

The iQuad Path into the Garden

A foundationalist approach to seeing
the truth of UTUA.



iQuad Entrance

Part I:

A Brief Overview of The Garden and Truth

The Garden of UTUA is a new kind of knowledge system built by Dr. Gregg Henriques. It positions itself as an exemplar of the "Ionian Enchantment" and claims to offer the first "truly unified" view of human knowledge.

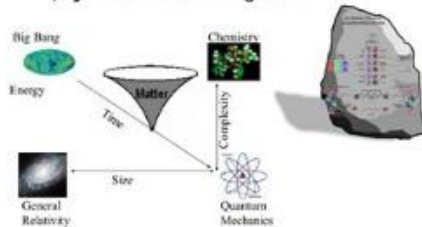


A Brief Overview

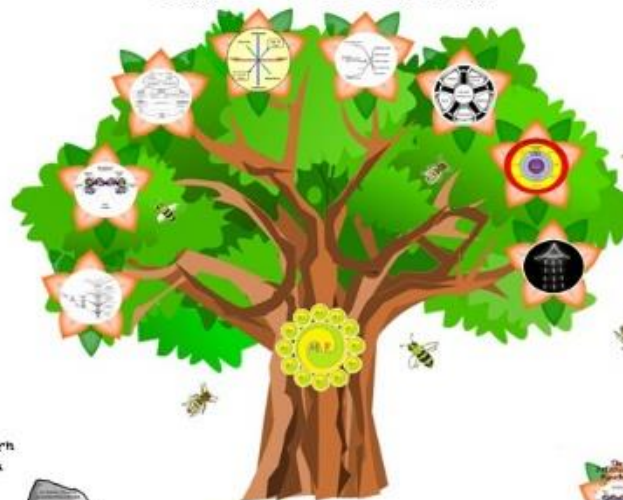
The word UTUA (pronounced: a TOA) comes from the combination of "UT" and "UA", where UT stands for the unified theory of psychology and UA stands for a unified approach to psychotherapy. In the Garden, you will find the **STEPPING Stone**, the **MEUTUATOK Tree**, **UTUA Flowers**, the **UTUA Seed**, and two **UTUA Bees**, the **WKIP WTBMB** and the **WIC WB**. The Garden is an artistic representation of a system of knowledge that offers a novel way to unify modern science, psychology, and philosophy into a coherent scientific humanistic worldview. The Garden is scientific in the sense that it offers a map of the universe that is consistent with modern scientific knowledge, from quantum mechanics to sociology. It is humanistic in the sense that it embraces value-based living, meaning-making, creative expression, and the concept of the sacred. As such, the Garden provides a place for the two cultures of the academy, the sciences and the humanities, to come together in a mutually inspiring dialectical dance.






The Garden is grounded in modern physics via the STEPPING Stone.



The MEUTUATOK Tree



The **UTUA Seed** includes a way to link mathematics to humanistic thought , a new theory of education , and a way to cultivate wisdom .



The **WKIP WTBMB** pollinates wisdom via the Knowledge Hierarchy and Wholistic Inter-Subjective Mental Behaviorism.

The **WIC WB** builds structures that foster Wisdom, Interests, Character, and Well-being.



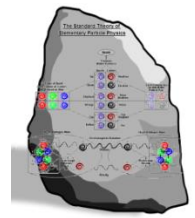
The M.E. Flower Garden

A New Kind of Knowledge System that Challenges the Current Disorder of Things

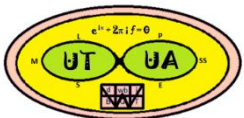
Currently, human knowledge systems are enormously fragmented. Even the scientific picture of the universe is characterized by significant degrees of [conceptual disorder](#). This is accepted by many as inevitable. To even suggest that there is one framework that might set the stage to unify the great branches of human knowledge into a coherent scientific humanistic philosophy is considered by most modern day intellectuals to be absurd. To claim that the Garden is a successful frame for unifying human knowledge is to claim that the impossible has in fact been achieved. One must be brave to even entertain the idea. In short, the Garden is [like nothing we have ever gone after before](#). And iQuad is the formal entrance.



The Garden of UTUA: A Brief Overview

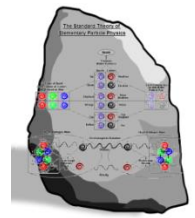


The word UTUA (pronounced ə tü ä') comes from the combination of "UT" and "UA", where UT stands for the unified theory of psychology and UA stands for a unified approach to psychotherapy. The Garden is an artistic representation of a system of knowledge that offers a novel way to unify modern science, psychology, and philosophy into a coherent scientific humanistic worldview. The Garden is scientific in the sense that it offers a map of the universe that is consistent with modern scientific knowledge, from quantum mechanics to sociology. It is humanistic in the sense that it embraces value-based living, meaning making, creative expression, and the concept of the sacred. As such, the Garden provides a place for the two cultures of the academy, the sciences and the humanities, to come together in a mutually inspiring dialectical dance.

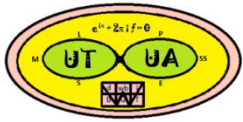




The Concept of Truth in the Garden



- Western philosophy is defined in large part by the search for truth.
- The Garden embraces the idea that there are three ingredients to the concept of truth for human knowers. These are: 1) beliefs (an individual or group's perceptions, notions, propositions or ideas regarding the current states of affairs); 2) truth (the "real" state of affairs that exists external to the knower's beliefs); and 3) justification (which refers the relationship between reality and the knower; specifically referring to the networks of reasons and propositions the knower has for their beliefs).
- There are a number of different conceptions of justifiable or epistemological truth. The Garden supports seven major angles on the conception of Truth, each of which are angles on how beliefs are determined to be justified in their truth content and context. They are listed in the next slide.



Seven Angles on the Nature of Truth



- **Foundational**– Formal mathematical truths derived via deductive logic (e.g., $1 + 1 = 2$ is true by definition and deductive logic).
- **Coherence** – Logically coherent concepts and categories that generate both deductive and inductive arguments for coherent or rationalist sense making.
- **Correspondence** – Scientific, capital E Empirical truths; data-based investigations of facts regarding the current state of affairs gathered by systematic investigation that attempts to control for the subjective bias of any particular observer.
- **Phenomenological** – One’s theater of conscious experiences and unique narrative; also small “e” empirical truths referring to that which one pulls in through one’s senses; also the truth of our subjectivity as such.
- **Social construction** – Shared social and cultural truths; the explicit intersubjective consensus by groups of people regarding what is true and truth; intimately connected to power and social context.
- **Moral/Ethical/Aesthetic Truths**–The “ought” angle on truth. What ought to be true and what does it mean to say that it is good to value such things as beauty, goodness, and truth as opposed to ugliness, badness or falsity?
- **Pragmatic** – The conception of truth as what works and what is useful in the world in determining accurate from inaccurate and fostering other goals.

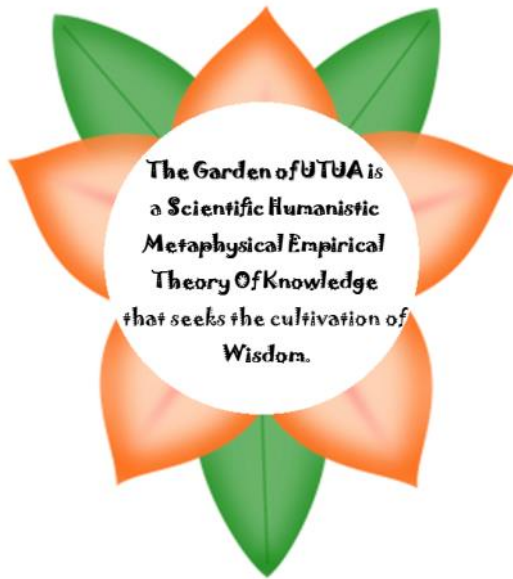


iQuad is a
largely Foundationalist and
Coherence-Based Approach into the Garden.
It explores a form of deductive logic that
attempts to connect to foundational
mathematical and physical truths in a way
allows for a more “direct entrance” into the
Garden and a way to see the “profound truth” of
the Garden.

The term “entrance” refers to how one experiences the Garden. When one is operating from the “exterior” one is viewing it as an object of study.



iQuad Entrance



When one is operating from the “interior,” then it is internalized as one’s belief system; that is, one is a believer in the Truth of the Garden as a justifiable Scientific-Humanistic Metaphysical-Empirical Theory of Knowledge that leads to the cultivation of Wisdom.

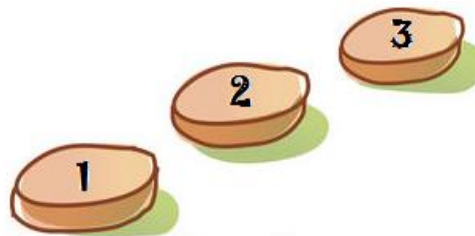
Part II

iQuad:

It starts with Three External Truths

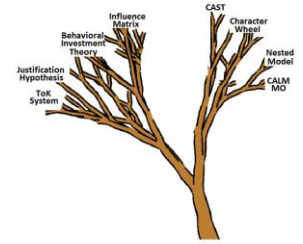
These are things that are true in the world. The three external truths set the stage for the fourth truth, which provides the entry point into the Garden for those seeking a foundationalist path to the truth. The first two truths are formal and mathematical; the third truth is empirical, with an aesthetic twist.

Three iQuad
External Truths...





The First Truth of iQuad is One



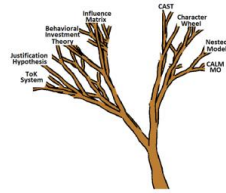
iQuad = 1 is the First Truth

This is because:

- 'i' is the imaginary number, which is the square root of negative one.
- 'Quad' simply refers to 'raised the fourth power'
- Thus $iQuad = i^4$ which equals 1
- $iQuad = 1$ because $(i \times i \times i \times i = 1)$
- So, iQuad equals one is the first truth. It is external, mathematically true and essentially a mathematical deductive truth and, true by the definitions of the system. And it can't be found to not be true in the deductive sense.



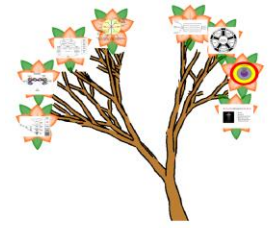
A few of things to note about the First Truth and the Garden



- We are starting with the number 1 as our foundational concept; this is aesthetically satisfying. We will be coming back to this being the truth of 1.
- The concept of an imaginary number is both fascinating and historically has been a bit perplexing to mathematicians; it is generally thought of as a dimension of numbers orthogonal to the dimension of real numbers.
- Real and imaginary numbers make complex numbers ($a + bi$).
- Complex numbers (real and imaginary) are now foundational in the equations that describe both quantum mechanics and general relativity. (This will be mentioned again when we approach the entrance to the Garden).
- We are equating 1 with i^4 ; the idea that there are four hidden dimensions inside of one dimension is going to become an important analogy.



The Second Truth of iQuad: The Truth of the Euler Identity



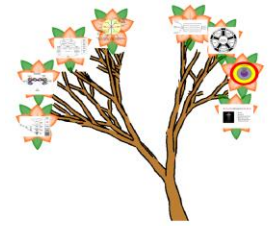
- [The Euler Identity](#) (pronounced 'oiler') is one of the most famous equations in mathematics. It is given as:

$$e^{i\pi} + 1 = 0$$

- The number π is the transcendental irrational number 3.141... and is the ratio of the diameter to the circumference of a circle.
- The number e is the transcendental irrational number 2.718... and is the base of the natural logarithm; the unique number whose natural logarithm is equal to one.
- i is the imaginary number



A few things to note about the Second Truth



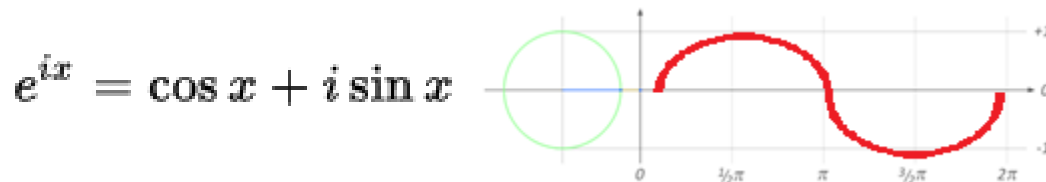
- This is a very important equation because it brings together the fundamental constants, e , π , i , 0 and 1 together in a single formula.
- For straightforward explanations of this identity and why it is true, see [here](#) or [here](#).
- It was mathematically proven to be true by Leonhard Euler
- The natural log constant, e , relates deeply to the mathematicization of change. It is central to calculus, which is the mathematics of change. Newton's invention of calculus went along with his work in physics. Indeed, part of what he accomplished was the mathematical representation of change over time.



A few things to note about the Second Truth



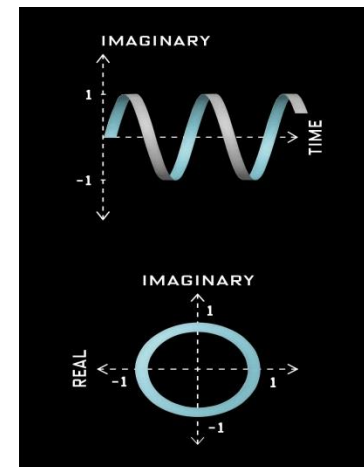
- The Euler identity is a special case of the more general formula:



([see here](#) for graphing process of $y = \sin(x)$ using a unit circle. We will see this representation has a familiar look to it later.)

- [Here is a useful description of an aspect of the Euler Identity](#), with a similar visual (again, this depiction will become important):

Imagine a graph with real numbers on the horizontal axis and, well, imaginary ones on the vertical. Now, remember the exponential function, $f(x) = e^x$, from high school math? Ordinarily it graphs as an upward swooping curve—the very paradigm of progress. But put i in there, Euler showed, and e^{ix} instead traces *a circle around the origin*—an endless wheel of samsara intercepting reality at -1 and $+1$. Add another axis for time and it's a helix winding into the future; viewed from the side, that helix is an oscillating sine wave.





The Third Truth: An Empirical Truth about Mathematical Beauty



- The Third truth is a different kind of truth from the first two. It is an empirical truth. Empirical truths are about factual states of affairs, as opposed to mathematical truths, which are about definitions of concepts and logical coherence.
- The third truth is the (current) empirical fact that:
The Euler Identity is the most beautiful mathematical equation in the world.



The Third Truth: The Beauty of the Euler Identity



- The third truth is based on the fact that, when surveyed about which equations are the most beautiful, [mathematicians consistently rate the Euler Identity as the most “beautiful equation”](#).
- [In 2014, neuroscientists looked at the brains of mathematicians in scanners and found that](#), compared to the other major mathematical equations, the Euler Identity carried the neurological signatures of beauty more than the other equations, in addition to being rated the most beautiful based on self-report.
- Here is [one description of why the Euler’s Identity is so beautiful](#):

The number 1, that most concrete of numbers, is the beginning of counting, the basis of all commerce, engineering, science, and music. As 1 is to counting, pi is to geometry, the measure of that most perfectly symmetrical of shapes, the circle - though like an eager young debutante, pi has a habit of showing up in the most unexpected of places. As for e, to lift her veil you need to plunge into the depths of calculus - humankind's most successful attempt to grapple with the infinite. And i, that most mysterious square root of -1, surely nothing in mathematics could seem further removed from the familiar world around us.

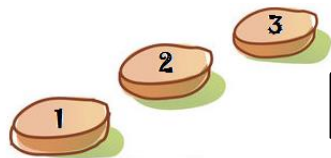
Four different numbers, with different origins, built on very different mental conceptions, invented to address very different issues. And yet all come together in one glorious, intricate equation, each playing with perfect pitch to blend and bind together to form a single whole that is far greater than any of the parts. A perfect mathematical composition.



Reflections on Where We Are



- It should be explicitly noted at this point that “iQuad” is intentionally positioned to look and sound like “iPod”. This is a reference to be a bridge to the world Steve Jobs gave us. Indeed, one can think about taking this tour as “downloading” the “iQuad app” into your mind so you can see the world through the lens of the Garden.
- We have noted two foundational mathematical truths, which are external to the Garden. I emphasize these first two truths because I came to see the importance of i in my work using the ToK System to understand modern physics. The way I did that and the “pseudoproof” which I generated in relation to that insight turned out to relate deeply to the Euler identity, which ultimately gave rise to the equation representing the fourth truth.



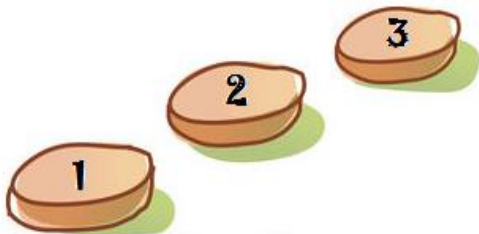
Reflections on Where We Are



- The third truth is of a different nature. It is an empirical truth about mathematical beauty. This empirical truth about mathematical beauty connects via association (not deduction) a central hub in mathematics (the Euler Identity) to the methods and practices and epistemology of science (the empirical investigation of the behavior of brains of mathematicians experiencing mathematical beauty) to the humanities (where the personal experience of beauty has a central place).
- Standing firmly on these three steps, we are now at the foundationalist entrance to the Garden. However, prior to taking the next step into the interior of the Garden, we need to some additional background about the shape and nature of human knowledge.



Preparations for the Fourth Step



Part III:

Preparations for the Fourth Truth

To understand the scope and nature of the Fourth Truth, background knowledge is needed regarding the following:

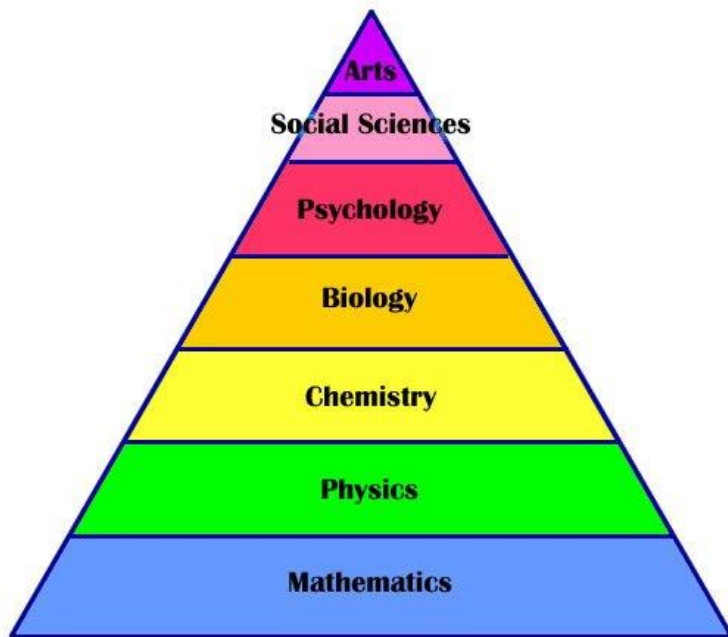
- The concept of Radical Mathematical Humanism (RMH)
- The role of i in modern physics
- Eight Key Points about the ToK and modern physics
- Knower-known relations and the Henriques Hawking Correspondence.
- The ToK and the Concept of Behavior
 - The central metaphysical concept in science
 - Behavior as object field change
 - The ToK as a Map of Behavioral Complexity and Change
 - The Periodic Table of Behavior
- Henriques' Pseudoproof
- Advanced ToK Dynamics
- Henriques' "inverted Sokal"
- The Fourth Truth stated formally

Part III(a):

Radical Mathematical Humanism

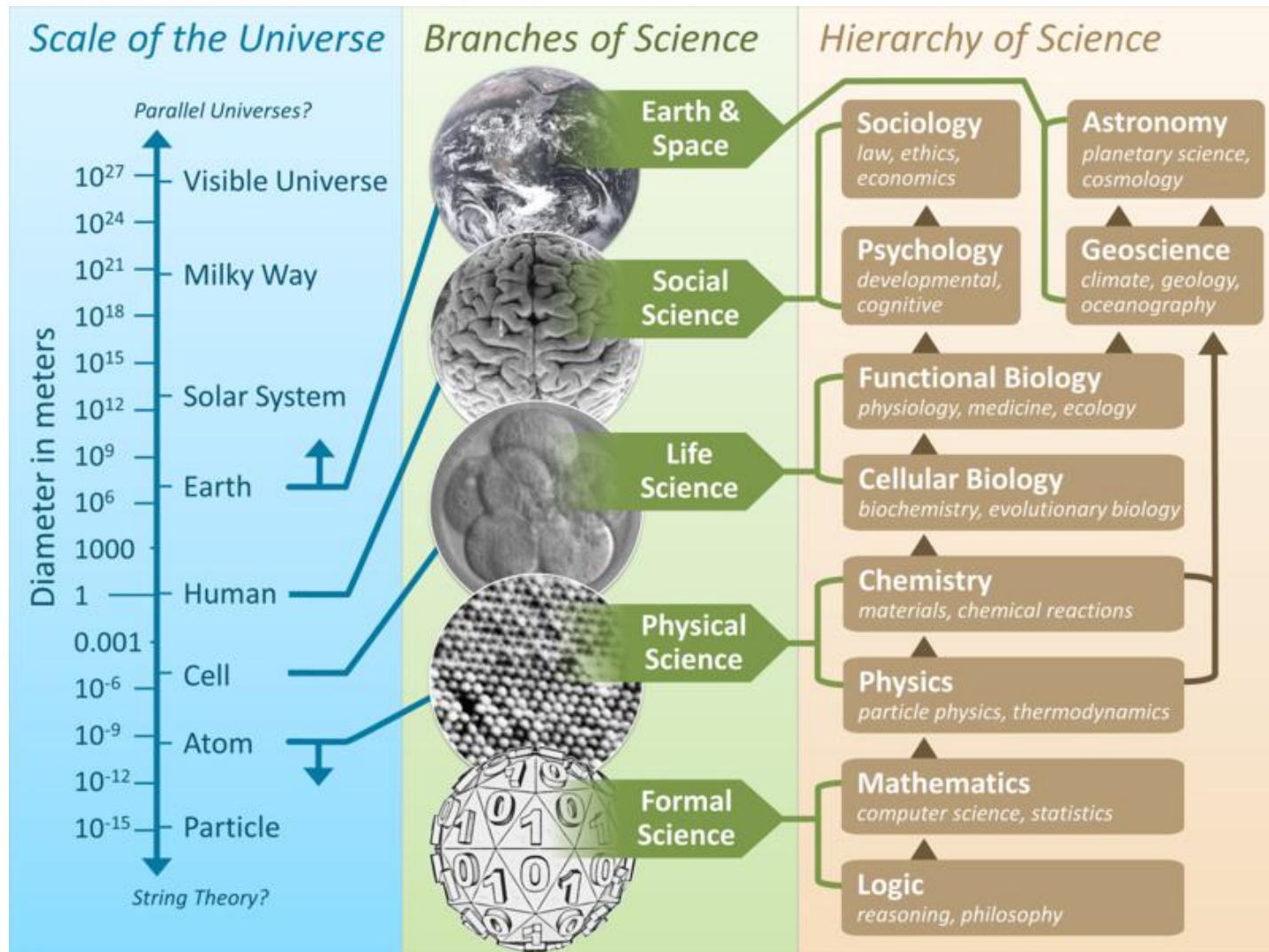
The Fourth Truth is called the “radical mathematical humanistic” or RMH equation. To obtain a grasp as to why, we need to understand the “shape” of human knowledge, from mathematics into science and into the humanities.

Here is one such depiction:



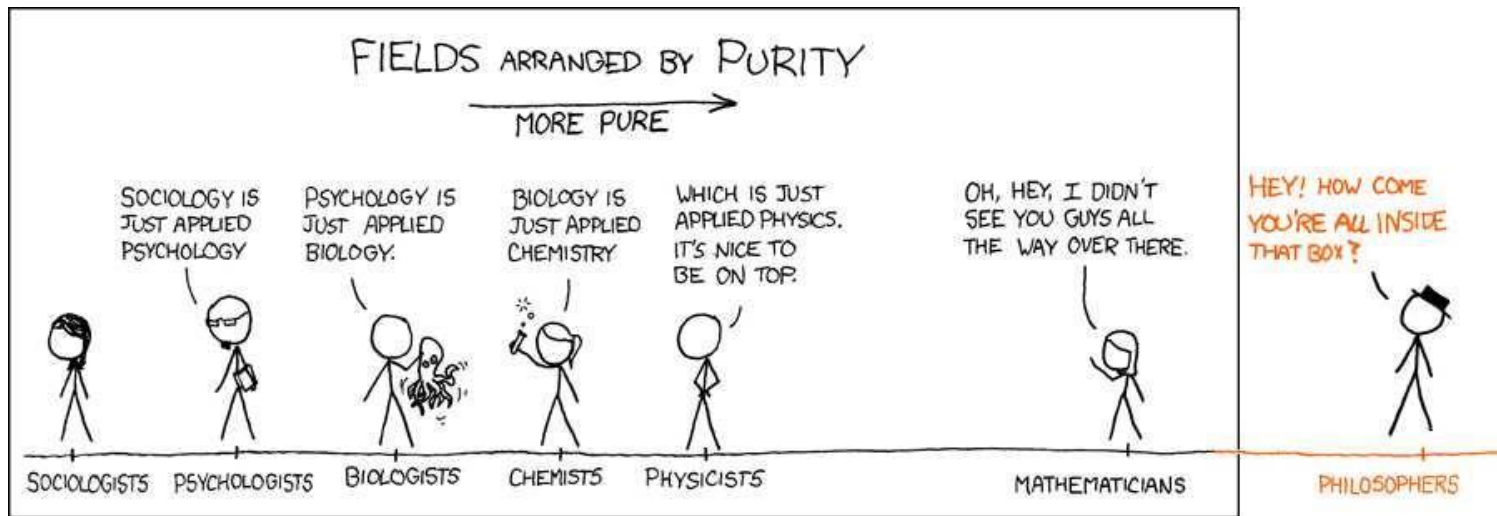
Notice mathematics is at the bottom. It can be considered the most pure or formal knowledge system. Then there are the sciences, listed in order, from more basic to more complex. At the top is the “arts”, which would stand for the humanities more generally. Thus, this depiction shows the progression from mathematics through the natural sciences into the social sciences and then into the humanities.

A Map of the Empirical Sciences on Scale, anchored to “Formal Science” (Math and logic)

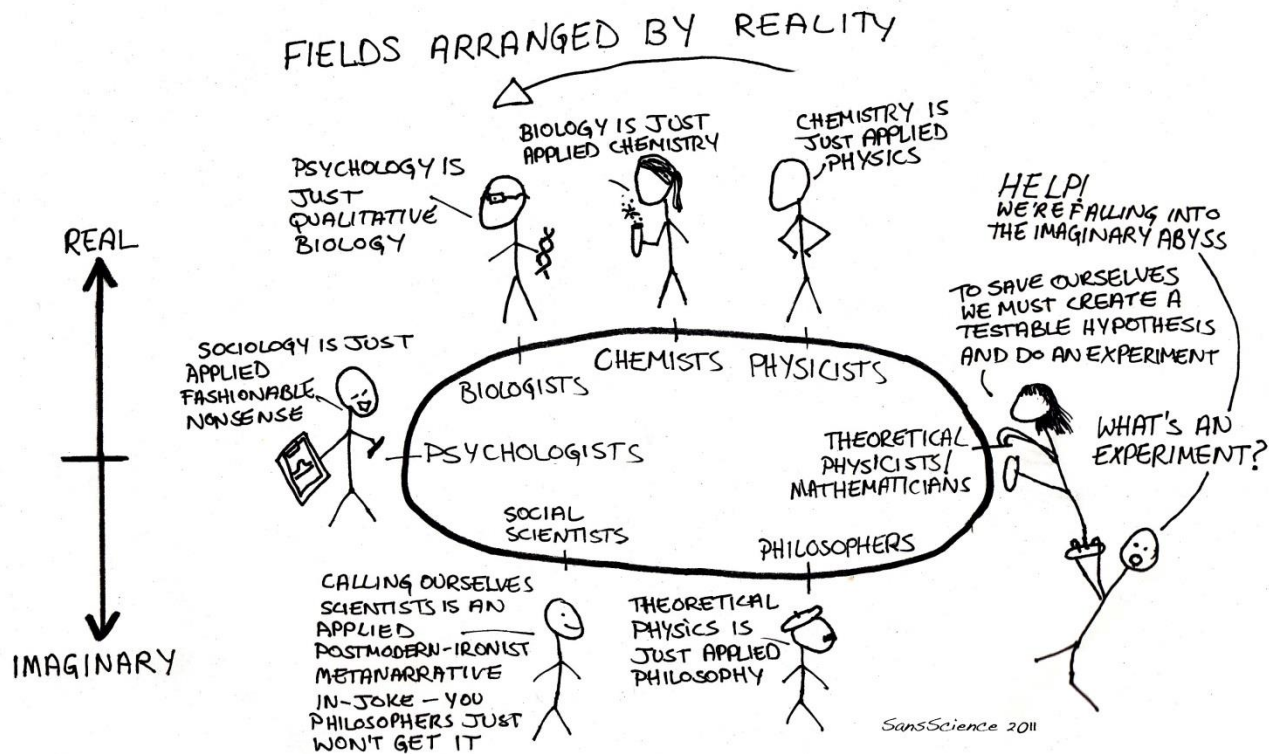


More Depictions of Math, Science, and the Humanities

Here is a similar depiction adding philosophy.



More Depictions of the Relationships between Math, Science, and the Humanities



This depiction is interesting because it captures the “loop of knowledge”, which is part of RMH. (Also take note of the real and imaginary dimensions on the left).

Quick Summary of RMH

- RMH notes the relationship between mathematics, empirical science and the humanities, and human subjectivity in particular.
- RMH notes “the loop”, meaning that, somehow, mathematics emerges from humans to map scientific reality.
- As will be made clear, RMH is a formulation of a subjective humanistic vision through science into mathematics that resulted in the experience of unity.

How can it be that mathematics, being after all a product of human thought independent of experience, is so admirably adapted to the objects of reality? Albert Einstein

Einstein's question is an example of the conundrum of the loop.

Part III(b):

The Root of the Revolution in Modern Physics

- Prior to the beginning of the 20th Century, it was believed that the Newtonian picture of the universe, with its material, mechanical forces and absolute notions of space and time, was the truth and would forever be regarded as such.
- However, between 1900 and 1930, that belief system had been transformed and new formulations were confirmed.
- The traditional, mechanical Newtonian model was split by two different formulations, Einstein's General Relativity and Quantum Mechanics.
- Both upended Newton's notions of absolute space and time. General relativity transformed the understanding of gravity, mass and "spacetime". Quantum mechanics revealed a bizarre world of wave-particle duality, knower-known interactions, a sea of "probabilistic foam", and, ultimately, "spooky action at a distance".

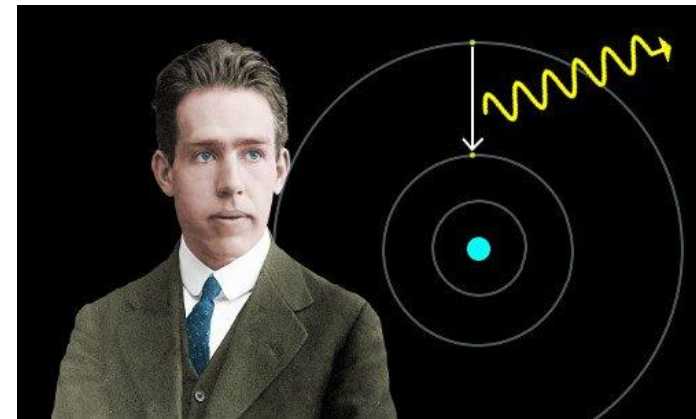
The Root of the Problem: Quantum Mechanics v. General Relativity

- The two great pillars of modern physics are not fully “commensurate”, meaning that they have fundamentally different assumptions regarding the nature of reality and the mathematical equations that support them do not fully converge to yield satisfying results.
- Einstein spent the latter part of his life searching for a Grand Unified Field Theory of Everything, that would unite these two great branches into a single theory.

What is at the Root of Modern Physics?

The Famous Physicist Niels Bohr offered the following summary of one of the foundational conceptual issues that resides at the heart of the modern physics revolution:

*Even the formalisms, which in both theories within their scope offer adequate means of comprehending all conceivable experience, exhibit deep-going analogies. In fact, the astounding simplicity of the generalization of classical theories which are obtained by the use of multidimensional geometry and non-commutative algebra, respectively, **rests in both cases essentially on the introduction of the conventional symbol i** . The abstract character of the formalisms concerned is indeed, on closer examination, as typical of relativity theory as it is of quantum mechanics, and it is in this respect purely a matter of tradition if the former theory is considered as a completion of classical physics rather than as a first fundamental step in a **thoroughgoing revision of our conceptual means of comparing observations, which the modern development of physics has forced upon us.** (p. 64-65) ⁹*



Niels Bohr

Identifying the Root: A Foreshadowing of iQuad

In the concluding article of the two special issues in the *Journal of Clinical Psychology* devoted to the unified theory titled *Toward a Useful Mass Movement* (Henriques, 2005, p. 125), I stated the following in the 8th footnote:

⁸I have included this complicated quote from Bohr because it makes the fascinating point that imaginary numbers play a central role in our deepest mathematical formulations about the physical universe. Although virtually every mathematician will tell you that imaginary numbers are as “real” as real numbers, psychologists should be aware that there are interesting mental operations at work. Lakoff and Nunez’s (2000) *Where Mathematics Comes From: How the Embodied Mind Brings Mathematics Into Being* offers a fascinating overview of the relevant issues. The final reason I offered this quote is that ***I believe the ToK System carries substantive implications for unifying quantum mechanics and general relativity****.

*This final line, bolded here, is a reference to how I had developed a “pseudo-proof” that pointed to the centrality of i in resolving key elements of the conceptual problem Bohr was talking about.

Part III(b):

Quick Summary of the Root of the Modern Physics Revolution

- Newtonian models of the universe presumed an independent observer and three dimensions of space and one dimension of time as absolute reference points.
- Both quantum mechanics and general relativity insist, in different ways, in including the observer in relation to the observed and suggest much more relative conceptions of space and time.
- And, as suggested by the quote from Bohr, both carry with them mathematical formulations that include complex number formulations (i.e., intersections of real and imaginary numbers) that are central and render the conceptual understanding of the relationship between knower and known opaque.
- In 2005, I felt the need to publicly state that I had seen a deep relationship between the ToK System and the complex relationship between quantum mechanics and general relativity.

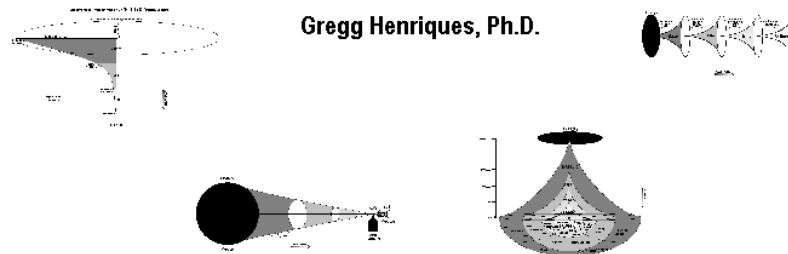
Part III(c):

The ToK and Modern Physics

- The ToK set the stage for a new view of modern physics because it allows one to position the knower in relation to the known.

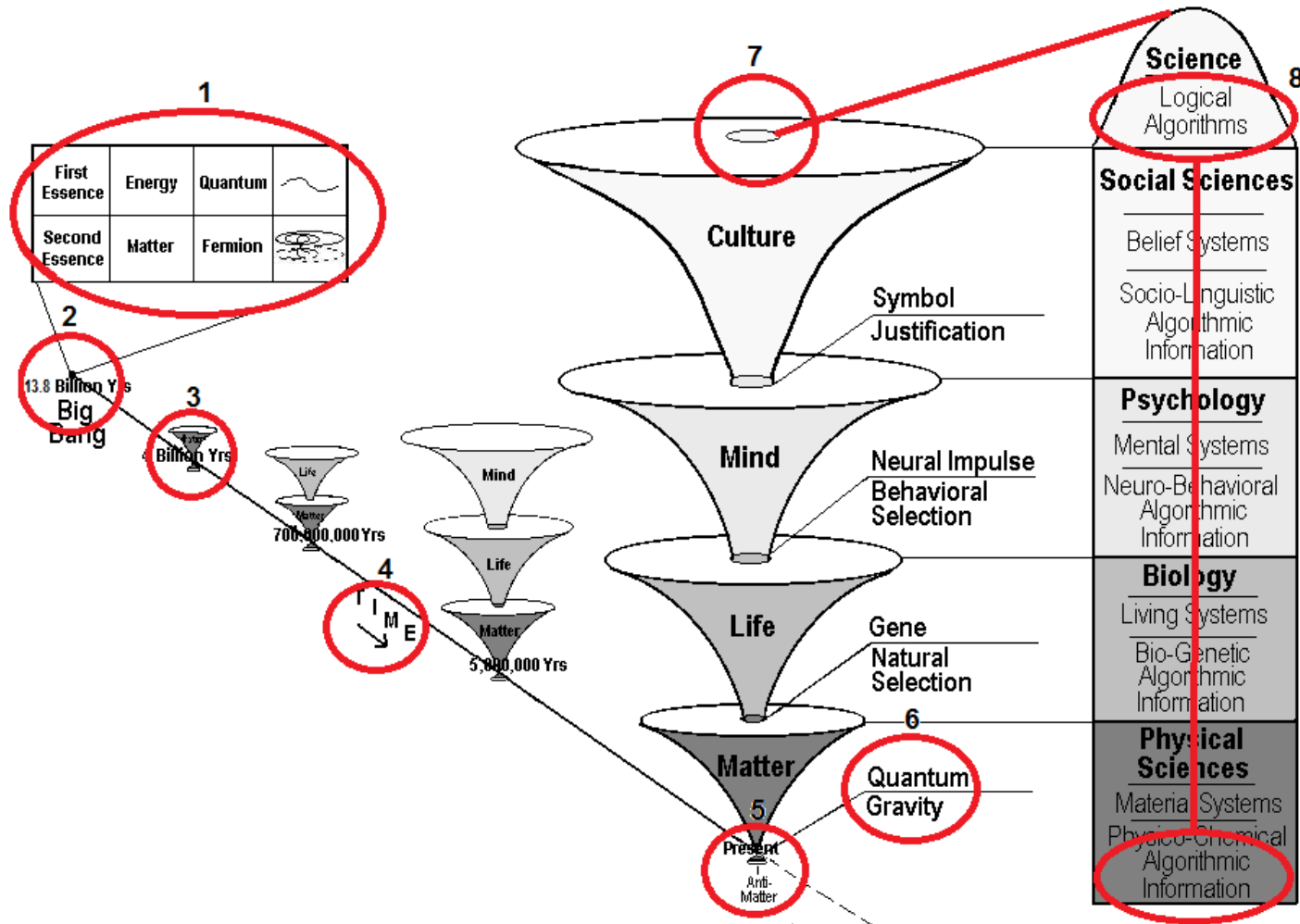


The Tree of Knowledge System



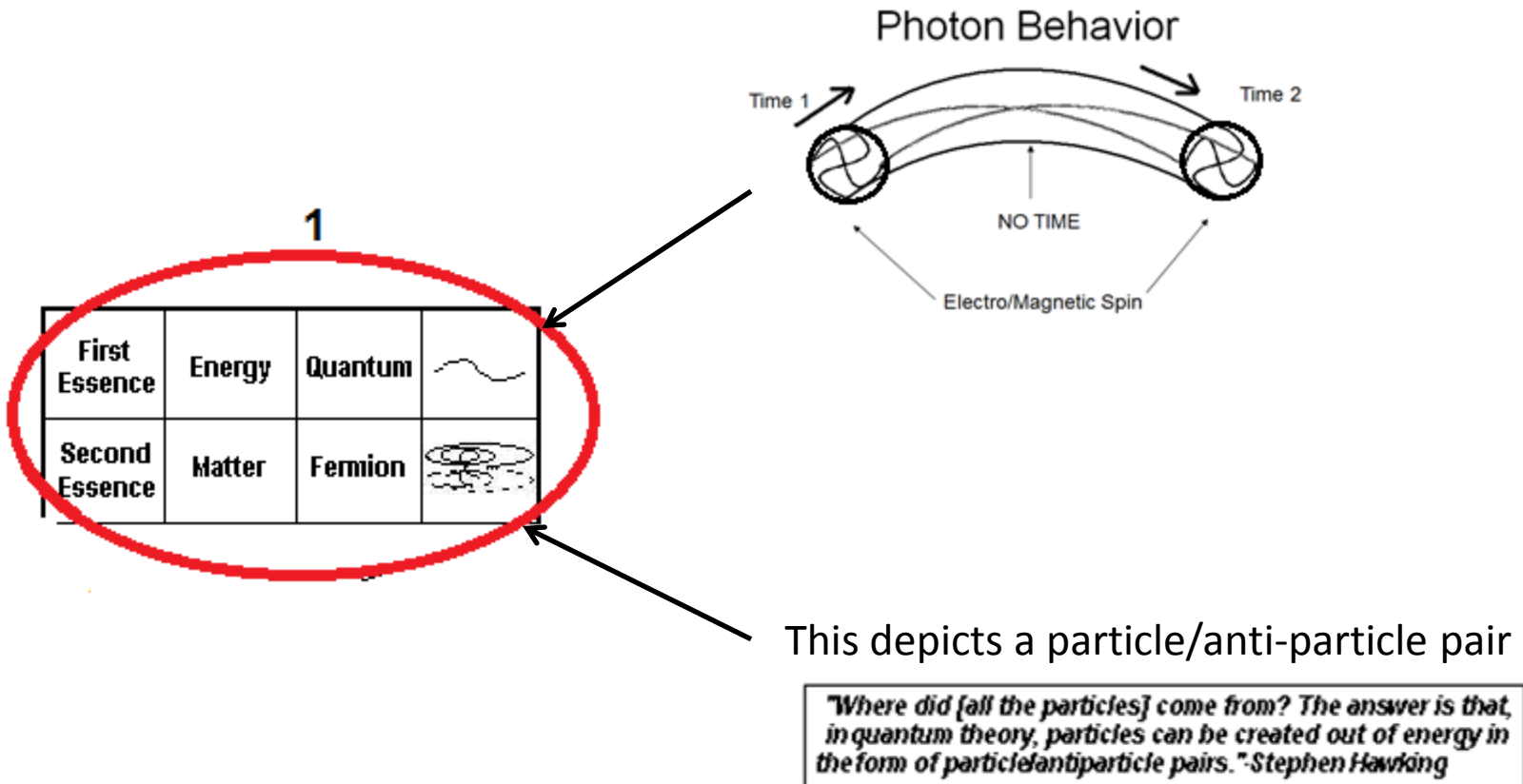
Part III(c):

Eight Things to Note about the ToK and Modern Physics



ToK Point #1:

Energy is the first essence and ultimate common denominator.



ToK Point #2:

The Big Bang and the Nature of Energy

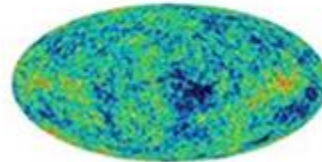
Point 2 represents the “pure energy singularity” state that characterized the universe at its initial state. Then, [13.8 billion years ago](#), an inflationary chain reaction took place called the [“Big Bang”](#), and the material universe sprang into being and has since evolved as an unfolding wave of behavioral complexity on a spacetime grid.



The Pure
Energy
Singularity



and the



Big Bang

ToK Point #2:

The Big Bang and the nature of Energy

Modern physicists debate exactly how the universe sprang into being from the “singularity” at the [Big Bang](#). In technical terms, the word singularity is derived from Einstein’s theory of general relativity and refers to a gravitational force of infinite density, resulting in the collapse of the dimensions of space and time. There is significant uncertainty among physicists regarding the nature of the singularity at the Big Bang. The laws and concepts of modern physics breakdown at this point, which makes things especially murky.

The ToK System characterizes the initial condition as a “pure energy singularity”. This places energy as the most fundamental substance, and the ultimate common denominator in the universe. This conception bends the standard definition of energy in physics, which is conventionally defined as the capacity to do work. There are many different forms of energy that are interchangeable. There are two general categories of kinetic and potential and then specific kinds (e.g., gravitational, electromagnetic, heat). However, in physics energy refers to the amount of an entity, as opposed to an entity per se. In this regard, “pure energy” is somewhat akin to saying “pure quantity”; thus, it is important to realize that the concept being applied is not crystal clear. However, all foundational concepts reach a point at which they become difficult to define or conceptualize, and energy is no exception. Consistent with the ToK formulation and as suggested by the accompanying quote from Einstein, many physicists think of matter as being a form of frozen energy.



**Matter is energy
(light), whose
vibration has been
so lowered as to be
perceptible to the
senses. There is no
matter.**

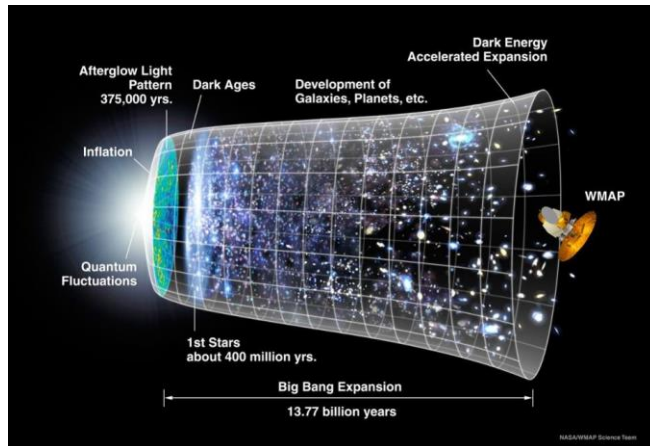
Albert Einstein

ToK Point #3:

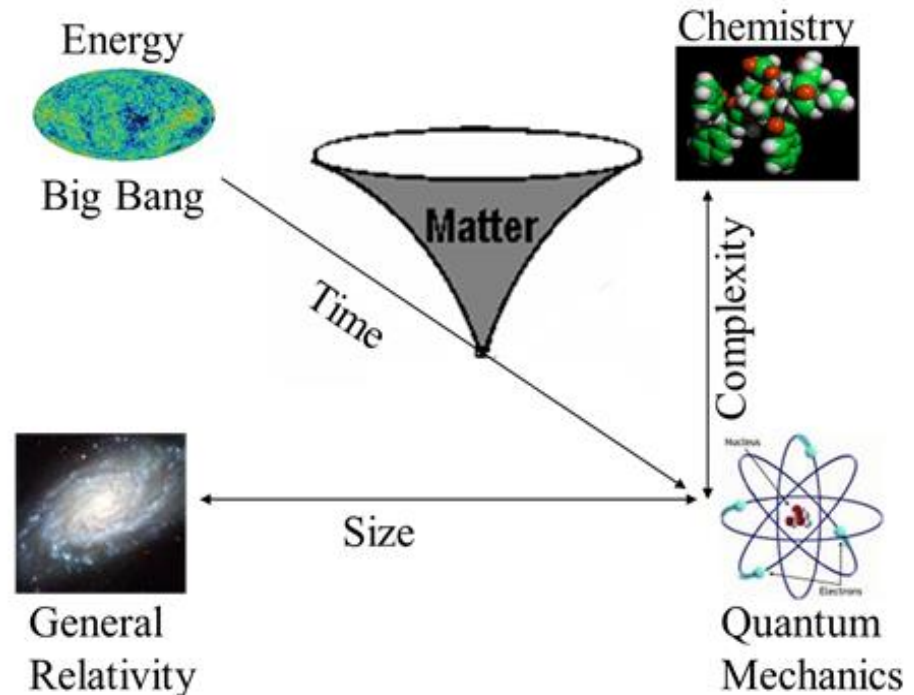


The Emergence of the Material Dimension of Behavioral Complexity

Matter, along with space and time, emerged following the Big Bang inflationary period. Nonliving material objects range in complexity from subatomic particles to large organic molecules. There are also complex physical systems. **The physical sciences** (i.e., physics, chemistry, geology, astronomy) describe the behavior of material objects at various levels of analysis.

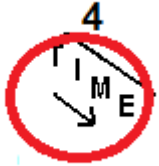


Standard depiction



ToK Point #4:

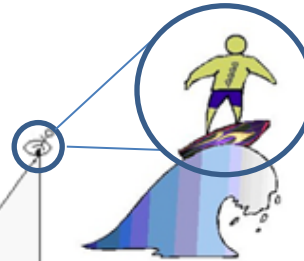
Time emerges at the Big Bang and represents the unfolding wave of behavioral complexity.



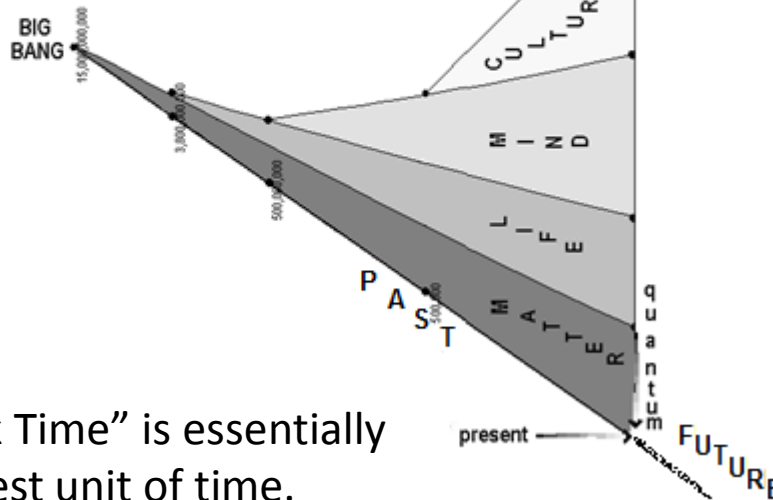
Time is defined in terms of the present, which is the point at which a probabilistic future becomes a determined past.

* i is not capitalized here because it represents a reference to imaginary numbers

As i ride the crest of the wave of causality, i look out onto the sea of probability and back on to the sea of effect.



Note: This is the human knower using the ToK to observe the world

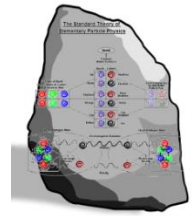


A "Planck Time" is essentially the smallest unit of time.

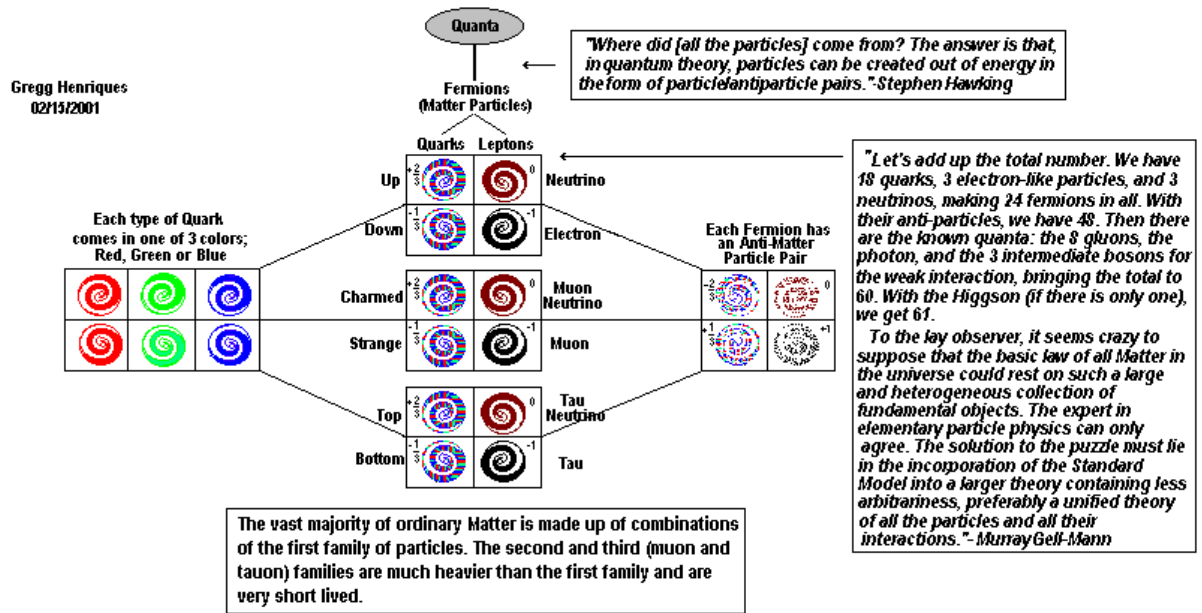
Time is relative to scale. Time operates in different ways depending on the dimension and level of analysis. The relation between present, past and future is more ambiguous as the dimension and level of behavioral complexity increases.

ToK Point #5:

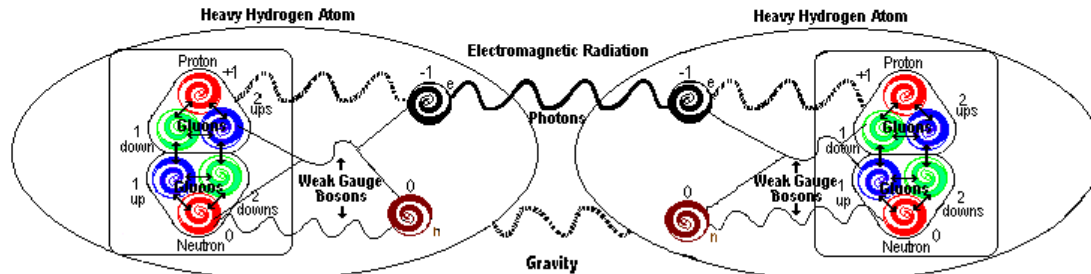
The base of the Matter Cone is mapped by the Standard Theory of Particle Physics and is represented as the STEPPing Stone in the Garden of UTUA



The Standard Theory of Elementary Particle Physics

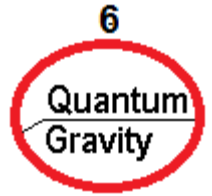


The diagram is suggestive that anti-matter may exist on a different dimension of complexity, although in later diagrams I removed this.



ToK Point #6:

Reflections on “Quantum Gravity”



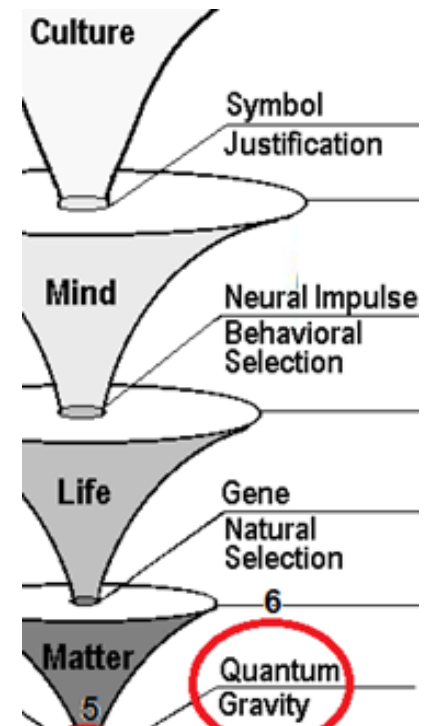
[Quantum gravity](#) reflects the hypothetical merger of quantum mechanics and general relativity; or, more specifically how to explain gravity in the context of a quantum field theory. Einstein spent the latter part of his life looking for such a union. String theory and loop quantum gravity are the two most promising current avenues, although there are others. But there are profound conceptual and mathematical problems, and currently no clear, consensually agreed upon solution.

The ToK offers a unique perspective on the problem and possible solutions, which I prefer to call “[quantum relativity](#)”. The reason the ToK offers a unique perspective has to do with how it conceptualizes the universe as an unfolding wave of behavioral complexity and how it places the knower in relationship to the known, allowing for greater clarity between observer and observed. Classic physical theories assumed that the nature and place of human knowledge was not relevant for the truth of the physical theories that described the behavior of matter and no physical theories include the human knower in the equation. However, both quantum mechanics and general relativity demonstrate the need to consider and account for the role of the observer in determining what is observed.



ToK Point #6: Reflections on “Quantum Gravity” Continued

In addition to providing a place for the knower, The ToK suggests deep parallels in the causal feedback loops that give rise to each dimension of complexity. Specifically, each dimension is characterized by a unit of information that is acted upon by a broad and general selection process. The classic example of this is the modern evolutionary synthesis, whereby the general selection process of natural selection operates on generic combinations across time. Via BIT and the JH, the ToK posits that the behavioral dimensions of Mind and Culture arose similarly to that of Life. Specifically, Mind emerges as the general process of behavioral selection operates on neuro-information processing systems. And Culture emerges as the general process of justification operates on symbolic information systems. This gives rise to the question of whether the same might be true of the relation between quantum mechanics and general relativity. The quantum can readily be considered a unit or digit of behavioral information. The question is whether Einstein’s conception of gravity in general relativity can be thought of as a sort of selection process.



This shows
the parallels
described.

ToK Point #6:

Reflections on “Quantum Gravity” Continued

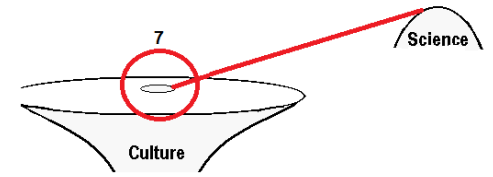
Could gravity be a general process that operates on quanta, conceptualized here as digits of information? The idea here is that the base of the universe is a “quantum foam”, and there are quantum fluctuations everywhere. Mass refers to the density of these digits of behavioral information localized in spacetime. The relations between masses in spacetime can be considered a “co-relation” in spacetime. I have speculated that this claim is more than just an analogy, but that gravity is actually a form of regression that emerges out of quantum fluctuations. The closer and more dense the material information is packed the more regression between clusters. This is why mass warps spacetime. This is conceptual speculation and I have no method at this point of diving further. However, in 2001 I shared this idea with [John A. Wheeler](#). Although he was ill and had recently returned home from the hospital, he wrote back, calling the notion of gravity as regression intriguing, and he put me in touch with his colleague at UPenn, [Ken Ford](#). I explained my ideas to Ken Ford and showed him my “pseudo-proof”, which I was convinced linked Born’s fundamental equation of quantum mechanics with the conceptual operations of the scientific measurement of behavioral information in a way that opened the door for a quantum relativity. However, Ken Ford could not make heads or tails of the claims, and I did not speak advanced math so nothing came of the encounter.

I should note here that Ken Ford pointed out a number of problematic assumptions that were hidden in my pseudo-proof regarding matrix mechanics and the apparent mixing of constants with variables that I had not fully considered or worked through at the time. As such, I worried that the equation from the pseudo-proof was simply a fiction I had generated and put it aside. Indeed, after the encounter I explicitly labeled it a pseudo-proof. It was not until I realized the connection with the Euler Identity that I became much more certain of what exactly it was that I was seeing.

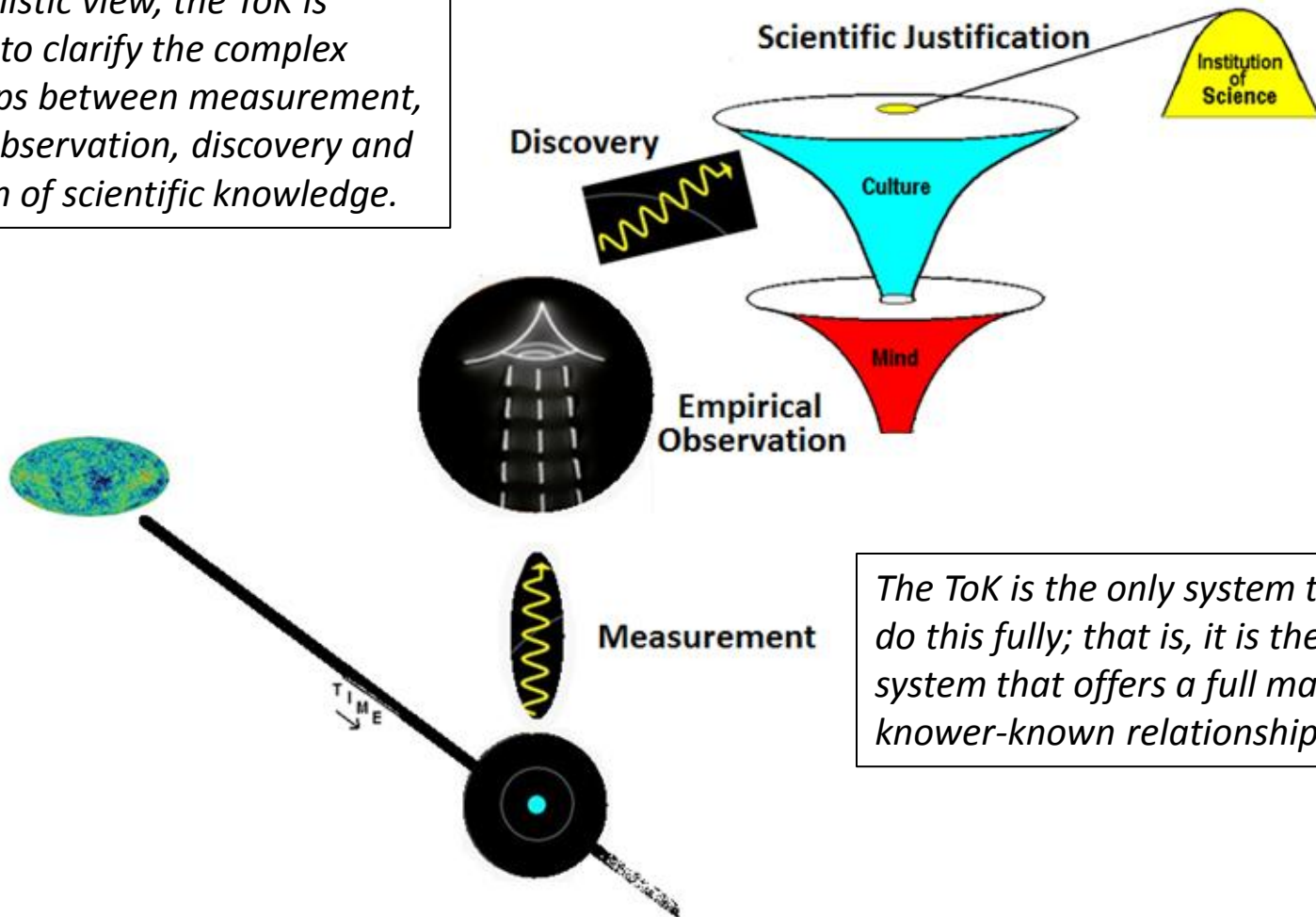


John Wheeler
coined the term
black hole.

ToK Point #7: The Place of the Human Knower in the ToK



Via its wholistic view, the ToK is positioned to clarify the complex relationships between measurement, empirical observation, discovery and justification of scientific knowledge.

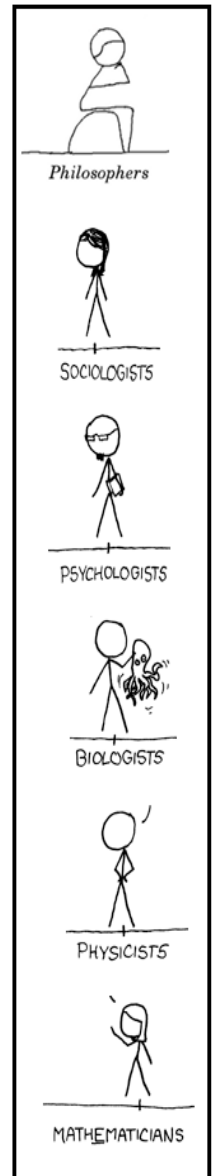
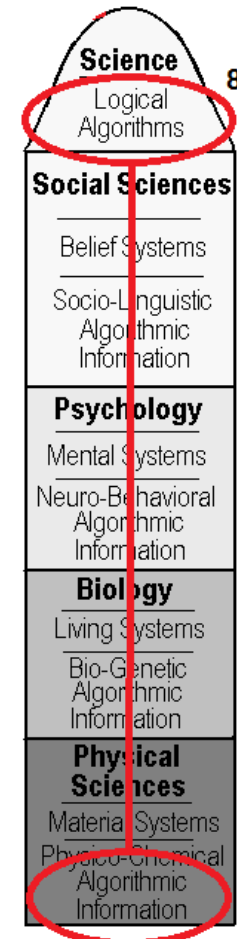


The ToK is the only system that can do this fully; that is, it is the only system that offers a full map of the knower-known relationships.

ToK Point #8:

The Alignment of the Sciences and a Return to Radical Mathematical Humanism

- Murray Gell-Mann offers an important definition of complexity as [“algorithmic information content”](#).
- This allows for a description of each dimension of complexity in terms of specific kind of algorithmic information.
- We see how the ToK sets the stage for a “RMH” view, with a specific human knower at the top, the mathematical equations that represent complexity and change at the bottom, and how the sciences are arranged, from physics into biology into psychology into the social sciences into the specific human knower.



Part III(c):

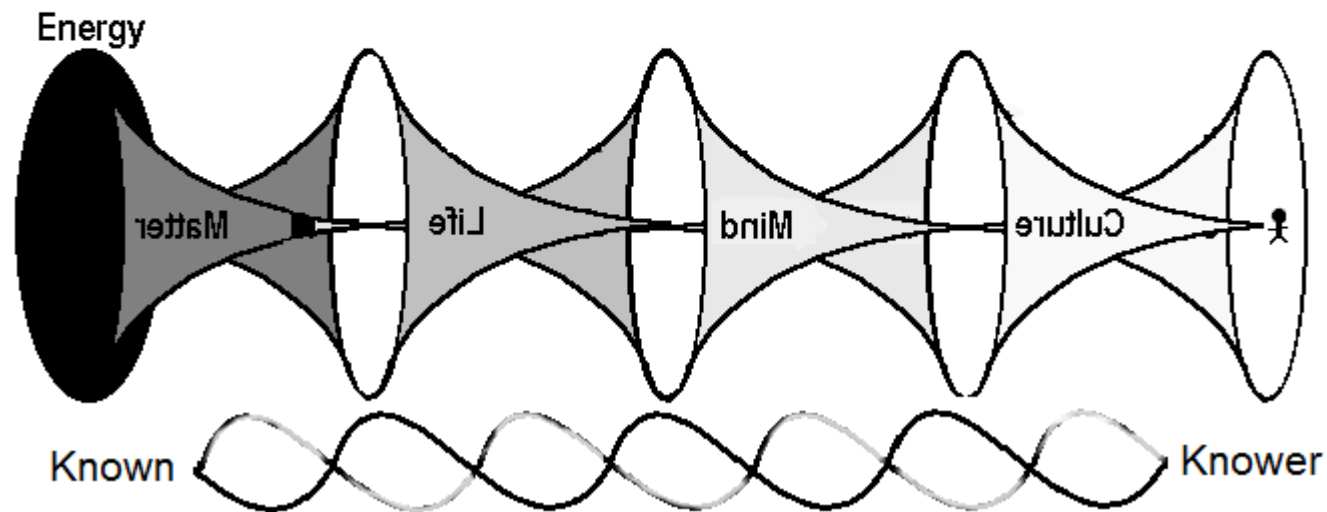
Clarifying the Knower-Known Relations Depicted by the ToK

- One of the most unique aspects of the ToK System is the way in which it depicts the relationships between the universe at large, the smallest bits of quantum data, and the position of the human knower.
- This macro-level view allows for a much clearer understanding of the relationship between human knowledge (the justifiably true mathematical representations of behavioral complexity) and being (the external reality as such).

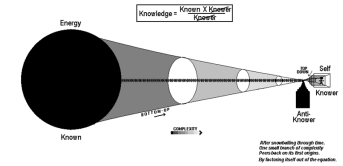
Part III(d): Knower-Known Relations

Tree of Knowledge

*FIVE ESSENCES LINKED BY FOUR JOINT-POINTS:
A Five Factor Analysis of Variance
Solution to the Problem of Knowledge*

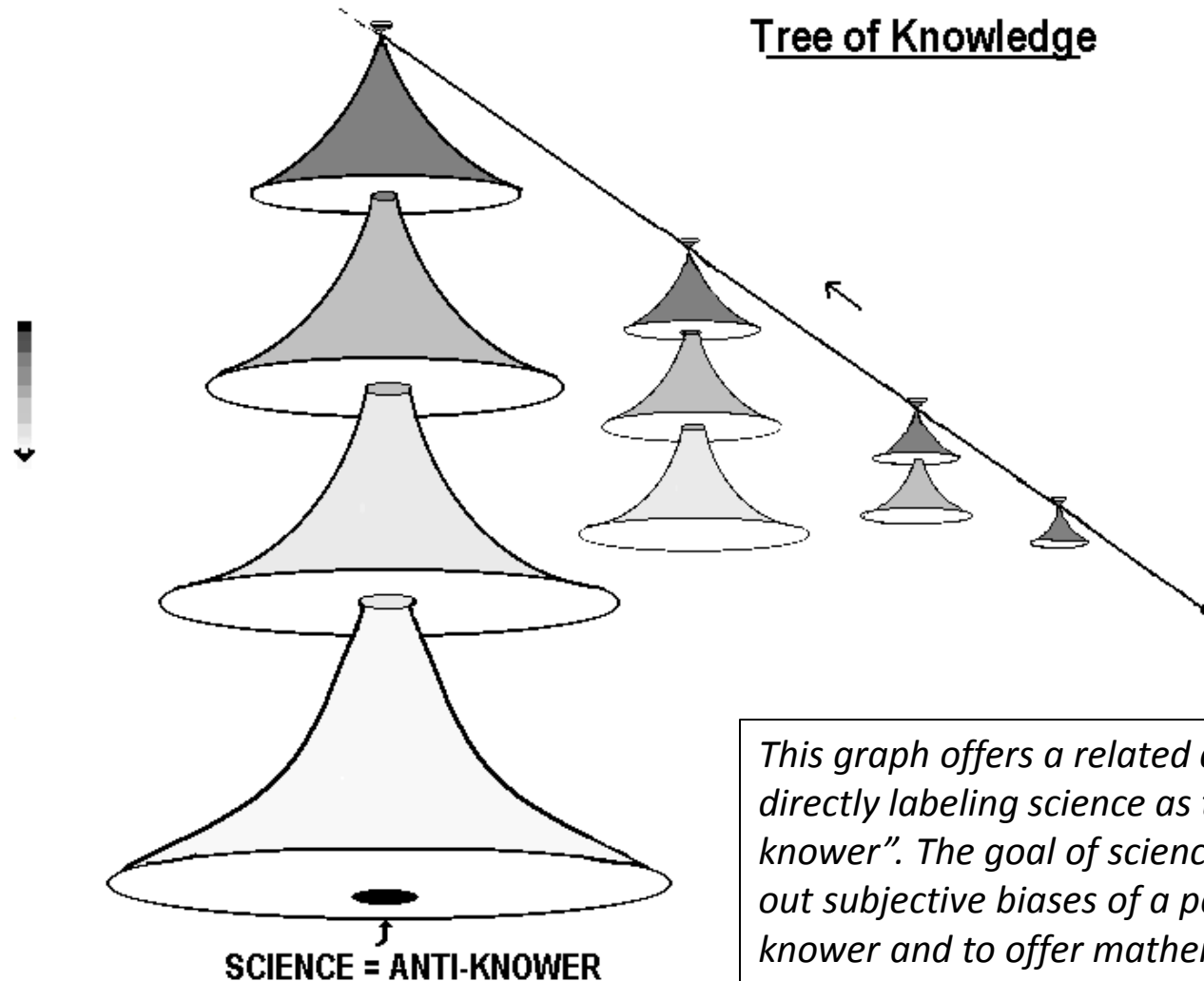


Part III(d): Knower-Known Relations

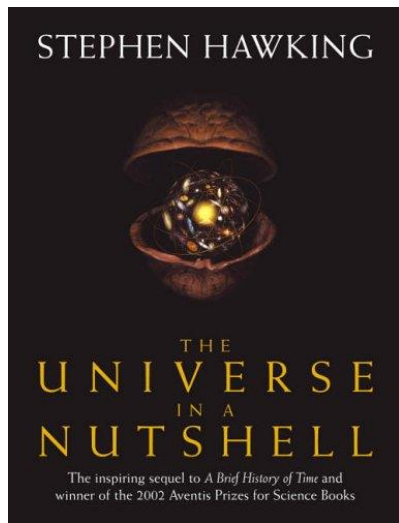


- The binary code running down the middle represents complexity.
- There is a bottom up arrow, representing “the knowledge trail” that starts with matter and goes “up” to human culture, and there is a top-down trail, starting with human phenomenology situated in culture and go down to the material world.
- The diagram [corresponds to Ken Wilber’s conception of epistemological quadrants](#).
- The equation in the box represents the scientific ideal of objective knowledge.
- The shadow of the “anti-knower” represents the scientific enterprise of factoring out the biases and position of the particular knower and leaving behind generalizable knowledge.
- The quote is meant to be personal. It captures the particular sense of me, Gregg Henriques, being in the one position to actually be able to factor himself out of the equation because of the view point provided by the unified theory.

Part III(d): Knower-Known Relations via the ToK



This graph offers a related depiction, directly labeling science as the “anti-knower”. The goal of science is to factor out subjective biases of a particular knower and to offer mathematically consistent, empirically supported models of behavioral complexity and change.



Part III(c): Knower-Known Relations via the ToK

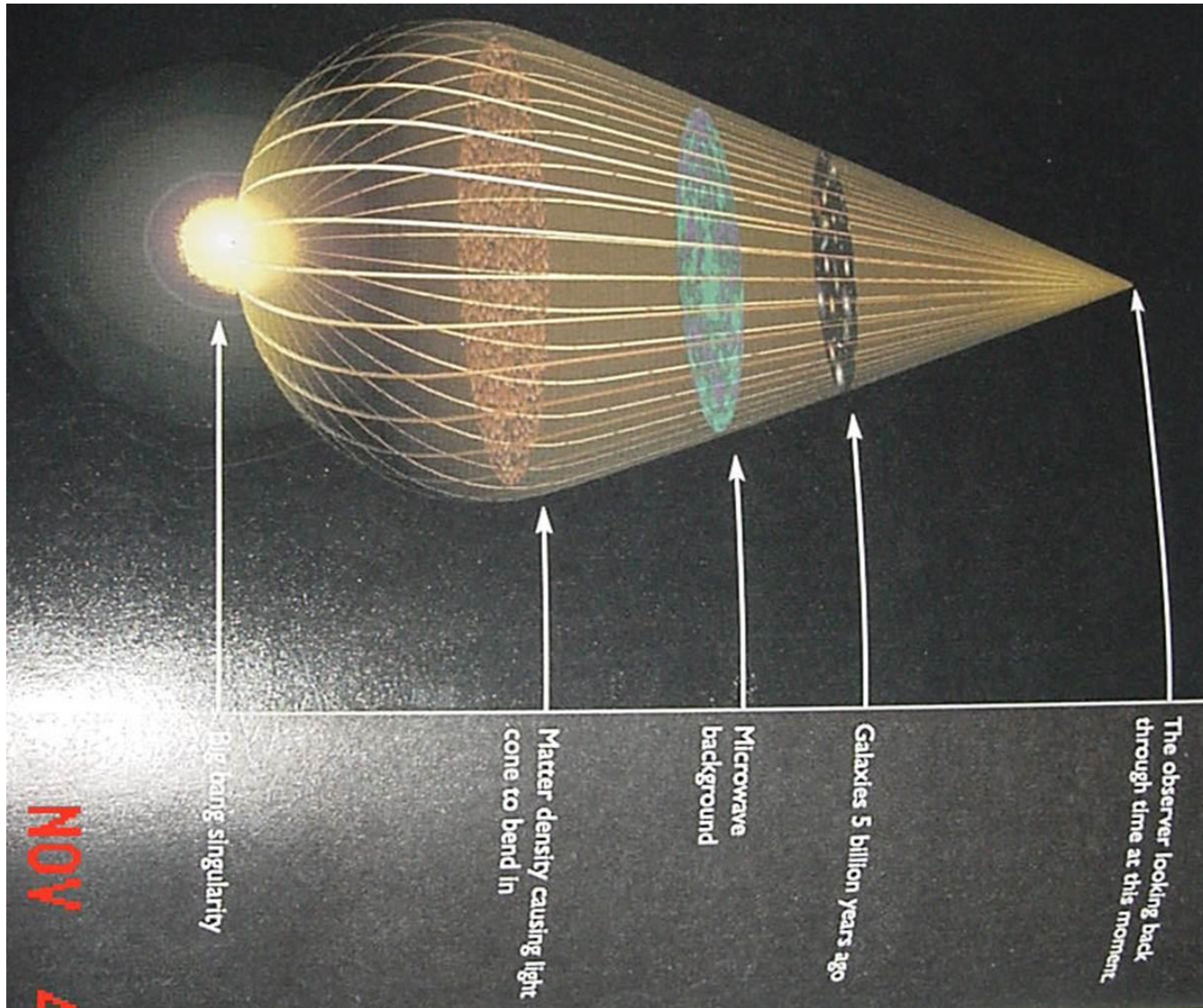


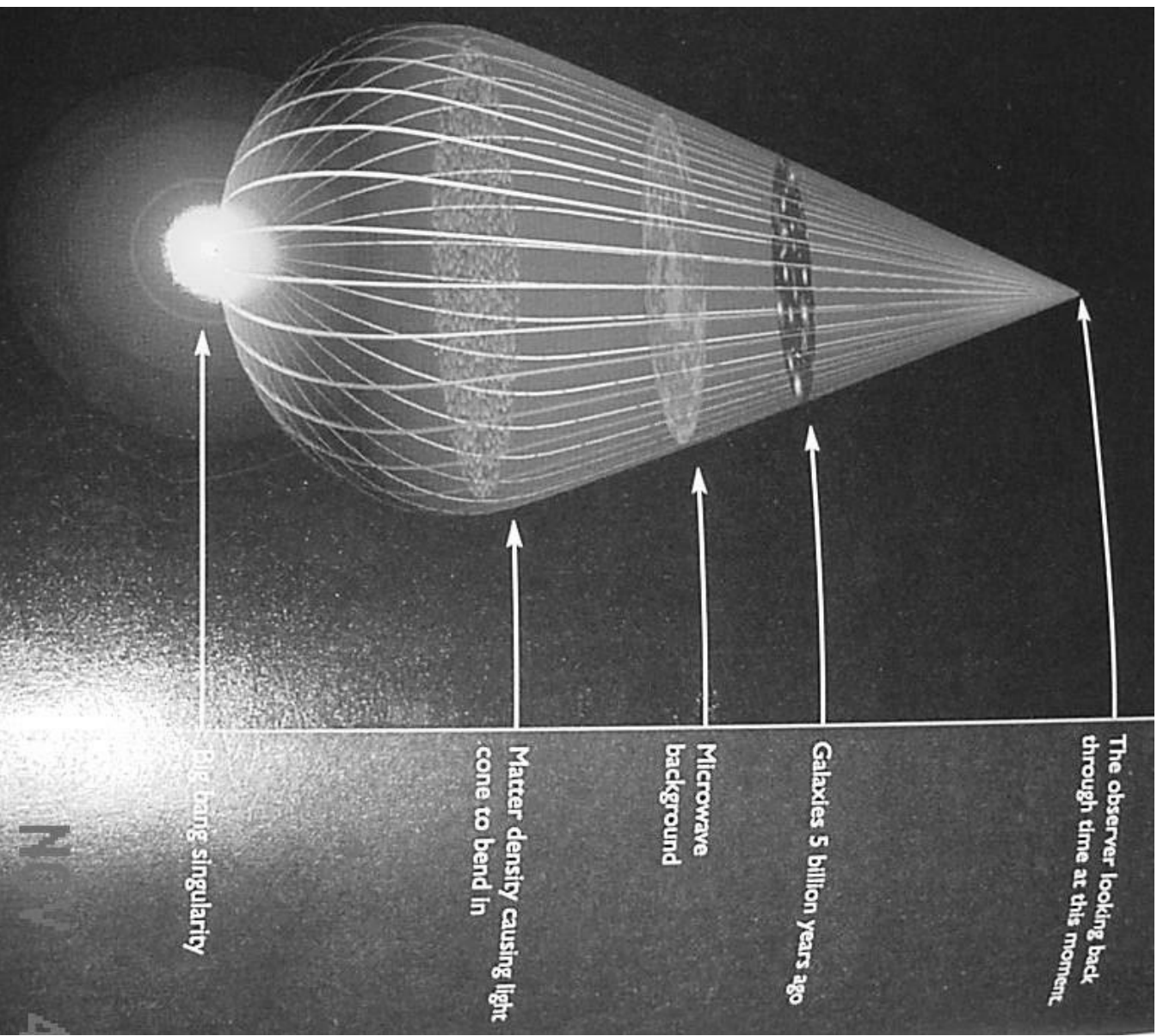
The Hawking Correspondence

In December 2001, my parents gave me Hawking's new book, *The Universe in a Nutshell*.

As I flipped through it that Christmas day, I jumped out of my seat because I immediately “saw” a diagram that corresponded directly to one I drew 11 months prior.

This diagram is on page 45





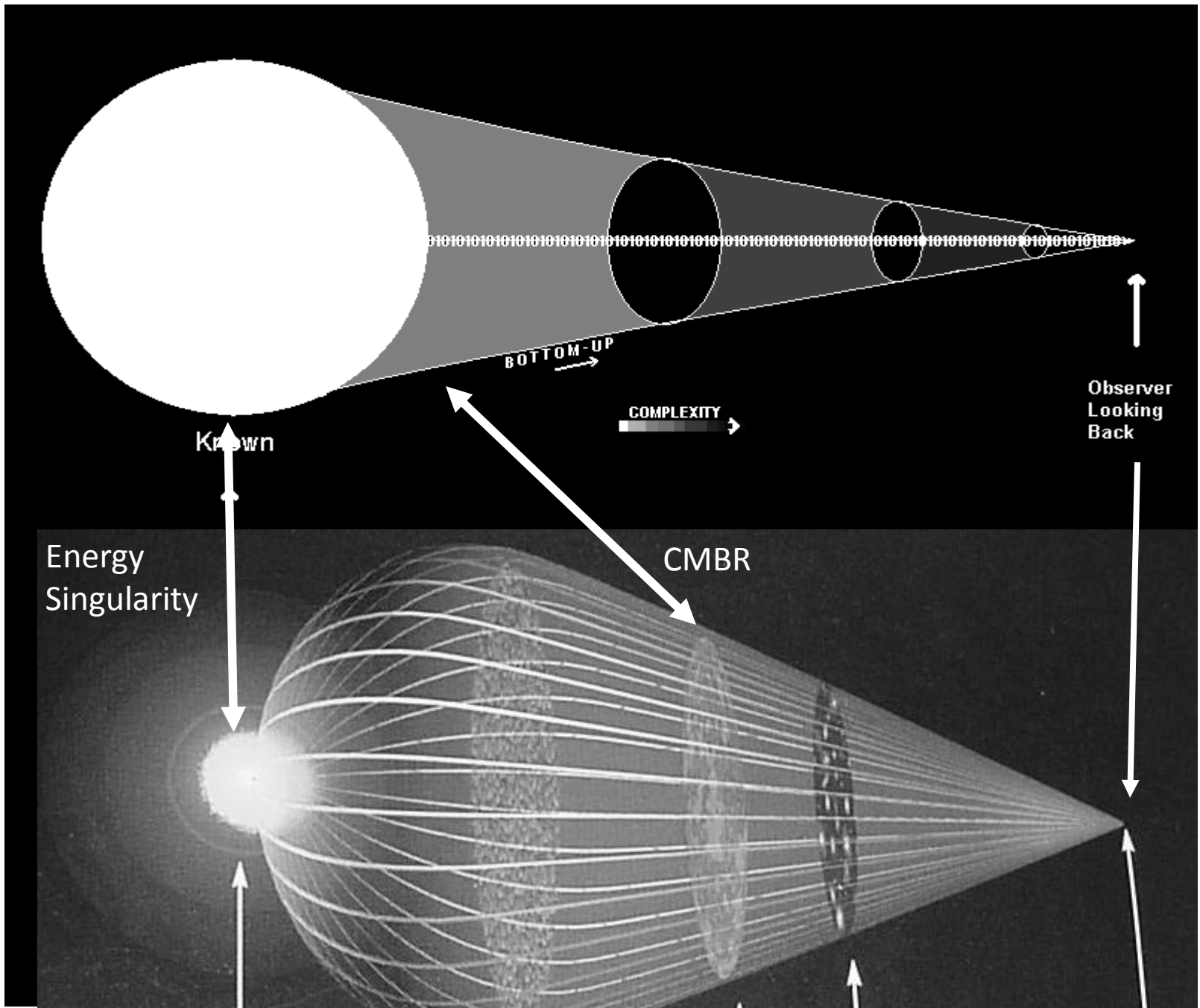
The observer looking back through time at this moment

Galaxies 5 billion years ago

Microwave background

Matter density causing light cone to bend in

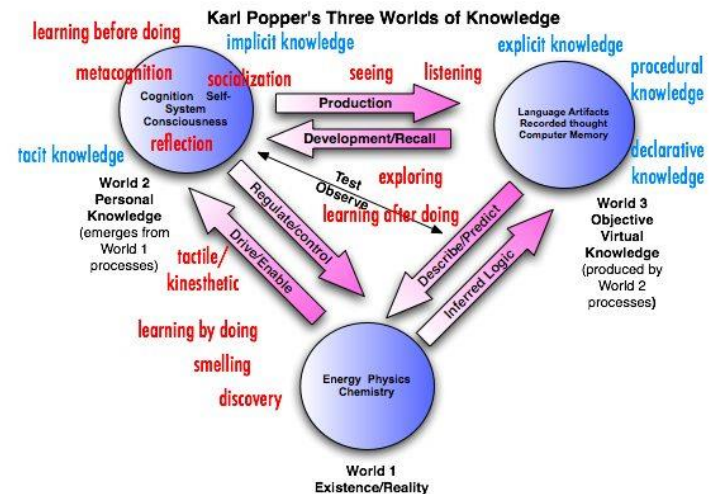
Big bang singularity



Part III(e):

The ToK and the Concept of Behavior

- The ToK System can be thought of as a general theory of behavior that connects scientifically objective behaviors with subjective experiences of being with human intersubjective knowledge systems to see the whole universe of knowledge.
- It is the only system that can effectively connect Karl Poppers' "three worlds".



Part III(e):

The ToK and the Concept of Behavior

- The ToK System offers a “universal behavioral metaphysics”, meaning that the concept of behavior and the categories of change versus constancy, and objects and fields and causes and effects are fundamental to the “language game” of science.
- The universe is depicted as an unfolding wave of behavioral complexity and change, and the task of basic science is to mathematically map this process.
- Behavior is defined as *the change in object-field relationships*.

Part III(d):

The ToK and the Concept of Behavior

- Defined as such, behavior can be represented symbolically or mathematically as $(X)(X_{\theta}) - [(X)(X_{\theta})]'$, where X is the object, X_{θ} is the field (not X), with the minus sign representing change or difference between states. Normally, this would be the difference between the object-field relationship at time 1 relative to time 2.

$$X(X_{\theta}) - [X(X_{\theta})]' = \text{Behavior}$$

- According to the ToK, physics and the material sciences in general operate from an Objective Behavioral Metaphysics that includes: *Objects & Fields* (objects in relation/space), and *Causes & Effects* (time and energy transfer).

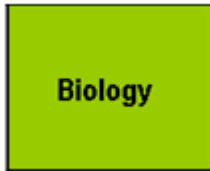
Part III(d):

The ToK and the Concept of Behavior

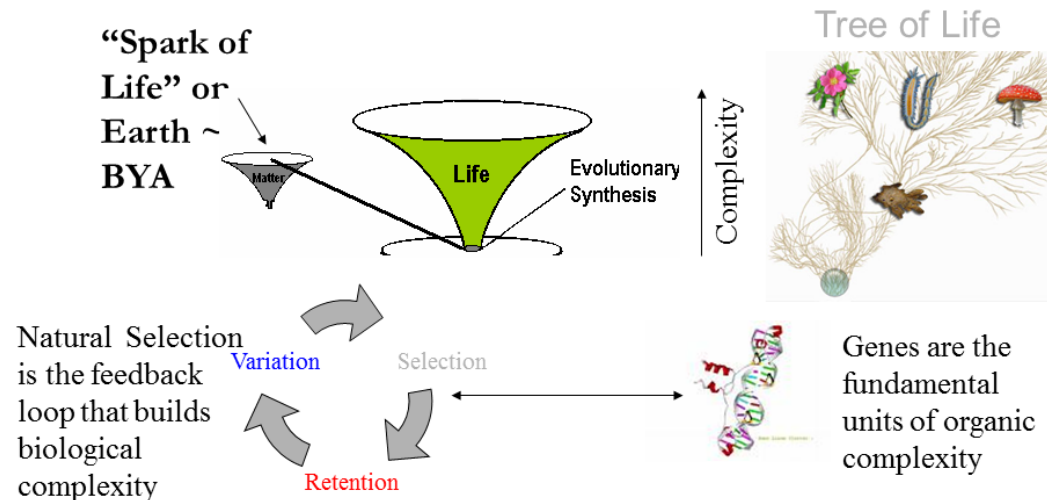
- Physics is the science of the behavior of energy and matter on the spacetime grid. Particle physicists study the behavior of the very small (e.g., particles like photons and electrons) using quantum theory, and cosmologists studying the behavior of very large objects (e.g., galaxies) using the general theory of relativity.
- However, in making this claim the ToK System does not advocate for reducing all behaviors to physical and chemical processes. Everything is energy and matter, but everything is not *just* energy and matter. Instead, the ToK posits the existence of different irreducible dimensions of behavioral complexity, which offers up a new big picture view of reality, indicating that following the material dimension of complexity, there is also the living, mental and cultural dimensions.

Biology (the Life Sciences) operates from an **Living Behavioral Metaphysics***

Biological complexity, in addition to being a function of material behavioral causes, also stems from genetic/epigenetic information processing causation (i.e., input-information processing-output), which ultimately gives rise to emergent forms of self-organization.



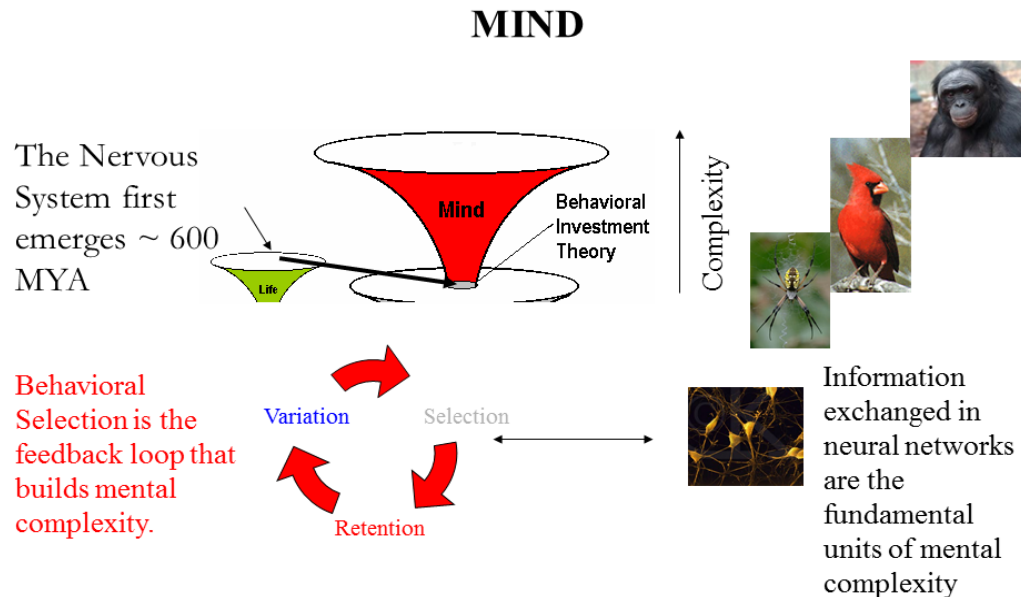
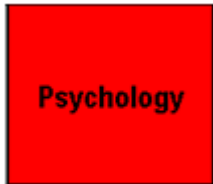
LIFE



***Metaphysics refers to the concepts and categories that one uses to map reality.**

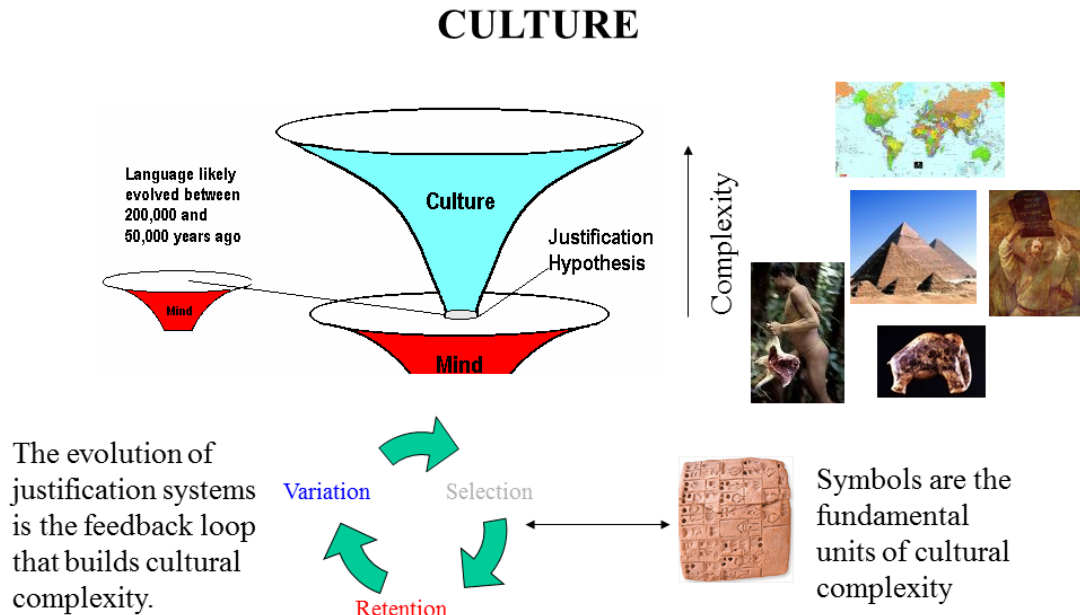
Basic Psychology (or the Mind, Brain, Behavior Sciences) operates from an **Mental Behavioral Metaphysics**

Mental complexity, in addition to being a function of biological and material behavioral causes, also stems from neuro-information processing causation, which ultimately gives rise to emergent forms of self-organization, including animal consciousness.



The Human or Social Sciences operate from a **Cultural Behavioral Metaphysics**

Cultural complexity, in addition to being a function of psychological, biological, and material behavioral causes, also stems from linguistic-information processing causation, which ultimately gives rise to human societies and the reflective self-consciousness of modern peoples.



The ToK System offers a Periodic Table of Behavior

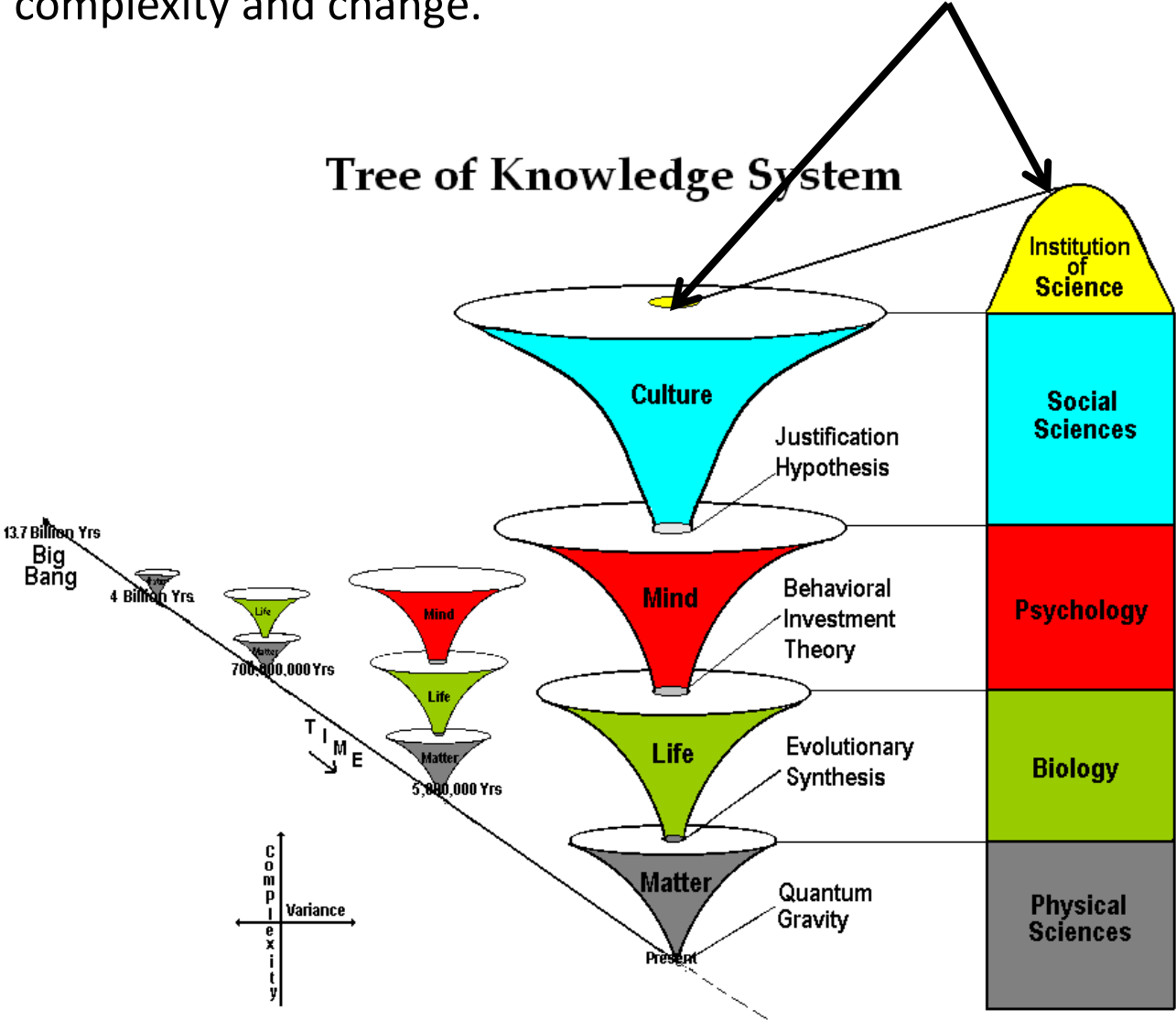
From the standard single axis of complexity model...



To a new, dual axes map of 4 Levels by 4 Dimensions view...

The Periodic Table of Behavior					
		Dimensions of Complexity			
		<u>Material/Physical</u>	<u>Living/Biological</u>	<u>Mental/Psychological</u>	<u>Cultural/Social</u>
Object-Field Relations	Context of Behavior	Field	Ecology	Environment	Society
	Behavioral Entity	Object	Organism	Animal	Person
Three primary Levels of Object Complexity (Part, Whole, Group)	Groups of Wholes	Molecule	Group/Colony	Family-Group	Family-Community-Nation
	Fundamental Whole	Atom	Cell	Animal	Human
	Fundamental Part	Particle	Gene	Neural Network	Symbol

It is worth repeating here that the ToK places science in cultural space, as a systematic institutional system that functions to map behavioral complexity and change.



Part III(f):

The Development of the Pseudo-proof

We are now in a place to walk through the pseudo-proof that I developed shortly on the heels of seeing how the ToK provided some new ways of examining the relationship between quantum mechanics and general relativity.

1. The Concept of Behavior

1a. The concept of behavior is fundamental to science. Behavior is the central metaphysical construct in science, meaning that it provides the foundational concepts and categories that enable scientist to describe reality.

1b. The concept of behavior is consistent across the dimensions of complexity, and can be traced from the earliest beginnings of the universe through each phase of evolution through the present observer at the level of empirical observation and justification.

1c. There are four different dimensions of behavioral complexity and change that correspond to the behavior of four different kinds of entities: i) objects; ii) organisms; iii) animals; and iv) people.

1d. The concept of behavior allows scientists to transcend subjectivity and to “factor-in-then-out” the position of the human knower.

Part III(f):

The Development of the Pseudo-proof

1. The Concept of Behavior

1e. Behavior is defined as object-field change. Behavior is made up of four concepts. In addition to objects and fields and change, there is, by implication, constancy. That is, objects and fields are changing in relation to what is not changing. So, object-field change (relative to what does not) is behavior.

1f. Behavior overlaps substantially with the concepts of [motion and action](#) in physics; behavior specifies the fundamental concepts needed.

1g. Behavior can be represented as $(X)(X_{\ominus}) - [(X)(X_{\ominus})]'$, where X is the object, X_{\ominus} is the field (not X), with the minus sign representing change or difference between states. Normally, this would be the difference between the object-field relationship at time 1 relative to time 2.

1h. Objects have position and momentum in the fields of space and time, which modern physics collapses into “spacetime”. We can represent this as:

$$\text{position/momentum in spacetime} - \text{position/momentum in spacetime} = \text{Behavior}$$

Part III(f):

The Development of the Pseudo-proof

2. The Concept of Energy

2a. The concept of energy is, like behavior, foundational. In the ToK System, energy the “first essence” and ultimate common denominator. This is why the universe is considered to begin as a “pure energy singularity”.

2b. In physics, the concept of [energy is defined as the capacity to do work.](#)

2c. Energy can be divided into two broad classes and many different “forms”. The two broad classes are [kinetic](#) (energy in motion) and [potential](#) (often called “stored energy”, and is based on the positional relations with other forces and entities). There are many different forms of energy (gravitational, electromagnetic, heat, etc.).

2d. Traditional Newtonian physics assumed that energy was continuous and could be divided into infinitely small units. The major shift toward quantum mechanics began when Max Planck realized that, via studying black body radiation, that electromagnetic energy could only be emitted or absorbed in discrete units.

Part III(f): The Development of the Pseudo-proof

2. The Concept of Energy

2e. Max Planck initially called these discrete units the “elementary quantum of action”, which can be translated here as the elementary or fundamental unit of behavior.

2f. Planck derived the numerical value for this elementary unit of behavior as 6.626×10^{-34} joule seconds. This was denoted by h , which became named as [Planck's constant](#) and is the central insight that leads to the quantum mechanics revolution.

2g. The quantum of action was recognized by Einstein and others to be a real property of nature and gave rise to the concept of a photon, which is a particle conception of light.

2h. The (kinetic) energy of a photon is a function of its frequency multiplied by Planck's constant, in a formula often referred to as the [Planck-Einstein relation](#), given as:

$$E = hf$$

Part III(f):

The Development of the Pseudo-proof

3. Quantum Mechanics and Born's Fundamental Equation

3a. [Quantum mechanics](#) is a branch of physics that explores the smallest scales of behavior. Quantum mechanics stems from the fact that there is, fundamentally, a “smallest unit of action”, called a quanta. This fact results in quantum mechanics differing from classical mechanics in that energy, motion, and other properties are restricted to discrete values (quantization). Objects behave as both waves and particles (wave-particle duality). And there are limits to what can be known (uncertainty).

3b. Erwin Schrödinger developed wave mechanics, represented in the [Schrödinger equation](#), which offered one version of characterizing quantum phenomena. [Werner Heisenberg](#) worked toward developing matrix mechanics, which became the first, self-consistent description of quantum mechanics. He also specified the uncertainty or indeterminacy principle.

3c. [Max Born](#) was also central to the development of quantum mechanics, although his contributions were not as well publicized as Einstein, Heisenberg, or Schrödinger.

Part III(f):

The Development of the Pseudo-proof

3. Quantum Mechanics and Born's Fundamental Equation

3d. In a 1925 paper, Born, Heisenberg, and Jordan published what would be called the fundamental (matrix) equation in quantum mechanics, given as

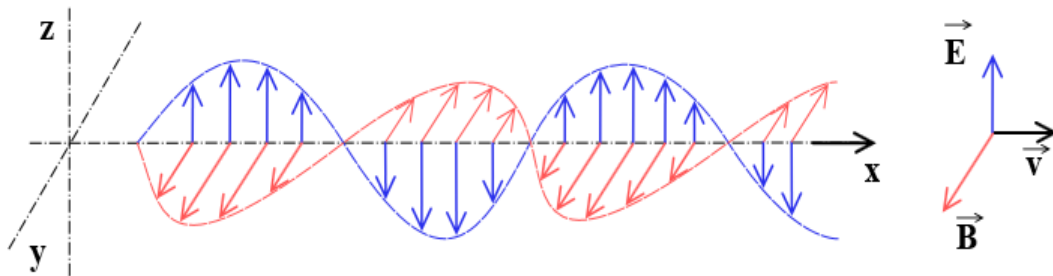
$$pq - qp = \frac{h}{2\pi i} I$$

where p and q were matrices for position and momentum, and I is the [identity matrix](#).

Part III(e): The Development of the Pseudo-proof

4. An Idealized Case of Observing a Photon with Frequency of 1.

4a. Electromagnetic radiation refers to the waves (or their quanta, photons) of the electromagnetic field, propagating (radiating) through space carrying electromagnetic radiant energy. It includes radio waves, microwaves, infrared, (visible) light, ultraviolet, X-rays, and gamma rays. Classically, electromagnetic radiation consists of electromagnetic waves, which are synchronized oscillations of electric and magnetic fields that propagate at the speed of light through a vacuum.

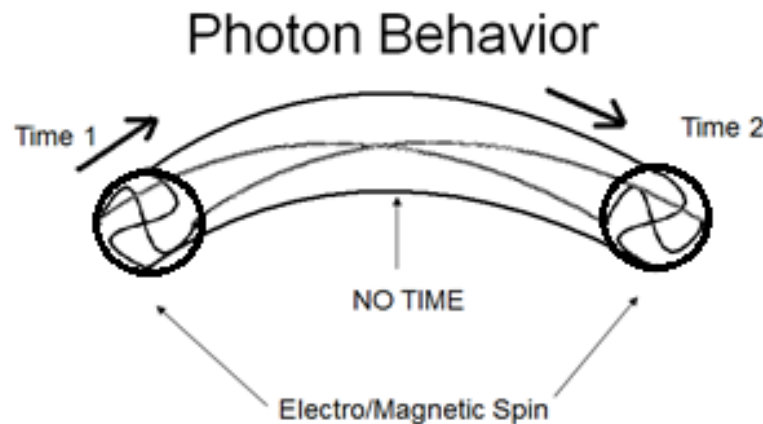


The electromagnetic waves that compose electromagnetic radiation can be imagined as a self-propagating [transverse oscillating wave](#) of electric and magnetic fields. This diagram shows a plane linearly polarized EMR wave propagating from left to right (X axis). The electric field is in a vertical plane (Z axis) and the magnetic field in a horizontal plane (Y axis). The electric and magnetic fields in EMR waves are always in phase and at 90 degrees to each other.

Part III(e): The Development of the Pseudo-proof

4. An Idealized Case of Observing a Photon with Frequency of 1.

4b. The simplest possible example of a behavior the behavior of a photon with a frequency of 1 in a vacuum.



4c. Photons in a vacuum move at the speed of light. Per Einstein's special theory of relativity, time slows as entities approach the speed of light, such that time ceases at the speed of light. Thus, photons do not age as they move through a vacuum. (The "tube" can be considered conceptually akin to a ["wormhole"](#)).

Part III(e):

The Development of the Pseudo-proof

4. An Idealized Case of Observing a Photon with Frequency of 1.

4d. Time does exist outside the entity moving at the speed of light.

4e. For an observer to observe (i.e., make a measurement), entities must exist (i.e., they must be determined). Science requires observers to exist and entities to exist.

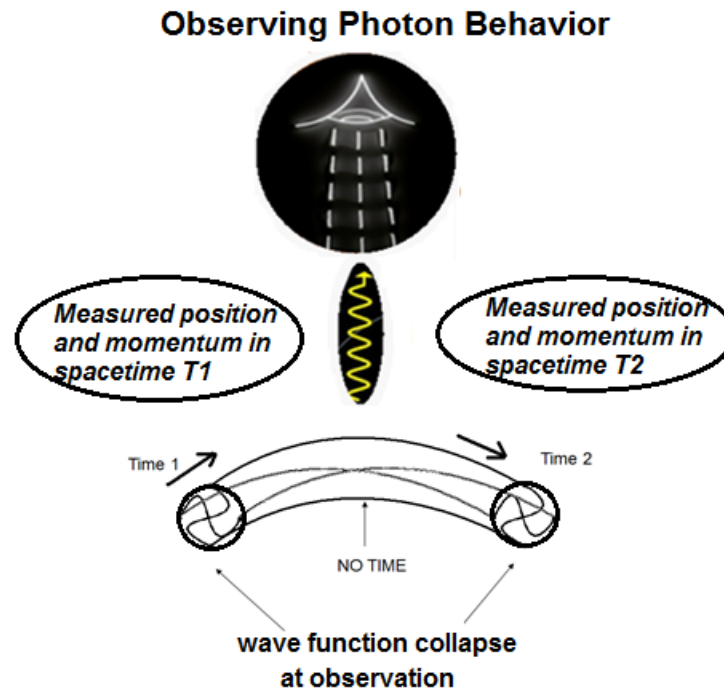
4f. The present is when a probabilistic future becomes the determined past.

4g. This means that an observer must transform a probabilistic future into a determined past to make a measurement. [This is the collapse of the wave function that is omnipresent in quantum mechanics.](#)

Part III(e): The Development of the Pseudo-proof

4. An Idealized Case of Observing a Photon with Frequency of 1.

4h. Mapping the observer as measuring the ideal case.



Part III(f):

The Formal Pseudo-Proof

- i. Behavior equals object-field change.
- ii. Behavior equals $(X)(X\ominus) - [(X)(X\ominus)]'$
- iii. Behavior equals motion
- iv. Motion equals kinetic energy.
- v. Measured behavior equals $\frac{\text{position/momentum}}{\text{spacetime}} - \frac{\text{position/momentum}}{\text{spacetime}}$,
- vi. This is $pq - qp$ in matrix mechanics, which equals $\frac{h}{2\pi i}$ (I)
- vii. The kinetic energy of a photon equals hf
- viii. In the idealized case of an observer observing a photon, the observed equals the action, thus kinetic energy of the photon equals measured behavior of the photon.
- ix. Where vii is true and the frequency of the photon is 1 and the Identity matrix is 1, then:
$$\frac{\hbar}{i} = hf \quad \text{or} \quad \frac{\text{Planck's constant}}{2\pi i} = (\text{Planck's constant})(\text{frequency})$$
- x. This reduces to $2\pi i f = 1$.

Part III(f):

The Formal Pseudo-Proof

What is represented by $2\pi i f = 1$?

These are formal mathematical or conceptual operators performed by an observer in detecting behavior. They are present in the simplest formulation of behavior.

$$2\pi(1) = \bigcirc \quad f = \text{~}$$

**i = an imaginary or hidden number
or dimension orthogonal to the real dimension.**

Part III(f):

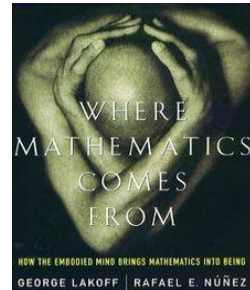
The Formal Pseudo-Proof

- I had no formal training in physics. I could not speak advanced mathematics; I lost my ability to do calculus in college.
- My capacity to assimilate and integrate the knowledge contained in the pseudo-proof was derived from the ToK System.
- No one else spoke that language. So when Ken Ford could not understand my thinking, and I was helpless to explain it in the necessary, standard mathematical terms, I boxed it away.
- However, the truth of it returned when I encountered the Euler Identity in a book on mathematical idea analysis.

Part III(g):

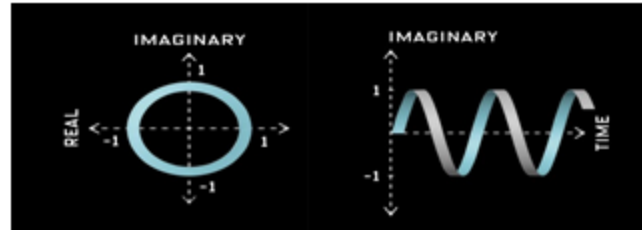
Encountering the Euler Identity

- In 2002, my wife brought home a book that would revive my interest in the pseudo-proof.
- *Where Mathematics Comes From* details the interplay between logical-mathematical concepts and how human knowers draw visual/geometric and conceptual/algebraic linkages together.
- In the appendix, the authors applied their “mathematical idea analysis” to the Euler Identity.
- In learning about mathematical idea analysis and the Euler Identity, I realized $2\pi i f = 1$ had deep connections to the Euler Identity.

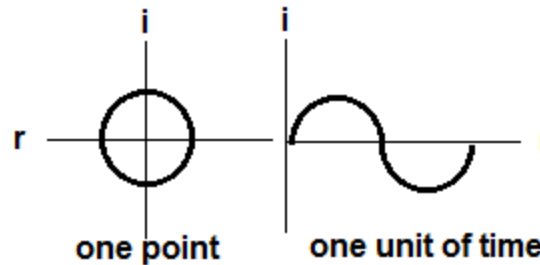


Part III(g): Encountering the Euler Identity

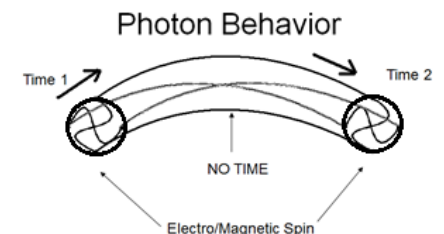
- Consider, for example, this depiction of the [Euler Identity](#):



- And this of my $2\pi if = 1$:



- In the above article, Simmons refers to the Euler identity as a “wormhole”, which is exactly how it is represented in the depiction of the behavior of a photon diagram.



Part III(h)

Developing the Connection and Performing an “inverted Sokal”

The two equations correspond logically. Here is how:

From $2\pi if = 1$ we can say $i = 1 / 2\pi f$

If you plug that into the Euler equation, you get:

$$e^{1/2f} = -1$$

Raise each side by $2f$ and you get:

$$e = 1^f.$$

Now return to my $2\pi if = 1$ equation and substitute $1/2\pi i$ for f . Raise each side by $2\pi i$ and you get:

$e^{2\pi i} = 1$, which is another way of writing the Euler Identity.

Thus the two equations are in logical harmony.

Part III(h)

Developing the Connection and Performing an “inverted Sokal”

In 1996 in a special issue of *Social Text*, the mathematical physicist Alan Sokal (1996a) contributed a paper, *Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity*, which professed to offer a postmodern interpretation of some of the fundamental issues in physics, especially concerning the unification of quantum mechanics and general relativity. Although the paper was accepted as presenting a genuine argument, shortly after the article was published, Sokal (1996b) announced it was a parody written to send a shot across the bow of postmodern scholarship. He had written the paper as a “mélange of truths, half-truths, quarter truths, falsehoods, non sequiturs, and syntactically correct sentences that have no meaning whatsoever” (Sokal, 2008, p. 93) to demonstrate that much postmodern scholarship was intellectually vacuous. Sokal articulated his justification for the hoax in a subsequent publication a few weeks later.

- One of my goals is to make a small contribution toward a dialogue on the left between humanists and natural scientists--"two cultures" that contrary to some optimistic pronouncements (mostly by the former group) are probably farther apart in mentality than at any time in the past fifty years...My concern is explicitly political: to combat a currently fashionable postmodernist/poststructuralist/social-constructivist discourse--and more generally a penchant for subjectivism--which is, I believe, inimical to the values and future of the left. (Sokal, 2008, p. 93)

Part III(h): My (i)nverted Sokal

In 2004, I sent the following analysis to “Dr. Math”, an act I now consider to be an “(i)nverted Sokal”.

Dear Dr. Math,

I have discovered a simple relationship between quantum mechanics and Euler’s Identity ($e^{\pi i} + 1 = 0$) that I would like to ask about.

As cited on page 150 in John Gribbin's *Q is for Quantum: The Encyclopedia of Particle Physics* the fundamental equation of quantum mechanics is:

$$pq - qp = \hbar/i$$

where position is q , momentum p (in matrices), \hbar is Planck's constant divided by 2π and i is the square root of negative 1.

Another key equation in quantum mechanics is Planck's fundamental equation for the energy of a photon, which is:

$$E = hf.$$

For complicated epistemological reasons that I cannot give details for here, I connected energy (E) to behavioral information ($pq - qp$) as conceptually equivalent. In so doing, I concluded that if this was a valid connection, then these two equations can be merged in the form of:

$$\hbar/i = hf.$$

This reduces to $1 = 2\pi i f$.

I discovered this relationship in 2001, brought it to a prominent physicist because I thought it was an interesting solution. I argued that it might deeply connect to hidden dimensions and the wave-particle duality observed in quantum mechanics. He was intrigued, but argued that you could not merge the matrix mechanic conception with the traditional conception, as I had done. Not being a physicist, I remained convinced that I had discovered something important, but I was not sure where to take it.

Part III(h): My (i)nverted Sokal Page 2

Anyway, about three months ago, I stumbled across the Euler equation. In delving into the conceptual make-up of the Euler equation, I have realized that my equation seems to merge with it. At the most basic mathematical level consider that from my equation,

$$i = 1 / 2\pi f$$

If you plug that into the Euler equation, you get

$$e^{1/2f} = -1$$

Raise each side by $2f$ and you get

$$e = 1^f.$$

Now return to my $2\pi if = 1$ equation and substitute $1/2\pi i$ for f . Raise each side by $2\pi i$ and you get

$$e^{2\pi i} = 1, \text{ which is another way of writing the Euler Identity.}$$

My first question is: Did I do the basic mathematical operations correctly?

My second question is: Does anyone there know of any previous work connecting the Euler equation to quantum mechanics?

My third question is: Obviously the notion of e equaling 1 raised to f (defined as wave oscillation per second) is of debatable meaning at a conceptual level. However, I believe that I do have a conceptual framework that can specify its meaning intelligently. To those skeptical, I would point out that many concepts in math have an illogical, imaginary, and transcendental flavor to them. To my third question: Do you think this “proof” would be of interest to the mathematical and physics community?

Thanks for any thoughts you can share.

Best regards,
Gregg Henriques, Ph.D.

Assistant Professor of Psychology
James Madison University

Part III(h):
My (i)nverted Sokal

What I mean by an (i)nverted Sokal:

This is meant to describe an impressive feat, like a [complicated inverted dive](#). Note the *i* is not capitalized as a reference to the imaginary number dimension.

The parallels and inversions are as follows:

Alan Sokal performed a powerfully ironic act to make a point. He, as a mathematical physicist, was demonstrating the vacuousness of post-modernism by showing how they accepted the silliness of a hermeneutic pathway toward understanding quantum gravity. He published it in a real journal and got much attention.

Part III(h):
My (i)nverted Sokal

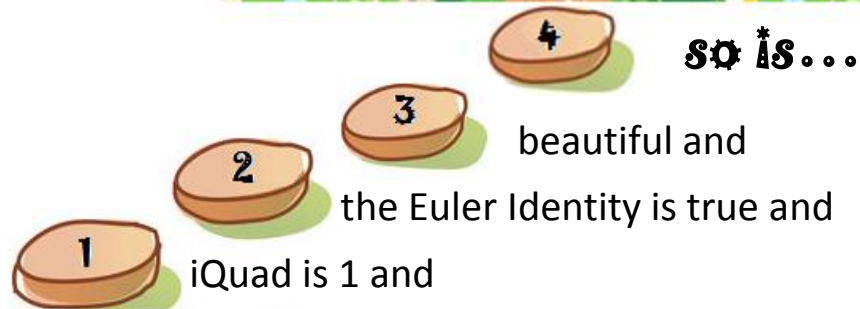
What I mean by an (i)nverted Sokal:

I am a psychologist who sent a real (if partial) solution to the problem of quantum gravity to the Dr. Math website and received no reply.

In short, there is a profound, ironic symmetry between the two acts.

Part IV:

With the Background Knowledge in Place, You are Ready to take the 4th Step and Formally Enter the Garden





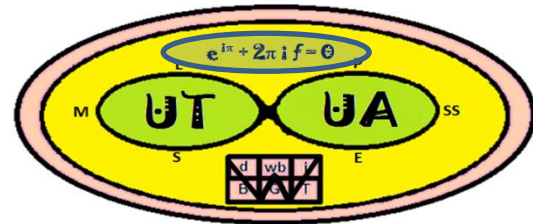
The Fourth Truth

One true,
beautiful,
good,
statement.

*The Fourth Truth of
iQuad is:*

$$e^{i\pi} + 2\pi i f = 0$$


This is the first beautiful truth of the Garden.
It is found in the UTUA seed. There are a total of
15 beautiful truths to be found.



Welcome to The Garden of UTUA

*True Radical Mathematical
Humanistic Knowledge Starts Here...*