belongs to humanity.

-Fabiola Gianotti

Indeed, Isaac Newton himself, who introduced the concept of immutable laws which guided the planets and stars without divine intervention, believed that the elegance of these laws pointed to the existence of God.

-Michio Kaku

"Laws"[462] from astrophysics, atomic physics, classical physics, cosmology, molecular physics, nuclear physics, optical physics, particle physics, quantum physics, and associated disciplines with an emphasis on "laws of nature" implicate, by definition, an informed architect of the heavens in form, function, and ultimate origin. Informational cosmology indicates the baggage of historical contingency and in the modern context for the study of physics with recognition of the information processing foundations of the discipline. In place of the standard terminology related to "laws of

[462] See law of nature. (2015).

nature," "laws of physics," or "constants of nature," informational cosmology utilizes the phrase "principles of existence" in contrast to the aforementioned phrases to encapsulate the greater descriptive capacity for the disciplines of informational cosmogony, informational cosmology, and informational eschatology.[463]

Principles of existence do not assume or assert an architect within the definition of the phrase, i.e. a set of axiomatic rules governing the large-scale and small-scale structure of the universe, but from first principles defines the purported "laws of nature" as emergent principles. A set of principles without definition refined into well-defined principles, i.e. emergent into persistent, through continued persistence of existence; wherein existence and persistence of existence necessitate principles of existence with an appearance as laws of nature. Emergent principles grounded in existence and persistence of it. Therefore, "principles of existence" become tendencies of form, function, and origin, *qua* "laws of nature."[464,465]

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[463] "Principles of existence" means "rules which arise from principles of non-contradiction – emergent rules rather than axiomatic rules."

[464] In correspondence, on the proper phrase for the phenomena of "tendencies plus memory" in "tendencies of form," I wrote, "Every known consciousness endowed system in nature operates on non-conscious processing with some or no conscious processing. Universe, by extrapolation, might have majority non-conscious processing with minority conscious processing. One important note from this: any total capacity calculated about the universe would not by necessity calculate the conscious processing of universe, but the total, and therefore upper limit, of the capacity for conscious - and non-conscious - processing of universe with a strong possibility of far greater non-conscious processing constraints compared to conscious processing. [. . .] Brains, and therefore minds and universe, have tendencies of form. Structure dictates function. Information as material makes mental. Note, the dynamic nature of universe's structure and brains' structures, and therefore the dynamic nature of memory too. "Tendencies plus memory" might present a higher-level separation of a more basic idea. Namely, the more fundamental concept "tendencies of form" for universe and minds. In other words, structures change over time; forms change over time. But at relevant magnitudes - brains and universe, we have tendencies in these structures or forms, which translated into tendencies of input, (storage,) processing, and output. These tendencies dictate kinds and degrees of information processing, and therefore consciousness. Furthermore, tendencies of form dictate "memory." In the human brain, we know encoding and retrieval of memory operates in construction of memory, i.e. encoding constructs the event for the individual and retrieval reconstructs the event based on the encoded information about the event. We can rephrase this too. To the universe through time, how does the universe encode (construct) and retrieve (reconstruct) memories of prior space-time events for self-perception (and other thoughts) over extraordinarily deep periods of cosmic time? Tendencies of form might provide the platform for "tendencies plus memory." In that, the more active parts amount to dynamic tendencies of form ("tendencies") whereas more dormant parts amount to more static tendencies of form ("memory"). From this, we have degrees of activity in terms of form and general persistence in structure. This ties the ideas down to fundamental IC: varieties of informational processing and net self-consistency (latter is implied). These build to consciousness and roots the description of self as "tendencies plus memory" to the fundamental IC conceptual apparatus. In fact, the formulation of structure plus memory - including the parenthetic statement - lean more in this direction." Rosner responded, "Agree about tendencies of form. Brain architecture underlies mind architecture. Mental architecture of conscious being with language must be very different from architecture of pre-language beings. There's a kind of friction where brain architecture and brain limitations drive mind architecture - a structure somewhat hidden from the mind - your thoughts are gonna go this way, because that's what your brain is built for."

[465] In question "42." of *The Rick G. Rosner Interview*, I wrote, "Why the principles of existence (laws)?" Rosner responded, "There's a tautological aspect to the principles of existence. (Why principles and not laws? Because laws seem like rules delivered from on-high, while principles can be emergent – nebulous until made tight and precise by the statistical behaviour of large amounts of organized matter.) Things that exist have to exist – they can't both exist and not exist (except when their existence or not is incompletely specified quantum mechanically). Right there, you have a principle, but not a very useful one until you draw some conclusions from it. A conclusion might be that existence includes

Geometry

I am a male chauvinist, proudly.

-Ayn Rand

There is no royal road to geometry.

-Euclid[466]

Geometry provides the basis for the spatial work of mathematics. By definition, geometry amounts to the branch of mathematics concerned with questions of relative position of spaces, shape, size, and the properties of space. Much of the earliest known work in the research of geometry emerged independently on numerous parts of the world. Even so, the title "geometry" for the field derives from the Greek roots for the combination of words Earth, or "geo," and measurement, or "metron."[467,468]

Some developments from the Milesian school of the pre-Socratics assisted in the burgeoning of geometry and formal mathematical sciences into the present arsenal of the academic world. However, more formal treatments required three centuries for some significant developments in the direction of the formalization of geometry in a discipline with the mathematical sciences. In the third century before the Common Era, the development of the most common form of geometry came to the fore with the Greek mathematician, philosopher, and geometer Euclid[469].

The geometry of the active center creates and sustains the geometry permitted by the principles of existence. Principles of existence permit dimensions within the limits of information contained in the universe. Information contained in the active center does not permit more than the

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duration – that for every existent moment, there's at least one related existent moment which can be seen as a subsequent moment. Somehow out of this, you get the fairly tautological principle that persistent structures or processes are persistent – that they create a bias towards their own continued existence. You get things which work like Liebnizian monads – little correlation engines whose main job is to be correlated with other engines at various times. These correlations pull the universe tight, giving it structure in space and time. I believe that protons (and the electrons which go with them) are the correlation engines. They're each like a little spatial axis – a dimension – and the variable that lies somewhere along that dimension, all in one. But the dimension doesn't extend to infinity – it fades – it only extends as far as it needs to for the correlations it's involved with, like a street. Streets only exist for their own limited length.

[466] See Founder of mathematics into Euclidean geometry.

[467] Some example of vector objects or geometric objects exist in the addenda to this piece in Image VII. Geometric objects have an infinite configurative set of possibilities. More famous objects such as the Buck Ball of Buckminster Fuller seen in modern architecture in the form of geodesic domes presents some of the practical and real representations of the abstract into the concrete and actual.

[468] See Image VII.

[469] See Internet Encyclopedia of Philosophy (n.d.). Euclides.

normal dimensions in Euclidean[470,471,472,473] space in addition to time[474]. Three spatial dimensions and one linear dimension of time in which the material in the three spatial dimensions transform through whole additions in time through the *arrow of time*[475].

Standard Big Bang cosmology extrapolates dark matter and dark energy from the present unknowns in physics and the reasonable extensions from the present physics. The Standard Model dictates the retrieval of baryonic matter and filamentary walls by the activity of dark matter[476]. Informational cosmology might provide some answers to the inquiries related to the number of interconnections within other filaments in which galaxies collect through mutual gravitational attraction into galactic groups, clusters, and superclusters, and filaments where the filaments associate with other filaments into networks, and wherein networks develop very large-scale cosmological structures capable of information processing over many millions and billions of years whilst not limited to Euclidean geometric formations.[477]

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[470] See Euclid. (2015).
[471] See Euclidean space. (2015).
[472] An n-dimensional space where "n" equals "3". In other words, 3 spatial dimensions: left-right, up-down, and forward-backward. If displayed with axes perpendicular to one another, then called a *Cartesian Coordinate System*.
[473] See Weisstein, Eric W. (n.d.) Coordinate System.
[474] Time equates to a 4th dimension in addition to the 3 spatial dimensions.
[475] See Jones, A.Z. (n.d.).
[476] See White, M. (n.d.). Dark Matter.
[477] In correspondence, on the possibilities for the recall of old galaxies into the active center, I wrote, "I had some thoughts this morning about the Standard Model. Dark matter dictates the structure of baryonic matter. Dark matter draws in baryonic matter and the filamentary structures/walls form from this. Wanted to cover some more of the following: "10^11 visible galaxies in universe, maybe 1000 times more not visible in the outskirts. So along each linear dimension, about 10^(14/3) - a few tens of thousands of galaxies, enough for a fairly fine-grained filamentary structure." [quote from Rick in earlier correspondence. Ed.] I see this as a valuable thought requiring some more expansion. How many inter-filamental connections (IC Trademark) to build into networks of association in the observable universe? What about the rest of it? For instance, scientists discovered small and large ones. However, in theory, what are the maximum and minimum possible filament sizes in universe?" Rosner responded, "Universe doesn't make sense unless there are spatial relationships among the collapsed matter. But the geometry doesn't have to be Euclidean - could be very hyperbolic, with the more hyperbolic it is, the more connections and I assume the more angles of approach. Perhaps not all the adjacent regions light up when a galaxy lights up - perhaps which adjacent galaxies light up depends on the path the stimulus takes. Basing this wild guessing on high numbers of connections among neurons in the brain. Active universe has to be three-dimensional and close to flat, but collapsed universe could be convoluted, if that's informationally efficient. More than three active dimensions are inefficient. Guessing that a higher-dimensional collapsed space would be similarly inefficient, plus, having active 3-space bubble up out of collapsed N-space is odd. (Imagine a 2-D region bubbling up in the middle of 3-space - it's weird.) But hyperbolic space might make sense - I dunno. Each time a new active center forms then collapses, the new filamentary relationships formed are preserved and just crammed in among other filaments, making collapsed space increasingly hyperbolic. But assigning too much organizational awesomeness to the unseen collapsed outskirts risks making the aether error - there's this thing we can't see that does everything we need it to. [. . .] The outskirts can't be spatially normal because -
Normal 3-space comes with the full flowering of space and time in the active center. The outskirts have little space and time. The outskirts have to be highly interconnected. Imagine the galaxy-like structure that represents the concept "orange." Orange shows up in a variety of contexts - it's connected to a large number of other concepts and memories. Normal space is limited in adjacency - dodecahedral packing is about as tight as you can get in 3-space. Guessing that outskirt space might be fuzzy and hyperbolic - highly connected, but with smeared-out and overlapping locations - maybe indefinite large-scale structure that becomes definite as it's pulled into the active center. The collapsed structure is a big deal - it determines how appropriate memories are lit up without too much stuff getting lit up - how you can light

Geometry pertains to multiple sub-disciplines developed in the extensive periods of existence for the core discipline beginning with Euclid. Non-Euclidean geometries provide new tools, techniques, insights, and applications into the mathematical arsenal. Instruments of mathematical war dependent upon the mental battle brought forth to a person or team of mathematicians devoted to the surrender of a mathematical puzzle. Fields of geometry with individuated conceptual apparatuses such as analytic geometry, Riemannian geometry, differential (symplectic) geometry, projective geometry, algebraic geometry, and hyperbolic geometry.[478]

Euclidean geometry remains relevant to the extent that informational cosmology requires it. Hyperbolic geometry contains core elements necessary to explain the more obscure portions of informational cosmological definition of the contents *and* arrangement of the universe. Each of the aforementioned geometries will have brief descriptions because of the undivided nature of geometry. Geometries might not have explicit connection with one another, but some will converge in the discipline of informational cosmology. Such a convergence necessitates some introduction to the other geometries found in the mathematical sciences, presentation and description of these geometries will include some of the formalisms, vernacular, and relevant images of these geometries. Different levels of aptitude and knowledge pertain to the kinds, forms, and variations necessary to provide a robust comprehension of the subject matter.

Present theorization on informational cosmological geometry bifurcates into two possible geometries: Euclidean plus time (or Minkowskian) and Hyperbolic. Informational cosmological explanations of the structure of the universe depict the informational foundation of it. A universe based on information with intrinsic capabilities for self-definition through internal interaction. Information developed from within itself. It's never an account of the information necessary for a complete knowledge of itself; rather a sufficient amount of information for the construction of three spatial dimensions and one temporal dimension for a Euclidean plus time geometry.

Of course, the utilization of height, width, and depth, in addition to progressions through time delineates the space and time experienced in Newtonian Mechanics and Einsteinian Relativity. More information would become necessary for the introduction of additional dimensions. We do not have necessary reason to assert increments of dimensions up to and including ten (plus time) or more. String theory posits more, but one needs to explain the other information for the new compact dimensions bundled inside of the Euclidean ones.

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up orange without lighting up absolutely everything associated with orange. And how everything that gets lit up gets to come together in the center, regardless of where it was in collapsed space. Could be that the outskirts and the active center exist in the same space but non-lit-up stuff doesn't participate in the apparent expansion of space in the active center because it doesn't have the necessary protons to participate in the photon-mediated expansion. I dunno. Anyhow, it's the biggest thing that still needs to be figured out. It's a reasonable bet but not the only possible bet that the number of connections among galaxies in collapsed space far outstrips the number of galaxies. Another possibility - Burnt-out galaxies aren't lit up and lifted whole into the active center. Instead, when hosed down with neutrinos, they yield their outer layers as protons which form the (evolving) active center, but the remaining collapsed matter stays put. The freed protons eventually form their own new galaxies (with the freed matter somehow retaining and conveying memory). I don't like this version as much. Think it makes more sense for all of lit-up old galaxies to enter or comprise the center - that's how new associations would form."

[478] See Image III and IV.

To the proper correspondence of evidence to theory, Ockham's Razor or the principle of parsimony would argue for the lack of parsimony in theories with premises in their implicit arguments necessitating more dimensions than the information presented in the universe's calculated net self-definition. By which this means, the interactions of the universe from particle collisions to galactic groupings gravitational attraction, each provides novel information about the universe to the universe. In the process, sufficient defining, i.e. self-defining, occurs by the universe for the universe to construct dimensions up to and including three spatial (Euclidean) dimensions in addition to one time (Minkowskian) dimension.

A geometry in the standard Big Bang cosmological theory of the cosmos presents explanations for the geometry of the universe to different degrees of accuracy. It describes zero distinction between different geometries of the universe except by convenience and desired accuracy - engineers tend to use Newton for convenience and easier mathematics whilst Einstein becomes more accurate but more difficult in the physics.

Informational cosmology distinguishes between the geometries for the collapsed matter portions of the universe and the active centre. Collapsed matter outskirts operate in hyperbolic geometry. Active centre operates in Euclidean plus time, or Minkowskian, geometry. Minkowskian geometry relates to our four dimensional universe.

Akin to the book length gedankenexperiment or "thought experiment" in *The Animate and The Inanimate* (1925) by William James Sidis, a thought experiment about net reversal of time of universe provides comprehension of the increased rate of expansion of the universe. An increase tied to the introduction of dark matter and dark energy into the calculated astronomical material in consideration.

A space of collapsed matter in the area called the collapsed matter outskirts might function within hyperbolic geometry. An active centre with the Euclidean (or Minkowskian 4D) geometry must conform in transformation to a hyperbolic geometry because an informational cosmological cosmos must merge in mutual geometries. Separated geometries, incompatible geometries, would indicate a fault in the attempt of a monistic, unified theory of the structure of the universe. Based on the principle of relevance/irrelevance, the information of importance to the universe would incorporate the active centre whereas the irrelevant information would constitute the collapsed matter outskirts.

Upper Limits

I feel that everyone who wants to say anything, do anything, should be able to say anything or do anything, within the limits of not hurting another person.

-Madalyn Murray O'Hair

The limits of my language means the limits of my world.

-Ludwig Wittgenstein

Informational cosmological conceptual apparatus purport the necessity of particulate structures external to the universe in addition to the overriding of standard Big Bang cosmological perspective of the universe with upper limits theorized and calculated of large-scale structures connected to the self-containment of the universe. A self-contained system such as the universe reflects not the completion of reality; rather the information processing of an external material framework or armature for the universe in which the armature equates to an information processing and the dynamic interplay of the processes become conceived by internal to universe entities such as animals on the biosphere, but as the information processing in action.

In this, the information processing occurs from the bottom to the top of the universe's scales and the armature world exists external to the universe for the information processors, and the information processors inhabit an entire world of armatures existent in a non-literal tower of minds of variegated magnitudes, kinds, and degrees of consciousness. Humans with one form of conscious experience; the universe with another form of conscious experience. Even with these considerations in mind, the forms of consciousness internal to the universe will inhabit an enormity of possible structures and functions and, therefore, possible levels, kinds, and degrees of conscious experience, but many factors below the 10^80 base interactions of the universe with human beings. This leaves multiple open questions about the objects in the universe, astronomical objects of maximal size, maximal magnitudes.

Cosmologists purport maximal magnitudes to the size of objects comprised of smaller elements in the universe. One scales the magnitudes from the quantum realm into the large-scale structure of the universe for explanations of present and emergent traits in the constituents of the universe at each increased magnitude of considered objects. Each develops into much larger objects in relation to their constituents of previously accepted objects. At one moment in time, the largest

known object amounted to the Earth with the heavens in orbit around it. In the historical development of proposals for the heavens' organization and relation to the Earth and human beings, the geocentric model of the universe transformed into the heliocentric model of the universe. The Solar System seemed the largest set of objects outside of the expanse of the unknown in the night skies. Only the stars, the "wanderers," moved in odd patterns to dot the night sky.

Time, and knowledge and techniques, marched forward to add to the arsenal of large-scale objects in the structure of the known universe in addition to discounting of alternative notions about them with the eventual division of classes of objects such as planets and dwarf planets, and the dismantling of the planetary crown for Pluto and the inclusion into our Solar System's group of dwarf planets known as Ceres, Haumea, Makemake, and Eris. Of the Sun, planets, dwarf planets, moons, asteroid belt, and Oort cloud, these failed to have the appropriate inclusion for a complete view of the cosmos because knowledge and theories continued to expand, develop, refine, and breed whole new classes of objects in addition to increasing the number of objects.

We find new objects in black holes, neutron stars, quasars, gas clouds, pulsars, and an increasing parking lot filled with various kinds and forms of vehicles. All of these vehicles have containment in galaxies, massive gravitationally bound objects comprised on billions of stars, planets, gas clouds, and the other previously listed objects. Bear in mind, the formation of galaxies occurred early in the universe, but had limitations in size and kind based upon the configuration of matter in space-time at an earlier time in the universe.

Many knew of galaxies for a long time; indeed, the philosopher Immanuel Kant[479] called these island universes in that the construction of the present galaxy appeared as a universe unto itself with the formation of the structures similar in shape and configuration must have a similar function in the universe in terms of operation and, therefore, kept an independent life as if a universe like ours, little islands – island universes or galaxies.

Cosmologists began to discover the presence of other objects comprised of galaxies bound together by their mutual gravitational attraction in spite of differences in structure such as elliptical[480], spiral, S0, or irregular galactic structures whose structure might have an -2gravitational influence of one another totalling about 50 or less galaxies.[481][482][483] In line with the common tradition of convergence of constituents of the universe, of the constituents well-defined, experimentally verified, and contained in the relevant mathematics of the mathematicians, physicists, and cosmologists, galactic groups formed into a much grander structure known as a galactic cluster, which does equate to a much larger magnitude than groups whilst not having a definite distinction between the galactic groups and clusters. In that, the large-scale structure of these objects provides reasonable grounds for blurred lines in their apparent distinguishing and unique characteristics.

Galactic groups and clusters create some of the largest known objects in the universe; where the large-scale structure of the universe's density appears to exist in these large-scale cosmic

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[479] See Rohlf, M. (2014). Immanuel Kant.
[480] $I=I_0(r/a+1)^{-2}$
[481] See Image V.
[482] See McNally, E. (2000, April 18). Types of Galaxies and Classifications.
[483] See Wiedenhoff, F. (2014). Types of Galaxies: Principal Schemes of Classifications.

structures, themselves comprised of baryonic matter. Mutual gravitational attractions do not explain the full breadth of the structure observed in galactic clusters because of the differentiating-out individuated velocities comprising the net velocity of the galactic clusters prevent the known mutual gravitational attraction from explanation of the present consistent structure for the clusters.

Research with the assistance of x-rays discovered the necessary material to bind the galactic clusters through mutual gravitational attraction, an additional attraction from the material in the apparent, but not actual, vacuum. The apparent emptiness had something called intergalactic gas. It provided the necessity of additional mass for the unknown attraction between the galaxies and galactic groups for the galactic clusters to hold together with the known velocities and the unaccounted for gravitational attraction.

Intergalactic gas became known as the intergalactic medium. Intergalactic medium's temperature remains very hot[484] between 10^7K and 10^8K. At this temperature, the intergalactic medium will emit x-rays, and, therefore, the studies into the *explanandum* for the unknown mutual gravitational attraction had discovery in the intergalactic medium, the *explanans*. X-rays emitted thermal the bremsstrahlung mechanism. One might consider this the end of the story in the timeline of convergence for large-scale structures in the known universe with dozens of galaxies and an intergalactic gas bound together through their mutual gravitational attraction for the formation of galactic clusters. Following historical precedent, cosmology found more.

Modern cosmologists discovered structures comprised of both galactic groups and clusters called superclusters. These superclusters laid the foundation for a new understanding of the hyphenated term "large-scale" and phrase "large-scale structure." Existence of superclusters depicts a non-uniform universe in the standard model of cosmology. Where galactic groups can contain dozens of galaxies, galactic superclusters might contain thousands of galaxies, which amounts to an enormous swathe of stars and their respective galaxies gravitationally bound together in addition to the existence of the aforementioned intergalactic gas for the at present extant necessary additional gravitational explanans, superclusters create vast, dense amounts of matter in close proximity relative to the magnitudes of their operation; in addition to this amassing of baryonic matter, the accruement of large-scale structures in the universe form their converse by logical and physical necessity in which the proportion of dense baryonic matter – in an intergalactic medium, galactic structures, and superstructures – creates a proportional emptiness in "empty space" or a corresponding void. Voids exist in the universe.

Voids exist in the universe; in particular, these provide the basis for a cluster-void network. A network of purported emptiness and dense baryonic matter. One emits light visible to the previous and present generations of detectors on, in orbit around, or launched from Earth. Our detectors and computers show the continued upward movement of magnitude into different structures with each connected by gravitation. Gravitation might remain the most weak of the four fundamental forces of the universe. Even with this in mind, the weakness spread over large-scale structures of the universe delineate the increased strength of gravitation dependent upon the scale in consideration with the small-scale delineating small effects and the large-scale demonstrating the large effects such as the bounding of galactic structures and intergalactic mediums together into

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[484] 10^7 Kelvin and 10^8 Kelvin or 10^7K and 10^8K.

large-scale structures in the universe. Beyond the superclusters and voids of the cosmos, considered voids grow in magnitude in relation to the size of object under examination. Objects of greater magnitude exist in the cosmos with emergent traits through their operation through time.

The Cosmic Web

It would be a bitter cosmic joke if we destroy ourselves due to atrophy of the imagination.

-Martha Gellhorn

Not enough people in this world, I think, carry a cosmic perspective with them. It could be life-changing.

-Neil deGrasse Tyson

Filaments, supercluster complexes, great walls, great attractors, or galactic filaments, emerge from the convergence of small-scale astronomical objects, galaxies, galactic groups, clusters, and superclusters, coordinated in conjunction with one another. Each filament in the universe contingent upon the operations of the sub-components (small-scale astronomical objects, galaxies, galactic groups, clusters, and superclusters). Galactic filaments range from 50 to 80 megaparsecs^{-1}. Of the aforementioned voids, the galactic filaments construct the walls of the boundaries between the voids; contrariwise, voids construct the necessary space for the funneling of galactic filaments, both bound to these fates through gravitation, contents, or logical and physical necessity. Akin to the forms of structure seen within the developments of small-scale astronomical objects – stars, planets, dwarf planets, moons, asteroids, comets, gas clouds, quasars, pulsars, and others – and large-scale astronomical objects – galaxies, galactic groups, galactic clusters, and galactic superclusters, the consistent influence of gravitation among the four fundamental forces of natures for the formation of structure and concomitant function in the universe delineates the increased importance of the mutual gravitational attraction among small-scale and large-scale structures in the universe for eventual influence upon structures known in the standard Big Bang cosmological explanation of the origin, lifecycle, and denouement of the universe.

Circa March 21, 2015, Hercules–Corona Borealis Great Wall (Her–CrB GW) remains the greatest object by magnitude in the known universe – with a maximum dimension of approximately 10,000,000,000 lights years - in which the proposal of standard Big Bang cosmology begins to exhibit some threadbare elements in relation to galactic filaments too large, too complex, and too early in the formation of the universe. In the standard Big Bang cosmological view of the universe, 1,200,000,000 light years in dimensions remains the calculated upper limit for the formation of structures in the universe compatible with the cosmological principle – based on all estimates to date. Other structures with dimensions exceeding the calculated upper limit for the formation of structures in the universe compatible with the cosmological principle exist called Huge-LQG at 4,000,000,000 lights years, U1.11 LQG at 2,500,000,000 lights years, Clowes-Campusano LQG at

2,000,000,000, and the Sloan Great Wall at 1,370,000,000 light years in each object's maximal dimension with a range of 170,000,000 to 8,800,000,000 lights years in maximal dimension past the calculated upper limit permitted by the cosmological principle.

Modern physical cosmology proposes the cosmological principle. Isaac Newton[485] had the first proposal for the cosmological principle in the *Philosophiæ Naturalis Principia Mathematica*[486]. It rests upon the shoulders of some basic assumptions in relation to the ubiquitous structure of the universe: isotropy and homogeneity. Isotropy means the uniformity in all orientations. Homogeneity means uniformity in character and content. Together, these predict a uniformity of the large-scale structure of the universe with some further specifications, but the core idea remains within a similarity in structure and, therefore, observation from each particular point of possible observation by a conscious entity in the universe. In standard Big Bang cosmological explanations of the origin and evolution of the universe, certain events should unfold in the history of the universe to the present moment and into the future with the isotropy and homogeneity ubiquitous in the earliest moments of the universe in which the cosmological principle becomes significant. Insofar as the structure of the universe in *standard Big Bang cosmology* predicts an isotrophic and homogeneous character, content, and organization in the universe, the cosmological principle extrapolates within reason to the laws of nature.[487] Laws consistent independent of the particular location or observer in referent at the moment of observations or measurement. Within the reasonable construction of standard Big Bang cosmology developed from the cosmological principle of Newton, refined over time, and extended with the extensions of physical cosmology based on General Special Relativity, the laws will remain pervasive and consistent across the expanse of the known universe.

With differences of magnitude outside of the bounds predicted by *all* calculations of standard Big Bang cosmology between 170,000,000 to 8,800,000,000 light years, structures exist, or have experimental verifications with modern technology and research methodologies, informational cosmology's explanations for the structures begin to hold some experimental weight outside of logical, metaphysical, and theoretical cosmological grounds of predominant theories. Of course, other theories might incorporate and explain the phenomena sufficiently - Standard Big Bang cosmological explanations for the contents of the cosmos have limits in present expectations. Filaments appear as the sole rulers of magnitude in the universe aside from the universe itself. Where standard Big Bang cosmology ends, informational cosmology begins in this respect.

Networks of association develop from the inter-filamentary structures derived from the connections of the filaments with one another; furthermore, the inter-filamentary structures derived from the prior composition of small-scale astronomical objects to galaxies to galactic groups to clusters to superclusters and filamentsform objects of greater magnitudenot predicted or at present compatible with standard Big Bang cosmological explanations of origins because the structures appear too big, too complex, and too early in the universe. Informational cosmological explanations of origins and development for the universe permit or allow compatibility with the structure of the universe in the superstructures called filaments and inter-filamentary connections in addition to the

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[485] See Newton, I. (1687, July). Philosophiæ Naturalis Principia Mathematica.
[486] Ibid.
[487] Duly note, the emphasis on standard Big Bang cosmology predicts these phenomena, patterns, and laws.

most novel prediction and verified large-scale structure of informational cosmology called inter-filamentary networks of association.[488]

Logical Possibility, Imaginability, and Actuality

For those who believe, no explanation is necessary; for those who do not believe, no explanation will suffice.

-Michio Kaku

Black holes, black holes, black holes. We're seeing them early in the universe, in huge sizes, in much greater quantities than some of us expected, and we've discovered new classes of black holes.

-Andrew Weisskopf

Informational cosmology does have distinctions between the real and non-real, the imaginable and non-imaginable, and the actual and the non-actual. Each associated with particular ideas. Consciousness, mind, and the universe interrelate with the categorizations here. Logical possibility, imaginability, and actuality have clear distinctions.

First example, logical possibility permits gravitational reversal in operation; imaginability permits this too; actuality does not because of internal constraints for the universe and entities such as ourselves in it. Classical laws of nature would not allow this in every circumstance; principles of existence disallow reversal based upon high levels of continued tendencies in operation of the universe.

Second example, logical possibility does not permit a square triangle; imaginability does not permit this unless the distinct traits of "square" and "triangle" change, i.e. if the elements of these sets labelled "square" and "triangle" as mathematical objects differ from common definitions, then imagination of a "square triangle" might occur, but these would not equate to the same "square" or "triangle" to create aforementioned "square triangle"; actuality disallows this in every circumstance except in bizarre contexts described in the portion on imaginability.

If considered in sets, concentric circles of containment, or conditional statements - the points remain, elements of actuality exist within the bounds of imaginability, elements of imaginability exist within the bounds of logical possibility, and elements of logical possibility contain imaginability and actuality and not vice versa, and, therefore, with the elements of logical possibility limning the actualized and non-actualized (associated with actuality), the imaginable and non-imaginable (associated with imaginability), and the real and non-real – in the mind, in the universe, or in the total set of logical possibilities of armatures/universes/mind-spaces (associated with logical possibility).

Informational cosmological explanations of the universe do not appear in the abstract, but with the inclusion of the logical formalities into the concrete world of the natural philosopher and

[488] See Image I.

the applied physicist, cosmologist, and astrophysicist; of course, some of this will require some recounting of the history of logic from which the terminological progression into imaginability and actuality can have a more fine-grained distinction.

Quod Est Necessarium Est Licitum (Ic⇒Ie)

A human being is a part of a whole, called by us _universe_, a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest... a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty.

-Albert Einstein

In every system of morality, which I have hitherto met with, I have always remarked, that the author proceeds for some time in the ordinary ways of reasoning, and establishes the being of a God, or makes observations concerning human affairs; when all of a sudden I am surprised to find, that instead of the usual copulations of propositions, is, and is not, I meet with no proposition that is not connected with an ought, or an ought not. This change is imperceptible; but is however, of the last consequence. For as this ought, or ought not, expresses some new relation or affirmation, 'tis necessary that it should be observed and explained; and at the same time that a reason should be given, for what seems altogether inconceivable, how this new relation can be a deduction from others, which are entirely different from it. But as authors do not commonly use this precaution, I shall presume to recommend it to the readers; and am persuaded, that this small attention would subvert all the vulgar systems of morality, and let us see, that the distinction of vice and virtue is not founded merely on the relations of objects, nor is perceived by reason.

-David Hume

Universe cannot not exist; universe exists by necessity.[489] Informational cosmology posits the bases of the moral, the lawful, on the necessary.[490] Existence and persistence of existence become the bedrock in statistical terms for the ethical, the right, the moral, and the correct choices among the neutral set of all logically possible choices in the universe for a unit of sufficient individuation with a consciousness. An extension of the Latin for law by necessity, sine qua non of an ethic implicated from informational cosmology.[491]

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[489] In correspondence, Rosner wrote, "The set of all possible things is biased towards existence, in that things exist (or at least that we perceive them to exist with the simplest conclusion being that they exist). (As far as we know, universes can exist without limit in size and duration. (However, the set of all possible universes will probably turn out to be a complicated and problematic thing.))."

[490] "Quod Est Necessarium Est Licitum" means "what is necessary is lawful."

[491] In question "91." of *The Rick G. Rosner Interview*, I wrote, "Derivation from the prior trivial truth – cultures differ or multiculturalism - to disallow any moral calculus or assertion of human construction of ethics. Information cosmology

Informational cosmology argues for strong tendencies of universe to exist and persist. Insofar as informational cosmology dictates the high probability of universe to exist and persist, entities within universe have strong statistical tendencies for existence and persistence in addition to proportioned values. Values correspondent with existence and persistence. Principles for positive valuation of existence and persistence. Informational cosmology terms these "existence-valuing principles." Within the constraints of an informational cosmological framework, the necessity of existence and persistence dictates the tendency for universe and entities within universe to exist and persist in addition to the development of values for entities within universe consistent with the facts of existence; where facts derive principles, limited by context, informational cosmology implicates informational ethics.[492][493]

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implies informational ethics and, therefore, by necessity requires objective and binding nature of ethics rather than assertion of human construction of ethics."

[492] Informational cosmology argues for the strong tendency for existence of universe called Statistical Argument for Universe and of consciousness called Statistical Argument for Consciousness. Together called The Persistence Project. "Existence-valuing principles" derive from this. Where I_c equals informational cosmology, S_u equals Statistical Argument for Universe, S_c equals Statistical Argument for Consciousness, P equals The Persistence Project, C^E equals or "existence-valuing principles," Ie equals informational ethics, we can construct one conditional argument to derive informational ethics from informational cosmology: 1) $I_c \Rightarrow (S_u \wedge S_c)$, 2) $(S_u \wedge S_c) \Rightarrow P$, 3) $P \Rightarrow C^E$, 4) $C^E \Rightarrow I_e$, 5) I_c, 6) $\therefore$, I_e.

[493] In correspondence, Rosner wrote, "The principles of existence don't judge. There's no entity behind them who cares what exists or how it behaves. Everything (as far as we know, and we don't know much, yet) that exists and has the ability to care is a mind/information space. At this point, the Golden Rule kicks in. Nobody's in charge, we have only our own feelings to go by. And our feelings tell us it feels bad to not get what we want. So, might as well try to give everyone what they want, within reason (and with reason being some sophisticated utilitarian system of estimated best practices). So, up to this point in the argument, what you have is compassionate existentialism. No one's in charge, we have to make our own rules, the rules might as well maximize happiness. However, there's some reinforcement. Beings that have evolved to exist generally want themselves and their worlds to continue to exist. So niceness – the Golden Rule – is existence-positive. Systems that include the Golden Rule are more likely to continue to exist. There is a probabilistic bias towards niceness and the Golden Rule. Even though no one is in charge, niceness is built into existence. Worlds that are spun from niceness are more durable and persistent. Every link in this chain is a pretty wild guess (though getting some support from the history of philosophy). But at least it's a blueprint of what issues to explore. And one more thing – the locality argument, extended:

Of course we're going to be nice to ourselves and beings like us, from empathy. Call that local niceness. But why be nice to lesser beings? Because, in the endless ladder of beings, we will always be someone's lesser being, and we would want them to treat us with reasonable consideration, as they would want to be treated considerately by beings superior to them. At least there's a lower limit to consideration. Inanimate objects and beings with zero consciousness don't have to be treated with consideration except as their existence enriches the world."

Meaning of, in, to, and from Life

Life is an unfoldment, and the further we travel the more truth we can comprehend. To understand the things that are at our door is the best preparation for understanding those that lie beyond.

-Hypatia

Beyond work and love, I would add two other ingredients that give meaning to life. First, to fulfill whatever talents we are born with. However blessed we are by fate with different abilities and strengths, we should try to develop them to the fullest, rather than allow them to atrophy and decay. We all know individuals who did not fulfill the promise they showed in childhood. Many of them became haunted by the image of what they might have become. Instead of blaming fate, I think we should accept ourselves as we are and try to fulfill whatever dreams are within our capability. Second, we should try to leave the world a better place than when we entered it. As individuals, we can make a difference, whether it is to probe the secrets of Nature, to clean up the environment and work for peace and social justice, or to nurture the inquisitive, vibrant spirit of the young by being a mentor and a guide.

-Michio Kaku

Meaning brings intense, awe-inspired works of the human spirit to bear upon civilization from the emotion-soaked hands of the great masters of art and science. Meaning gives breathe to the movement of life. An invigoration to the dull, the ordinary, the mundane and dust-ridden regular. Cosmos does not contain meaning. Meaning does not emerge from the flow of matter through the embankments of space-time. Life lacks meaning. Common conceptions present themselves in four forms – tacit, implicit, or explicit, formal or informal: "meaning of life," "meaning in life," "meaning to life," and "meaning from life."

"Meaning of life" appears the most prominent, most argued for and stated in public. Insofar as the trite answers to the questions of the meaning of life, the assumptions underneath the assertions belie an inherent falsehood. An untenable notion with scientific knowledge, not incompatible, but untenable. Untenable in reasonable argumentation with the natural philosophic domination of the present, Anthropocene epoch; compatible in abstract, logical grounds. Assumptions in relation to the forms of meaning in life appear ever-convenient in dismissal or ignorance of the technical, non-mystical motion of matter through space-time. In this, the phrase "meaning of life" becomes moot.

"Meaning in life" describes an inherent quality to the universe, or better stated cosmos in this phrase. It might accept the technical movement of the material contents of the cosmos's variegated geometric relations within 3-dimensional Euclidean space operant through time. Once more an impasse obliterates the assumptions in the phrase "meaning in life" with inherent lack in

the indeterminate, information processing universe, indeterminacy and meaningless motion of contents through space-time do not permit meaning *in* life.

"Meaning to life" assumes less and acknowledges more, such as the observer. Observers can judge; judges can evaluate; and in the process of evaluation, observers give meaning to life. It edges closer to an accurate account of the contents of the world with the introduction of an individual in prime status and the universe in secondary status. The word "to" disallows a bidirectional account of meaning, though. An attribution *to* the universe *from* an observer. Another – more explicit – means of expressing meaning exists: "Meaning from life."

"Meaning from life" encapsulates the three prior phrases in one. Proper assumptions with best comprehensions of the contents of the universe, the function of those contents, and the interaction between them. Universe will not inherit meaning from the armature world nor from the global information processing known as itself, where the creatures internal to the universe perceive the universe and the universe exists as the information processing of an armature. The universe will not contain meaning, consciousness endowed entities in the universe will evolve meaning to the universe for themselves. "Meaning of life" emerges for units of sufficient individuation in the universe; "meaning in life" and "meaning to life" develop in an intersection of observer and observed; "meaning from life" codifies the process-language necessary to contain knowledge of the universe dependent upon the intersection of the universe, beings created in it, attribution of value by these beings to the universe, and to reap meaning from the cosmos.

Meaning *means* personal valuation, attributed value. Events and happenings imbued with meaning. Universe does not contain meaning. It gives, beings derive, meaning. Meaning from meaninglessness. An honest free lunch. Consciousness endowed entities in the universe light the universal monochrome canvas of existence into luminous significance. A meaningless conscious universe bears children, gifts consciousness to them, and bestows meaning in Creation.

Addenda I-VII

Addendum I: Glossary of Definitions[494]

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.

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[494] Some definitions from Canadian Oxford Dictionary (2nd Edition).

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 ½) 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[495][496].

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.

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[495] See Weisstein, Eric W. (2014). Hypersphere.
[496] See [WildStar2002] (2008, October 14).

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).

Addendum II: Basic Arguments

From "24."[497]:

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.

From "28."[498]:

Consciousness[499] emerges from self-consistency[500] 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.[501] 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.[502] 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."[503] 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.

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[497] See Rosner, R.G. & Jacobsen, S.D. (2015, January 1). The Rick G. Rosner Interview.
[498] Ibid.
[499] Ibid.
[500] Ibid.
[501] Ibid.
[502] Ibid.
[503] Ibid.

Addendum III: Basic Principles

From "127."[504]:

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 I_c equals informational cosmology, S_u equals *Statistical Argument for Universe*, S_c equals *Statistical Argument for Consciousness*, P equals *The Persistence Project*, C^E equals "existence-valuing principles," and I_e equals informational ethics, we can construct one conditional argument to derive informational ethics from informational cosmology: 1) $I_c \Rightarrow (S_u \wedge S_c)$, 2) $(S_u \wedge S_c) \Rightarrow P$, 3) $P \Rightarrow C^E$, 4) $C^E \Rightarrow I_e$, 5) I_e, 6) $\therefore$, I_e. Therefore, one acquires values consistent with the facts of existence: "existence-valuing principles" or C^E. 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 (M_n) implies armature (A_n); if armature, universe. Universe equates to information processing; armature equates to material framework/processor: ($A_n \Rightarrow M_n$).

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[504] Ibid.

Principle Seven: armature and universe construct mind-space: ($A_n + M_n = S_n$).

Principle Eight: net self-consistency and information processing equates to consciousness. This reflects *Principle Five*. Sigma, ∑, self-consistency, S, times, *, sigma information processing, $\sum I_p$, would equal mind-space, S_n, where mind-space equals information-space, I_s: ($\sum S * \sum I_p = S_n = I_s$).

Principle Nine: universe as conscious: ($A_n \Rightarrow M_n$); ∴, ($A_n + M_n$); ($A_n + M_n$) ⇒ S_n; ∴, ($A_n + M_n = S_n$). In addition to this, we have the inclusion of *Principle Eight* to derive the same conclusion about mind-spaces, S_n: ($\sum S * \sum I_p = S_n$). 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.

Dear Dr. Manahel,

I'm in discussion with the University of California, Irvine Ethics Center to continue work from last year for publication of a book entitled *Women of the Academy*. Two versions, one continuing from last year with an unknown completion date. Another, shorter one, with the same main title. I've been sending some questions to those with the appropriate experience in these areas, i.e. with expertise, to provide some clarity on the issue, which I intend to use to guide the research. Guided because the book would remain small and, therefore, bound by word count/page count. This one incorporate some of the previous In-Sight work in addition to one historical lens and one academic lens. Historical with the perspective of an overarching trend. Academic with inclusion and commentary from prominent research from varied researchers such as Ceci and Williams (2010, 2015, and others). Of course, I'll work towards incorporation of as many views as possible, but cannot include everything because of the prior limitations. Limits in time too. Does this clarify? Or would more assist you?

Addendum IV: Basic Ethics

Principle 1: Self-determination with strong protection against danger to others (and to self). Systems, whether biological, mechanical, or hybrid, have the right to self-determination as long as this doesn't endanger others. Determining danger is a field all by itself.

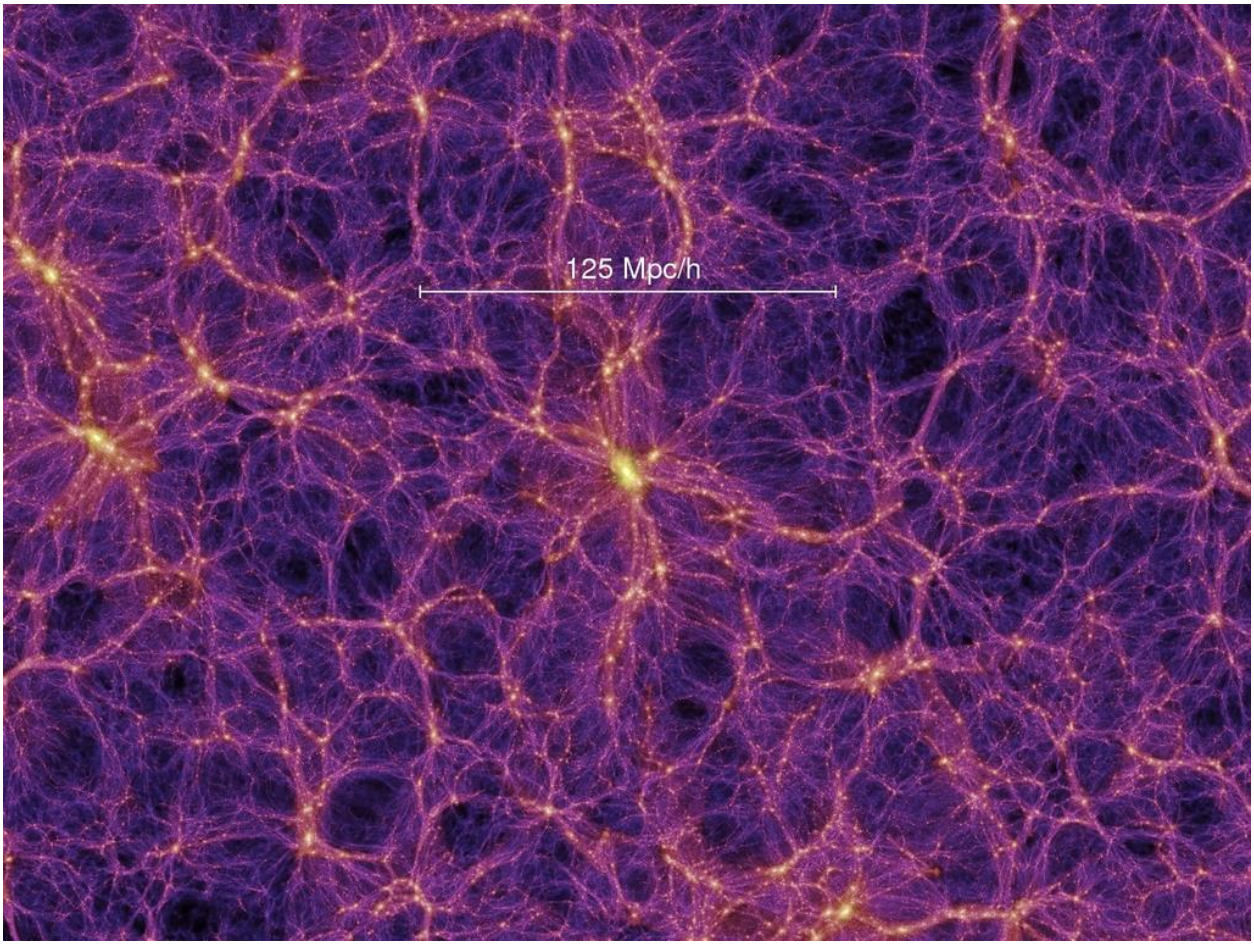
Principle 2: Systems of sufficient mental complexity have rights and responsibilities.

Principle 3: Consciousness is a thing - a constructable, mathematically characterizable thing (and a thing that's not that hard to create).

Principle 4: Future moral systems will have to take consciousness into account. Our evolving morality up to now does this, usually without explicitly acknowledging that it does so. Morality tends to grant legitimacy to a widening sphere of beings - to minorities and to animals - acknowledging that they have thoughts and feelings, just like members of the dominant class. Without saying or even fully understanding that this is the case, the expanding sphere of morality is based on the idea that beings with relatable and authentic self-directed behavior have consciousness.

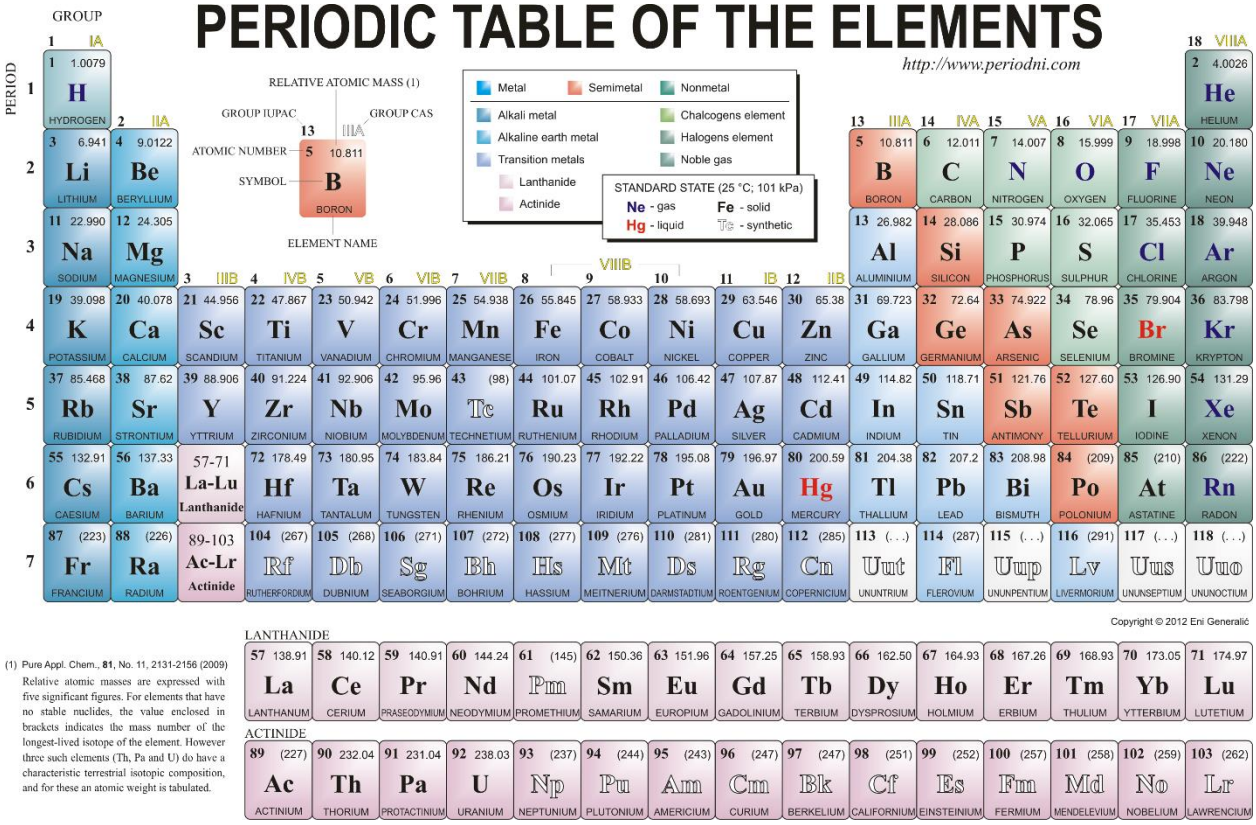
Addendum V: Figures and Images

[Image I: Inflamed filamentary structure of the active center of the universe.][505]



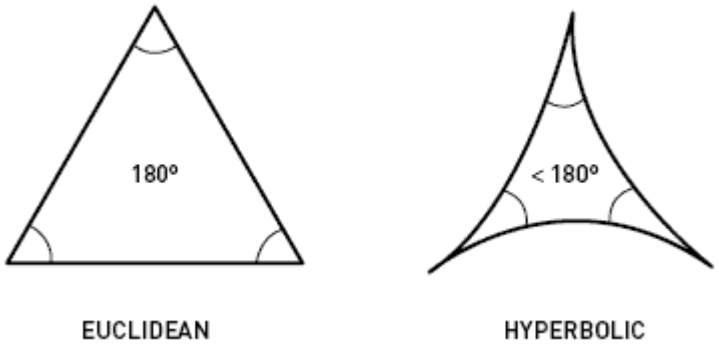
[505] See University of California, Riverside (2014, November 18). Cosmic Web.

[Image II: Periodic Table of the Elements.][506]

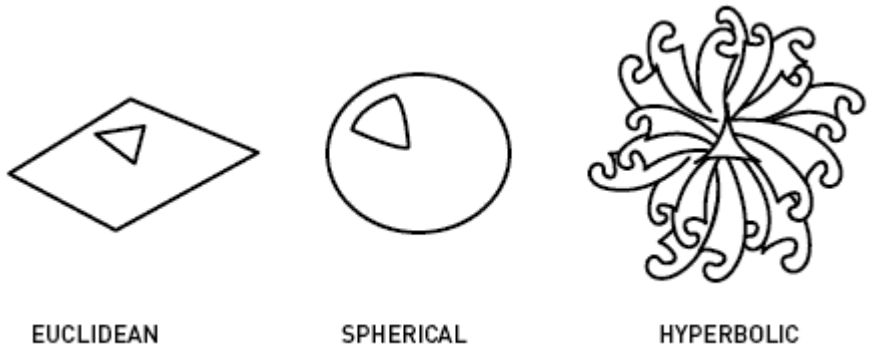


[506] See H3DWallpapers (2015).

[Image III: Euclidean and Hyperbolic Geometry][507]

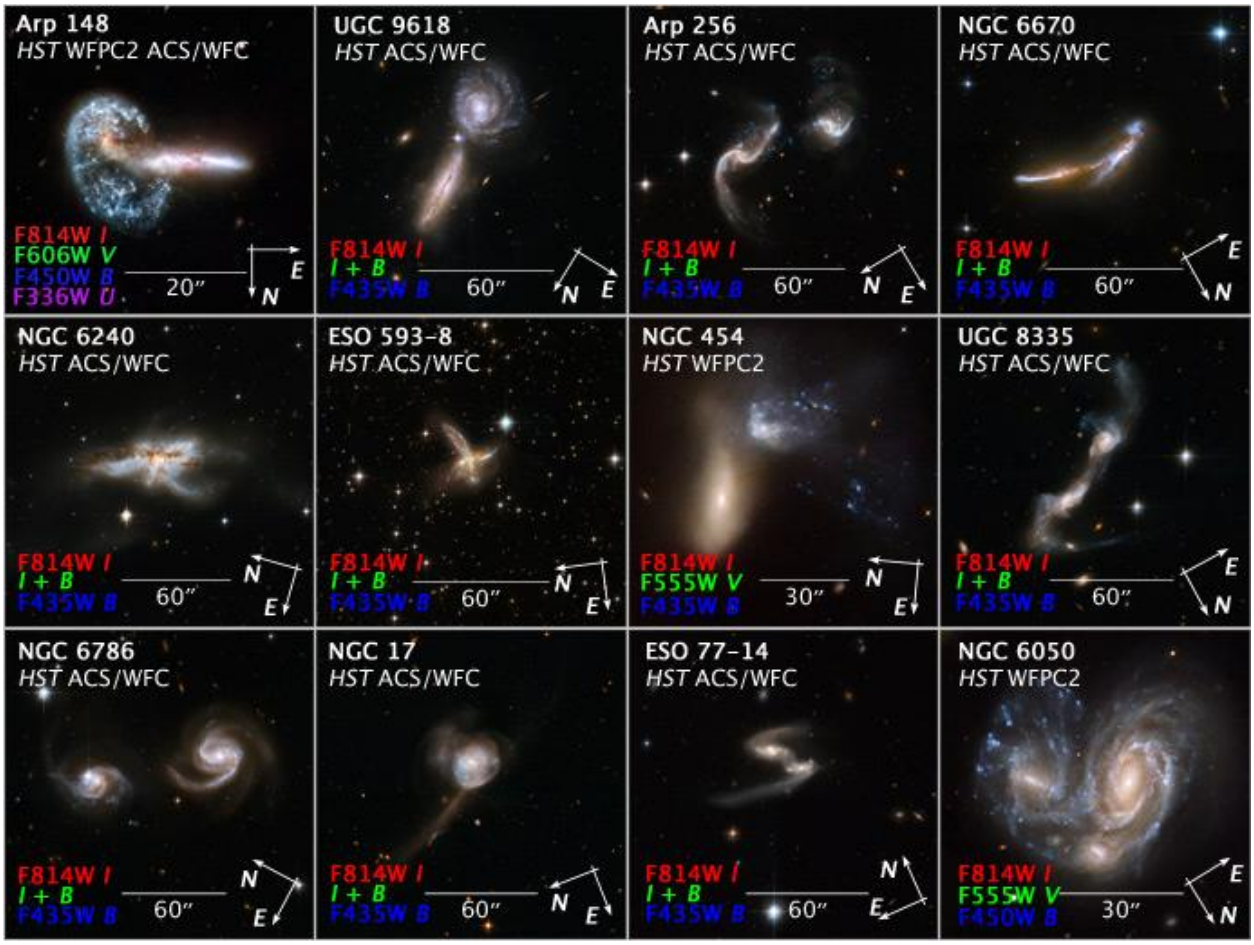


[Image IV: Euclidean, Spherical and Hyperbolic Geometry][508]

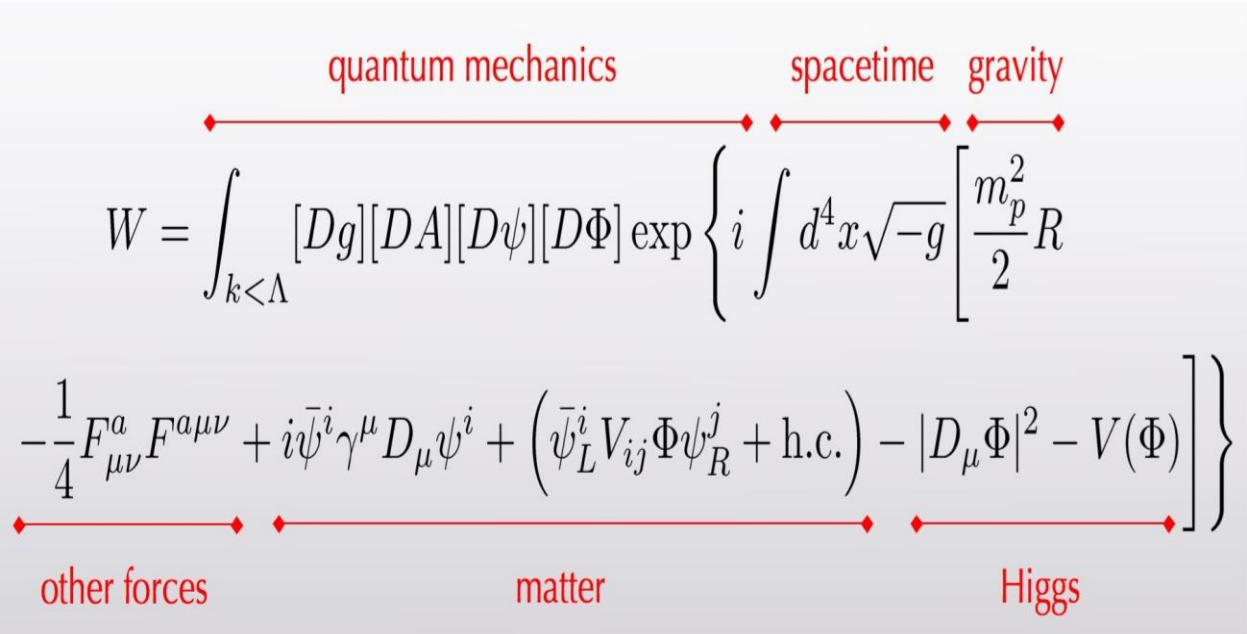


[507] See Annenberg Learner (2015). Geometries Beyond Euclid: Spherical and Hyperbolic Geometry.
[508] Ibid.

[Image V: Galactic Set]

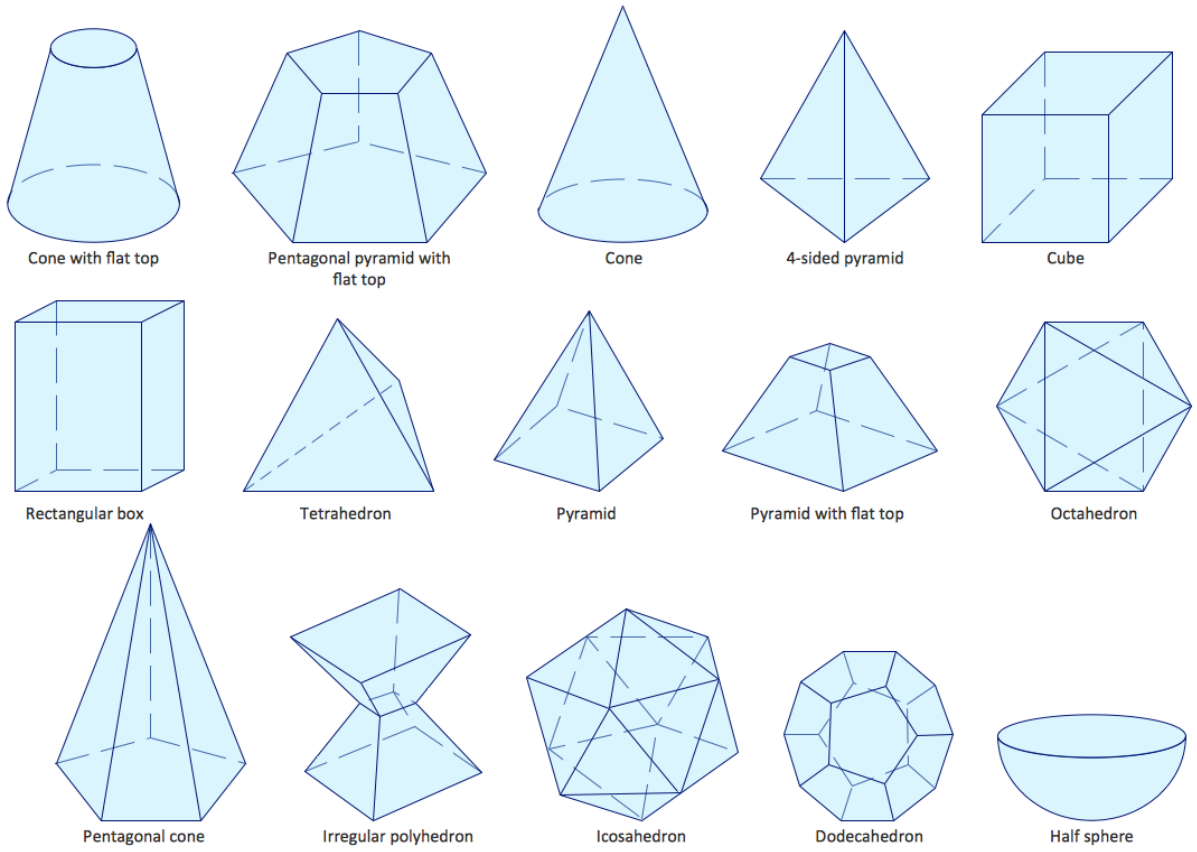


[Image VI: Dr. Sean Carroll's informal equation for everything.][509][510]



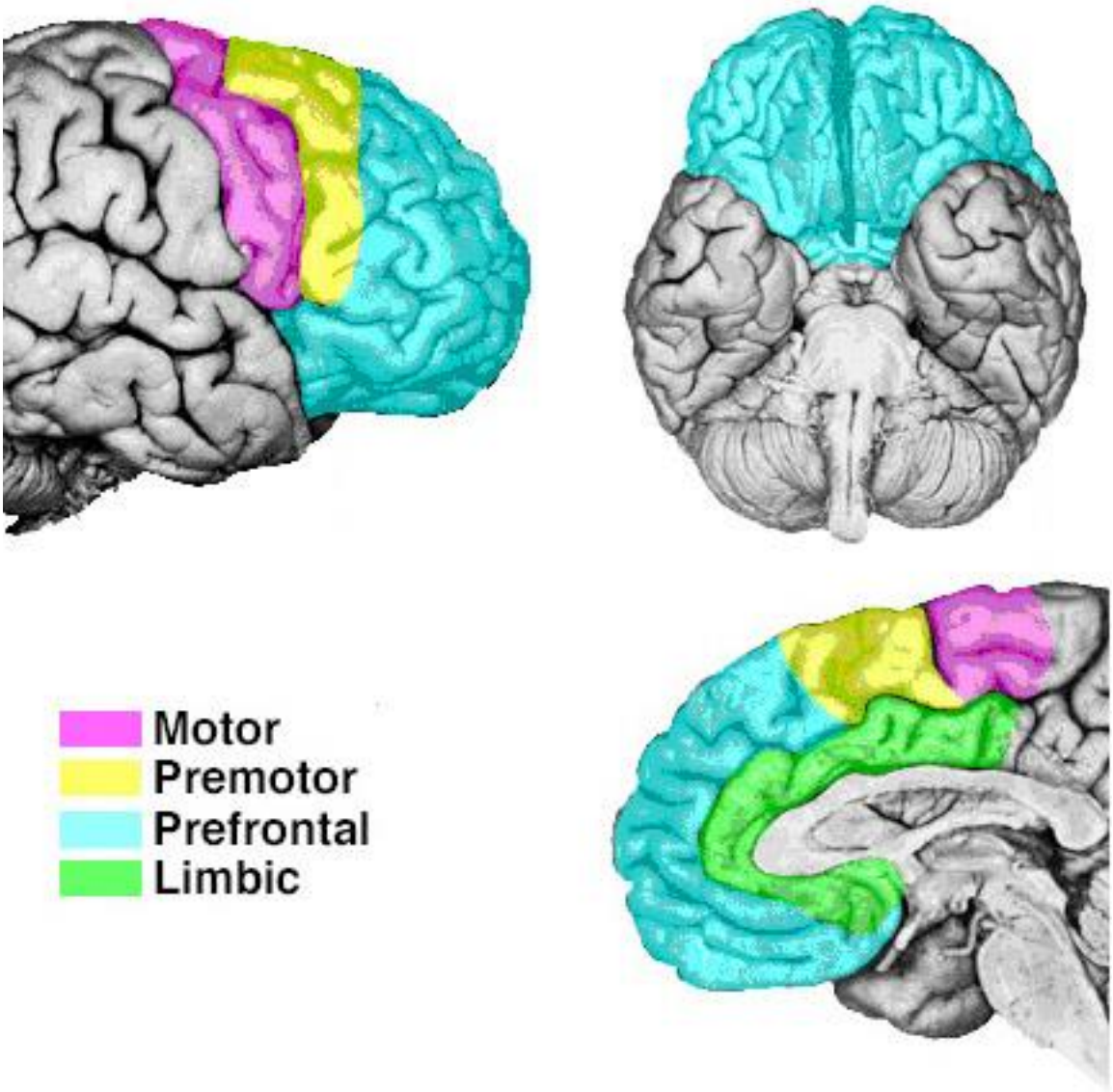
[509] See Carroll, S. (2013). Everyday Equation.
[510] See Carroll, S. (2013). The World of Everyday Experience, In One Equation.

[Image VII: 15 vector objects, geometric object set][511]



[511] See Concept Draw.Com (n.d.). Scientific Symbols Chart.

[Image VIII: Prefrontal Cortex.][512]



[512] See Morgan, J. (2005). Prefrontal Cortex—Neurologists Perspective.

Addendum VI: Tables

[Table I: dating methods by Isotope and Half-Life.]

PARENT ISOTOPE	**HALF-LIFE**
Uranium-235	704 Million Years
Potassium-40	1.25 Billion Years
Uranium-238	4.5 Billion Years
Thorium-232	14.0 Billion Years
Lutetium-176	35.9 Billion Years
Rubidium-87	48.8 Billion Years
Samarium-147	106 Billion Years

[Table II: dating methods by age range of application, material dated, and methodology.][513]

Name of Method	**Age Range of Application**	**Material Dated**	**Methodology**
Radiocarbon	1 - 70,000 years	Organic material such as bones, wood, charcoal, shells	Radioactive decay of ^{14}C in organic matter after removal from bioshpere
K-Ar dating	1,000 - billion of years	Potassium-bearing minerals and glasses	Radioactive decay of ^{40}K in rocks and minerals
Uranium-Lead	10,000 - billion of years	Uranium-bearing minerals	Radioactive decay of uranium to lead via two separate decay chains
Uranium series	1,000 - 500,000 years	Uranium-bearing minerals, corals, shells, teeth, $CaCO_3$	Radioactive decay of ^{234}U to ^{230}Th
Fission track	1,000 - billion of years	Uranium-bearing minerals and glasses	Measurement of damage tracks in glass and minerals from the radioactive decay of ^{238}U
Luminescence (optically or thermally stimulated)	1,000 - 1,000,000 years	Quartz, feldspar, stone tools, pottery	Burial or heating age based on the accumulation of radiation-induced damage to electron sitting in mineral lattices
Electron Spin Resonance (ESR)	1,000 - 3,000,000 years	Uranium-bearing materials in which uranium has been absorbed from outside sources	Burial age based on abundance of radiation-induced paramagnetic centers in mineral lattices
Cosmogenic Nuclides	1,000 - 5,000,000 years	Typically quartz or olivine from volcanic or sedimentary rocks	Radioactive decay of cosmic-ray generated nuclides in surficial environments
Magnetostratigraphy	20,000 - billion of years	Sedimentary and volcanic rocks	Measurement of ancient polarity of the earth's

[513] See Peppe, D. J. & Deino, A. L. (2013) Dating Rocks and Fossils Using Geologic Methods.

			magnetic field recorded in a stratigraphic succession
Tephrochronology	100 - billions of years	Volcanic ejecta	Uses chemistry and age of volcanic deposits to establish links between distant stratigraphic successions

[Table III: Basic mathematical symbols.]

Symbols	Meaning	Symbols	Meaning
√	square root	/	fraction bar
<	less than	∟	right angle sign
>	greater than	%	percent sign
≠	not equal	±	plus or minus sign
=	equal	GCF	greatest common factor
≡	equivalent	LCM	least common multiple
≈	approximately	|	divides
≤	smaller or equal	a : b	ratio
≥	bigger or equal	a^n	a to the nth power
÷	division	||	parallel lines
×	multiplication	| |	sign for absolute value
+	addition	()	parentheses for grouping
−	subtraction	b	base length
∠	angle	h	height
°	degree	p or P	perimeter
π	pi (3.14)	l	Length or slant height
A	area	w	width
m	slope of a line	C	circumference
S.A.	surface area	-a	opposite of a
L.A	lateral area	d	diameter or distance
B	area of base	b_1, b_2	base lengths of a trapezoid
V	volume	r	rate or radius

^ DABC	perpendicular triangle ABC	∠ABC m∠ABC	angle ABC refers to the measure of angle ABC

[Table IV: ethics' disciplines.]

Descriptive Ethics	Discipline purposed to answer issues in relation to moral values possessed and lived by individuals and collectives. *Is it moral to perform medical experiments on non-human animals?*
Moral Psychology	Discipline purposed to answer issues in relation to the nature and development of moral agency, i.e. an agent can act moral or immoral because of the capacity for moral or immoral action. *When do children develop the capacity for moral decisions?*
Applied Ethics	Discipline purposed to answer issues in relation to specific situations moral aspects. *How should a psychologist behave after a patient provides information about the patient's desire to harm other human beings?*
Theoretical Normative Ethics	Discipline purposed to answer issues in relation to the determination of moral values and moral decisions. *How might one properly determine the right and the wrong in a moral context – their distinguishing characteristics?*
Meta-Ethics	Discipline purposed to answer issues in relation to fundamental nature of ethics, the nature of the concepts in ethics, the methods employed in the research into ethics, the meaning of oral terms, and epistemological status of claims about morality. *What is an intrinsic moral value?*

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