MIND/BODY/SPIRIT COMPLEX IN QUANTUM MECHANICS

Justin M. Riddle

ABSTRACT: Prevailing theories of consciousness may be characterized as either a physicalist view of mind with material building blocks that grow in complexity unto an emergent conscious experience, or as a dualistic model in which mind-body interaction is taken as the interface of conscious intent and unconscious bodily processing. Roger Penrose supports a model of consciousness that goes beyond dualism by adding a third domain [19]. The Three World model describes interconnected yet independent aspects of consciousness: Physical, Mental & Platonic. These three worlds are grounded in the three axioms of quantum mechanics: measurement, superposition and entanglement. The Mental World corresponds to the superposition principle in which all possible future realities are superposed as potentials before a choice is made. The superposition is analogous to the choices we make everyday. In the Physical World, the measurement principles states that the quantum system must collapse the superposed possibilities into a single actuality. The most peculiar phenomenon in quantum mechanics is entanglement. Quantum systems may be entangled in a timeless and spaceless way such that they will still be connected despite separation in space or time. The Platonic World is akin to entanglement, because mathematics and conceptual forms are unchanging regardless of space or time. Finally, a new model called Fractal Trialism is proposed which describes how there is a nested trialism within each of the three worlds in order to elaborate their interconnectedness. This model describes digital computers, quantum computers and shared experience.

KEYWORDS: Quantum Consciousness; Metaphysics; Trialism

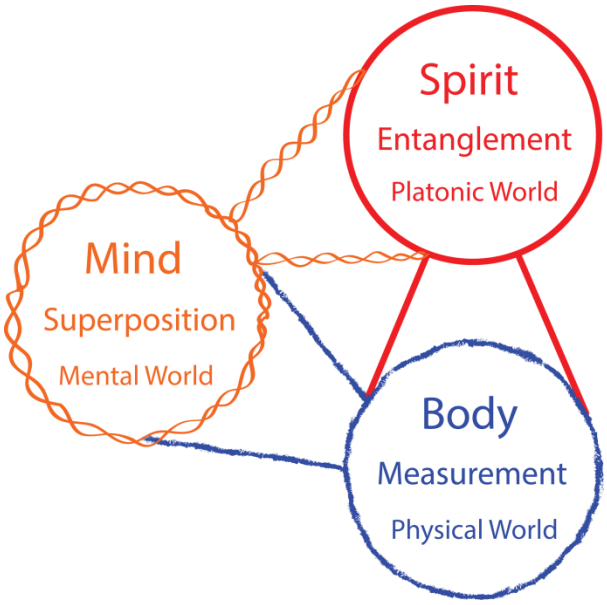

Figure 1. Three world model of consciousness. Each aspect of consciousness is interdependent and relates to one of the fundamentals of quantum mechanics. In everyday experience, these three parts of consciousness are referred to as the Mind, Body and Spirit.

1. METAPHYSICS

Why is there something rather than nothing? What are the fundamental laws and mechanisms behind all that is seen and experienced? Theories on metaphysics can be categorized into three general camps: physicalism, dualism and trialism. This paper focuses on trialism and connects metaphysics to quantum mechanics, Figure 1.

1.1 Physicalism

As an intuitive and accurate starting point, humans began to measure and quantify interactions with the world seeking laws that govern physical matter and allow for control and tool-making. This line of inquiry leads to two important aspects of physicalism: deterministic physics and the piecemeal approach.

Determinism is the theory that if the position and momentum of every atom in the universe were known, then a cause and effect model could accurately predict all subsequent movements and interactions. This ideal suggests there is an inevitable and incorrigible chain of events behind all activity. The reason some action might seem

random or unknown is simply a matter of complexity and unstudied factors. Under this theory, consciousness could be a chain reaction of trillions of specific processes all deterministically plugging along.

Through the lens of deterministic physics, the satisfying explanation is the piecemeal approach: a complex object is understood through analyzing each building block and how every piece fits together. Once each cog in the machine is satisfactorily grasped within the overall function, the inquirer can accurately claim to know the meaning and purpose of the machine. For example, a "car" is understood by the dynamic interaction of the engine, wheels, seating, etc. The "car" is simply a quick way to reference this collage of moving parts. As this example suggests, the piecemeal approach is essential to designing and replicating man-made tools. The prevalence of tool-use in modern society may unconsciously be driving many towards the physicalist belief system.

This intuitive emphasis on physical determinism leads to a devaluation of consciousness [6,8]. Whether explicitly rejected or implicitly undermined, there is no room for conscious intention in the framework of a purely mechanical/deterministic unfolding of events. While it is appealing to have the simple and straightforward explanation offered by cause and effect, subjective experience has many qualities such as unity of self, freewill and empathy that must be explained. The physicalists claim that there is such a bounty of cause-effect relations, i.e. complexity, that a human mind could not simulate all of these interactions. Thus it cannot be imagined how consciousness can emerge, but they claim that it does. This is a non sequitur argument as it does not attempt to explain how a simple cause-effect relation could create something as entirely different as qualitative experience.

1.2 Dualism

René Descartes is notable for his methodological doubt [9]. Step 1: assume that all physical perceptions cannot be trusted as one could very well have dreamt all these details; knock out Penrose's Physical World. Step 2: assume an Evil Deceiver is manipulating your reasoning abilities such that you concluded that 2+2=5 and a square has no right angles; knock out Penrose's Platonic World. What remains? Conclusion: *cogito ergo sum*, "I think, therefore I am;" it is impossible to deny Penrose's Mental World.

By taking the mind seriously, a model of the universe now includes mind stuff and body stuff, which must interact to some extent. In the field of philosophy, the question of how the mind can control the body and how the body leads to mental perception is termed the mind-body problem. For many thinkers, the dichotomy of mind and body,

polarizing Penrose's Mental World and Physical World, reigns as the ultimate mystery. Mind-body duality is called *substance dualism*.

Another class of dualist thinkers polarizes Penrose's Physical World and Platonic World. David Chalmers calls his model *naturalistic dualism* [4]. When humans use language there are dual aspects of linguistic information being transmitted, figure 2. From the Platonic World, information is the meaningful experience that is simulated by the speaker and provoked in the listener. Semantics are in the 2nd person point of view in which transpersonal universal ideas are grasped. From the Physical World, information is constrained to particular utterances entering the available biological perception. This syntax conveys the 3rd person point of view because it can be objectively measured by anyone. The Mental World is the 1st person point of view and offers an explanatory bridge between the Physical and Platonic.

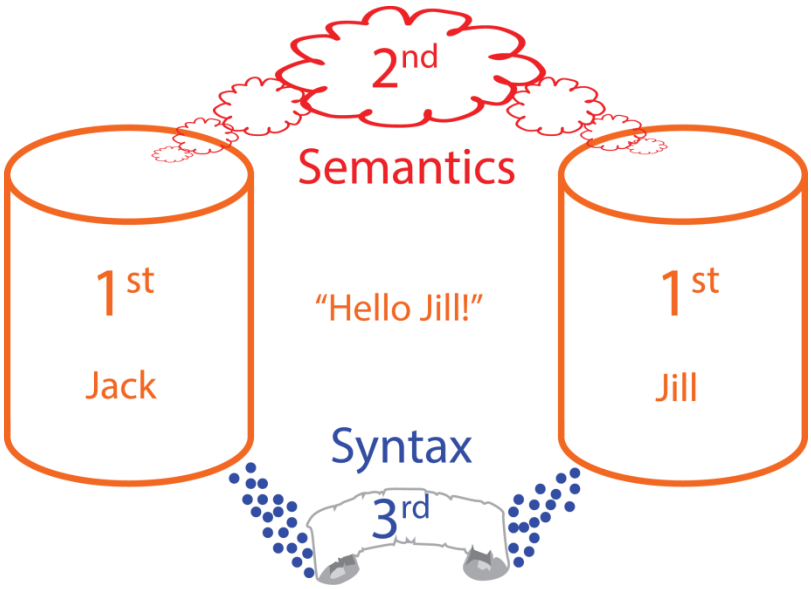

Figure 2. David Chalmer's dual aspects of information. Jack and Jill in the Mental World communicate using syntax of the Physical World simultaneously with semantics in the Platonic World

1.3 Trialism

It may be noted that many dualistic theories of consciousness have an implicit third world that is spoken of as a bridge between the dualism. For Descartes, his conception of God orchestrates the mental and physical bodies. For Chalmers, the personal

psyche is the explanatory bridge, or structural coherence, between the syntax and semantics. While it is seldom discussed in popular science, adding a third domain to the study of consciousness provides clarity and is motivated by diverse fields of study.

One of the earliest accounts of trialism comes from Plato's proposition that humans are endowed with a tripartite soul [1]. The three parts of the soul are the physical desires mastered by moderation (Physical), the emotional content empowered by courage (Mental), and the intellectual spirit to govern the rest (Platonic). Importantly, the tripartite soul is a microcosm of Plato's metaphysics. The human mind is barraged with particulars, or shadows, entering through the perceptual mechanisms of the body (Physical). Behind the scene, there is a world of universal mathematical and conceptual forms (Platonic). In order to break out of the simplistic perception of shadows and see the true forms underlying reality, one must be an active sophist, or philosopher (Mental).

Psychologists Sigmund Freud and Carl Jung collaborated with each other on psychoanalysis resulting in a trialism of mind [11,14]. While they were eventually divided by differences in application and interpretation of this model, they ushered in a new era of psychology. At the Physical level, Jung describes the personal unconscious (Freud's id) which contains biases or contents that were at one time consciously perceived and have since been forgotten. These past experiences still exert their influence, but beneath the level of conscious awareness as subconscious programming. At the Mental level, Jung explains that the personal conscious (Freud's ego) integrates new experiences into the self and differentiates a conceptual framework from the milieu. At the Platonic level, Jung suggest the collective unconscious (Freud's superego) has never been personally acquired but arises from cultures to define the archetypal mind.

2. THREE FUNDAMENTALS OF QUANTUM PHYSICS

Quantum theory is based on three fundamental axioms: measurement principle, superposition principle and entanglement, figure 3. While each axiom is simplistic in its own right, a quantum system is only describable by the interaction of these axioms [7]. After introducing the axioms, a correspondence is posited from measurement, superposition and entanglement to the body, mind and spirit respectively.

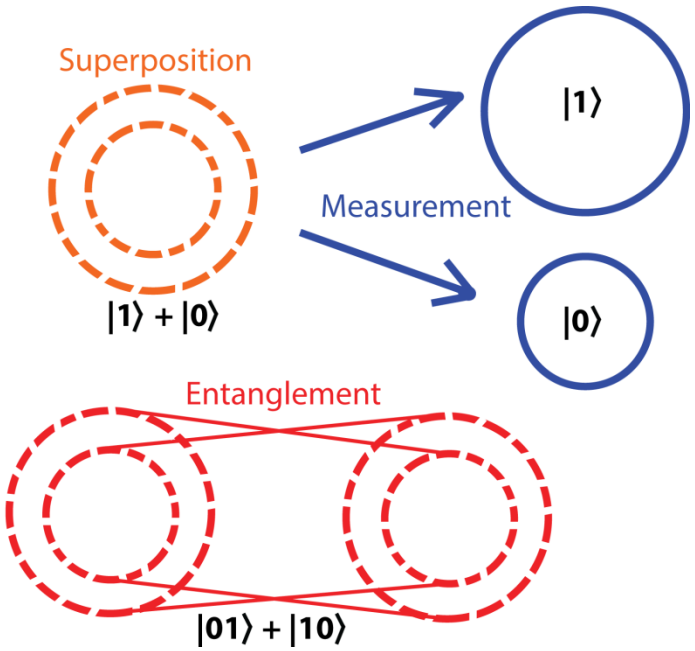

Figure 3. Three quantum axioms: superpositions of possible space/time realities, measurement collapses the superpositions into a single discrete state, multiple systems can be entangled such that future measurements will be correlated

2.1 Measurement

The quantum, or *quanta*, paradigm arises from the notion that space and time are discrete. The span between two regions of space cannot be infinitely divided in half. Instead, there is a specific and finite number of regions of space between any two regions. The same principle applies to time. Time is not an infinitely divisible flow from now to the future, but is instead a series of jumps from each moment to the next.

The measurement principle states that when a quantum system is observed, or measured, it will necessarily exist in one region of space/time or another. This axiom has given rise to the human perception that all of reality is composed of physical matter. Whenever the environment is observed, it appears solid and fixed in space and time. In quantum theory, the act of observation itself is forcing the quantum system into one of these discrete space/time regions. Measurement does more than extract information, it causally alters the future of the quantum system by collapsing its wave function [22].

2.2 Superposition

What happens when a quantum system is not being observed? The superposition principle states that a quantum system will evolve into a probability distribution of many possible space/time regions. This wave function of probability densities describes the chances that an observer will measure the quantum system in one space/time region or another.

When the measurement principle and superposition principle are taken in conjunction, movement is envisioned as a quantum system starting out measured in one particular space/time region, evolving outwards in superposition to many other regions, then measured again at a new space/time region. The very notion of movement as a fluid action or continuous flow from one region in space to another is an illusion. All things are flickering into discrete space/time states before being engulfed back into a superposition of many states.

2.3 Entanglement

When two photons are focused through a diamond to form a coherent laser beam, they are entangled. Now the two photons, or quantum systems, share a single wave function. Despite any spatial shifts, e.g. moving the photons to separate sides of the Earth, or temporal shifts, e.g. waiting a few days, the photons will continue to share this wave function. Now when the photons are simultaneously measured, the results will be correlated. Entanglement describes spaceless and timeless bonds that underlie a deeply interconnected reality. The peculiarity of quantum mechanics arises from the paradoxical realities of entanglement being spaceless/timeless and measurement being discretely here/now.

3. FRACTAL TRIALISM

Fractal Trialism expands on Penrose's Three World Model by proposing a fractal-like projection of trialism onto each world, figure 4. In the Physical World, digital computers are described with three Levels that have been established through the process of designing and developing digital algorithms and machines. The Physical World represents the subconscious and interfaces with the other Worlds through its three Levels. The Mental World is the quantum computer mind of personal conscious experience. Once again there are three Levels to describe how the conscious Mental World interacts with its lower Physical and higher Platonic World.The Platonic World encompasses the entanglement relations of the Mental World to the rest of the universe, other quantum computers. In each World, the nested trialism serves the purpose of expanding on the relation of each World to another. The Physical Level of

the Physical World, Mental Level of the Mental World and Platonic Level of the Platonic World are the purest essence of the original Three World model.

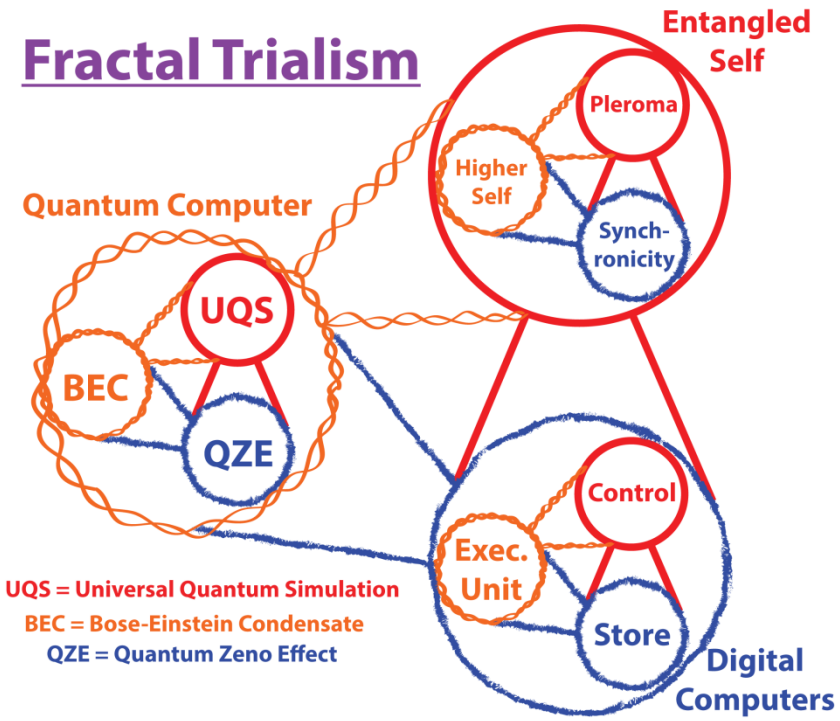

Figure 4. Fractal Trialism. The three aspects of consciousness are best explained by a nested three Levels within each World. The Levels describe the interface of one World to another or its purer essence.

4. THREE WORLD MODEL OF DIGITAL COMPUTERS

The digital computer exists specifically in the Physical World of Fractal Trialism. While there are three Levels of digital computers that mirror the Three World model, digital computation requires the discrete states restricted to the realm of Measurement.

Alan Turing, the father of the digital computer, or *Turing* machine, crucially described its function using three levels, figure 5 [25]. At the Physical Level, the machine has a Store of bits on a ticker tape that is used as input and output. At the Mental Level, an Executive unit manipulates these bits using a series of rules and

machine states, e.g. if the machine is in state A and sees an input string of 001, then produce output string 110 and move to machine state C. At the Platonic Level, there is a Control which is the overarching goal and purpose of the machine. The Control does not exist anywhere in the machine but exists in the understanding of the programmer of what the machine was designed to perform; e.g. a calculator does not know it is performing addition but this function has mathematical significance to the programmer and user.

David Marr similarly postulated his three levels of analysis of information processing systems which are a clear analogue to Turing's original conception [18]. The Implementation Level asks of what material the computer is made (Physical). The Algorithmic Level asks how the machine transforms representations of the problem to reach the desired output (Mental). The Computational Level asks why the computer is performing the operations and its purpose for the user (Platonic).Digital computation holds a fundamental role within quantum metaphysics: occupying the realm of Measurement. By discussing its limitations and capabilities, digital computation are seen to act as the subconscious within Fractal Trialism.

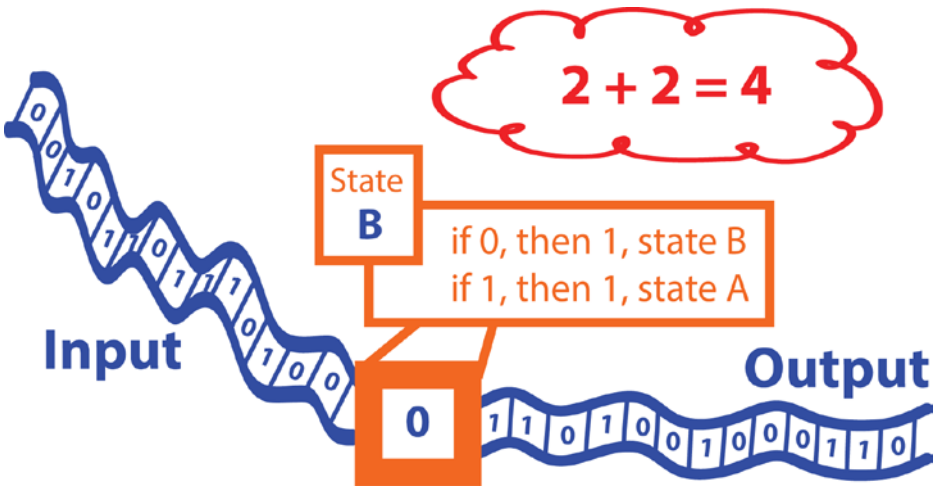

Figure 5. Three parts of the Turing machines: Physical store of bits for input and output, transformation rules for input to output that performs the computation (Mental), and the concept of why the program is running exists in the understanding of the user (Platonic).

3.1 Solid-State Illusion

Digital computation relies on creating and sustaining solid-states, or bits. A bit is defined as a mutually exclusive state of either 0 or 1. These bits are stored in transistors and carried as signals through wires. In a transistor, the bit is encoded by a cloud of electrons enclosed in one of two chambers connected by a channel that can be selectively opened and closed. Depending in which pocket the bulk of electrons are measured to reside, the transistor will decode as a 0 or 1. When a computer must transmit a signal of 0 or 1, it carries this message through the voltage of the wire; e.g. a high voltage is 1 and a low voltage is 0.

Neither storing nor transmitting bits is perfect in reality. A cosmic ray may enter the transistor and flip the stored electrons to the wrong readout. In a wire, the barrage of electrons chaotically ricochet off each other and fly out of the wire producing heat and random deviations. Much of the material science, electrical engineering and low-level software programming is aimed at error-correcting the quantum fluctuations, or unpredictable breakdown of the solid-state. For this reason, the digital computer is an abstraction that must be rigorously maintained to mask out the quantum uncertainty at the fundamental level of reality. From the perspective of the everyday user, each measurement within the digital computer must maintain the illusion of a deterministic and solid-state environment.

4.2 Chinese Room Argument

John Searle put forth the Chinese Room argument to deny the existence of strong artificial intelligence [23]. The thought experiment goes: a human is placed inside a room and receives Chinese characters through an input slot. Upon receiving these inputs, the human searches through a rule ledger and follows a logical series of transformations to produce Chinese characters that are sent out of the room. From the outside, Chinese speakers are deep in conversation with this room and believe it to be fluent in Chinese. The point of this parable is that the human inside the box represents a digital computer following a mindless series of transformation and will never come to understand Chinese. This effectively shows the core limitation of digital computers: a knowledgeable programmer is always required to write the rule ledger. The clever intelligence of the programmer should never be mistakenly attributed to the machine itself.

The Chinese room argument is fundamental to the digital computer's place within Fractal Trialism because digital computers represent the subconscious mind. There is no interpretation of meaning in the Measurement World of consciousness. Throughout our lives the external environment is programming our perceptions and patterns of thought. Often we are unaware of this programming and fall victim to

unwanted negative thoughts. We must realize the subconscious is simply a result of its own history and can be actively reprogrammed by rehearsing desirable thought patterns and taking an intentional role in thinking.

4.3 Universal Turing Machines

Every universal digital computer that is given a specific program and input will necessarily produce the same output [25]. Since digital computation rides on the solid-state assumption, there is no ambiguity as to which bits represent 0 or 1. There is a nonnegotiable serial sequence of transformations from input to output. In other words, if a computer is told to execute an addition program with the inputs 2 and 2, every universal digital computer will output 4. The Platonic Level of digital computation is representing abstract forms that never deviate from their specification. (Implementing abstract math into software.)

In Fractal Trialism, the Platonic Level of digital computers is the ability of the subconscious to be reliably programmed and act as an interface between conscious intention and the environment.

5. QUANTUM COMPUTER METAPHOR OF MIND

Quantum computers are naturally occurring and new evidence continues to emerge that our biology has evolved to manipulate quantum principles [21,24]. While describing the makings of a quantum computer, this section explores the Quantum Computer Metaphor or Mind. In Fractal Trialism, the quantum computer is conscious/self-aware occupying the Mental World. Like the Physical World of Measurement, the Mental World of Superposition also has three distinct Levels which mirror the whole.

5.1 Quantum Zeno Effect - Freewill

Quantum computers are built out of quantum bits, or *qubits*, which exist in a superposition of two possible states. Measurement of the qubits not only extracts information but collapses the current wave function and initiates the state from which the quantum computer will now evolve. If the experimenter applies repeated measurement as fast as possible, the quantum system can be forced to stay within a particular state. This effect is called the Quantum Zeno Effect (QZE).

In the quantum computer metaphor of mind, the conscious mind can apply attention to a particular object and hold that object in mind using QZE. William James says the primary function of freewill is that of a *selecting agent*; as thoughts arise in consciousness one either applies attention, QZE, or lets the thought disappear [13].

Henry Stapp uses QZE as a mechanism by which the mind can build templates for action in the brain [22]. By repeated collapse of the wave function to a particular goal, the brain develops a pattern of execution. In Fractal Trialism, QZE is the interface for the human mind, Mental World, to train the subconscious brain, Physical World, through repeated measurement to actively participate with the environment and subconscious.

5.2 Bose-Einstein Condensate - Unity of Self

The computational power of a quantum computer is based on how large of a superposition can be generated and maintained. The more qubits that can be held in superposition together defines how many input bits may be simulated by the quantum computer. The state necessary to generate such a large wave function to encompass many qubits is called a Bose-Einstein Condensate (BEC).

One problem in biology is how the cell is able to orchestrate sensory perceptions and behavior across such a large distance. Quantum computers offer a solution in that a superposition spread throughout a cell would enable long-range orchestration. Stuart Hameroff and Roger Penrose have proposed that the cytoskeleton, composed of microtubules, is such a structure in biology that acts as the on-board quantum computer of the cell integrating sensory inputs and organizing behavior at the macroscopic cellular level [12].

In Fractal Trialism, quantum coherence in a BEC represents the Mental World's ability to simulate many possible choices in superposition and intuitively choose the most efficient solution at the level of the whole body/brain. Furthermore, as multiple sensory inputs are received they are combined within a cohesive whole, or gestalt. This describes the unity of consciousness and sense of self that is subjectively experienced.

5.3 Universal Quantum Simulation - Empathy

René Magritte's famous painting, *The Treachery of Images*, depicts a pipe with the inscription "This is not a pipe" beneath the image [20]. The painting of the pipe is not a pipe; it is a painting of course! This brings up the question of what is actually a simulation pretending to be reality and what is true reality. Clearly our models of how consciousness works are not consciousness itself. As Robert Anton Wilson states, we do not try to eat our restaurant menus or drive on our maps, since such items are only simulations of reality [27]. Quantum computers present a curious case for the simulation versus reality debate because each quantum computation is an instantiation of Universal Quantum Simulation (UQS) in which there is no difference between

simulation and reality [17]. The simulation of reality by a quantum computer is identical to the reality itself.

Any two quantum computers that are prepared in the same state will evolve their superpositions identically. Although their outputs are probabilistic, the evolution of the wave function is predictable. According to this logic, simulation of a cluster of ten atoms in a vacuum can be perfectly simulated by preparing a quantum system of the same size with an identical initial state [17]. Every quantum computer has the ability to simulate any other.

In Fractal Trialism, UQS allows for humans, Mental Worlds, to simulate the experience of others. As two individuals discuss complex topics, their minds create representations of this information and build off each other's mental imagery. UQS allows both Mental Worlds to access Platonic concepts such that their simulations of reality become identical through communication. All of human interaction relies on relating transpersonal qualitative experience through empathy, now explainable as UQS.

6. ENTANGLEMENT AND THE SELF

The third axiom of quantum mechanics, entanglement, describes the Platonic World where space and time are eternal. All entanglement relationships between quantum systems are interrelated and maintained in concert. The entirety of expanding space is held in a single, spaceless *zero point*. The history and future of time is summed up into a single moment. In this zero point and penultimate moment your consciousness exists within the perspective of the entire universe. Your particular history and meaningful co-existence is like a fingerprint in the universal reference frame.

David Bohm describes the third world of entanglement as a holomovement, or evolving hologram at the universal level [2]. All of our thoughts and actions are enfolded into the holomovement and are implicitly present in all of space and time, even though we are not explicitly aware of its presence. Every new action or thought unfolds from the implicit into the explicit taking with it all the relevant nonlocal and atemporal relations.

Another expression of the Platonic World is John von Neumann's process 3, or nature's choice [26]. After the potential futures have been presented to a quantum system, Physical process 2, the observer makes a choice, Mental process 1. It is up to nature to decide whether it accepts the decision of process 1 or makes its own choice. Nature in this scenario can be understood as the sum total of all entanglement relationships.

In Fractal Trialism, the Platonic World of Entanglement has three distinct Levels that mirror the Three Worlds: Synchronicity, Higher Self and the Pleroma.

6.1 Synchronicity

Synchronicity was coined by psychologist Carl Jung to express the simultaneous experience of a mental event and physical event which holds personal significance with no possibility of a causal explanation [3,15]. Everyday examples of synchronicity include a friend calling your phone or running into you on the street just as you are thinking about them, the repeated occurrence of a specific number in relation to some feeling or thought, turning on the radio only to have it express exactly how you are feeling, or learning a new concept or word and then experiencing it again and again immediately after. Due to its subjective nature, synchronicity is often difficult to explain and skeptics explain away these occurrences, but as Carl Jung says "synchronicity is an ever present reality for those who have eyes to see it" [15].

While the cause and effect paradigm of classical physics has no room for synchronicity, quantum mechanics opens its arms to the possibility. Just as two entangled photons can be simultaneously measured and seen to have correlated outcomes, the quantum computer of the human mind may be entangled with other humans and, by extension, events in our physical universe. *Synchronicity is the physical evidence of your personal entanglement with the rest of the universe.* In Fractal Trialism, the Platonic World of Entanglement is measured in the Physical Level as synchronicity.

6.2 Higher Self

Religious traditions have explained that each human is evolving their consciousness towards their ultimate and true form, the *higher self* [5]. This higher self exists in the eternal realm of entanglement. This produces a paradox: each human is presently working to evolve towards their higher self and will eventually reach this goal, but since the higher self is timeless and spaceless it is always here in the present actively working to help you achieve this goal.

In the Red Book, Carl Jung describes that each human has a single star in the sky which is his personal divinity and his ultimate goal [16]. The metaphor of the star represents our personal significance and place within the universe. Ralph Waldo Emerson says, "Every man is a divinity in disguise, a god playing the fool" [10]. In Fractal Trialism, the Higher Self is the personal Mental Level within the Platonic World of Entanglement.

6.3 Pleroma

A paradox is when two descriptions of reality are verifiably true, yet express opposite explanations. The most prevalent quantum paradox is wave-particle duality. The photon *is* a particle, because there are plenty of experiments that demonstrate this fact. However, there are other experiments that clearly show that the photon *is* a wave. How can both of these completely different realities co-exist? In essence, this reveals the contradictory nature of the Platonic World and the Physical World. The Physical World has discrete measurements and laws of cause and effect, while the Platonic World has nonlocal entanglement relations resulting in synchronicity for simultaneous measurements. The two have nothing in common and a bridge is sought via the Mental World.

Generalizing this principle of paradox between Platonic and Physical we reach the conclusion: all truth is at its best half-true. Once a half-truth is realized its paradoxical counterpart is realized to also be half-true. In this sense the whole truth can be seen as the experience of two half-truths in a mind-boggling, paradoxical co-existence. Each half-truth appears to be self-evident given a certain set of facts, and contradicts or disproves the other half-truth to the logical mind. For this reason, the whole truth is difficult to analyze logically but must be intuitively grasped and the paradox held in a sort of theoretical superposition.

Carl Jung calls the paradox level of reality the pleroma. The pleroma is everything undifferentiated and the unification of opposites.

> "Nothing is the same as fullness. In the endless state fullness is the same as emptiness. [...] The Nothing, or fullness, is called by us the PLEROMA. In it thinking and being cease, because the eternal is without qualities. [...] The pairs of opposites are the qualities of the Pleroma: they are also in reality non-existent because they cancel each other out."
>
> - Carl Jung, *The Red Book* [16]

7. CONCLUSION

Fractal trialism presents a tripartite view of consciousness where each World has three distinct Levels that reflect the original three Worlds. In the Physical World, the measurement principle describes our body as composed of subconscious programming from our digital interface with the external environment. The subconscious body is the result of the measurements performed throughout our lifetime. The Mental World is a quantum computer mind which relies on quantum coherence for unity of self generating large superpositions of life choices, quantum Zeno effect for learning and programming the body, and universal quantum simulation for empathy and

communication. The Platonic World is the entanglement of the self which is revealed in the form of meaningful synchronicity that defies our classical cause-effect logic. The higher self is our ultimate form and goal of consciousness evolution, ever present and connecting us to universal meaning. At the peak of fractal trialism, is the Pleroma which is comprised of paradoxical half-truths that defy analytic logic and behold the mysteries of the universe.

Department of Psychology,
University of California,
Berkeley; Berkeley,
CA, 94720-3190,
USA

REFERENCES

1. Bloom, A. D. (Ed.). (1991). *The Republic of Plato*. Basic Books.
2. Bohm, D. (1981). *Wholeness and the Implicate Order*. Routledge.
3. Cambray, J. (2009). *Synchronicity: Nature and psyche in an interconnected universe* (No. 15). Texas A&M University Press.
4. Chalmers, D. J. (1995). Facing up to the problem of consciousness. *Journal of consciousness studie*s, 2(3), 200-219.
5. Chopra, D. (2001). *The Higher Self*. Simon & Schuster Audio.
6. Churchland, P. M. (1981). Eliminative materialism and the propositional attitudes. *The Journal of Philosophy*, 67-90.
7. Dasgupta, S., Papadimitriou, C. H., & Vazirani, U. (2006). *Algorithms*. McGraw-Hill, Inc..
8. Dennett, D. C. (1993). *Consciousness Explained*. Penguin UK.
9. Descartes, R. (1641) *Meditations on First Philosophy*.
10. Emerson, R. W. (1841). *Self Reliance. Essays: First series.*
11. Freud, S. (1899). *The Interpretation of Dreams*.
12. Hameroff, S., & Penrose, R. (1996). Orchestrated reduction of quantum coherence in brain microtubules: A model for consciousness. *Mathematics and computers in simulation,* 40(3), 453-480.
13. James, W. (1890). *The Principles of Psychology* (Vol. 1). New York: Holt.
14. Jung, C. G. (1981). *The Archetypes and the Collective Unconscious* (Vol. 9). Princeton University Press.
15. Jung, C. G. (1955). *Synchronicity, an Acausal Connecting Principle*.

16. Jung, C. G. (2012). *The Red Book: A Reader's Edition*. WW Norton & Company.
17. Lloyd, S. (2006). *Programming the universe: a quantum computer scientist takes on the cosmos*. Random House LLC.
18. Marr, D. (1982). *Vision: A computational investigation into the human representation and processing of visual information*, Henry Holt and Co. Inc., New York, NY, 2.
19. Penrose, R. (1994). *Shadows of the Mind* (Vol. 204). Oxford: Oxford University Press.
20. Magritte, R. (1929). *the treachery of images. Oil on canvas*, 231(2), 1928-29.
21. Ritz, T., Thalau, P., Phillips, J. B., Wiltschko, R., & Wiltschko, W. (2004). Resonance effects indicate a radical-pair mechanism for avian magnetic compass. *Nature*, 429(6988), 177-180.
22. Stapp, H. P. (2004). Mind, matter, and quantum mechanics (pp. 81-118). Springer Berlin Heidelberg.
23. Searle, J. R. (1980). Minds, brains, and programs. Behavioral and brain sciences, 3(03), 417-424.
24. Sarovar, M., Ishizaki, A., Fleming, G. R., & Whaley, K. B. (2010). Quantum entanglement in photosynthetic light-harvesting complexes. *Nature Physics*, 6(6), 462-467.
25. Turing, A. M. (1950). Computing machinery and intelligence. *Mind*, 433-460.
26. John Von Neumann. (1955). *Mathematical foundations of quantum mechanics* (No. 2). Princeton university press.
27. Wilson, R. A. (1990). *Quantum psychology: How brain software programs you and your world*. New Falcon.