PROCESS AND THE BRAIN: THE ORIGINS OF REFLEXIVE CONSCIOUSNESS

by

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ABSTRACT

In this thesis, I show how consciousness correlates with the nature and complexity of associated neural processes, applying Arthur Young’s reflexive arc of evolution to discover how and why reflexive consciousness develops in systems of matter, from subatomic particles to the human brain.

One recent attempt to place consciousness in a context of scientific materialism is the Orch OR model developed by Stuart Hameroff and Roger Penrose. Despite their attempts, they succeed only in developing a model of how quantum mechanical actions of neurons correlate to particular states of consciousness. They fall short of demonstrating any causal relationship between quantum-neuronal events and the production of consciousness. When I apply Christian de Quincey’s philosophy of radical naturalism, we see that consciousness is present already throughout the Orch OR model, in every system, or monad, of matter.

Hierarchical as well as heterarchical intersubjective relationships exist among the levels and units of systems of matter. I speculate that the combination of these processes account for reflexive consciousness. Arthur Young’s reflexive arc model of involution and evolution demonstrates the process of consciousness “descending” through various levels and stages of constraint, resulting in the emergence of molar matter from the original source of “Spirit,” which Young identifies with the “quantum of (purposeful) action” or photon, and de Quincey characterizes as primordial “sentient energy.” The “descent into matter” is then followed by an “ascent” back through the evolution of matter, life, mind, and soul to spirit (de Quincey, 1993, p. 9). A key thesis of this work is: Only through a process of creating an experience of relationship with “other” can the universe experience reflexive consciousness.
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Rather than going through the motions of the obligatory “acknowledgements,” I would like to meditate deeply into the full impact specific individuals have had on my life, which have led to my producing this metaphysical work.

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STATEMENT OF PURPOSE

The primary question of this study is: How is consciousness correlated with the nature and complexity of associated neural processes?

In this thesis, I focus on how reflexive consciousness operates in the brain, using a framework of Christian de Quincey’s radical naturalism, where consciousness is defined as a stream of experience with teleological action inherent in all matter. According to de Quincey, the brain, as with many physical entities, is a nested hierarchy of sentient matter, from subatomic particles to the whole human. Even the smallest particles of matter down to photons, possess some degree of subjectivity (a synonym for consciousness) and make choices, developing into larger monads by forming intersubjective relationships with other monads. His work describes the philosophical, ontological nature of consciousness.

Stuart Hameroff and Roger Penrose created their own model of consciousness called Orchestrated Objective Reduction, or “Orch OR.” They argue that microtubules collapse quantum wave-functions in the brain. This cascade of self-collapses leads to a series of “moments of now” representing our experience of consciousness. Their model fails to account for the existence of consciousness, instead it describes the physical processes associated with hierarchical, psychological levels of awareness.

I am interested in examining the neurological details in the brain to see if they can illuminate how the specific physical processes of neurons correlate to particular states of consciousness. By applying de Quincey’s radical naturalism to the Hameroff and Penrose Orch OR model, I show that microtubules make specific choices in brain cells that lead to quantum
mechanical procedures. Objectively, this quantum coherence facilitates cerebral functioning. Subjectively, microtubules form relationships of meaning with other microtubules, just as all matter has the capacity to do. We see from quantum mechanical equations that purposeful action occurs even at the level of molecules, which, therefore, are themselves sentient or conscious, as opposed to “producing” consciousness.

To analyze the nuanced levels of reflexive consciousness throughout the various systems of matter in this model, I turn to Arthur Young’s reflexive arc. Young’s arc represents an involution of consciousness into matter, followed by an evolution back toward consciousness (which Young also calls “Spirit”). The degree of reflexive consciousness depends on the degree of intersubjective relationships among the units, as well as hierarchical relationships among the levels throughout this arc.

**Larger Context for this Study**

We need a study of consciousness to help us with the current ecological crisis on the planet. For four hundred years, we have operated from a mechanistic, deterministic worldview with no place for consciousness. This has allowed us to attempt to manipulate and exploit the world, with disastrous results. If we are to live in a safer, more harmonious relationship with the Earth, then we need to re-discover the study and understanding of meaning and intention, which are elements of consciousness. We need to start to understand that long-ignored part of our reality by beginning a thorough study of different forms of consciousness and their associated neurological-quantum correlates—if we are to survive.
INTRODUCTION

My early years, peppered with a sense of existential crisis, foreshadowed the direction my academic life would eventually take. As a first-grader at summer school, recess meant freedom in the warm sun, a time of movement and possibility. The other kids squealed and bounded outdoors with large rubber balls to play “4-Square” on the asphalt beside the jungle gym. The teachers muttered under their breaths each day when I inevitably grabbed a ball just for myself and went off to the corner of the playground, bouncing the ball, lost in solitary imagination. The rhythmic, soothing thump-thump of the rubber ball on concrete sent me immediately into a trance. In this gorgeous state, far removed from the silly thoughts and squabbles of the children, I now had a vast, rich and textured mental interior space where I was safe to pursue existential trains of thought.

In this space of clarity and rich aloneness, I thought about the meaning of life and other self-referential questions: Are other people looking out of themselves just like I am? Where in my body are my thoughts and feelings? Already, at a young age, I felt aware of the mystery that we are all immersed in a stream of experience but can never understand what it is. In my ball-bouncing trance, I did not expect an answer would arrive at my feet. Instead, I adored the inquiry process, feeling how questioning the infinite drew me closer to the divine, to the reason I incarnated on this planet, filling me with purpose and creative insights as to what just a tiny part of the answer might be!

“Jesse, why don't you play with the other children? Are you feeling ok? Is something wrong?” asked the teachers.
Early in life, no other child or adult shared my passions, so I developed a painful sense of the gap between my imaginative internal world and “everyone else.” How ironic: This life-struggle represented the essence of my original inquiry, the nature of the gap between interior and exterior, between mind and matter. That gap plagued me for years, remaining an emotional catalyst for my existential inquiry two decades later, as now I formulate my own pieces of the puzzle to the human quest, pieces that relate to my understanding of how we are all reflective facets of one being.
REVIEW OF THE LITERATURE

In mainstream science, deterministic materialism reigns as the predominating worldview. In a universe devoid of meaning, consciousness emerges as a function of physical processes in the brain. Some scientists and philosophers consider reducing consciousness to some other physical aspect of reality too simplistic. Still unsatisfied, some now call for a new, expanded science of consciousness that includes subjectivity. Bound to an object ontology (materialism), these philosophers now realize that an entirely new ontology and epistemology must evolve from objects to process. Process ontology holds merit for joining together the objective and subjective, matter and consciousness.

In his 1991 book, *Consciousness Explained*, Daniel Dennett proposes his own materialistic model of consciousness, called the Multiple Drafts model. This model serves as an alternative to the Cartesian Theater analogy (Dennett, 1991, p. 17) that we often assume true. In the Cartesian Theater analogy, we view consciousness as one coherent whole, in a “theater” in the brain. However, if the theater itself represents consciousness, then who’s watching? Instead, according to Dennett, consciousness involves “parallel, multitrack processes of interpretation and elaboration of sensory inputs” (p. 111). He theorizes an editing of sensory signals processes, which in turn gives us the experience as a product (p. 112). Just how “editing” leads to “experience” is never explained.

Dennett certainly has a point: the Cartesian Theater model is flawed, since it is, essentially, dualistic—i.e., it doesn’t imply or require that consciousness comes from the brain,
but that consciousness (a nonphysical homunculus) inhabits a physical brain. He provides plenty of excellent examples and thought experiments that elucidate the shortcomings of this model.

However, Dennett’s theory is purely materialistic, which attempts to circumvent a magic, ontological leap to produce consciousness from matter, that gap persists, for even if we see an “illusion” of consciousness, that illusion is still very much real, and the experience as well as experiencer of that illusion remain unaccounted for.

In his 1999 work, *The End of Time: The Next Revolution in Physics*, Julian Barbour also makes the assumption that consciousness “emerges” from the brain. He says the brain, in fact, “plays the movie for us” (Barbour, 1999, p. 29) by stringing together snapshot images of each present perception. However, the problematic question remains: Who or what is watching this movie? Thus, his theory falls short.

Jeffrey Gray believes scientific materialism is the only way to approach the problem of consciousness, claiming in his 2004 work, *Consciousness: Creeping Up on the Hard Problem*, that the “hard problem” as well as the concept of “self” arise as an illusion. His arguments include examples of experiments where conscious awareness arises with a lag of 1/2 second in time after a decision has been neurologically determined and the person physically acts. Gray admits to the remaining mystery of consciousness, but assumes the mystery relates specifically to how the brain gives rise to consciousness. At this early stage, he suggests, we are still too ignorant in understanding to place that narrowing lens on the nature of consciousness. Drawing on de Quincey’s distinction between the two fundamental meanings of consciousness—*philosophical* and *psychological*—I point out that Gray merely analyses *psychological forms* of consciousness, failing to account for the ontological *fact* of consciousness, the “hard problem.”
Furthermore, Gray uses the term “illusion” as a dismissive gesture. He supports epiphenomenalism, which states that not only does consciousness arise from the brain, but plays no *causal* role in anything physical in the universe. Nonetheless, the point of the entire endeavor—precisely how the alleged “illusion” arises—remains unsolved.

In his 2002 work, *Consciousness in Four Dimensions: Biological Relativity and the Origins of Thought*, Richard Pico arrives from a materialist framework to argue that consciousness emerged at a specific point in the history of evolution. He asserts that consciousness emerges from serial processing in the neural structures, as well as working with memory to produce the perception of temporal reality. He proposes the prefrontal integration model, in which consciousness emerges from a foundation of structure-function relationships (Pico, 2002, p. 177).

Excellently researched, Pico’s analysis, even if incoherent, essentially presents consciousness as a frame of reference for the integration of spatial and temporal reality. However, who or what is doing the “referencing” or “reframing”? We still find ourselves in an infinite regress problem, that we can be aware of being aware of being aware, ad infinitum. If we can *know* of the prefrontal integration model, then there must be some consciousness that lies beyond it, and so on and so on. We are left with a fantastic explanation of neural processing that fails to account for consciousness.

Tuszynski points out in his 2006 work, *The Emerging Physics of Consciousness*, that classical, materialist physics proves insufficient to truly understand the nature of consciousness. His view focuses on the mass transport wiring rules accounted for by the quantum processing of microtubulins. He displays an enthusiastic optimism for science, also asserting that science must be able to open up to new ideas and paradigms that lie outside the classical realm. He fully
admits to the fact that none of these physics-related theories ultimately answers the fundamental question.

Nonetheless, we run into limits with objective analysis when trying to analyze a subjective phenomenon. Tuszynski has excellently collected the latest scientific research on the physics of consciousness, and he eagerly and passionately waits for someone to come up with a revolutionary thought on the topic.

Marc Seifer proposes consciousness as an integrated dimension of space-time in his 2008 work, *Transcending the Speed of Light: Consciousness, Quantum Physics, and the Fifth Dimension*. Seifer presents a five-dimensional model of the universe. The first three dimensions form the spatial realms we commonly know. Seifer seems to think of dimensions as nested hierarchies of physical systems. He then names an additional dimension for inner space, which is defined as the mind, but does not specify what he means by “inner” vs. “outer.” How could he? . . . since that would confront him with the impossible task of explaining how subjectivity arises from objectivity.

Seifer claims that within this supposed fifth spatial dimension, the dimension of the mind, time is actually transcended. Existing on a meta-level to time, we use our minds to leap backward and forward in time; thus it appears that the mind is somehow beyond time. His theory possesses several flaws. The mind’s action of “leaping” requires process through time, and yet Seifer places the mind beyond time. Seifer also confuses the mathematical, spatially extended dimension of time with experienced time.

To further illustrate this point, he uses the mathematician Peter Ouspensky’s concept of the hypercube, shown below (see Appendix I). Using our perception, we can allow ourselves to see the cube in the upper left moving downward to become the cube in the lower right. In this
way, we use our three-dimensional visual processing along with our mind’s ability to perceive the movement in time, thereby accessing the fourth dimension.

Seifer addresses a paradox, resulting in a problem with this theory. In seeing the mind as a higher spatial dimension, one becomes “obliged to postulate an infinite number of extra dimensions and a corresponding number of observers” (Seifer, 2008, p. 224). In layman’s terms, if awareness is a higher spatial dimension, one can be aware of that dimension, and so on, and so on. The following question devastates Seifer’s theory: How could subjective consciousness emerge out of objective space?

Seifer then introduces Charles Musès’s theory that these dimensions of the “inner space” are structured by hyper numbers, or imaginary numbers (p. 245). In addition, he uses Penrose’s theory of “twistors,” which includes imaginary number hyperthreads that are woven at right angles within the lattice fabric of space-time (p. 247).

Many scholars describe consciousness as multiple modalities that they consider “dimensions,” meaning hierarchies of neural processing. These include primordial awareness, the unconscious, thoughts, and qualia, defined as subjective experience. Once again, we enter the confusion between psychological forms of consciousness and the ontological fact of consciousness. Furthermore, it cannot be stated enough that there is danger in reifying an analogy. Each of these spatial phrases to describe consciousness must be held lightly. If images are objective, then we simply cannot “picture” consciousness. Nowhere in the work does Seifer account for the problem of individualized versus collective mind, or subjectivity at all.

Peter Ouspensky, a Russian esoteric philosopher at the beginning of the twentieth century, used his work, New Horizons, to tackle the existence of a spatial fourth dimension which houses “hidden knowledge” (Ouspensky, 1990, p. 95)—namely, the realm of the mind
and all its contents. We would understand this if we were able to perceive a three-dimensional world parallel to ours, extended in four-dimensional space, which houses psychic or spiritual phenomena. He then proceeds to do a phenomenological analysis attempting to train oneself to cognitively perceive in four dimensions. Thus, Ouspensky, like Seifer, is attempting to objectify consciousness.

An analogy is a two-dimensional organism living on a two-dimensional plane world. His sense organs are face-up on the plane, so that he can see across a three-dimensional distance, to another plane world. Nonetheless, his sense organs are merely in 2-D, so what he perceives will seem strange and magical, just as psi phenomena are strange and magical to post-European Enlightenment minds. One problem with this analogy is that 2D does not have depth, and perception without depth could not perceive a 3D world. The analogy breaks down even before it starts.

Ouspensky says that we can train ourselves to cognitively perceive this dimension, using certain types of images. One example given is the image of a tree (Ouspensky, 1990, p. 128), where each segment of growth in time is preserved, becomes “frozen,” so that one can see the trail as progressed through time: the fourth dimension. True, the 3D physical world “records” the passage of time as the pressure of the past impinges on the present, leading to the realization of possibilities in the future. However, these objective residues of the temporal process are not time per se. They fail to capture the actual experience of time.

The problem with Ouspensky’s conclusion of the fourth spatial dimension as “mind” emerges in the form of a runaway hierarchy. One can ultimately be aware of the fourth dimension, leaving an awareness that is still higher (hierarchically) than the fourth dimension. One could continue this thread, being aware of being aware of being aware, ad infinitum.
In his 2003 article, “Space, Time, and Consciousness”, John Smythies argues that consciousness acts as a third fundamental aspect of the universe, along with space-time and matter. Each of these, he says, possesses its own degrees of freedom, claiming that consciousness occupies its own “phenomenological space,” as opposed to space-time.

Smythies provides a modern, membrane theory version of Ouspensky’s parallel dimension theory, saying that perhaps “consciousness is located in its own brane further external to the dimensions of the physical world” (Smythies, 2003, p. 52). He then asks, “Is our subjective experience of time merely our phenomenal impression of the casual relations between the parallel branes of space-time and ‘phenomenal space’?” (p. 55). We’re left with the question, “Who is experiencing the phenomenon?”

Besides the obvious dualism in Smythies’ model—and, therefore, the insurmountable problem of mind-matter interaction—an obvious problem is Smythies’ use of material language to describe the immaterial. He means to say that consciousness occupies a distinct realm from matter, but describes the “location” of consciousness, and discusses “extensions” of sensations and images in their own space (p. 48), all of which is an inappropriate use of physical language to describe non-physical events.

Many philosophers remain stuck in this linguistic rut. Instead of a “phenomenological space,” we need some other non-physical metaphor, analogy, or image to use, otherwise we are bound to reify these physical metaphors and stay confused.

In his 2008 chapter, “Where Physics Meets Metaphysics,” Michael Heller begins with the assertion that at the smallest realm of physics, the Planck scale, physics meets philosophy—because at that level our traditional, mechanistic notions of reality get strange. He discusses
quantum mechanics phenomena, such as non-local causality and probability, and how these might correlate to more metaphysical concepts such as purpose and universal intelligence.

Heller succinctly outlines the dangerous line one must walk when discussing science versus metaphysics. However, he sticks to the realm of Western theology, and the Christian god. He does not account for any other spiritual tradition or way to holistically combine these two drastically different (at least politically) systems of belief.

In their discussion of the exclusivity of our mechanistic object ontology, Robert Jahn and Brenda Dunne in their 1997 article “Science of the Subjective,” state that this “sterilization of science may have been excessive and could ultimately limit its epistemological reach and cultural relevance” (Jahn and Dunne, 1997, p. 1). The authors call for a science that includes subjectivity, a science that makes allowances and expands its definitions of measurement and replicability, the hallmarks of objective science.

The authors of this essay do an excellent job in clarifying their position: Rather than completely eschew objective science, we need a new, holistic science that is inclusive of the subjective aspects of reality. They do not take these ideas any further to propose a model or new methodology, but they indeed lay the foundations.

Alan Wallace, in his 2010 work, Hidden Dimensions: The Unification of Physics and Consciousness, calls for a brand-new methodology for studying consciousness—a subjective methodology. He claims that we need to “[enhance] introspection in ways that are unprecedented in the history of modern science” (Wallace, 2010, p. 41). His “telescope of the mind” theory joins together the fields of physics and Buddhist spirituality, involving highly disciplined attention and introspection through meditative practices. Wallace theorizes an underlying unity from which both the physical world and consciousness emerge. He refutes the theory that matter
arises from mind, or that mind arises from matter, proposing instead that they both arise from that underlying unity. For this to make sense, the underlying unity must itself *already possess* some trace of both consciousness and energy—otherwise, he is faced with a *double* hard problem of inexplicable emergence.

In Wallace’s model, an underlying unity of mind and matter gives rise to *separate* mind and matter, which leaves us right back at Descartes’s dualism. Using precise terminology of radical naturalism, Christian de Quincey would say that Wallace recognizes an inherent *distinction* (not separation) between the aspect of the universe that *knows and chooses* and what (the objects) it knows and chooses—i.e., between mind and matter/energy. If Wallace’s proposed unity exists, it would not exist solely as an underlying reality, but rather would be present at all levels of reality, including the world we are familiar with.

Nonetheless, Tibetan Buddhist practices consist of extremely detailed, rigorous descriptions of various underlying realities. Wallace’s thoughts on these topics hold consistent, and he remains on the forefront of the phenomenological study of consciousness.

Wallace then describes an important problem. John Wheeler and Bruce DeWitt have used the Schrödinger equation to create a single wave function of the universe. However, the universe they describe would not change with time; this is called the *problem of frozen time* (a blatant contradiction). In order to not have a dead universe, but a dynamic one that actually evolves in time, we need to include experienced duration (Wallace, 2010, p. 109).

Wallace describes an inherent relationship between the hard problem, the previously described “time problem” in quantum cosmology, and the measurement problem in quantum mechanics (the role of “the observer”). Once again, he pushes at the boundaries of what we know
about consciousness, but can only go so far, unable to provide descriptions, explanations, or consequences of those relationships.

Willis Harman and Christian de Quincey emphasize the need for a new epistemology, resulting in a new science, one that will allow for the study of consciousness, in their 1994 research report, *The Scientific Exploration of Consciousness: Toward an Adequate Epistemology*. The authors lead us through a full history, offering varying perspectives in chronological order that elucidate the gaps in modern Western science. They discuss the limitations of traditional, materialist science, describing its inability to handle a fundamentally subjective process such as consciousness. The authors do not call for the elimination of sensory-based science, but rather an expanded epistemology, one that includes other ways of knowing, with a foundation in process ontology. Their work includes an analysis of Bergson’s philosophy of time, and how traditional science has abstracted a spatial dimension from the more phenomenological feel of the duration of time.

Alfred North Whitehead challenges fundamental assumptions of the fundamental nature of reality and proposes an entirely new ontology in his 1959 work, *The Concept of Nature*. Stepping away from the traditional analysis of space and time, he argues for a relational theory, as opposed to spatial (Whitehead, 1959, p. 25). He claims the fundamental nature of reality, in the form of relationships, is “occasions of experience,” as opposed to objects. Instead of chopping the universe into bits of “stuff,” he describes it in terms of “drops of experience.” Whitehead’s ontology represents an alternative solution to the mind-body duality. Written in the wake of Einstein’s revolutionary physics, Whitehead asserts the problematic nature of our assumption that existence occurs in an exclusively physical substrate.
Alfred North Whitehead developed his ideas of process in the Gifford Lectures at the University of Edinburgh in 1927-8, later edited into a 1979 work of speculative philosophy, *Process and Reality*. He describes reality at its most fundamental level as a process of becoming. In this work, he thoroughly explains the various categories and nuances of relational experiences. These “categories of experience” include actual entities (or actual occasions) and prehensions, which are concrete facts of relatedness (Whitehead, 1978, p. 22). In Whitehead’s philosophy, experience is primary and foundational. *Actual entities* are the experiential, temporal “building blocks,” of reality, and *prehensions* are the relations between the actual entities.

Whitehead brings in another important term in his process theory: “concrescence,” a process in which prehensions are integrated into a fully determinate feeling of satisfaction (Whitehead, 1979, pp. 24-26). Concrescence allows purposive action to enter the picture, and purposive action requires the existence of consciousness.

Arthur Koestler develops a theory of human creativity in his 1964 work, *The Act of Creation*. He asserts that all inspiration, creativity, or discovery share a basic underlying pattern. When a relationship of instability develops between thought and emotion, creativity as *bisociation* (as opposed to association) may occur between those two frames of reference (Koestler, 1964, p. 36).

The importance of this work lies in Koestler’s ability to introduce a theory of the subjective element of creativity that coherently fits with scientific analysis. Not only humans partake of creativity; it is inherent to the universe itself.

Koestler directly addresses the mind-body problem in his 1968 work, *The Ghost in the Machine*. He introduces the term “holon” to describe the mind as both a whole and a part. The work focuses on the reasons behind the emotional distress so rampant in humanity. Although
Koestler was not a material reductionist like Dennett, he delves into a materialistic paradigm featuring emergent consciousness, a concept that remains incoherent to this day. However, he provided uniquely insightful descriptions of nested hierarchies of phenomena such as habits, language, and genetics. We perceive the largest holon, the entirety of these complex processes, as the one self.

The concept of holons proves crucial when we turn to our analysis of intersubjective relationships from single entities to larger monads. Later in this thesis, I will discuss how the holarchical nature of intersubjectivity ultimately leads to consciousness of an entire being, which incorporates the smaller holons of sentient matter within it.

Christian de Quincey explicitly captures the panpsychist view of consciousness in his 2002 landmark book, *Radical Nature: Rediscovering the Soul of Matter*. He argues that consciousness is present in all matter, “all the way down” (de Quincey, 2002, p. 49). In reviewing the history of Western studies of consciousness from the pre-Socratic philosophers to the twenty-first century, he finally argues for a panpsychist view of consciousness, that consciousness is non-physical, and intrinsic to all matter in the universe, from photons to human beings and other animals.

De Quincey believes there can be a science of consciousness, but only if science is radically transformed to include other “ways of knowing,” besides simply using sensory, analytic reasoning. He argues that we can understand consciousness and its relation to the physical world through process philosophy. He proposes a “radical naturalism in which matter intrinsically feels—an ontological position that makes no separation between . . . consciousness and the physical world” (de Quincey, 2002, p. 145).
While *Radical Nature* takes a broad view of the relationship between consciousness and energy, the finer neurological details of each step during the subjective process are not covered. I intend to apply the radical naturalist foundations to examine how matter makes choices at the cellular level in the brain.

Arthur Young applies mathematics and geometry to specific subjective processes in his 1976 work, *The Geometry of Meaning*. He takes an inherently subjective concept, meaning, and coherently applies a mix of philosophical and mathematical analysis to the relationship between ideas and things. He describes four different kinds of acts in nature: Spontaneous Act, Change (reaction), Observation, and Control (Young, 1976, p. 38). He admits that subjectivity, or more specifically *purposiveness*, as the power to initiate action, lies at the fundamental level of the universe (p. 77).

Young further discusses the mathematic details of how matter acts through purposive choice in *The Reflexive Universe: Evolution of Consciousness*. He begins with a discussion of light, asserting that a photon, as *purposive action*, has its own primitive intelligence (p. 14). He offers the equation of the quantization of energy in photons, $h = E \times T$, where $h = $ Planck’s constant. He provides the example the *principle of least action* to argue for subjective intelligence in light, that traveling the path that takes the shortest amount of time involves intentional choice (p. 18).

According to Young, Planck’s constant expresses action (p. 22). In the equation $h = E \times T$, the photon represents a quantum of action. A choice is either made or not made. One cannot make half a choice, for instance, so purposive action is quantized. We do not see purposive action in other elements of the equation, such as mass, or frequency, so in a sense,
“action precedes measure” (p. 20). Thus, action represents the whole of the other elements (p. 19). And, as action comes in irreducible quanta, it can be considered the “first cause” (p. 21).

Young’s important work illustrates how consciousness is present in the universe down to the smallest unit of matter. He continues with an analysis of elementary-level calculus. The first derivative of position is velocity, the second is acceleration, and the third derivative is control (p. 44), which implies action, telos, or self-control. However, traditional scientists do not discuss or teach the third derivative, because it proves unpredictable in experiments. Not only that: It implies the presence of choice, which, in turn, implies consciousness—and physicists and mathematicians typically do not know how to work with consciousness.

Young presents his model of the history of the relationship between consciousness and matter in terms of a reflexive arc. Originally, consciousness exists, with no separation or distinction. It begins to “descend,” ultimately forming the domain of matter, experiencing losses of freedom of choice along the way (Young, p. 36). At this point, a residue of freedom from complete determinism remains because of the principle of quantum uncertainty (discovered by Werner Heisenberg), a “basis on which to build a return,” (p. 46) or ascent back toward consciousness.

At this point, the turn of the arc, matter evolves toward more and more complex forms back toward unified consciousness, which could also be considered “enlightenment” by many people.

The only element lacking in Young’s work is the underlying purpose and motivation behind the entire model. Why would consciousness (or “Spirit”) take the journey through this evolutionary arc in the first place? This is the main question I intend to expand on in this thesis.
David Pleasants attempts to apply process philosophy to quantum physics in his 2002 article, “Panpsychism, Intersubjectivity, and the Nature of Time.” He escorts the reader through a broad discussion regarding the foundational principles of panpsychist process philosophy and the relationship between matter and consciousness, where the fundamental elements of reality are “events” as opposed to physical objects.

One of Pleasants’s arguments is that, unlike de Quincey’s model, there are not only temporal, but spatial aspects to the nature of consciousness in the form of extensions and boundaries. He takes de Quincey’s concept of aggregate versus unitive consciousness, originally discussed by Whitehead and Hartshorne, and argues for spatial metaphors, proposing that consciousness, like matter, “has extensions in space and time” (Pleasants, 2002, p. 12). With this precarious thesis, he gets stuck in physical language, and so ultimately remains unable to address the hard problem, unable to explain how the subjectivity of consciousness is supposedly accounted for by objectivity.

Let’s take the example of a table. The table demonstrates aggregate consciousness; the individual molecules are related only externally, forming no higher-order consciousness when assembled together. In unitive consciousness, such as a living organism, matter is related both objectively and subjectively. The tiny micro-consciousnesses interact intersubjectively with one another, forming greater systems of meaning.

Physicist Roger Penrose built foundations of what would become the Orch OR model in his 1994 work, Shadows of the Mind: A Search for the Missing Science of Consciousness. He discusses the possibility of quantum coherence in microtubules, a kind of Bose-Einstein condensate, and argues that the cytoskeleton is responsible for consciousness, since it is the
cellular structure most affected by anesthesia. Right from the start, he confuses the psychological meaning of consciousness with the ontological problem, our real concern.

The problem of “emergence” creeps in when Penrose asserts that through evolution, consciousness was generated by a “subtle interplay between quantum-level and classical-level processes,” in other words, objective reduction (p. 373). Thus, consciousness as “something new comes in” to reduce the physical wave function. (p. 329). But how can subjectivity magically arise out of objectivity? He later admits to “seek[ing] the physical basis of mind” (p. 376). Thus, with a brilliant quantum physics background and laudable intentions, Penrose built the foundations of his model on incoherent assumptions.

Penrose also discusses how the state vector, $|\psi\rangle$, encapsulates the sum total of our knowledge about a physical system. But whose knowledge? (p. 314). In the spirit of Arthur Young, perhaps $|\psi\rangle$ represents the whole of knowing in a given quantum situation, just like $h$ represents a quantum of chosen action.

Stuart Hameroff and Roger Penrose propose that consciousness emerges from quantum self-collapse in microtubules, in their 1996 article, “Orchestrated Reduction of Quantum Coherence in Brain Microtubules: A Model for Consciousness.” Essentially, they argue for a “global binding” theory of consciousness, where microtubules in the brain maintain quantum coherence over large parts of the brain, similar to a Bose-Einstein condensate. In this theory, the non-random, non-computable wave function “self-collapses” as a real, objective occurrence. In the transition from pre-conscious to conscious, a threshold of energy must build for no greater than 500 milliseconds, before the superposition collapses. Each collapse represents an “instantaneous event . . . which becomes our ‘conscious now’” (Hameroff & Penrose, 1996). The
authors claim that “time” comes in discrete units, where our feeling of consciousness arises through the flow of “nows.” In this way, they confuse mathematical, spatialized time with experienced time. The Orch OR falls short, because it provides an insightful neural correlate of the psychological levels of consciousness, but does not address the ontological question. Furthermore, they fail to explain how or where subjective feeling arise, which was ostensibly the purpose of their endeavor.

We can see how consciousness is present in the Orch OR model even before reduction, although this fact remains unacknowledged by Hameroff and Penrose, since it would render the entire theory incoherent. Notice how the authors unintentionally assign agency to various parts of the biological system. For instance, they refer to how MAPs (microtubule-associated proteins) “tune” quantum oscillations (p. 4), implying intention on the part of the MAPs. These cytoskeletal networks are “self-organizing,” not realizing that “self-organization” (autopoiesis) does not entail the presence of consciousness. In fact, purely physical systems could engage in auto-organization. (p. 5).

Hameroff and Penrose continue to say that tubulins are “cooperative” (p. 6) and “coordinate conformational changes” (p. 6). They even speculate a “hidden order” (p. 20) beneath the quantum-mechanical logic. Again, “hidden order” does not imply consciousness. Consciousness is required for quantum collapse to happen; that is, consciousness must precede the collapse, not arise from it. If cells exhibit subjectivity to begin with, then it would make no sense to say that subjectivity later emerges as a result of cascading wave collapses, as the authors contend.

Hameroff reiterates the Orch OR model in his 2003 article, “Time, Consciousness and Quantum Events in Fundamental Spacetime Geometry,” discussing implications for what he
terms experiential time. Once again, Hameroff assigns agency to the events themselves, claiming that they “select” (p. 8) which configuration in which to arrange. Clearly, consciousness has entered the equation before reduction. Hameroff’s language of agency gets more bizarre when he describes Penrose’s claim that at the Planck scale, Platonic ideals inform the geometry (p. 4). This point is reiterated is describing how the non-computability of the process is accounted for by “Platonic logic embedded in space-time” (p. 8), which, upon reduction, “influences” (p. 9) the deterministic quantum computation (p. 9). He says that the events “choose” their states (p. 4). Lastly, he says that each “event is conscious” (p. 5), but his theory asserts that events create consciousness. The contradiction is glaring.

Stuart Hameroff continues to assign agency in his 1998 article, “‘Fundamental Mentality’: Is the Conscious Mind Subtly Linked to a Basic Level of the Universe?” pointing out an interesting aspect of Bose-Einstein condensates by describing how individual atoms or molecules “give up their individual identity and behavior” (p. 5). He then revives the notion of Platonic values, implying that at the foundation of both matter and consciousness lies a third realm, “embedded” within the space-time geometry (p. 1). However, he never discusses such a third realm.

Hameroff actually makes a connection between the Orch OR model and Whitehead’s process philosophy, in his article, “Whitehead and Quantum Computation in the Brain: Panprotopsychism Meets the Physics of Fundamental Spacetime Geometry.” Hameroff begins the discussion with a critique of his own OR theory, asking “But what is synchronized?” (p. 1). His thesis is that the real self-collapse reductions are equivalent to Whitehead’s “occasions.”

Hameroff admits that consciousness must exist in some form in the ultimate granular, digital, Planck scale spin networks of space-time geometry (p. 7) in a kind of “proto-consciousness” form, referring to this interpretation as proto-panpsychism. However, this leaves
us with the emergence problem, if proto-consciousness does not already include subjectivity. On the other hand, if subjectivity already exists in this “proto-consciousness,” then the very notion of proto-consciousness versus consciousness is meaningless.

Like many of the authors described above, Hameroff and Penrose attempted to formulate a model of consciousness by analyzing wave-function collapses in the neural structure. However, they succeed only in describing the physical correlates of psychological forms of consciousness, unable to reach their goal of understanding the ontological bases of consciousness.

De Quincey has formulated a model that coherently and consistently describes the philosophical meaning of consciousness and how it relates to non-conscious, physical reality. He makes a crucial distinction between the two fundamental meanings of consciousness—philosophical and psychological. While emphasizing this distinction (often overlooked by other scholars), in Radical Nature, de Quincey focuses on the philosophical, or ontological fact of consciousness in an otherwise objective physical universe. In other works, for example, Radical Knowing, he focuses more on the “psychological” meaning of consciousness, its various psychospiritual forms, and epistemological implications. In my thesis, I intend to study the small-scale intricacies of neural processes associated with the psychological meaning of consciousness, using the Orch OR model, where physical processes adjust the amount of options available for subjective choices and intersubjective connections.
METHODS AND PROCEDURES

Qualitative research is a process of inquiry often used in the social sciences, to further understand human behavior. Data collection includes interaction with consenting participants, through storytelling, collective inquiry, or interviews. Heuristic research emerges as a sub-topic of qualitative research, primarily involving the researcher themselves as they process through the inner workings as they relate to their research topic.

Theoretical research aims to systematically develop a model that represents a standpoint that builds on an existing body of knowledge.

I propose the development of a new perspective on process in the brain, using the Orch OR model, where physical processes adjust the amount of options available for subjective choices and intersubjective connections.

My project will consist of a combination of heuristic and theoretical research methodologies. The heuristic method involves a private and imaginative framework for the exploration and discovered meaning of the researcher’s own experience, and the theoretical research method strives to develop a model or standpoint out of an existing body of knowledge that consists of a coherent collection of hypotheses. I chose a combination of these two methodologies in order to include the various goals that I have in creating my hypotheses. I synthesize the current research in order to develop my own model, and use my own insights and experiences in the development of that model.

The heuristic methodology involves six phases, as described by Clark Moustakas, in his 1990 work, *Heuristic Research: Design, Methodology, and Applications*. In the first step, the
initial *engagement*, I delve into my own life to discover how the topic of consciousness and space-time has been brewing passionately throughout my life experiences.

The second phase calls for an *immersion* process, where the researcher spends every minute involved in intimate relationship with the topic, where every thought and feeling can be considered raw data for the project. I ponder the topic throughout my days, jotting down notes in a journal as they arise in my mind.

The third phase involves *incubation*, where the researcher takes a brief hiatus from the topic and engages other pursuits, so that insights might arise from the unconscious. I have other activities that demand my attention and removal for the topic, such as physical exercise and performing music.

The fourth phase means *illumination*, or cultivating a receptive state of mind, where new thoughts or revisions of old thoughts might emerge into consciousness. This involves an openness to changing my theory.

The fifth phase, *explication*, consists of further analysis in order to revise, dissect, and re-organize various thoughts and angles. I directly apply and re-assess any insights that have arisen during the fourth phase to my theoretical model, making changes where necessary.

Finally, the sixth phase, *creative synthesis*, final insights of the phenomenon in question merge in a holistic fashion with the context and rest of the project, involving a final description of the entire process. I relate my new theoretical model to the future of human knowledge, while offering an explanation to those current theories I do not believe to be coherent or have merit.

In addition, I will use the theoretical method in parallel to the heuristic process, which involves six steps. In the first step, the research question formulation, I formulate my own life-long question about the relationship between consciousness and space-time. Secondly, I will
amass a literature review, including all of the latest, cutting-edge theory regarding the hard problem. The third step involves concept reflection and identification, in which I reflect on my original hypotheses based on the literature that I reviewed in the previous step. I then embark on the fourth step, the theoretical conjecture formulation, where I concisely construct my own theory in the context of the current literature and my own reflections.

The fifth step, or discourse with peers, involves an analysis of an interview consisting of a theoretical discussion with an elite participant, which I describe in subsequent paragraphs.

The sixth step theoretical conjecture refinement and acceptance, involves my re-assessing and sculpting my theoretical model of consciousness into its final stage.

In the seventh step, I discuss the impact of my newly conjectured theory. This pertains largely to directly contributing to a paradigm shift that allows people a new mindset in realizing that by nature we are all connected as one living system. {Retrieved on Feb. 11, 2012 from: http://knol.google.com/k/narayana-rao/theoretical-research-strategy/2utb2lsm2k7a/35#A_Seven[2D]step_Approach_for_Theoretical_Research}

As a part of my theoretical method, my project will include an interview with one participant, obtained based on the professional relationships I have cultivated in my studies at the university. This participant is author and scholar, Dr. Christian de Quincey, who has a personal and professional investment in the topic.

The interview will be conducted face-to-face, for one hour, at John F. Kennedy University on Friday, February 24, 2012, at 3:15 PM. The interview will be recorded using Audacity software. We will then begin a theoretical discussion based on the fact that the participant has certain disagreements with aspects of my ideas. The list of questions for the interview are provided in Appendix II. See Appendices III for the participant forms.
Ethical considerations in this study will be accounted for by the participant signing a thorough form involving consent, confidentiality, and consequences. In this particular research, the anticipated risks are no greater than the everyday risks of engaging in self-exploration, idea sharing, and frank dialogue.

The individual responsible for overseeing the student’s work is the instructor of the course: Karen Jaenke, Ph.D.

The project will last approximately nine months, beginning on June 18, 2012, and completed by March 20, 2013.
LIMITATIONS OF THE METHODOLOGY

In this thesis, I do not claim to present any replicable “proof” regarding the nature and quality of consciousness, but rather aim to speculate on and illuminate the psychological implications of neural correlates of consciousness using a process framework. Rather than a scientific research study, involving experiments on the brain and nervous system, this thesis is presented as a work of philosophy and metaphysics. Instead of depending on scientific data, my research will rely on the logical coherence of my arguments.

My thesis looks at the nature and complexity of first-person subjectivity, second-person intersubjectivity, and correlations with third-person objectivity. In accordance with these dynamics, my methodology includes research from all three arenas.

Given the nature of subjectivity, it is appropriate to include my own personal narrative, since my understanding of consciousness is not just based on reading others, but on my own subjective insights, developed and expressed from a first-person perspective.

When I include another person in a relationship of conversation, we allow for a direct experience of intersubjectivity. In order to include a second-person perspective into my research, I engaged in an interview-based dialogue with philosopher and author Christian de Quincey (see Appendix II for full interview questions). To begin the interview, I asked questions related to his personal story relating to his interest in consciousness, including how he came to insights of radical naturalism. We then teased apart the arguments and conclusions of how consciousness is in no way physical or spatial.

The third-person perspective does not involve any kind of direct experience, but rather the study of sensory correlates of consciousness. The key challenge: When it comes to
consciousness, what is so special about the brain, if all matter has the ability to make subjective choices? Another way to think about the question is: What's so special about neuronal microtubules, especially if every cell in the body is also conscious? Hameroff and Penrose show that microtubules possess characteristics that allow them specific options. Every monad of unified matter makes choices, but different options are available based on properties and environmental context.

I would reply that each physical monad has its own sentience, and is situated in its own environment, and that these and other factors determine the amount and variation of options available for choices. For instance, consider that both a microtubule and I are both material (and sentient) in nature. However, I have very different options for choices I can make compared to the microtubule, such as purchasing a car. I speculate that certain characteristics of the options that neuronal processes offer leads to our subjective bias toward the brain as the primary center for studying consciousness.

Focusing on neuronal microtubules merely illuminates the frequent confusion and necessary distinction between the philosophical vs. psychological meanings of consciousness, as de Quincey has noted. It makes sense to discuss the process of consciousness of the neural system, because neurons have more hierarchical levels in terms of relationship, and thus correlate directly with the psychological levels of awareness.

The nervous system, with its myriad of synapses, has a greater amount of connections and possible connections between one another, more so than any other network in the body. The first place we think of in terms of the nervous system, is the brain, but there are other locations in the body with particularly large amounts of neurons, such as the heart. However, the reason we conceptualize the brain as the central seat of the nervous system, the mind, even the self, may
simply be because there are not only more neurons, but an even more complex system of relationships of meaning among those neurons.

What do I mean by the word “meaning?” It would be wise to clear up the distinction of the two ways in which the word is interpreted. The first, most common definition, places “meaning” as a symbol that refers to a thing or idea. However, the second interpretation of “meaning” is the one I use in this thesis, to discuss the foundation of intersubjective relationships. It is a more abstract definition, one that refers to a deep sense of significant purpose.

There are certain areas of the body that have an even greater quantity of neurons than the brain, though not necessarily a greater complexity of relationships, such as the heart. The most obvious reason that we commonly experience the brain as the “central processing unit” of the body despite the fact that neuronal networks permeate the entire body, is that four out of five of our physical senses are located in the head area.

Essentially, the fact that we exhibit a preference for the head as opposed to other bodily areas, such as the heart, shows a Western cultural bias toward the sensory world as primary reality. In this culture, we are raised from birth to perceive things though a strictly materialist lens, recognizing the brain as the only legitimate “source” of consciousness; thus, that is how we are primed to perceive. However, we can certainly develop an awareness of these other somatic intelligences over time.

Other cultures have long been practicing awareness of other bodily centers, using models such as the chakra system, the understanding of how specific areas in the body have their own distinct qualities of intelligence. This model is congruent with radical nature theory, since all of
matter is conscious, and the amount of nested hierarchies is greater in certain areas (such as the heart), producing their own monadic awareness.

We can use the theory of radical naturalism to understand the process of reflexive consciousness in monads and hierarchies among different somatic parts of the body. First, we see how the monad of the entire organism is in relationship with each lower-level organ monad, which in turn are in relationship with the lower level cells that comprise those organs.

Since neurons represent a more complex system of relationships and, subsequently, of intersubjectivity, the nervous system is the most important example of a physical correlate of reflexive consciousness in the body. Thus, we choose to focus on the nervous system in order to adjust the settings that correlate to psychological levels of consciousness.

The nervous system and its correlation with psychological levels of consciousness is distinct from the philosophical discussion of consciousness, which deals exclusively with the ontological status of subjectivity. When we turn to the ontological status of consciousness, we see it as inherent to all matter; subjectivity is not exclusive to neurons.

With this important distinction in mind, we see more clearly how Hameroff and Penrose present a confused model, drawing conclusions about the ontological nature of consciousness based on data derived from neuronal correlations of psychological levels of awareness.
DEVELOPMENT OF THESIS

Let us begin with a discussion of key terms, themes, and concepts. First, we must not take for granted the concept of consciousness itself. “Consciousness” is still widely considered an abstract term in Western culture, and its existence is denied among many scientists, or minimized as a mere illusion or an epiphenomenon. When I use the word “consciousness,” I am referring to a basic level of subjective experience, the quality of “feeling like.”

The very word “consciousness” has become an umbrella term for all of the mystery of what subjective experience is. It has also become something of a dirty word in the traditional, mainstream neuroscience community, or at least it was in the laboratory where I worked as an undergraduate, the University of Wisconsin, Madison. There, despite Richie Davidson’s pioneering scientific research on meditation, the moment I uttered the word “consciousness,” I was seen as too New Age, and was pressured to steer away from the topic altogether.

The irony of those modernist materialist scientists is that, although they are committed to studying the nature of the mind, in their refusal to accept out-of-the-box thinking, they are doomed to hit their heads repeatedly against walls of problematic and contradictory concepts, in their quest to defend a physicalist basis for non-physical consciousness. Psychology and neuroscience will not be able to make any headway into studying mind until they admit to the possibility that subjectivity is a non-material, fundamental part of the cosmos.

In the scientific quest, new ideas by their very nature lie outside the mainstream box. If new or different ideas (such as the word “consciousness”) are judged to the point that discussion of them is not allowed, those scientists will surely discover the finer details of the matter they examine, but will never find even the tiniest piece of the puzzle they seek to solve. That “piece”
of the puzzle requires a step outside their rigid paradigm, and in this thesis, I risk judgment, and step outside the modernist box.

Since we are, for the most part, still immersed in a mechanistic paradigm dating back to the days of Descartes, our current tendency is to approach consciousness using “energy talk,” which, as de Quincey points out, is language capable of describing only physical phenomena. One consequence is that in the study of consciousness, scientists and philosophers find themselves capable of using only physical and objective concepts and language to describe a phenomenon that is inherently subjective and non-physical. It is yet one more example of using objective “energy talk” for discussing a phenomenon that is neither energetic nor objective. “Energy talk” consists of phrases such as mental space, vibrations of consciousness, and, of course, energy.

Thus, a more precise use of language would enhance consciousness studies, first by noticing the difference between physical and non-physical language. Fortunately, again as pointed out by de Quincey, such precise terms relating to various aspects of consciousness already exist in English (and other languages), such as awareness, experience, perception, and interiority.

All of the above terms are nearly synonymous with one another, expressing the concept of the raw “feels like.” However, I choose each of these words depending on the context. Awareness refers to a more generic input of what it feels like to be someone. Perception relates more specifically to sensory input from our material surroundings. Experience is often used in the context of duration, or a series of perceptions. Lastly, I use the word interiority when venturing into more philosophical territory, to refer to our “inner sense of being,” in direct contrast to “exteriority,” meaning the physical world.
Subjectivity refers to first-person awareness, the experiencer who feels qualia. Intersubjectivity refers to a relationship among multiple subjective experiences. An intersubjective experience, then, refers to a quality of shared meaning. Lastly, a collection or system of subjects that share meaning, both heterarchically and hierarchically, is called a monad. More specifically, a monad represents a system that encompasses all monads hierarchically below it.

Admitting to the existence of subjective experience leads to some difficult epistemological questions. For instance, how does one ultimately know if other people (or anything else) is or is not conscious? In my own early childhood, I remember the exact moment I realized that other people were having their own, subjective experiences just like me. However, that realization came with further questions: What if they weren’t? I could conclude only that I certainly didn’t have an answer, and maybe would never know whether anyone else was conscious.

However, the question of whether others are conscious is a consequence of a modernist, object ontology. If one takes away subjectivity altogether (except, of course, in one’s own case) and imagines a world with only objects, then everyone else would be a zombie, a mere object.

However, if one follows the radical naturalist process paradigm, it follows logically that if I am an embodied subject then everything that possesses the same or similar matter, organized in a similar hierarchical structure, would also be an embodied sentient being. Nevertheless, the problem of other minds would still remain because how could we know through experience that others are also sentient? Even though we may not be able to directly experience subjectivity in others, by internalizing radical naturalism, we can begin to act as though all matter is sentient, with greater sensitivity and compassion.
De Quincey’s *radical naturalism* offers an alternative solution to the “hard problem”—how consciousness could arise from matter (or, more precisely: how non-physical consciousness is related to physical objects or events). According to radical naturalism, consciousness is not physical because it is non-located in space (or Einsteinian space-time). Therefore consciousness or mind is not material, yet is inherent in all matter. As de Quincey explains: “Consciousness is the intrinsic ability of matter/energy to *know, feel,* and *purposefully* direct itself.”

Consciousness, then, is not something separate from matter; it is a natural, intrinsic ability inherent in all matter/energy to feel and purposefully move itself.

It is important to remember that although consciousness is non-located, it is also embodied, since we are not only intersubjective, but *subjective* (in the sense that there is *something it feels like* to be us). The non-locatedness of consciousness, and thus the existence and primary nature of intersubjectivity, does not eliminate or minimize the importance of the individualized subjectivity (i.e., the Cartesian ego) we are familiar with. Our physical bodies associated with our consciousness are, of course, located and individualized.

The fundamental idea is that an intersubjective network of relationships is fundamental and primary to the universe. It allows the possibility that individual egos can arise temporarily and eventually die and fold back into the great transpersonal “matrix” of intersubjectivity.

While, as de Quincey points out in *Radical Knowing*, the deepest nature of consciousness is intersubjective (formed by relationships between all sentient beings), in the cosmic “network” of relationships each “node” (or monad) in the network is, nevertheless, also real. It is just not *primary*. Egoic, individualized consciousness (monadic subjectivity) is a *secondary* effect of the co-creative whole. Each monad is a *temporary* node in the network. The intersubjective network
is the fundamental and eternal reality, within which individualized nodes or monads or egos arise for a time.

Throughout our lives, daily, we understand that there are different qualities to consciousness. Not only does the quality of consciousness appear to vary among species, but we ourselves are immersed in a dynamic stream of experiences, from sleep to dreaming, to spacing out, to concentrated focus. Qualities of consciousness depend on how various organisms arrange themselves, which allows for different qualities of experience.

How consciousness correlates with the nature and complexity of associated neural processes depends on the material composition of both individual components and systems, from a subatomic particle to the human brain. We differentiate qualities of consciousness in feeling the changes in intersubjective relationships among dynamic physical monads, leading to different kinds of reflexive consciousness.

This leads us to a prime example of the attempt to avoid “energy talk,” the question of how we can be “more” or “less” conscious. How can there exist “more” or “less” of a subjective experience? Perhaps we should adjust our language, since what we really mean to imply is a greater awareness of one's internal, subjective experience. “Less conscious,” would then mean ignorance, or thinking and acting without thought, without consideration. Perhaps instead of saying “more conscious,” I could say, “more developed introspection,” which would entail taking more time to reflect upon one’s experience.

Proceeding a step further, what is the distinction between more or less aware? The phrase “more awareness,” despite its referring to physical quantity, means a greater degree of reflexive consciousness, meaning that one can feel more intersubjective exchanges happening, both heterarchically and hierarchically.
We know from de Quincey’s radical naturalism that relationships of meaning exist not only heterarchically, among monads at one level, such as two atoms, but also hierarchically, or intersubjectivity among *levels* of monads. The depth of reflexivity of consciousness is *correlated* with the associated physical complexity—for example, the consciousness associated with the nervous system of a worm is “shallower” or less evolved than the consciousness associated with the complexity of a human brain. Therefore, the complexity of the system of relationships among hierarchical levels of matter is what differentiates qualities of consciousness, where *complexity* refers to the amount of physical and relational interactions among individual monads.

“Hierarchical binding” (de Quincey, 2010, pp. 230-5) represents a part of the solution to the “binding problem”—the question of how I experience my unified human consciousness, without any of the little consciousnesses (quarks, atoms, cells) that compose my body. Process philosophy answers this question by stating that completed subjects become the objects for subsequent subjects. Thus, my unified human consciousness is the current subject, and the lower level monads that compose me are expired subjects, or objects (de Quincey, 2011, p. 6). It is precisely this hierarchical binding that accounts for reflexive consciousness.

I use myself as an example of a complex living system, a unified monad interacting with a higher level I am only dimly aware of, perhaps collective human consciousness. My own reflexive consciousness is a result of the ability to see myself in relation to an “other,” i.e., my interaction with the surrounding environment and the meaning I draw from it. What I perceive as the “other” allows my basic awareness to “reflect” back onto me.

The basic concept behind *process philosophy*, pioneered by Alfred Whitehead, involves how we view fundamental reality. This new way of thinking completely revolutionizes how we traditionally perceive the world and ourselves as part of the universe. Usually we think of
fundamental units of reality as being material, such as atoms, or particles within space-time. This view directly affects everything about our culture, behavior, and way of perceiving ourselves. We take for granted that our worldview is composed of an object ontology. That is, we perceive every “thing” as being an independent, discrete object that interacts with other independent, discrete objects.

Whitehead imagined an entirely different ontology. According to process philosophy, the fundamental units of reality are events, or more specifically, occasions of experience, in small chunks of experience. One cannot separate any one “thing,” because the entire universe experiences relationships with itself. Thus, process philosophy asserts that relationships are primary. Earlier, entrenched in our object ontology, we thought of objects being primary, where relationships are merely the interactions among those objects.

Through a process philosophy lens, the universe is inherently dynamic, not one static system that can be solved or predicted in a deterministic manner. Objects seem to appear static and exterior to us, but really they are sequences of occasions of experience. We are verbs: dynamic, ever-changing relationships. We are not nouns, which are static and categorized. Everything (using the word “thing” loosely) is in a state of becoming. Every event that occurs provides data that represents possibilities for future events.

Alfred Whitehead warned of “the fallacy of misplaced concreteness,” also referred to as reification, when an abstract construct is taken to be concrete, or “real.” One example of this is taking mathematical models to be true reality. We humans are excellent at developing conceptual constructs to represent reality, but we often take concepts too literally.

Process philosophy transforms our notions about the universe. First of all, the universe takes on new meaning as one giant living, interconnected system. If there are feelings of
loneliness or meaninglessness, we can be assured that we are an integral part of the cosmos; each of us is connected to the whole had has a place of belonging. The inherent dynamism of the universe allows for personal transformation as well, for liberation from stuck roles and myths that we may be playing out in our lives.

Process philosophy also allows for free will, since possibilities arise with every occasion of experience, and change is inherent to the universe. Of course, over time there may be a finite amount of possibilities. If that is true, then process philosophy allows for a combination of free will and some degree of determinism.

As de Quincey has pointed out, we must also take note of the important distinction between “consciousness of self,” feeling one’s own embodied boundary, and “self-consciousness,” consciousness reflexively aware of itself. Less complex consciousness implies an awareness of its own embodied boundary, whereas more complex consciousness has additional capacities for self-reflection, for turning the beam of awareness back on awareness itself.

As nested hierarchies of intersubjectivity exist, nested hierarchies of options determine the amount of conscious choices available to matter. Let us zoom in to take a closer look at what this process looks like. If we use the Orch OR model, we might begin with a microtubule, but a microtubule is still composed of smaller sentient systems. Thus, we begin with the smallest matter that we know of, the subatomic particles, quarks, and quanta.

Along with the process of consciousness comes the ability to make intentional choices concerning movement and behavior, based on the available options. In “hierarchical binding,” coined by de Quincey, an element of creativity exists for each monad subject, in the prehension of the smaller monads that compose them, the objects, or past subjects.
However, this inherent creativity is limited by a specific set of physical options available to this “dominant monad.” The reason a monad higher on the hierarchy has more potent self-agency is because of the greater amount of options available from which to prehend and make choices. The free will of matter might be bound by its hierarchical position, but it is the nested hierarchy of levels that allows for reflexive consciousness, a freedom not afforded otherwise.

If particles experience consciousness, what choices do those particles have? Virtual subatomic particles have only one choice, with two options available to them; the choice to pop in or out of existence, or to emit. To act or to not act; the choice is simple at this physical level of space-time. Subatomic particles may choose to move or to form an intersubjective relationship with another particle.

When these particles form an intersubjective relationship with one or more other particles, they experience a shared meaning between the two. The original options held by the individual particle, remain applicable only at the smaller, individual level. Furthermore, each level, while prehending the options of the smaller units, makes choices as a unified whole. The shared meaning allows for a synergy, a larger system of matter with its own set of additional options. If no relationship of meaning is formed, the particles simply remain two sentient entities that function independently of one another.

As the arrangement of particles grows its complex network of intersubjective relationships, the system develops into an atom, a molecule, a cell, an animal. The quality of consciousness experienced by an elementary particle differs from that of a cell, in that the cell feels a greater degree of reflexive consciousness.

One can categorize process philosophy and radical naturalism under the general umbrella of panpsychism, the paradigm that all matter has a conscious aspect. In a very general sense, this
view forms the framework of the assumptions that we use when delving into process philosophy or radical naturalism, foundations which need to be asserted explicitly, since they differ so drastically from the materialist view so many are accustomed to: According to panpsychism, subjective experience is an essential aspect of the cosmos, not limited to certain living organisms, or part of living organisms, such as the brain.

Although panpsychism is sometimes used as either a synonym or in conjunction with process philosophy, this view is best used when considering the implications of process philosophy. If consciousness is a fundamental part of the universe, inherent to all matter, then the way we see ourselves in relationship to others, to other beings, and to the earth drastically changes. We enter into a framework of connection rather than separation.

The reflexive arc model drew my attention in that it gives a brilliant wider context for a radical naturalist cosmology. The reflexive arc, a story of involution followed by evolution, contributes, to our explanation of how reflexive consciousness occurred and developed through matter. *Involution* refers to a conscious choice to constrain, or “involve” oneself into matter (Young, 1976 p. 91) by forming intersubjective relationships with other monads at the same level. *Evolution* is moving against the law of entropy (pp. 90-91), an increase in material organization, which allows for a greater freedom of reflexive consciousness.

Nevertheless, a glaring question remains in Arthur Young’s reflexive arc: Why did self-reflexive consciousness develop in the first place? In the infancy of the universe, all was singular and unified. However, the universe, alone in its singularity, could never be *reflexive*. In the desire to experience itself through reflective consciousness, a sense of separation—a “self vs. other” split—had to occur. Perhaps this is how the divine became reflexive.
One may persist in the question of “why.” As de Quincey emphasizes, Young was explicit that the ultimate nature of reality is the photon, the quantum of purposeful action (which he also equates with Spirit). Thus, purposeful action and energy constrain themselves to become matter. In other words, implicit in Young’s cosmology is the metaphysical notion that the ultimate consists of both consciousness (“purpose”) and energy (“action”). Spirit, then, is not pure consciousness. It is purposeful energy (or sentient energy) as described in panpsychism or radical naturalism. Therefore, Spirit, the primordial monad of a purposeful quantum of action expresses itself in forms of sentient matter, the world of space-time. Involution, then, is the process by which the ultimate manifests its purpose in material forms that then begin the long journey “home” to a more “enlightened” Spirit. The reason for this process is to experience relationship, and subsequently, develop a capacity for reflexive consciousness. Nonetheless, one can still go a step further and ask why the universe would bother with reflexive consciousness, or why reflexive consciousness would be a goal.

Arthur Young used the term “quantum of action” to describe the photon, the fundamental unit of matter. This implies, then, that at its most fundamental level, reality consists of “action”—an ability to act or manifest. However, Young was emphatic that this fundamental “quantum of action” is purposeful action. That is, it consists of both energy (action) and consciousness (purpose). The quantum of action or photon has the ability to choose. At its deepest level, then, the universe acts intentionally through choice.

If the cosmic ultimate consisted only of consciousness, at most it could form only intentions and choices. But, as de Quincey points out, without also possessing an ability for “action,” it could never manifest intentions or choices. For a manifest universe to occur, both choice and action are required—both consciousness and energy. In this scenario (if the ultimate
were “pure” consciousness without action/energy), awareness would remain an ontological certainty, but the universe would be fundamentally still. Nothing would, or could, happen. Everything would remain eternally in a state of suspended possibilities or potential.

Instead, sentient energy—the quantum of purposeful action—“involves” itself through a process of self-constraint, to create the ontological level of Matter, with its myriad of particles, (subatomic, atomic, molecular). In short, light (consisting of photons, quanta of action) shatters itself into multiple sparks that we recognize as matter. After that step has been established, subsequent processes follow the same pattern, arranging material systems and their corresponding intersubjective relationships into greater complexity.

Reflexive consciousness is not present throughout the entire arc. Since reflexive consciousness requires the combination of monads of the same level in relationship and in relationship hierarchically, first-level monads (photons) do not experience reflexive consciousness. There is no hierarchical level “below” them.

The most basic, primitive level of egoic consciousness must occur at the level of the atom, one level up from the subatomic particles. At this level, the atom experiences relationship with other atoms; Young says this (the level of the atom) is where “identity” first appears. That is, atoms are distinguishable from one another, whereas every electron and every proton is indistinguishable from every other electron or proton. Not only do atoms represent the first appearance of self-identity; they also represent the first level where monads can make choices among the physical options presented by monads on lower levels (subatomic particles).

Now that we have explored the intricacies of a process model of the reflexive arc, let’s turn attention back to the Orch OR model proposed by Hameroff and Penrose. The combination of the Orch OR model and radical naturalism addresses the question of how consciousness
correlates with the nature and complexity of associated neural processes. When I combine these
two previous models with Arthur Young’s reflexive arc, we finally see the details of how
consciousness correlates with matter, according to degrees of reflexive consciousness.

When we take a fresh look at the Hameroff and Penrose Orch OR model, through a lens
of process, radical naturalism, and the reflexive arc, a different story emerges from the one
shaped by the materialistic paradigm. Hameroff and Penrose proposed a kind of emergent
consciousness, where quantum mechanical collapses create experience. However, through the
lens of radical naturalism, we now understand that experience was present all along. Using the
reflexive arc model, we can even understand the cosmological story of involution and evolution
to describe how experience directed matter from subatomic particles, to atoms, to molecules, all
the way to microtubules and the entire human.

What the Orch OR model offers is an examination of the neurological details in the brain
that illuminate the specific physical processes of neurons correlated to hierarchical,
psychological levels of awareness. On a purely material level, yes, quantum coherence allows for
neuronal functioning. However, if we are discussing consciousness, we understand that
microtubules form relationships of meaning with other microtubules, just as all matter has the
capacity to do.

Taking a closer look, we see that radical naturalism and reflexive consciousness are
present in every step of the model. The Orch OR model specifically looks at the actions of
microtubules in the nervous system. If we look at the lowest level monad, subatomic particles,
we now understand that even these particles have subjective intention. When multiple subatomic
particles form relationships of meaning, atoms are formed, creating higher-level monads, and
now a basic nested hierarchy of relationships exists.
When multiple atoms connect via intersubjective relationships, molecules are formed, and so on, until we have a nested hierarchy of subatomic particles, atoms, molecules, to more complex macromolecular structures, such as proteins, DNA, and RNA, to organelles and cells, until we get to monads at the level of conscious organisms.

Microtubules reside in the cellular monadic level. They are informed by the objects, or the expired subjects, of every lower level and lower-level monad. Let us assume that the Hameroff-Penrose’s theory is correct insofar that the microtubules do indeed create a quantum wave collapse: How does this quantum activity fit into the combination of radical naturalism and the reflexive arc?

That microtubules maintain quantum coherence throughout the brain certainly affects neurological processes and structures, because the event drastically reduces the amount and availability of chemical and physical possibilities into one arrangement. This will have a direct effect on the kinds of options available to the nervous system.

More specifically, Hameroff even stated that the microtubule’s self-collapse reductions are equivalent to Whitehead's “occasions” (Hameroff, 2003). The difference between Hameroff’s model and process.radical naturalist models is that occasions of experience are not unique to microtubules, but to all monads at every hierarchical level in the cosmos. It just so happens that the events microtubules experience are quantum mechanical in nature in a way that affects psychological states of consciousness. The collapse of the wave function itself is the perfect example of subject expiring into object, following the very nature of process.

Thus, the process model implies that for quantum physics the state of superposition is somehow correlated with an experiencing subject, where the collapse itself, as we’ve seen, represents the object.
At this point, we can now understand how subatomic particles pop in and out of existence. According to process theory, the most fundamental aspect of the universe is intersubjectivity. According to Young’s reflexive model, the quanta of action, manifested as subatomic particles, emerge as single subjective monads, from the underlying matrix of intersubjectivity.

In this analysis, it is clear that some correlation exists between intersubjectivity and the quantum wave of superposition. The difference between the two is ontological in nature; intersubjectivity is an experience, whereas quantum superposition, however bizarre it may seem to us, is a physical actuality. Perhaps, in a sense, they are two sides of the same coin.

It is important to remember that every event that occurs becomes a set of physical options for future events. Because we are discussing quantum activity in the same model, which involves superpositions of possibilities (Whitehead’s “eternal objects”), we must make a distinction between quantum “possibilities,” or superpositions, and the physical options for future events. Whitehead distinguished between eternal objects, or possibilities, and actual occasions, or subjective objects, which, as de Quincey points out, consist of both a physical pole (objective “matter”) and a mental pole (subjective “mind”):

“The point is that actual occasions are ‘stubborn facts,’ determined by the past (ultimately the entire past of the universe). However, because each actual occasion is also subjective, it has the ability to select or choose from among the stream of objects flowing from the past into the present—that’s why we don’t get overwhelmed at every moment by the ‘blooming buzzing confusion’ of trying to process the entire history of the universe. The subjective mental pole chooses from among the deterministic chain of past events leading into the present moment (based on criteria of relevance to its current interest or aims). In
other words, the mental pole selects (‗prehends‘) a relatively tiny subset of physical objects to incorporate into its next actual occasion.

“In addition, the subjective mental pole also selects from among the possibly infinite spectrum of ‘eternal objects’ (i.e., possibilities) that surround each actual occasion. In this way, the subjective mental pole introduces something novel from the realm of possibilities, and circumvents the otherwise massive determinism of the pressure of the past impinging on the present. Each present actual occasion, then, is a combination of determinism, the causal chain of past events, and choice, the prehension of selected past objects, and the ‘ingression’ or choice of some new eternal object(s). No actual occasion is ever fully determined, although it still carries the weight of the entire history of the universe” (de Quincey, personal communication, March 2013).

In the model I am developing here, a brain that achieves quantum coherence over large areas relates directly to specific states of consciousness. The quantum act of collapsing the wave function, a physical occurrence, directly affects the neural structures involved, and consequently, the correlated psychological states of consciousness.

Hameroff and Penrose identified a cascade of collapsing wave functions, or rather, a cascade of occasions of experience, but in Whitehead’s metaphysics, this which applies not only to microtubules, but to all matter in the universe. Whitehead’s model of the universe can be summed up by a cascade of occurring events, of present subjects and past objects. Ultimately, the Orch OR model fails at its attempt to understand the ontological status of consciousness, but provides an excellent detailed look at how process works on the intra-cellular level, where subjective choice is made to render a specific physical options available for future subjects to “collapse”—thus manifesting actuality from quantum potentiality.
I do not refute the Orch OR model, but rather redirect it to a more appropriate focus and
description: physical neural processes that rearrange options or potentials available for subjective
choice—thus configuring the sentient matter that constitutes brain tissue.

The implications of these new theories are not to be underestimated. To fully internalize
that consciousness is fundamentally inherent in all matter to various degrees of reflexivity takes
us beyond the old, deterministic, exclusively materialist view of the universe. We arrive at an
understanding that each of us is one distinct node in a living system.

According to Arthur Young’s model, which identifies quanta as first-level monads—the
“quanta of action.” The nested hierarchy of monads grows from this level to include subatomic
particles, atoms, molecules, cells, plants, mobile animals and humans. However, we may ask:
What lies beyond humans? Is there an “end limit”—i.e., a final monad beyond which no further
levels exist?

Beyond the single human, the answer will depend on which track we follow. The levels
beyond individual humans may include the human species, or a larger category that includes all
animals. However, the end of the arc is qualitatively different from the beginning. If we follow
the reflexive arc model, we return to a unified, integrated Spirit, at the end of the arc.

Heterarchically, one may perceive two monads on the same level, in relationship to one
another, such as two human organisms. However, in daily life, our hierarchical awareness seems
to go only so far. For instance, I am aware of my heart and its pulsing muscle in my chest.
However, I perceive my organs as objects, which is consistent with process philosophy which
views physical objects as expired subjects.

Furthermore, if we consider monads even just one level lower in the hierarchy, at the
cellular level, I have little-to-no awareness of them whatsoever. Nonetheless, people do exist—
for example, yogis, shamans, or other kinds of mystics—who claim to have awareness of such lower-level monads (possibly involving altered states of consciousness).

We are typically not conscious of lower-level consciousnesses because, in relation to the dominant monad of the experiencing human being, such lower-level monads are past subjects; they are objects for the current creative subject. Each current subject, then, is then able to make creative choices based on the options provided by the lower-level objects.

However, as described above, it still seems possible for some people to perceive lower level monads. In order to explain that phenomenon via process and radical naturalism, we see that, somehow, awareness has intersubjectively expanded to include lower-level subjects as subjects, not as objects.

We must be careful with our language: saying “awareness has expanded” does not imply that awareness or consciousness is spatial (and, therefore, physical and objective)—which would mean using words and or images borrowed from the materialist paradigm. We must always keep in mind that consciousness is not something physical.

Just what it means, precisely, for one to talk about being aware of more than one monadic level, we must remain within process philosophy to be consistent and coherent. Certainly, while the current human monad is alive and moving about, monadic subjects at lower levels also exist, with new ones coming into being with the birth of new cells. For one subject to be aware not only of itself, but of lower-level subjects, too, probably requires an altered state of consciousness.

Thus far in this discussion of the “binding problem,” hierarchical binding has included only a monad subject and the levels hierarchically below it. What might an experience of intersubjectively connecting with a higher-level monad, above the human organism, be like?
Although hardcore materialist skeptics might regard such a scenario as a kind of science fiction, we can say, nevertheless, that from the perspective of radical naturalism, consciousness one monad higher than an individual human would involve the shared, collective consciousness of some intimately related group of humans or, indeed, perhaps the species as a whole.

According to process philosophy, the present monad, as a subject, prehends lower-level expired subjects as objects and physical options. Understanding how multiple subjects at different hierarchical levels could share experiences intersubjectively poses a greater conceptual and explanatory challenge. However, de Quincey offers a detailed solution to the “binding problem” in *Radical Nature* (pp. 230-5).

As described earlier, the “binding problem” refers to why one tends to experience only one unified consciousness, rather than every individual monad on lower levels (i.e., many little consciousnesses), such as cells and atoms. De Quincey answers the “binding problem” by describing “hierarchical binding,” the process by which completed subjects become the objects for subsequent subjects. Each level represents a dominant monad, in which the correlated consciousness, transcending and including all lower-level consciousness in the nested hierarchy, is thus a unified experience of the dominant monad. Our dominant monad, the human as a whole, represents the current subject, while each lower-level monad is simultaneously also a current subject for the levels below it (de Quincey, 2011, p. 6). Hierarchical binding makes reflexive consciousness possible.

Subjects experience duration, form relationships, make choices, and expire to become objects for future subjects. When two or more subject-monads on the same level experience intersubjectivity, it is possible for them to form a larger monad. Of course, within any hierarchy at any given time, each level contains experiencing subjects. Consciousness associated with
inter-level (i.e., “hierarchical”) intersubjectivity, along with intra-level (“heterarchical”) intersubjectivity, is reflexive.

Physical proximity does not necessarily lead to heterarchical binding. Consider the difference between an aggressive mob of football fans and an intentional group of meditators. The football mob may very well be akin to an aggregate, where many individual monads (each fan) are clustered together, but no intersubjectivity is formed, and consequently, no higher-level monad is formed. Thus, if one observes this mob of fans, as a whole they move more chaotically and possibly even mechanistically.

In observing the meditators, one will likely see a different scene. In the transpersonal experience of human collective consciousness, the practitioners are in higher-level relationship, where a kind of telepathic synchrony leads us to the understanding that a higher-level monad has formed.

Or, the difference between an aggressive mob and mystics meditating together in a peak state of collective human consciousness could relate more to the “dimmer switch”—i.e., the psychological levels of each monad. From this viewpoint, unlike before, both the aggressive mob and the meditators experience a higher-level monad. However, whereas the meditators experience a fully emotionally and cognitively aware transcendent monad, the football mob experiences a more animalistic “mob mentality,” unable to think, feel, or act beyond basic instinct.

For many of us, our imminent concern is not the experience of integrated Spirit at the end of the reflexive arc, but accessing whatever qualities of consciousness exist at the next level up from the level of individual humans. At this point, our exploration of the potentials and possibilities of consciousness takes us into the transpersonal disciplines. Accessing higher-level
monads of consciousness, beyond the individual, are as rare in daily Western life as accessing lower-level monads. As implied earlier, experiencing higher-level transpersonal consciousness, just as with lower-level communion, probably requires altered states of consciousness, the result of intentional spiritual or shamanic practices.

According to the theories I have outlined (e.g., Young), one might conclude that somewhere in the evolutionary story of the universe, upper-level transpersonal monads must have evolved. Higher-level monads of consciousness evolve in association with the evolution of complex physical forms (e.g., from atoms to molecules to cells to organisms . . .) — allowing for different kinds of subjective and intersubjective relationships, depending on the physical options available.

We must distinguish the difference between the beginning (“flip-switch”) and the end of the reflexive arc (“dimmer-switch”). In Young’s model, for example, the cosmic process of involution and evolution is not simply consciousness at the starting point circling back on itself, re-experiencing the same quality of consciousness. The arc of process begins with the photon, the “quantum of action.” Consciousness at the second level is one-directional. Reflexive consciousness cannot exist at this level. For reflexivity to occur, consciousness must evolve into more complex forms that allow for higher-level intersubjective experiences.

Toward the end of the arc, we have a nested hierarchy of reflexive consciousness, a vast and rich array of dynamic and diverse experiences. The quality of consciousness associated with such experiences would involve integration of all lower levels of relationship felt by its associated matter, and, at the same time, experience a kind of wholeness of being. This may seem paradoxical to us: wholeness coupled with awareness of distinction. Put simply, the difference between unity consciousness at the beginning of the arc, and unity consciousness at
the end of the arc is that the end of the process consciousness is more complex, more reflexively self-aware.

Our human experience can inhabit various levels of consciousness, since we are composed of many levels of matter interacting in relationship. When we experience our dominant monad as our human identity interacting with the cosmos, during certain peak states of consciousness, we may be able to experience the beauty and importance of Spirit encasing itself in matter, binding itself into structure in order to live out human stories. In a sense, our ultimate “goal” feels as though it wants to come home, toward pure Spirit, our true nature, “enlightenment,” or human growth.
CONCLUSION

Given the premise that all matter in the universe is sentient, I have shown how the quality of consciousness correlates with the nature and complexity of associated neural processes, applying Arthur Young’s reflexive arc of evolution to speculate on the process of reflexive consciousness development in matter.

Penrose and Hameroff’s Orch OR model provides an excellent example of how the quantum activity of microtubules determines the physical correlates of consciousness and the processes associated with levels of awareness. However, we are left with an untold story, the question of subjectivity and the nature of the nuances of subjective experience. We get a more complete picture of the relationship between consciousness and matter when we overlay another philosophy over the Orch OR theory.

When we apply de Quincey’s model of radical naturalism, we see that despite Penrose’s and Hameroff’s claim that microtubule action causes subjective consciousness, consciousness was present in the system the entire time. At the lowest level of matter, subjectivity of one subatomic particle, without relationship to another, has the most basic kind of awareness. As the system of matter becomes more complex, relationships are formed between the units as well as the levels. My claim is that the combination of these processes account for reflexive consciousness. Thus, reflexive consciousness exists in varying degrees in all systems of matter. It is a part of our involutionary and evolutionary heritage, emerging out of the intention for unified consciousness to reflect upon itself.
Deeply internalizing the ontological unity of consciousness inherent in all matter allows one to perhaps live differently in the world. My personal experience of this paradigm has most profoundly affected my interaction style with others.

In order to better imagine what the transformed experience might look like, consider the contrast how one might live in the world according to the materialistic paradigm. Materialism is essentially a framework of separateness, of atomistic entities bumping against one another. There exists nothing to form a connection between objects or beings, other than the decision to approach and engage. Since interconnection is not a prerequisite for consciousness, an effort or specific intention must be made in order to connect.

That effort to connect epitomizes the pain I felt at an early age, feeling so separate from everyone else. Embedded in a culture of objects (the paradigm of materialism), it is no surprise that I experienced this. The irony, of course, is that in a culture of objects, everyone likely feels that separation; our perceptions have been trained to see dualism as a result of the mechanistic paradigm we have been immersed in for the past few hundred years. We think and behave as though the world is dualistic: Lived experience of the mind-matter split.

The new paradigm we propose includes the idea that consciousness is not an object that can be separated into each person, but rather one, fundamental unified phenomenon, manifesting distinctly through all matter. Thus, when I look at a stranger at the bus stop, we are the same consciousness, experiencing itself in slightly different ways. In this new way of seeing the world, connection is inherent and fundamental.

A more specific way that one might live differently is by adapting to a new relationship with change. As a personal example, one day I stood half asleep at the train platform, in one specific spot where a specific door would open, so that when I arrived at my destination, I could
exit the door in the spot closest to the stairs, providing me the quickest route to the bus, with the quickest access to the most comfortable spots on the bus. I had been doing this for three years. On this day, however, the train pulled up, and my specific train doors were closed for maintenance. Jolted out of sleep, I rushed to the next car, adrenaline raking like hot coals through my organs. My lost sense of control felt like a life-and-death struggle.

Trains are an example of change as a transition from one place to another. Change can manifest in various ways: a transition in careers, the transition from life to death, or simply the transition from one present moment to the next. For many people, the potential for growth and satisfaction lies in relinquishing control throughout each change. The very concept of “control” implies that each of us is a conscious volitional subject among objects.

We balance the paradox of limitless Spirit incarnated into solid matter by realizing that “Spirit” is not pure consciousness. It is a quantum of purposeful action—i.e., as noted earlier, Spirit is ontologically both consciousness (purpose) and energy/matter (action). How does one embody a living architecture, rather than a clenched, rigid wall? As long we identify strongly with the ego-I vs. other, we perceive change as objects that happens to us. When holding identity loosely, intuiting our more universal connectedness, then we are inherently a part of the change, so that the concept of control becomes less relevant.

In conclusion, living by the paradigm of radical naturalism and consciousness inherent in all matter creates an understanding of how I, you, and everything else in the cosmos, are all facets of one being. This new experience eases the pain of the gap between my imaginative internal world and “everyone else,” the nature of the previously perceived gap between interior and exterior, between mind and matter.
We may find ourselves pondering possible reasons why the cosmos evolved to a point of subjective, embodied consciousness, eventually able to experience reflexive consciousness. Ultimately, when I engage in dialogue with another human, our fundamental level of existence is one non-located consciousness, so what could be improved by the experience of individual consciousness?

If anything, the experience of “other” is one that brings great pain, as I described in the Introduction, in my early life. However, it is precisely this challenge, and the pain that accompanies it, that is a key ingredient for evolution, through the lesson of being in relationship and harmony with the “other.”

Interacting with a boundary can be a growing point. If there were no boundaries, matter would evolve in a runaway growth, with no order. This is sufficient for less evolved types of matter, but after a certain point of growth, consciousness must perceive an interaction with itself in order to organize itself to a greater degree of complexity. This “interaction with itself” is reflexive consciousness.

A revelation lies waiting for us if we perceive our individual human selves as lower-level monads of a higher level of consciousness. This can be interpreted through many different paradigms, from radical naturalist philosophy, to postmodern physics, to various spiritual traditions that acknowledge a “higher consciousness,” which we can now interpret as a higher-level monad with which we are engaged in intersubjective relationship. If that relationship is established, we then have a relationship of meaning with higher-level consciousness.

These theories contain important implications; radical naturalism, or more specifically, the dynamics of reflexive consciousness inherent in matter, can fill gaps that current Western science cannot yet explain. We need look no further to find mystery in Western science than
quantum physics—which is still full of mysteries and paradoxes that inspire both awe and future investigation.

One of these is the concept of non-locality. Not to be confused with the term non-located, non-locality is the apparent instantaneous communication between two particles separated by space. In that particular case, we can relate the concept of the “transcendent realm” to the human monad becoming aware of the intersubjective relationship with higher-level monads.

In current Western science, the focus on materialism inevitably prevents scholars from understanding how non-local interaction is possible. If every aspect of the universe is physical, there absolutely must be a physical medium of transmission, in every interaction. Needless to say, consciousness has no place in such a model.

We can use radical naturalism and the interaction of monads and hierarchies of monads to understand how non-locality is possible, without relying on pure materialism as current science does. When two objects seem to communicate non-locally, they are said to be entangled. From a materialist, object-oriented viewpoint, non-locality and entanglement are impossible, since any kind of communication requires a physical transmission through some physical medium.

When two objects are said to be entangled, we can rephrase that notion as two monads experiencing an intersubjective relationship. Once that relationship is established, physical distance no longer matters, since both monads are inherently connected to the same knowing, the same consciousness. This makes sense when we remember that both particles, both monads, are not only nested within a higher-level monad, but in relationship with it.

Let us examine this on a larger scale, an environment that we’re familiar with in our daily lives. Currently inhabiting a human organism monad, I have control of my hands. As I sweep a hand to and fro, moving it about in space, all of the monads at one level lower (the cells), all
move along with the hand. If we were to observe two finger cells moving simultaneously, from the point of view of a nearby hand cell, it would seem mysterious how the two other cells seem to know to move together at the exact same time.

The point is that the cells themselves are inherently a part of a higher-level meaning. Furthermore, although they may have a relationship of meaning with the higher-level monad (the whole human body), they are aware only of the relationship itself. The cells are not aware of the body’s greater intention and motivations—these belong to the intersubjective relationship with the next higher-level monad.

If we return to the concept of non-locality, we can use the process above, we understand that the two particles are not communicating via a physical medium. Instead, the intersubjective meaning that drives the particle to non-locally communicate has already been established in the higher-level monad. Thus, what appears to us as “non-local interactions” are generally lower-level monads acting according to an established relationship with higher-level monads. They are simply another example of the reflexive consciousness of matter.
APPENDICES
Appendix I

Diagram for 4-D Perception

This diagram is supposed to show three-dimensional visual processing works alongside the mind’s ability to perceive movement in time, thereby accessing a kind of spatial “fourth dimension.” Nonetheless, even if we can perceive in four spatial dimensions using this alleged “mind,” then what, or who is doing the perceiving at that level? No matter how one reduces consciousness to a spatial dimension, there is always an awareness of that dimension, so consciousness still escapes our model. Thus, the concept of mind as a higher spatial dimension remains incoherent.
It can be extremely difficult for one to resist the urge to truly imagine consciousness as not material. In my personal life, growing up immersed in modern physics, I have long resisted the urge to imagine consciousness as nonphysical. To imagine that all is material that can be described as objects gave me an illusory sense of control and individuality. Thus, I attempted to construct models in which I tried to place consciousness in a physical realm that is currently inaccessible in our daily, material lives.

An example of such a solution might involve artificial intelligence, in the quest for how to possibly “give rise” to consciousness, obviously operating in the emergent materialist paradigm. Essentially, one constructs a cognitive robot’s body in 3-D, but its neural circuitry processing is in 2-D. Of course, nothing physical can be completely 2-D, but this robot is constructed so that the processing signals travel only in specific directions: forward, backward, and side-to-side. A robot such as this will be able to process only its 3-D foot hitting a wall, with 2-D sense processing. This sensation may feel distorted or strange, due to its 2-D cognitive limitations. To imagine what these higher qualitative perception might feel like leads to feelings of vague “knowings” that can’t be placed, much like how we perceive our own consciousness.

I have included these speculations, showing my early desperate attempts to place consciousness in a purely spatial model, as a way to convince any reader still resisting the concept of non-physical consciousness. The last farfetched model I suggested, before realizing that it was futile to try to explain the subjective as physical, is that we might be aggregates of one larger 4-D or 5-D being moving through space-time, so that we perceive linear slices of space-time in one direction.

The reason we can feel the urge to create higher spatial dimension representations of consciousness is the tendency to view our relationship to consciousness as something we are
immersed within but unable to see, like a fish in water. Similarly, I cannot use my own eyes to look at myself. Thus, philosophers have worked with what I call the “gazing at oneself” analogy, in an attempt to think up ways around the problem, which involves topology and perception, and then possibly apply these ideas back to consciousness.

With this in mind, we can look at our eyes with our eyes only if we use some sort of tool, such as a camera or mirror. In those cases, we need an external reflective property in order to see ourselves. This is not to be confused with the similar language we use when discussing subjectivity, such as “reflecting” back on a thought we have had. Indeed, the word “reflective” can refer to an objective material or a subjective process.

Since we can be aware of our own thoughts in a top-down way, we can employ specific mind processes to observe other mind processes. The only way to observe consciousness is for one to “use consciousness to look at consciousness.” However, even though we can “look at,” or self-observe different conscious processes, we are still, on the whole, completely immersed in this stream of conscious experience. We have no way of getting outside this, able to fully dissect consciousness as a whole, objective “thing.” After all, consciousness is not at all objective. If we could observe the whole “thing” of consciousness, there would still be a consciousness doing the observing.

Another perspective on the “gazing at oneself” analogy is to futilely work with the spatial analogy. Imagine a single finger trying to touch itself. The only way this would be possible would be to warp the topology, by accessing a higher spatial dimension, and folding the finger dimensionally in on itself. Is there a way to “fold” consciousness, or touch minds? We are still using material-centric language.
Another way to view the “gazing at oneself” analogy is through a lens of sociology. The dominant culture rarely sees itself as a distinct identity; immersed in a taken for granted sense of normalcy, one often needs an outsider to point out those assumptions. Thus, when discussing consciousness, we feel a draw toward getting outside ourselves to reflect back what we see. However, one can’t “get out of” consciousness, as if it were an objective location in space.

Finally, for me, the argument that convinced me of the immateriality of consciousness occurred during an interview with Christian de Quincey, who is convinced that consciousness has no aspects that can be described or reduced to space or spatialized time, since Einsteinian space-time is really 4-D space, and does not deal with time at all as we experience it—i.e., as duration. I probed him with questions, wanting him to demonstrate more fully how consciousness has no spatial aspects whatsoever.

In the course of our conversation, we came up with a thought experiment: The basic concept is that you can warp Einsteinian space-time, which includes a spatialized form of “time,” to its absolute limits, and consciousness remains unaffected. However, before discussing the details of the thought experiment, a basic understanding of physics is required, namely the concepts of special relativity and non-locality.

Special relativity overthrows the notion we hold that in science that we observe nature through an inert, objective lens. The idea is that there is no “objective,” absolute motion; all motion is relative to a point in space-time where an observer could be located. In addition, the relationship between space and spatialized time is malleable, not static as previously thought. Clocks on objects moving faster appear to run slower to observers moving slower than those objects. Objects moving faster appear shorter to objects moving slower, relative to the observer; this principle is called “Lorentz Contraction.” These length and spatialized time contractions
aren't typically perceptible in our daily lives, but they certainly come into play if comparing time and length at vastly different altitudes, such as mountains or satellites compared with sea level on Earth. There can be multiple truths depending on the observer's frame of reference!

Non-locality is a recently discovered alternative to traditional, linear cause and effect. According to the old, Newtonian, paradigm, we live in a universe of billiard balls, a world of mechanical determinism, where everything can be reduced to its parts, and everything has a cause that is distinct in time. However, with the advance of quantum mechanics, the concept of non-locality shows us that not everything in the universe behaves this way.

An example of non-locality is when two particles share a complementary property. For instance, two electrons share the property of spin. When two electrons are entangled it means that if one electron is spin “up,” the other is spin “down.” If you take these two electrons and separate them by vast distances, and determine the spin of one of them to be up, the other electron a million miles away will simultaneously be read as down. There is no causation here; yet it appears that the properties of these electrons have simultaneously “affected” one another—without the possibility of an energy or information transfer between them (assuming the upper limit of the speed of light, a corner stone of relativity physics). For this reason, non-locality is also referred to as "action at a distance."

Non-locality also appears to imply an inherent intelligence to matter, even subatomic particles. Those paired electrons appear to share some kind of intelligent information with one another, and that information is shared instantaneously. This is the most mysterious point of all, that there is a kind of “telepathy” happening between the particles themselves!
With these concepts in mind, the thought experiment I proposed was explained and resolved by philosopher Christian de Quincey, convincing me of the immateriality of consciousness, and goes as follows:

Suppose you have two observers, A and B. Person A is at rest—a scientist sitting in the lab, eager to conduct this experiment. Person B is hurtling through space in a spaceship moving close to the speed of light, while observed by Person A, and all of Person A’s colleagues back at the lab.

Now, due to the habits of Einstein’s special relativity, what Person A will observe happening in Person B, is that Person B’s clock will be ticking significantly slower, and his or her entire physical form, as well as the physical form of the ship, will be contracted, appearing squished. Meanwhile, Person B inside the ship will experience no change in his or herself, but will continue to experience the duration of time and the form of space as the same as always. This is a result of the typical warping that happens due to special relativity. In fact, if Person B continues to move at the speed of light for what he or she experiences as ten minutes, hundreds of year could pass by on Earth, and when B returns, Person A will be dead, and everything familiar to B will have radically changed.

Logic would maintain that if consciousness were physical, then it would be subject to the same laws of physics that govern the malleability of space-time as described by relativity. Thus, in our experiment, we would expect that if Person A and Person B were to have an *intersubjective* communication, they would experience great discrepancies in one another’s consciousness, parallel to the discrepancies observed by physical form and the mathematical duration of time under such extreme, near-light-speed conditions.
Here’s where it gets strange. Let’s say that while Person A is physically observing the warped space-time effects of Person B, these two people are able to have an intersubjective communication. Would Person A witness a “warped” consciousness of Person B? The answer is no. It would seem that the laws of relativity do not hold up when it comes to consciousness. The two people are having quite normal respective experiences. Even as Person A seems to be physically aging much faster than Person B, if they truly could feel one another’s subjective experience, there would be no change!

This thought experiment requires a suspension of disbelief, that intersubjective communication without a physical medium (e.g., non-local telepathy) is possible. For my personal understanding of the non-physicality of consciousness, the reality or fantasy of telepathy is not important in the bottom line of the argument, which is that if non-local telepathy existed in the proposed situation, then consciousness would not be affected by space and spatialized time.
Appendix II

Interview Questions

To include the intersubjective portion of my research, the following are questions intended to evoke a second-person experience, through dialogue with Christian de Quincey, about the nature and complexity of consciousness as relating to objective correlates.

How did you first become interested in the nature of consciousness?

When and how did you develop the insight of identifying “physics talk” and learning to discern material talk from consciousness talk?

How do you deal with people asking you for experimental proof of your theories? Is there some way we can demonstrate these ideas in an experiment?

Problem of causation: If consciousness has no spatial characteristics, then is it possible for consciousness to play a causal role in space-time?
Appendix III

Participant Forms

Letter of Participation

Dear participant,

Thank you for your interest in this research project. You have been asked to be part of this study because you have a personal and professional investment in the topic.

The purpose of this project is to develop a new perspective on process in the brain, using the Orch OR model, where physical processes adjust the amount of options available for subjective choices and intersubjective connections.

My interest in conducting this project has been a lifelong passion, a catalyst for my studies in physics, neuroscience, and metaphysics, and I seek to bring these various disciplines together in order to tackle how the quality of consciousness is correlated with the nature and complexity of associated neural processes.

If you choose to participate in this study, we will engage in an hour-long, face-to-face recorded interview where I provide you inquiries to ponder, relating to an aspect of your experience and thoughts on the nature of consciousness, and then you will be asked to describe this experience to me. I am also interested in your argument that consciousness that is nonlocated, having no spatial extensions and boundaries.

All information that you tell me, including your name, as well as the recording will be confidential unless you specify otherwise. No one else will have access to what you have said, although the interview data will be included in the final report.

Please be assured that your participation in this study is completely voluntary and you may choose to leave the study at any time.

I look forward to working with you. I hope you also find it an enjoyable and enlightening experience. If, during this process, you find that you want to talk, or if you have any questions concerning any aspect of this research please email me at pikorz@gmail.com.

Thank you again for your participation.

Sincerely,
Interview Consent Form

This document contains the oral and written agreement to be interviewed for the research project, Process and the Brain: The Origins of Reflexive Consciousness.

This project focuses on process in the brain, using the Orch OR model, where physical processes adjust the amount of options available for subjective choices and intersubjective connections.

Participation in this research project is entirely voluntary. If you agree to participate, you may be asked to provide your insights and experiences with the research topic. You will be recorded using audio software. You are free to say no and end participation in the study at any time. If you feel uncomfortable at any time during the project, you may end the process. You will have final review of all information you share during the project.

Participation in research is usually associated with both potential risks and benefits. It is possible that this research may touch on sensitive areas, and that you may experience strong emotions during the course of your participation. However, in this research, the anticipated risks are no greater than the everyday risks of engaging in self-exploration, idea sharing, and frank dialogue. While there is no guarantee of benefit, potential benefits from participation include learning about the topical area of the research and an opportunity to share and express your experiences on a topic of mutual concern.

We will use real names during the project, although my research report will use pseudonyms as a means of keeping confidentiality. The things you tell me will be included in my notes; however, I will always keep your name separate from the notes. The things you say will not be repeated to anyone, except in the final paper and in a class presentation, where no names or any personal identifying information will be used. Your confidentiality will always be protected, unless you specify otherwise, for professional or public relations reasons. You will receive a summary of/copy of the final research project for your information and use.

Do you have any questions?

I certify that I have been told of the intentions and potential outcomes of this research project, that I have been given satisfactory answers to my questions concerning the project procedures and other matters, and that I have been advised that I am free to withdraw my consent and to discontinue participation in the project at any time.

I herewith give my consent to participate in this project with the understanding that such consent does not waive any of my legal rights; nor does it release the principal investigator of the institution or any employee or agent thereof from liability for negligence.
Signature of research participant                   Date

If you cannot obtain satisfactory answers to your questions or have comments or complaints about your treatment in this study, contact the instructor of the course:  Karen Jaenke, Ph.D.
925-969-3137. Email: dreamhut7@gmail.com

Bill of Rights for Research Participants

You have the right to…

1. Be treated with dignity;

2. Be given a clear description of the study and what is expected of you as a participant/co-researcher;

3. Be told of any benefits or risks to you that can be expected from participating in the study;

4. Know the researcher’s training and experience;

5. Ask any questions you may have about the study;

6. Decide to participate, or not without any pressure from the researcher;

7. Have your privacy protected within the limits of the law;

8. Refuse to answer any research question, refuse to participate in any part of the study or withdraw from the study at any time without any negative effects;

9. Be given a description of the overall results of the study upon request;

10. Discuss any concerns or file an anonymous complaint about the study with Department Chair: Marilyn Fowler
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