The Search for the Grande Algorithm

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Abstract

The world could be an illusion, just a projection of consciousness. Naturally, we have spent the best part of our known history categorizing the world around us. We have developed mathematics to such a degree that it is difficult to question its fundamental assumptions, let alone looking at our fundamental axioms for a reappraisal, audit, and maybe a fresh start. Nevertheless, as flaws have been discovered in the past, flaws in our mathematical systems will undoubtedly be discovered in the future, potentially bringing numerical discovery to a halt. We should continually search for possible errors in our systems in order to improve, like many before us have.

This paper examines the many inconsistencies which exist across a diverse range of knowledge domains to explain the need for such a theory. It provides plausibility conditions to propose a new universal law called *The Universal Law of Homeostasis* discovered by the author to lay at the intersection of neuroscience, psychology, philosophy, mathematics, logic, computer science and physical theory. In this new proposed law, the number zero serves as a foundational equilibrium number, a new concept of inertia, which all measured change in the universe is centered around. The Universal Law of Homeostasis is a universal conservation law which explains the dynamism of the universe from a "nothingness". It seeks to provide a model in which the universe continually strives to balance any disturbances to the zero-equilibrium state, and in so doing, produces the infinite diversity of observable change of the known universe. A successful affirmation of this law will simultaneously remove all the reported inconsistencies observed across the various knowledge disciplines and reinforce the essential unity of all fields of knowledge with enhanced predictive power and experimental evidence.

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1 Introduction

It is the business of science to create models that represent reality accurately. A good model explains all known observations and also predicts new ones within its domain of investigation. The power of prediction has proven especially impressive in those fields of science that employ mathematics. As a result, it is no surprise that the power of a scientific theory is often dependent on the power of the formal mathematical system chosen to represent it. With the right set of starting axioms, a judicious choice of definitions and the use of logical deduction, any theory can derive unexpected and testable results about reality.

As proof of this, the field of modern physics has witnessed a number of these paradigm shifts since the 19^{th} century. Mechanical and aether models of the 19^{th} century gave way to quantum mechanics in the early 20^{th} century, while Newtonian mechanics has given way to special and general relativity. The Standard Model of particle physics evolved out of quantum mechanics but possessed so many deficiencies that it spun off a host of other contenders such as various supersymmetry models, string theory and M-theory. Despite the discovery of the long-sought Higgs Boson particle at CERN in 2012, particle physicists working on the supersymmetry model are at a difficult impasse due to the ongoing lack of supporting evidence. Some scientists are now looking beyond these with exotic theories such as Scale Symmetry [1]. A recent survey of quantum physicists showed a lack of consensus at the foundational level of quantum mechanics as well[2].

Physicists support their observations with scientific arguments and models that depend quite critically upon mathematics. Nevertheless, at the turn of the 20^{th} century, both geometry and arithmetic were undergoing major crisis because new understandings did not line up well with the theories of the time. The appearance of non-Euclidean geometries raised doubt about the e of Euclidean geometry. While the appearance of exotic infinite sets developed by Georg Cantor brought doubt into the prior understanding of the infinite due to his non-intuitive findings. These developments were worrisome to physicists, as they depended so critically on both geometry and real numbers.

The climate of scientific uncertainties at the foundation of mathematics inspired two mathematicians, in particular, Gotlieb Frege and Richard Dedekind, to commence work reducing mathematics to logic, creating the movement that would become known as *Logicism.* Then, a young Bertrand Russell produced a counterexample that refuted Frege attempts. Russell and Alfred North Whitehead picked up where Frege had left off and produced the *Principia Mathematica,* a new concept in math. David Hilbert later made a similar attempt to establish mathematical certainty, this time on a formal axiomatic basis. Then Kurt Gödel dealt a devastating blow both to Russell and Hilbert. **Gödel's** Incompleteness Theorem halted both attempts to construct mathematics from sound foundations. These are a few examples of how new theories can replace old theories, given time.

Subsequently, Gödel is known to have admired phenomenology later on in life, embracing the work of phenomenologist Edmund Husserl[3]. Today, emerging multidisciplinary fields such as the Psychology of Science, Systems Science, Neuropsychology, Quantum biology and Nondual studies demonstrate the increasing trend towards the whole systems approach required to solve the greatest riddles of science, mathematics and philosophy. [4, 5, 6, 7] The fault could lie within the mathematical systems themselves, which underwrite our interpretation of physical laws. If the math that underwrites our interpretation of physical laws is misconstrued, the currently dominant mathematical principles have led science into some needlessly complicated formulas and hypotheses. Testing *the Law of Homeostasis*, which conceptualizes the universe as a place of fundamental symmetry, may steer science in a new and more fruitful direction.

In 1925, mathematician David Hilbert said: "the final test for every new mathematical theory is its success in answering preexisting questions that the theory was not specifically created to answer[8]." While producing good mathematical results may be the working mathematician's criteria for determining the mathematical legitimacy of a new theory, the philosophical ramifications of applying such formal procedures are far from clear. Such a "do now, ask later" policy is reminiscent of the earlier acceptance of infinitesimals and complex numbers, simply because they produced results despite their problematic philosophical position. After Gödel's Incompleteness Theorem, however, mathematicians are resigned to the fact that all formal systems of sufficient complexity will have inherent limitations.

The post-Gödel post-Newtonian world is one in which the observer is accepted as an integral part of a whole system. Einstein's relativity theory attests to the indispensable role played by the observer in what is observed while Gödel's Incompleteness theorem laid bare the intrinsic failure of a system of logic, a formalization of human thinking, of ever being complete. In their book *Collective Beings* [9] , systems scientists Gianfranco Minati and Eliano Pessa point out that the role of the observer is no longer seen as passive, but active. In second-order cybernetics, the observer is considered as a cybernetic system trying to carry out a model of another cybernetic system. In other words, the observer is an integral part of the phenomena, and the observer and observed cannot be separated. The results of observation depend on their mutual interaction.

Science now accepts that the observer sees through his/her visual system and his/her cognitive models. That is, detecting what they are ready to see, expecting to see and able to be seen [9]. This was a scientific revolution. (See Fig. 1)

Naturally, then, we have spent the best part of our known history categorizing the world around us. Biologists have named the plants and animals around us. Linguists have come up with an international phonetic alphabet. In math, we have created languages; we have invented numbers, and systems in which we use numbers in increasingly complicated ways to describe the world around us.

Science advances through paradigm shifts that occur when new theoretical models emerge, which explain experimental anomalies and predict new results significantly better than established models. Since the introduction of quantum physics and relativity, science has fragmented into increasingly specialized fields of knowledge. However, rather than mirroring and supporting the findings of each respective field, taken together, the various sub-disciplines instead contribute to a collective, overall inconsistency. The persistence of such fundamental anomalies across a broad spectrum of knowledge domains strongly suggests a need for a new and greatly expanded

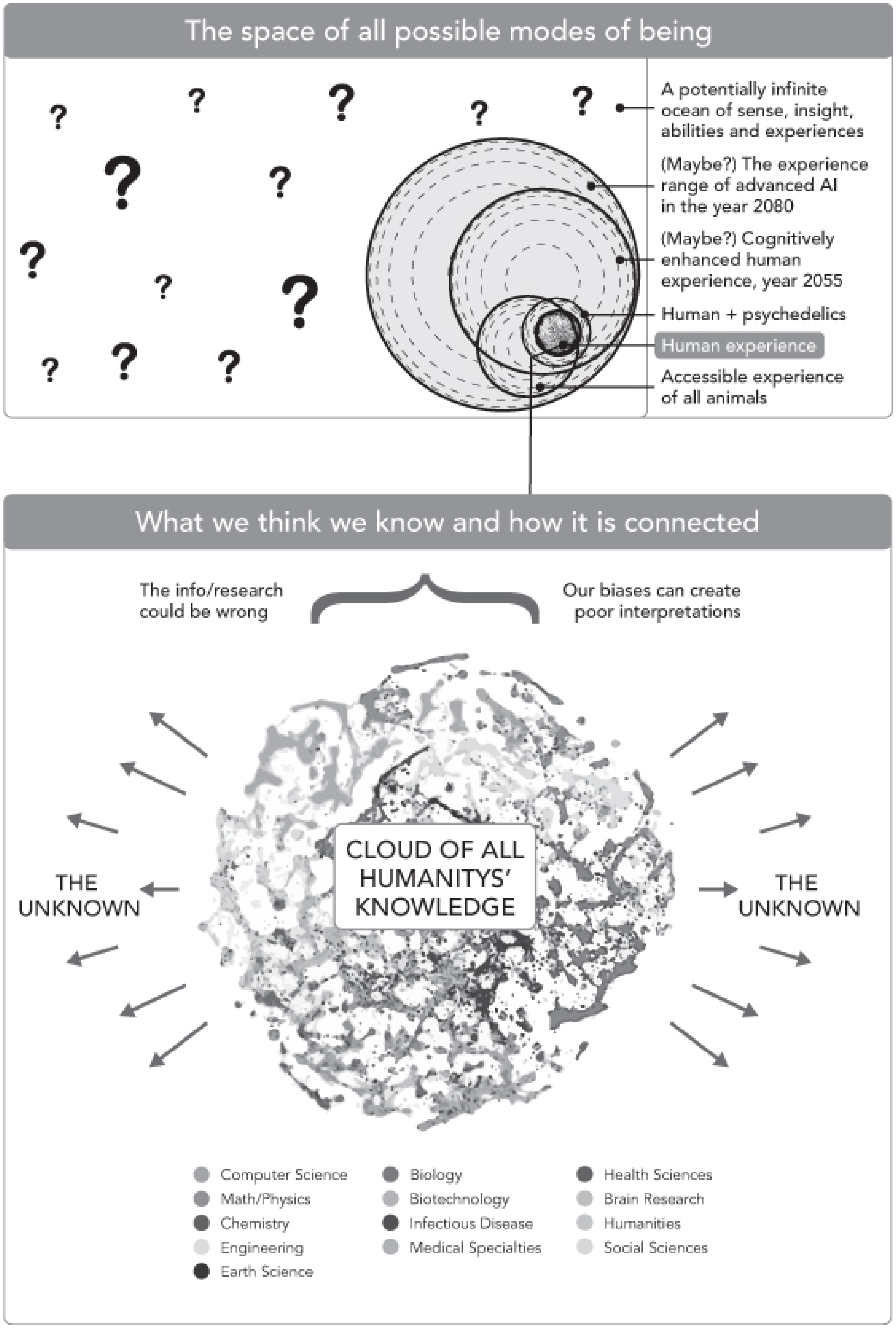

Figure 1: **Source:** Co-citations.(2 papers cited at that same time) and Biliographic Coupling(2 papers referenced a common 3rd paper) for 20 million scientific research papers in 1996-2011 Scopus database (Source: Boyack and Klavans,2013)

theory of everything (TOE) that crosses traditional silos of knowledge to dispel all cross-discipline anomalies simultaneously. Thus, science appears to be on the precipice of another paradigm shift.

1.1 The Philosophical Challenge of the Set Theory, The Number Theory and Consciousness.

"They're (set theorists studying infinity) shaking the foundations that we're all working on, up on the second and third floors. If they mess something up, it could tip us all over." - Steven Strogatz, Cornell University

2 Set Theory

A revolution, set theory, emerged in 1873 with the remarkable discovery by Georg Cantor that real numbers were not countable and displayed a paradoxical property of possessing a "larger" infinity than natural numbers. This remarkable claim divided mathematicians into two camps, those finitists who, siding with Aristotle, only believed as far a potential infinity, and those who mathematicians like Cantor himself who believed in an actual infinity. Cantor, a student of the great German mathematician Karl Weirstrass, saw the world differently than Frege did. In fact, Frege had a love / hate relationship with Cantor reflected in his sometimes supportive and other times highly critical communications with Cantor. While Frege was one of the first to accept Cantor's transfinite numbers, he also strongly criticized the way in which Cantor derived his results. Frege believed that mathematics and logic were strictly connected, and arithmetic had to encompass everything thinkable, a general reasoning that fell within the bounds of logic. This interpretation of mathematics was also followed by David Hilbert. However, Frege took exception to Cantor's perceived excessive use of abstractions by which such transfinite numbers were magically conjured up. Frege said:

> If, for example, one finds the property of a thing upsetting, one abstracts it away. If one wants to order a stop, however, to this destruction, so that properties that one wants to see retained are not obliterated, then one reflects upon these properties. Finally, if one painfully misses properties of the thing, one adds them back by definition. Possessing such magical powers, one is not very far from omnipotence[10].

Frege attempted to establish arithmetic on the bedrock of logic but Russell's paradox shattered his dream and revealed uncertainty and inconsistency in the heart of set theory, and by proxy, logic itself. The paradox of the infinite makes itself known at the most fundamental levels of mathematics, philosophy and the physical sciences. Cantor himself said:

> There is no doubt that we cannot do without variable quantities in the sense of the potential infinite: and from this can be demonstrated the necessity of the actually-infinite. In order for there to be a variable quantity in some mathematical study, the domain of its variability must strictly speaking be known beforehand through a definition. However, this domain cannot itself be something variable, since otherwise each fixed support for the study would collapse. Thus this 'domain' is a definite, actually infinite set of values. Thus, each potential infinite, if it is rigorously applicable mathematically, presupposes an actual infinite [11].

In her book, *The Philosophy of Set Theory*, Mary Tiles outlines the paradox that results from labeling infinity. For by creating the label *the Natural Numbers*, as an example, one creates a label for the familiar set of numbers 1, 2, 3, etc... On the one hand, this infinite property of a set is something even elementary school students take for granted today and yet, it is paradoxical in the same way that infinite space is paradoxical:

> What has to be recognized is that the line between potential and actual infinite is not easy to hold, even though, as we have seen, there are two distinct senses of infinite (unlimited) which ground the two notions. For when the geometer defines a circle as the locus of a point moving in a plane equidistant from a fixed point, he does not suppose that this motion literally takes place in time. He may imagine

> it as taking place in time, but in order to grasp that the path traced is a circle he also has to have a non-temporal conception of it as a complete path. Imagined generating slips into imagined completed generation; temporal becoming slips into a temporal being. For how else is the mathematician able to say anything about a potentially infinite domain, such as that of the natural numbers, or the points on a line. How can he theorize and generalize about the possibilities without supposing them to be, in some sense, actual and forming a completed totality? In other words, the finitist has to face two related questions: How is it possible to theorize about possibilities? and: What exactly is presupposed in the making of generalizations? How can a statement about all-natural numbers be true if there is no completed totality of numbers in virtue of which it is true? How is it possible to generalize over a potentially infinite totality when it never is a totality?[11]

The bizarre and nonintuitive properties of infinite sets that Georg Cantor was to discover had its roots in the seminal work begun by Gottlob Frege[12] and Richard Dedekind to provide a firm foundation to mathematics. This work was begun because the philosophy of Immanuel Kant and John Stuart Mills motivated Frege to attempt to reduce mathematics to logic, giving rise to the movement known as *Logicism*. In 1783, Kant made the claim that mathematical judgements were both synthetic (providing us with some sort of knowledge about the physical world) and apriori (knowable apart from experience). In contrast, in 1843, Mill proposed that all mathematical truths were empirical and arose from sensory experience. Frege rejected both these views and had an epistemological view — he felt that mathematical truths can be derived solely from the structure of our thoughts, in other words, from logic. Dedekind was a contemporary of Frege and the two shared a very strong bond in attempting to reduce arithmetic to logic. But a then young Betrand Russell dealt a death blow to Frege's project when he discovered what is now known as Russell's paradox and conveyed this to Frege as his second edition was about to go to press.

While Frege's project was dealt a crushing defeat by Russell, Russell himself, along with Alfred North Whitehead attempted to carry out the same program as Frege using his new definition of types. At about the same time, David Hilbert also attempted a similar construction of mathematics but instead of basing it on logic as Frege and Russell had done previously, Hilbert conceived of using even simpler pre-logical symbols which he collected together in starting strings called axioms. While Russell[13] brought Freges' program to an abrupt halt, it was Godel's Incompleteness theorem[14] that put an end both to Russell and Hilbertre logic. Russell's type theory solution was later used by mathematicians Ernest Zermelo and Abraham Fraenkel to rule out *urelements*, elements of sets that are not themselves sets, to create a set theory that did not allow Russell's paradox. The Zermelo-Fraenkel theory now serves as the one of the more popular set theory foundations for mathematics.

Today, set theory is viewed by many mathematicians as a stripped down and minimalist mathematical structure. Cambridge mathematician Thomas Forster expresses this view by saying:

> "The rationals form an ordered field. Throw away the ordering, then the rationals are a field. Throw away the multiplicative structure then they are an abelian group. What are you left with once you have thrown away all the gadgetry? Do we have a name for the relict? Yes: it's a set. That's what sets are: mathematical structures stripped of all the gadgetry"[15].

There are two ways we can arrive at set theory. Approach it from pure logic and deduce it. The second way is to derive the salient features empirically from observations of the world. To claim this status for set theory it is necessary to claim an independent and intrinsic justification for the assertion of set-theoretic axioms. It would be circular indeed to justify the logical foundations by appeal to their logical consequences, i.e. by appeal to the propositions for which they are going to provide the foundation. Thus, so long as set theory is cast in a foundational role, the appropriate basis for asserting an axiom; it is an appeal to set theoretic intuition. It is, moreover, the conception of set theory as a foundation, an ultimate court of appeal in all matters mathematical, that inspires the quest for additional axioms to give a more complete characterization of the set theoretic universe.

3 The Number Theory and Infinity

This conceptualizing of an indefinite process, such as counting, which leads us to create the concept of infinity was noted in antiquity by Aristotle:

> The universe, the totality of what there is, if it is to be treated as an object, a whole, is none the less a whole, a totality of a very special kind, for it represents a kind of absolute maximum. There just isn't anything which could contain more, or which could be bigger. And, as Aristotle points out, there is an incompatibility between the notion of a potential infinity and that of a totality which forms a complete whole, a unit. Indeed, there is here the source of another notion of infinity — the absolutely infinite, that which nothing can be greater than. The universe is that of which every other (created) being is a limited part. The absolutely infinite is that by reference to which every other being is recognized to be limited and to fall short of the maximum. There can be no limit to the absolutely infinite for then it would not be maximal; it would be possible for something to surpass that limit and hence be greater. Yet the absolutely infinite is complete in that there is nothing which is not contained within it

The confusion that arises with the word *infinity* can be partially traced to linguistics. For as soon as we assign a label to a concept, that word confers it a linguistic existence. The power of the word gives it an appearance of completeness, as "infinity" is a finite string of characters. Further words define different categories of infinities, where some philosophers are in agreement with "closed" geometrical infinities. That process, limiting infinity with words, creates a tension. Aristotle pointed out this tension between completeness and unlimitedness:

> Aristotle, although evidently aware of this sense of infinite, the infinity of an infinite being (substance — whether God, the Universe of Nature) does not think it a coherent notion. And it is possible to see where the problem lies, for there is a tension between completeness and unlimitedness — lacking limits or boundaries, between thinking of something as a unit, a whole thing and thinking of it as infinite. This tension becomes an incompatibility if, as Aristotle thinks, the only notion of infinite, the only way in which sense can be given to being unlimited, is that of being potentially infinite. For the whole idea of a potentially infinite series is that it is never complete and can never be completed. Being unlimited is here given an essentially negative reading as necessary lack of completeness, or lack of completability. The concept of potential infinity is essentially linked to the idea of a process of construction, of generation, or simply coming to be[11].

In addition to the infinitely large, there is also the problem of the infinitely small, demonstrated by Zeno's paradox. Aristotle's mathematical arguments against infinity in the large or the small was so persuasive that it may have delayed formation of calculus until Newton and Leibnez separately formulated infinitesimals[11]. However, Newton, Leibniz and their immediate successors used the mathematical concept of infinitesimal numbers that were finally given rigorous foundations by the work of Bolzano, Cauchy, Weirstrass and Gudermann. Thus math was able to overcome linguistic barriers in defining infinite numbers.

This in turn was called into question when Cantor produced transfinite numbers and used them to claim the existence of an actual infinity, which raised many concerns across a broad spectrum of fields including mathematics, science, philosophy and religion. This led to a heated debate regarding potential vs actual infinity. Advocates of potential infinity held to the finitist view that infinity was simply a concept to represent becoming and that it was nonsense to construe it as any kind of complete whole. Even today these concepts aren't fully accepted, as leading experts debate the meaning of infinity at conferences such as the World Science Festival in 2013.

However, working physicists and mathematicians generally accept the existence of infinity. Most do not discriminate between potential and actual infinity, leaving that to logicians and philosophers to debate. Yet, there are some who have tried to answer infinity with circular arguments of the following nature "We know that numbers (and subsequently infinity) exist, because if they didn't there could be no mathematics." A rigorously examination of this infinity requires a more rigorous approach than has previously been used. To resolve the puzzle of infinity, it is necessary to first analyze the fundamental properties of numbers themselves. If we look at two of the most fundamental numbers, we can ask what does it mean to say that "1 and 0 exist"? How can there be an infinite number of points between 0 and 1 on a line segment? Our familiarity of the properties of "0" and "1" makes it difficult for us to imagine a time without them; if their properties seem obvious, it is only through deep cultural conditioning. Indeed, apparently zero took a long time to gain acceptance historically. Some cultures regarded it as occult. In 1202, the mathematician Fibonacci published *Liber Abaci*, which disseminated the Hindu Arabic numbers, including zero. Italian merchants and German bankers quickly saw the value of this new algorithmic technology. As a result of Liber Abaci, zero and Hindu Arabic number scripts began to challenge and replace the combination of abacus and roman numerals used for accounting. Governments at the time were still suspicious of Arabic numerals because of the comparative ease of changing one symbol into another. Hence, some governments outlawed the new number system. Given their usefulness, merchants continued to use zero with the rest of the Hindu Arabic numbers in encrypted messages. This is, in fact, the etymology of the word cipher, meaning code, from the Arabic sifr. This short historical account shows that our current mathematical system is none other than deep cultural and psychological conditioning. Instead of the previous mathematical systems, Frege and then Russell and Whitehead, logicians, convinced of the deeper truth of logic, attempted to define 0 and 1 using set theory (defining 0 as the empty set, and 1 as the set containing the empty set). Then they proved in set theory that empty sets exist and the empty set along with proving the difference between the set containing the empty set. But this formal procedure merely shifted the question of the nature of 0 and 1 to the level of sets: how do we know the empty set exists?

We can say that infinity resides at the very foundation of mathematics. But within it is to be found an axiom of infinity. In 1967, Errett Bishop published his book *Foundations of Constructive Analysis[16]*, which accomplished the monumental feat of constructing the entire field of analysis from constructivist methodology. Bishop' whose accomplishment was in direct response to what he perceived to be a misuse of the logical law of the excluded middle to prove existence in mathematics. To a constructivist such as Bishop, deriving a contradiction by assuming the opposite was not a satisfactory proof of existence. Bishops work also happened to construct real analysis without an axiom of infinity. Although messy, it showed that it was indeed possible to establish mathematics without the problematic notion of infinity. In more recent times, Associate Professor Norman Wilderberger of the University of South Wales has followed the same constructivist line and has demonstrated and proposed mathematics that can be done using purely rational numbers[17].

Today, mathematicians continue to labor as they always have, albeit in a somewhat unresolved space. There is no undisputed winner, as the theories in vogue are regularly called into question. History has revealed the propensity for operational expediency to trump philosophical questions. Post-secondary students of pure mathematics often face confusion transitioning from high school because the content they were encouraged to learn in high school is suddenly, and for no apparent reason, thrown out. The student is told that intuition and content is not acceptable and only deduction is acceptable henceforth. In contrast to past theories, contemporary mathematicians operate invisibly as Platonists do with doses of intuitionism, formalism and constructivism throughout their work[18]. Simply put they do their work because it can model the universe well; it produces results and correct methods of categorizing the world. Yet, they work within systems whose clarity and consistency they are unsure of.

Any problems in the foundations of mathematics are deeply disturbing to the physical sciences as it is a field which is heavily reliant on the use of mathematics to quantify nature. Although the current system of mathematics continues to develop good results, its unresolved issues, particularly infinity, can lead to unpredictable dead ends and inconsistencies in modern day science and philosophy. Our number systems can be considered as a type of metric which gives rise to the fantastic predictive power of Mathematics. We now accept the real number system as fundamental, but may have forgotten that in its original form, it was fundamentally a ratio system thus all numbers used for measurement are an indication of a *ratio* measurement. Our desire to quantify the world around us and the method we have chosen to measure it with may have created a veil hiding the essence of the world we seek.

4 Consciousness

One of the foundational principles of science, and indeed of most human beings, is the existence of a subjective observer and the observable objective universe. The claim that the world may be a mirage, a simple projection of our own consciousness, has been brought forward by philosophers for centuries. The noted Anglo-Irish metaphysician George Berkeley, Bishop of Cloyne, coined the term *esse is percipi* (to be is to be perceived) to represent his argument that all “physical objects” are composed of ideas[19]. Berkeley based this on two theses, idealism (the claim that everything that exists either is a mind or depends on a mind for its existence) and immaterialism (the claim that matter does not exist). While counter-intuitive to say the least, his arguments remain strong and flexible, and able to withstand most criticisms. For most people, however, such claims are repugnant to common sense. *Object permanence*, the idea that objects continue to exist even when we cannot observe them (also known under the related term of *objective reality*) is not only a cornerstone of developmental psychology, the term coined by Jean Piaget, but also of our everyday mundane experience of life. Yet, no matter how common sense it may seem, object permanence cannot scientifically be proven.

Quantum mechanics was the first science to produce central but counterintuitive results relating to objective reality. These results simply could not be dismissed. Heisenberg, who discovered the principle that now bears his name, became the first scientist of the Quantum era to strongly point out how observed results are intimately dependent on the observer. We now know the is danger in removing the observer could be distorting reality to the point of misrepresentation.

Computer scientist Douglas Hofstader began exploring the eclectic mixture of infinity, consciousness, recursiveness, entangled thoughts and self-referential loops in a series of popular books. He recalls how he came to experience the strange self-referential experience of observing the observer. He writes:

> One day when I was around sixteen or seventeen, musing intensely on these swirling clouds of ideas that gripped me emotionally no less than intellectually, it dawned on me — and it has ever since seemed to me — that what we call "consciousness" was a kind of mirage. It had to be a very peculiar kind of mirage, to be sure, since it was a mirage that perceived itself, and of course it didn't believe that it was perceiving a mirage, but no matter — it still was a mirage [20]

Hofstadter thus began his lifelong passion of exploring self-referential phenomena. 10 years later, Hofstadter would begin work to distill these ideas into a book that another 8 years later would win him the Pulitzer-prize: *Gödel, Escher, Bach, An Eternal Golden Braid*[21]. Though it garnished Hofstadter a prestigious award, for many decades afterwards, it seemed that few really understood the raison d'être of the book. Hofstadter defines his central idea, a *strange loop,* as a hierarchy of levels, each of which is linked to at least one other by some type of relationship. This hierarchy is no ordinary one, however. It is one tangled in such a way that there is no way to ascertain a highest or lowest order. In other words, it is circular. Such a tangled hierarchy Hofstadter calls a *heterarchy* and by moving through the levels, one eventually returns to the starting point. He goes so far as to say such strange loops are the norm in consciousness and abstract thinking, culminating in the most complex symbol of all — the observer, the subject, "I". In Hofstadter's writing, we can see the natural convergence of self-reference, strange loops and mirages.

If that is a well-defined philosophical idea, it has yet to be proven in neuroscience. In neuroscience, in spite of the huge amount of scientific research, the hard problem of consciousness persists; the material model, called *causal closure* in philosophy, cannot answer how it is that a material brain can give rise to immaterial thoughts. Philosopher David Chalmers first defined the hard problem of consciousness in a 1995 paper:

> The really hard problem of consciousness is the problem of experience. When we think and perceive, there is a whir of information-processing, but there is also a subjective aspect. As Nagel (1974) has put it, there is something it is like to be a conscious organism. This subjective aspect is experience. When we see, for example, we experience visual sensations: the felt quality of redness, the experience of dark and light, the quality of depth in a visual field. Other experiences go along with perception in different modalities: the sound of a clarinet, the smell of mothballs. Then there are bodily sensations, from pains to orgasms; mental images that are conjured up internally; the felt quality of emotion, and the experience of a stream of conscious thought. What unites all of these states is that there is something it is like to be in them. All of them are states of experience.
>
> It is undeniable that some organisms are subjects of experience. But the question of how it is that these systems are subjects of experience is perplexing. Why is it that when our cognitive systems engage in visual and auditory information-processing, we have visual or auditory experience: the quality of deep blue, the sensation of middle C? How can we explain why there is something it is like to entertain a mental image, or to experience an emotion? It is widely agreed that experience arises from a physical basis, but we have no good explanation of why and how it so arises. Why should physical processing give rise to a rich inner life at all? It seems objectively unreasonable that it should, and yet it does.

> If any problem qualifies as the problem of consciousness, it is this one. In this central sense of "consciousness", an organism is conscious if there is something it is like to be that organism, and a mental state is conscious if there is something it is like to be in that state[22].

The world seems to be an illusion, just a projection of consciousness. Like many ideas in philosophy, this one cannot be disproven. However, most overlook this fact and embrace the potential illusion, taking the world for what it seems to be according to our senses. It seems like a new mathematical and physical theory, must take consciousness in to account to the point of including it into its axioms.

5 Proposal for a New Whole System Model of Reality

Science grows through periods of continuous growth followed by periods of discontinuous step change when old paradigms give way to new ones. As science presses deeper into the foundations of its various subfields, there appears to be a confluence of interdependent challenges emerging from across multiple knowledge domains. In mathematics, the infinite is questionable, both in the large and the small, our number theory possesses a strange foundation of formality devoid of meaning and intuition. In physical science, theories are assuming a more and more adhoc nature and fundamental observations such as dark matter and dark energy remain mysteries. In quantum mechanics, neuroscience and psychology, the comforting objective world we are so familiar with does not fit with observations. A meta-analysis of these problems reveals an entanglement of cross-disciplinary ideas. Working within silos is no longer effective in addressing the deep problems of science. Physical sciences critically depend on mathematics and psychology, mathematics depends on psychology, neuroscience, physical science, psychology depends on mathematics, physical science and neuroscience and everything depends on linguistics and philosophy. These interdependencies point to potential logical circularity. As so many disciplines overlap it is clear that an emergent Theory Of Everything (TOE) must transcend traditional knowledge silos and take into account multiple fields of knowledge.

It would appear that just as classical physics reached a fundamental limitation and had to shift to a new paradigm of quantum mechanics and relativity, we suggest the possibility that the simultaneous existence of fundamental problems in many fields of knowledge may be the harbinger of another far broader paradigm shift. It points to a new, inter-disciplinary whole system theory that can simultaneously account for the inconsistencies observed across all these multiple knowledge domains.

6 Building the Homeostasis Model

Constructing a new scientific model, of course, proves more challenging than simply critiquing the current model. For the proposal of an over-arching T.O.E. which covers not just physical science, but also consciousness, these considerations must be very broad indeed. The following are plausible reasons which suggest the new Universal Law of Homeostasis:

1. Consciousness is still the elephant in the room of physical science.
2. The two large research fields of neuroscience and physical science are fundamentally connected through an underlying, tacit assumption of duality embedded within the western scientific methodology itself — neuroscience studies the subjective and physical science studies the objective.
3. Heisenberg's Uncertainty Principle relates observation of a subject to the observed in western science. Though this subject/object relationship is explicated, curiously, it is not uniformly applied to the methodology of physics itself. We may legitimately ask: How does an axiomatic system appear which encodes the Heisenberg Uncertainty Principle? What are the implications for physical models of reality? How do we deal with the feedback mechanisms between: i) the subject forming new ideas about the world and ii) the world which is studied?
4. Although a few inter-disciplinary researchers such as Douglas Hoffman, Roger Penrose, Stuart Hameroff and John Hagel are building bridges between neuroscience and physical science, the majority still work in silos.

5. Mathematics is an output of consciousness but its legitimacy does not seem to be subject to the same experimental methodology as science, but rather on mathematical logic. The employment of mathematics throughout all of science gives it a special role.

6. Mathematical symmetry and invariance that arises thereof play critical roles in physical explanations.

7. Invariance has proven to be a key organizing concept for fundamental models

8. Emerging theories of consciousness bear elements similar to key ideas found in Western philosophy of Idealism and Subjectivism dating as far back as Socrates and Aristotle as well as Eastern philosophies of Hinduism and Buddhism. In particular, the idea that objective reality may not exist or may not be accessible is represented by the concept of *emptiness or shuyata.*

9. Some types of Infinity seem to be flawed concepts.

7 Consciousness

Recently, cognitive scientist Donald Hoffman of UC Irvine has created a new theory called *Conscious Realism* which attempts to solve the age old mind and body problem in a fresh way - by doing away with the need to know anything meaningful about an objective reality. Hoffman's theory does not claim objective reality doesn't exist, but only that perception acts as an unavoidable intermediate layer that prevents us from ever knowing what that objective reality is. Just as an undetectable aether spelled its own demise, perhaps an undetectable objective reality may do the same. Combining quantum mechanics and evolutionary games, Hoffman's theory attempts to construct the perceived reality of any persons' consciousness, including the fundamental physical properties of space and time, as outputs of another conscious agents' system. Hoffman's theory of Conscious Realism is one of the first falsifiable scientific theories to predict that space-time and three-dimensional objects have no causal powers and have no existence outside of our consciousness. It points to a fundamentally new foundation, from which to construct a theory of consciousness [23].

Borrowing from modern computer systems, Hofmann defines the concept of *Multimode User Interface* (MUI) which holds that our perceptual interface to the world is like a software "user interface" to the computer. Our entire experience of a perceived external reality is like the experience of our computers' software-rendered desktop and the objects we perceive are like the icons on the desktop. Our perceptions of reality are linked to actual objective reality in the same way that icons are linked to files. Hoffman's analogy breaks down, however, because in real life, we never have access to the files; the user interface will only ever allow us to see the icons.

By studying evolutionary games, Hoffman has arrived at a number of ways in which perceptual machinery has evolved in species to support fitness rather than accuracy. In each case, he found that perceptions are not veridical; they are better matched to fitness than to accurate representations of objective reality. Information about the environment is crucial for the survival of living beings as they compete for scarce resources to attain food, to survive and ultimately, to reproduce. Too much sensory data results in a net increase in the amount of energy expended to filter out the bits of information most relevant to survival. The field of digital signal processing offers an analogy. Engineers design digital filters to extract specific features from complex data signals. The more complex the signal, the greater CPU power expended to extract the relevant feature. Hoffman's experiments in evolutionary games demonstrate that our sense perceptions are not a good copy of "reality" at all. Natural selection favors perceptions that are fast, cheap and tailored to guide behaviors needed to survive and reproduce. Hoffman asserts that:

> studies with evolutionary games and genetic algorithms indicate that selection does not favor veridical perceptions, and that therefore the objects of our perceptual experiences are better understood as icons of a species-specific interface rather than as an insight into the objective structure of reality. This requires a fundamental reformulation of the theoretical framework for understanding objects. This reformulation cannot assume that physical objects have genuine causal powers, nor that space-time is fundamental, since objects and space-time are simply species-specific perceptual adaptions. If we assume that conscious subjects, rather than unconscious objects, are fundamental, then we must give a

> mathematically precise theory of such subjects, and show how objects, and indeed all physics, emerges from the theory of conscious subjects [24].

Looking back, Russell and Whitehead may have overlooked the possible idea that there is no objective number system and thus the number one doesn't actually exist. Considering the world as an illusionary projection, almost like a computer code of which we haven't started programming and which in turn is equal to zero (nothingness, or a null value). The new Universal Law of Homeostasis is based on the assumption that the universe has a fundamental axiom to stay in a state of zero entropy, the zero state static system which is a type of "nothingness". However, disturbances from multiple consciousnesses (observers) seemingly force the state away from zero and dynamic behavior emerges to rebalance the local zero state. In this dynamical appearance it is still possible for a dynamic Energy Tensor Field to remain balanced to a zero sum. There are many different intrinsic (or "proper") frames of reference in the universe which can be viewed as closed, resulting in zero entropy, or connected as a group which would also have a total entropy of zero. It is this continuous adjusting from multiple consciousnesses for universal balance and our perception of it that may give the illusion of the various modes of change: velocity, gravity, acceleration and movement. This is accomplished by assigning every point in space an entropy of zero and by offering the time and space as variables (with Electric and Magnetic Fields defined as tangent bundles). The total energy at any point can be changing in representation to maintain universal equilibrium from any observer.

8 Symmetry

An emergence theory, starting with our consciousness, would follow a logical progression. Zero is a critical mathematical concept which may be used in a new kind of physical theory that integrates consciousness with invariance. Invariance laws, conservation laws and their symmetry are all intimately connected to zero by the fundamental definition that transformations (or changes) leave certain properties unchanged (zero change). Both sides of the subject/object dualism experience change / transformation, yet this transformation may somehow be an empty illusion. This is naturally suggestive from invariance laws. Every concept needs an equal and opposite anti-concept. Both in Newtonian mechanics as well as the Theory of Relativity, invariance plays a key role. Applying the above to physical laws, we may be guided to find a way to express the quantum and classical physics theories to achieve a conservation condition of a zero rest state. This new, to-be-determined formulation would be used to indicate degrees of disturbances from the equilibrium "zero" state of the universe. The attempted disturbance from equilibrium manifests to the scientific observer as one of the many forms of change we observe in the universe. Any kind of change or motion of variables is therefore seen in this paradigm as a tendency for the universe to maintain a zero state.

9 The Symmetrical Solution

In order for us to explain a somethingness from a nothingness, we must accept that there can be a concept that is equal and opposite from a "anti-concept". Typically, conventional scientists would look towards the smallest building blocks for a fundamental symmetry. The electron, positron, proton or nuetrons or any other relatively "small lego blocks" are the most conventional contenders. But, because space and time are ubiquitous and necessary in almost every consideration of physics and life, these phenomenon may hold the key. Not only is spacetime ubiquitous, it is one of the most misunderstood but always featured prominently in philosophy. It is a difficult concept to understand, but it is also hard to define its properties and topology. So, with a questionable theory of time, the rest of science is equally questionable and it makes sense to look for a different understanding and structure of time, that will help the rest of the sciences unite.

The concept of time, then seems to attract our attention for reappraisal of our foundational scientific mortar. Our conventional concept of spacetime includes a length, width and height dimension (x,y,z) in combination with an arrow of time (t). In a metric signature, this can be written as (-,-,-,+) an is know as Minkowski spacetime. What if time and space were symmetrical with a metric signature of (-,-,-,+,+,+). If space and time were equal and opposite, this would then help us identify our concept and anti-concept and explain something from nothing.

Interestingly enough, and with a bit of research, we can find that William R Hamilton spent much of his life pursuing such a metric throughout the 1800's.
[1]

We are then guided, by Hamilton and our intuition, to assign two more degrees of freedom to our concept of time based on symmetry, without any proof that would refute such a claim, despite assumptions about corruption of causality. Kant's philosophy guides us towards placing spacetime in a foundational role. We can explore reducing the number of space dimensions, but remember we are interested in symmetrical dimensional signatures. We now can have an equal and opposite, concept and anti-concept upon which to attempt to balance our realities.

Another questionable assumption made by mathematicians, scientists and engineers throughout history include fundamental theories of the metric systems and the number theory. In contrast to these "a-priori" assumptions, some physicists such as Michael Duff hold that the laws of physics are inherently dimensionless. The fact that we have assigned incompatible dimensions to length, time and mass is, according to this point of view, just a matter of convention.

Metrics are ratios. When measuring something, it is always in relation to something else — there is always some frame it is in reference to. In the development of scientific knowledge, cascades of observations and ideas tend to lead us to consider ultimate frames of reference. Einstein's Theory of Relativity does away with the need for absolute frames of reference; the laws of physics are the same in any inertial frame of reference. Doing away with absolute frames of reference does not preclude choosing specific types of frames of reference for specific problems. For example, matter in the universe, such as the cosmic microwave radiation as a whole, can have a preferred frame of reference. From that, if we try again, it is possible that we could set one unit of time equal and opposite to one unit of space (distance).

Historically, symmetry and invariance were perceived as different concepts. From David Gross, 1998 on the role of symmetry in fundamental physics:

> Until the 20th century principles of symmetry played little conscious role in theoretical physics. The Greeks and others were fascinated by the symmetries of objects and believed that these would be mirrored in the structure of nature. Even Kepler attempted to impose his notions of symmetry on the motion of the planets. Newton's laws of mechanics embodied symmetry principles, notably the principle of equivalence of inertial frames, or Galilean invariance. These symmetries implied conservation laws. Although these conservation laws, especially those of momentum and energy, were regarded to be of fundamental importance, these were regarded as consequences of the dynamical laws of nature rather than as consequences of the symmetries that underlay these laws. Maxwell's equations, formulated in 1865, embodied both Lorentz invariance and gauge invariance. But these symmetries of electrodynamics were not fully appreciated for over 40 years or more [25].

Einstein was the first to formally notice the connection between symmetry and invariance:

> This situation changed dramatically in the 20th century beginning with Einstein. Einstein's great advance in 1905 was to put symmetry first, to regard the symmetry principle as the primary feature of nature that constrains the allowable dynamical laws. Thus the transformation properties of the electromagnetic field were not to be derived from Maxwell's equations, as Lorentz did, but rather were consequences of relativistic invariance, and indeed largely dictate the form of Maxwell's equations. This is a profound change of attitude. Lorentz must have felt that Einstein cheated. Einstein recognized the symmetry implicit in Maxwell's equations and elevated it to a symmetry of space-time itself. This was the first instance of the geometrization of symmetry. Ten years later this point of view scored a spectacular success with Einstein's construction of general relativity. The principle of equivalence, a principle of local symmetry—the invariance of the laws of nature under local changes of the space-time coordinates— dictated the dynamics of gravity, of space-time itself.
>
> With the development of quantum mechanics in the 1920s symmetry principles came to play an even more fundamental role. In the latter half of the 20th century symmetry has been the most dominant

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[1] O'Donnell, Sean. "William Rowan Hamilton, Portrait of a Prodigy." Dublin, Ireland: Boole Press Limited, 1983.

> concept in the exploration and formulation of the fundamental laws of physics. Today it serves as a guiding principle in the search for further unification and progress [25].

This invariance / symmetry relationship has gone on to become more notable in modern gauge theory:

> Gauge theories have assumed a central position in the fundamental theories of nature. They provide the basis for the extremely successful standard model, a theory of the fundamental, nongravitational forces of nature— the electromagnetic, weak, and strong interactions. To be sure gauge invariance is a symmetry of our description of nature, yet it underlies dynamics. Gauge invariance forces the existence of special particles, gauge bosons[25].

Symmetries such as Einstein's relativistic invariance or the symmetrical gauge invariant have predictive power. Symmetry provides us with an important tool for the exploration of the fundamental laws of nature. And yet, there is no clear answer for why nature should be symmetrical. This unclear answer forces us to once again examine our most basic assumptions to discover an even deeper epistemology of the universe that uses fundamental and symmetrical concepts to describe the universe.

"On the supposition that Euclidean geometry is not valid, it is easy to show that similar figures do not exist; in that case, the angles of an equilateral triangle vary with the side in which I see no absurdity at all. The angle is a function of the side and the sides are functions of the angle, a function which, of course, at the same time involves a constant length. It seems somewhat of a paradox to say that a constant length could be given a priori as it were, but in this again I see nothing inconsistent. Indeed it would be desirable that Euclidean geometry were not valid, for then we should possess a general a priori standard of measure." — Letter to Gerling, 1816 Carl Friederich Gauss

Higher dimensional spaces may prove to hold the key to an adequate description of reality that integrates the subject and object duality into the explanation. As early as 1870, mathematical physicist W.K. Clifford, using ideas of non-Euclidean geometry developed by Riemann, proposed that our ordinary three dimensional space is actually curved in a four dimensional hyperspace [26].

Projective geometry is seen as a viable mathematics that can be used to construct a systematic theory of symmetry that embeds our findings of consciousness. Because projective geometry does not depend on distance, it offers the ability for unit-less but still ratio-based measurement. It occupies a fundamental position in the field of geometry because all other geometries can be derived from it. Further, this type of Math "allows" certain categories of mathematical "complete" infinities, but disallows other types of infinities, thus satisfying our philosophical challenges.

Hyperbolic geometry, and by association projective geometry, plays an important role in special relativity. If the universe existed in a perfectly balanced state, perfect organization would obtain, producing a universe without entropy.

In a 'best fit' prediction, the authors of this paper support adding two dimensions to the ordinary single time dimension, to obtain three spatial and three temporal dimensions. Despite skepticism about what effect another time dimension may produce on causal reasoning, philosophy's investigation of the nature of time can help illuminate this ephemeral vector for scientists. Science will never advance on a steady keel, as long as the understanding of time remains precarious. The importance of the concept of symmetry must be maintained if we argue that there is an emergence from zero (nothingness). In order to maintain symmetry between time and space, our best option is to add two more dimensions to our concept of time.

In the proposed theory, the fundamental variables are the electric field, magnetic field (tangent bundles), time and space: if science measures perceptions within these fundamental forces, in place of regular units, the balance will require that each point in space possess a total entropy that equals zero. If that case does not bear out, then this geometry does not align with physical reality. This axiom of conservation law, which asserts that each point rebalances to a zero state, could account for action at a distance. All change is generated through the act of "maintaining" zero state. This process of change can propagate like wave motion of energy moving through space. That operation does not invalidate motion of particles at the localized level. Every observable change (creation, motion, heat-transfer, division and death) might appear as manifestations of the universe summing to zero.

And finally, our base axioms, as delivered to Dr. Brett Teeple in order to reinterpret our reality with six dimensional math were:

1. Our reality is a consciousness projection and as such a type of nothingness.
2. Within our illusion, spacetime is the fundamental force, with all other physics laws being derived from it.
3. There is a symmetrical spacetime signature. We will explore the most obvious symmetrical signature being three time and three space dimensions. This is naturally suggestive from invariance laws. Every concept needs an equal and opposite anti-concept.
4. In our illusion, infinities are a "closed" infinities.
5. Geometrical math is fundamental to our illusion.
6. In multiple "proper" timespace perspectives, the geometry must be preserved.
7.

Table 1: Law of Homeostasis Parameter

KNOWLEDGE DOMAIN	**OUTSTANDING PROBLEM**	**HOMEOSTASIS PARAMETER / REFERENCE**
Mathematics	Infinity	Constructivist Analysis [11]
Measurement	Number Theory	SO (3,3) [12]
Psychology	Objective reality exists? Is it a consciousness projection?	Field of "zero state" [25, 19]
Physical Sciences	Standard Model, Supersymmetry, Metrics	Conservation laws acting on Field of Zeros, No Entropy and a Zero Sum Energy Tensor.

These postulates and accompanying basic axioms may offer enhanced predictive power by equalizing the time and space concepts, now all possessing equivalent degrees of freedom. Proposing a different concept of time may lead to fundamental new symmetries, an explanation of infinitesimals and an intimate connection to consciousness. In a "best fit" prediction, we propose adding two more dimensions to the ordinary single time dimension to obtain three spatial and three temporal dimensions that would produce the most synchronicity with conventional science by addressing the challenging concept of infinity, consciousness and the existing number systems. Building from this research, we can create the image below in which our reality of three space dimensions and one time dimension is a consciousness projection from six dimensional spacetime. We explore the possibility of a type of nothingness and the projected somethingness that emerges from the nothingness. (See Fig. 2)

Developing a formal dynamical theory from this, we can now make derivations from our formal system and deduce formal predictions that can be tested against known results of science and also make new predictions. In this dynamical appearance it is still possible for a dynamic Energy Tensor Field to remain balanced to a zero sum.

This is accomplished by assigning every point in space an entropy of zero and by offering the time and space as variables (with Electric and Magnetic Fields defined as tangent bundles). The total energy at any point can be changing in representation to maintain universal equilibrium from any observer.

9.1 Excerpts from: 6D Mathematics:Emergent Natural Laws of Physics, Chemistry, Biology and SocialSciences 2018, 360 pages.

What we are to examine here is a novel symmetric simple interpretation of the laws of Nature, not just physics, but chemistry and biology as well. The main development of this results in our usual spacetime $R^{3,1}$ with metric $\eta_{\mu\nu} = diag(-1,-1,-1,-1)$, (Minkowski space) with three spatial dimensions, and one time dimension. Here the time dimension has index $\mu = 0 \wedge \mu = 1, 2, 3$ are our standard spatial x,y,z, coordinates. However, here we extend time into a three dimensional space in itself. How does this work? Well to start it means that there is a three dimensional 'trajectory' of a particle solving Newton's second law, which can be approximately our usual one dimensional trajectory solving $\overrightarrow{f} = \overrightarrow{ma}$. This is because the other time dimensions evolve slower than our

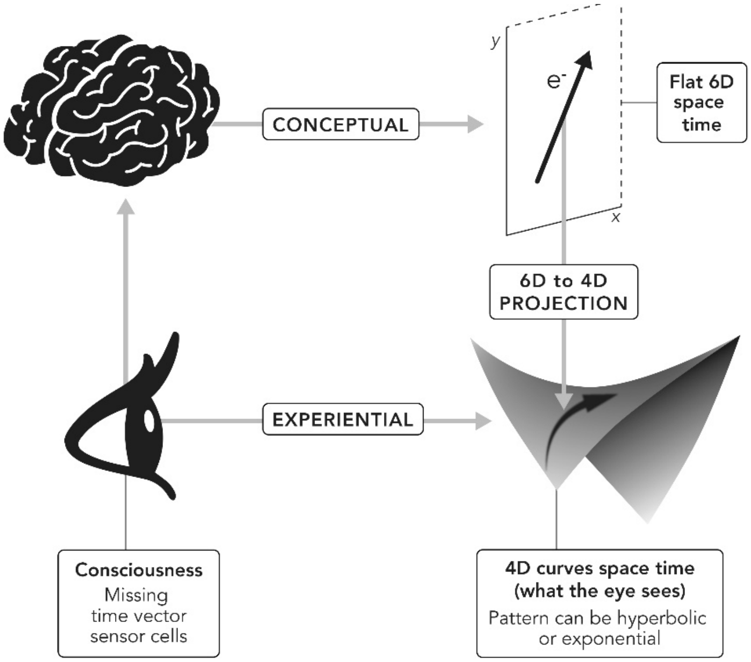

Figure 2: Human's do not perceive the two extra time dimensions. They exist in our awareness on a subconscious level. Human's perceive a sum reality of six minus two dimensions

time as we thought. However, especially with quantum effects, physics and its more strange quantum and high energy results can be described by a 'time spectrum', where time is actually a trajectory (curve) $\tau : R \rightarrow R$ At low energies and large spatial scales, the extra time dimensions, denoted u and v, are such that $t \gg u, \nu$. High energy relativistic effects can be attributed to more significant extra time dimensions, and so as small-scale quantum mechanical effects can be attributed to time deviations $t \rightarrow \tau(t, u, v)$ that become more significant at small spatial length scales. We will see the power of this symmetry not only in physics, but in chemistry, biology, and basically a whole variety of natural structures and laws which we will call 'physical laws of biology' that fit perfectly into this six dimensional space-time framework, with metric $g_{\mu\nu} = diag(-1, -1, -1, 1, 1, 1)$ where under usual conventions the spatial directions have negative signature and run with indices 1, 2, 3, while time dimensions have indices 4, 5, 6.

The so-called Theory of Everything is a theory of physics to unify all the forces of nature into one physical and mathematical entity, both a formula and a source. This includes gravity (both geometric/general relativistic or gauge-quantum in nature), quantum mechanics, electricity, magnetism, strong and weak nuclear forces in nuclear physics and particle theory, and special and general relativity. There, along the way, must also be found an answer to unanswered problems in physics relating to the fate of the Universe, the Big Bang, it's very early stages, the abundance of Dark Matter in the Universe and what it is, the existence or non-existence of supersymmetry, and extra dimensions, and how many there are, the size of the cosmological constant, the proton decay problem, quark confinement and mass gap, matter anti-matter asymmetry, and the list goes on and on,..., not to mention even day to day problems! Here we describe space and time as R3;3 as having three degrees of freedom each as the base manifold. Electricity and magnetism have three degrees of freedom each as well and live on the cotangent bundle of the spacetime.

Let us now switch to a discussion of spacetime algebras that will emphasize this 6D symmetric spacetime. This will unify and simplify all the laws of various areas of physics, from electromagnetism, to classical dynamics, astrophysics, particle theory, and relativity and gravity. Let us look at the algebraic constructions, called geometric algebra, which simplifies and has predictive power in all of Nature including "laws of biology" and much of all natural objects and phenomena, from mountains and magnets, flowers, leaves, human/mammal body's respiratory and circulatory systems, and all the way to emergent gravity, dark matter, cosmology implications, and deterministic 6D views of quantum mechanics, and new states of matter! The beauty and simplicity and predictive power of this approach and algebra will be seen in the following math!

Let us review the basics of transformations in $\mathbb{R}$3,3 preserving the 6-spacetime metric, that is Lorentz transformations of SO(3;3), after a review of the basics.

SO(3) is the group of rotations in 3d space and is a subgroup of the Lorentz group SO(1;3). It is defined as the group of transformations which preserves the norm of vectors, or analogously which preserves the metric δ i,j (in R3 the metric is the identity matrix whose components are given by the Kronecker delta)

SO(3;3) is the special orthogonal group in 6d space R6 with metric η

$$\eta = diag\left(-1,-1,-1,1,1,1\right).$$

It is defined as the group of transformations which preserves the metric

$$\Lambda \in SO\left(3,3\right) \Longrightarrow \Lambda^{\rho}_{\mu}\Lambda^{\sigma}_{\upsilon}\eta_{\rho\upsilon} \Longrightarrow \Lambda^{T}\eta\mathit{\Lambda} = \eta$$

In order to obtain the generators of the group, we consider an infinitesimal transformation

$$\Lambda^{\rho}_{\mu} = \delta^{\rho}_{\mu} + \delta\Lambda^{\rho}_{\mu},$$

where δ^{ρ}_{μ} is the Kronecker delta and $\delta\Lambda^{\rho}_{\mu}$ represents an infinitesimal perturbation. Substituting this expression

$$\left(\delta^{\rho}_{\mu} + \delta\Lambda^{\rho}_{\mu}\right)\left(\delta^{\rho}_{\mu} + \delta\Lambda^{\rho}_{\mu}\right)\eta_{\rho\sigma} = \eta_{\mu\upsilon} \Longrightarrow \delta\Lambda^{\rho}_{\mu}\eta_{\rho\upsilon} + \delta\Lambda^{\rho}_{\mu}\eta_{\sigma\mu} = 0$$

The solution of this equation, in matrix form, is

$$\delta\mathit{\Lambda} = \begin{pmatrix} 0 & r_1^1 & r_1^2 & b_1^1 & b_1^2 & b_1^3 \\ -r_1^1 & 0 & r_1^3 & b_2^1 & b_2^2 & b_2^3 \\ -r_1^2 & -r_1^3 & 0 & b_3^1 & b_3^2 & b_3^3 \\ b_1^1 & b_2^1 & b_3^1 & 0 & r_s^1 & r_s^2 \\ b_1^2 & b_2^2 & b_3^2 & -r_s^1 & 0 & r_s^3 \\ b_1^3 & b_2^3 & b_3^3 & r_s^2 & r_s^3 & 0 \end{pmatrix}$$

where we used the notation r_1^i to indicate the infinitesimal rotations in the time subspace, r_s^j to indicate the rotations in the spatial subspace, and b_m^n to indicate a boost concerning the temporal axis m and the spatial axis n.

For our Six Dimensions we find:

$$B^{11}\left(\xi\right) = \begin{pmatrix} \cosh\left(\xi\right) & 0 & 0 & \sinh(\xi) & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ \sinh(\xi) & 0 & 0 & \cosh(\xi) & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

In order to show the relation between rapidity and velocity, assume to have two reference frames. We can consider the first to be fixed while the second is moving along the first time coordinate t1 (but not the other temporal coordinates) and along the first spatial coordinate x1 respect to the first frame. Then, we can restrict the 6-dimensional spacetime to the 2-dimensional subspace (t1;x1) and the relation between the two frames is given by (in Planck units c=G $\hbar = 1$)

$$\begin{pmatrix} t_1' \\ x_1' \end{pmatrix} = \begin{pmatrix} \cosh\left(\xi\right) & \sinh(\xi) \\ \sinh(\xi) & \cosh\left(\xi\right) \end{pmatrix} \begin{pmatrix} t_1 \\ x_1 \end{pmatrix}$$

Where we follow the derivation and preserve our axioms and the geometry when a second observer is added, we see that it results in a greater predictive power. Some of the enhanced predictions include a Heavy Higgs Particle, Dark Energy and a prediction of Electrons and Muons.

A more detailed view of the theory and its predictions and applications is shown in the Figure 3.

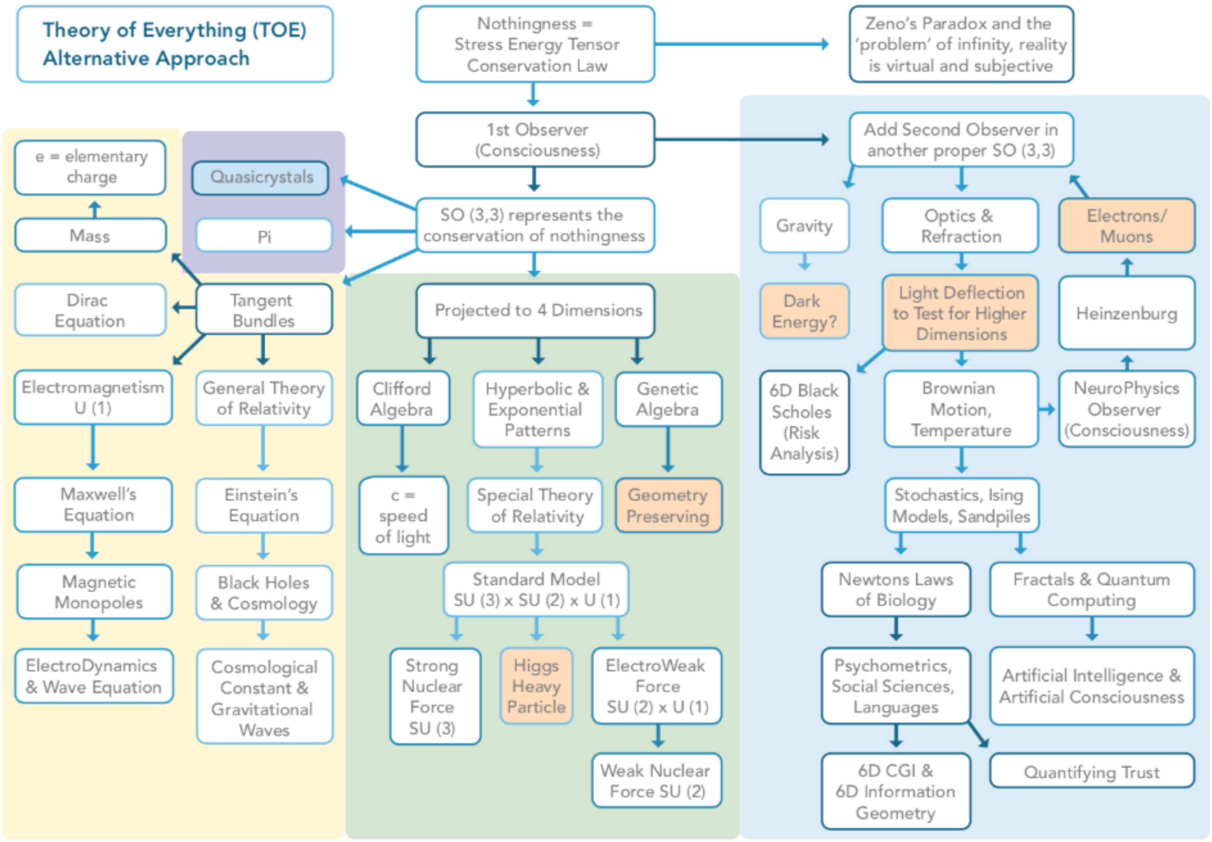

Figure 3: Extensions, predictions and applications of our approach and the Outline of this book. Some of the notable enhance predictions include Quasicyrstals, Dark Energy, Electron and Muon derivation, geometry preserving and a "Heavy" Higgs particle.

10 Conclusion

We stand at a crossroads in knowledge with fundamental inconsistencies emerging across multiple fields and affecting each other in complex feedback loops. Though the concepts of infinity and quantum mechanics is firmly accepted in mainstream mathematics and science, the persistent debates of the continuous vs quantized nature of reality by scientists working at the foundational level point to potentially deeper unresolved issues. Since its spectacular success, quantum theory has settled down to become a mature theory. Yet in the form of the Standard Model, it has failed to account for many key observations such as dark matter, dark energy, an expanding universe, gravity and a unified field theory. Physicists are becoming increasingly uncomfortable with the growing number of assumptions and numerical constants the model requires in order to explain observations and the dearth of observations predicted by the model. When a model begins to take on an adhoc nature, scientists have an intuitive sense that the model is not a good match for the reality it is representing. The failings of the standard model has given rise to even more exotic theories such as super symmetry and string theory. Consciousness is still the elephant in the room and in spite of the serious ramifications of the Heisenberg Uncertainty principle, scientists still fail to incorporate it in a consistent way in the mundane acts of scientific observations and reasoning used to reach conclusions. The hard problem and the mind/body problem of neuroscience remain as intractable as ever. The lack of progress in neuroscience is not limited to neuroscientists alone, however. Physical science is pushing the very boundaries of the small and large and at these limits, the role of the observer cannot be discounted. It is suggested that the inconsistencies emerging across broad fields of knowledge and their lack of consistent solutions are not accidental but due to the silo approach to solving problems. We propose adapting a *whole system approach that employs multi-disciplinary teams to develop new laws that can consider all the complex feedback loops of each respective discipline. The author proposes the investigation of a new law called the Universal Law of Homeostasis which reworks the fundamental parameters of physical science into a new zero entropy equation. Further, it is proposed that such new multi-disciplinary approach be used to systematically explain the anomalies in all these fields in relation to the new law. Such foundational-level investigations does not exclude philosophical and metaphysical components because the ideas themselves may generate inconsistencies.*

In the Universal Law of Homeostasis, it is no less reasonable to assume that a new kind of symmetry in which the structure of our spatial reality is represented by zero states everywhere as it is to suppose that reality is composed of difficult infinities at various scales. Though such a model may appear contradictory within our current model of reality, it is neither impossible nor inconsistent. This new descriptive model is possible by establishing a new set of axioms selected to generalize existing laws in all fields it encompasses and at the same time deal with inconsistencies across broad domains of knowledge.

Within this new theory, there are many systems that must act to keep the world in perfect balance of a zero state field. The universe is in constant flux as disturbances shuttle from one locality to another, forcing the universe to keep in balance locally everywhere. From the intrinsically static field, the apparent dynamism of the universe emerges in a natural propensity to continually maintain the zero state field.

In order to experimentally show the validity of the Homeostasis theory we are required to connect the theory to conventional science and subsequently improve the predictive power of conventional knowledge, which we have done. Our theory of nothingness aligns with conventional science.

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