Cosmic < *Soul* > **Harmony**

Brain < *coherence* >**TA** < *coherence* > **Mind**

Matter < *coherence* >> **Spirit of Truth** << *coherence* > **Spirit**

Adjutant Mind < *coherence* >> **Mid Mind** << *coherence* > **Cosmic Mind**

Intellectually << *coherence* >>> **Emotion Control** <<< *coherence* >> **Morontially**

Involuntarily <<<<< *coherence* >>>> **Brain Control** <<<< *coherence* >>>>> **Volitionally**

Physical <<<<<<< *coherence* >>>>>>>> **Wisdom** <<<<<<<< *coherence* >>>>>>> **Spiritual**

Worship

Counsel

Knowledge

C o u r a g e

Understanding

I n t u i t I o n

P r o t o p l a sm

P e r s o n a l i t r e e

Can our physiologies sense cosmic ideals?
Can we influence those physiologies to increase our cosmic-spiritual receptivity?

Fundamental Hypothesis:

I propose that electromagnetic energy ranges from the stationary and changeless which has pattern but no motion, through the low frequency motions of matter which have non-volitional patterning, through optical frequencies which have volitionally organized patterns, up to the higher spirit energy frequencies which have eternally enduring cosmic patterns.

I further propose that to the extent we can pattern our electromagnetic energy to be sympathetically spiritually receptive allowing coherence and harmony with spiritual influences, our energy patterns (both material and optical) become more stable and enduring.

We will examine these hypotheses from the personalized perspectives of:

Origin – Unorganized energy. (big bang - Unqualified Absolute)
History – Evolving energy patterns to the point of sentient wisdom. (Universal Absolute)
Destiny – Perfectly patterned wisdom. (Deity Absolute)

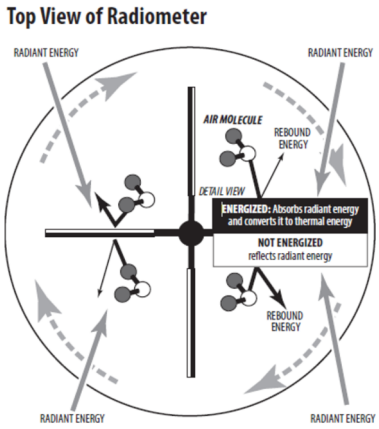
In this paper, we will look for ways to explain, using physics and physiology, how the very different spiritual energies might interact with our material energies. We will look for possible coherences in the electrochemical physical functions of body and brain, that might shed light on spiritual to material inter-associations. We will also look at our mindal/emotional overcontrol of these physiologies and perhaps find ways to improve our ability to detect, enhance and improve receptivity and capacity for spiritual influences.

I am not suggesting a reductionist mechanism wherein our self-consciousness and therefore our God consciousness could be reduced to the motions of matter. I think we are more than our matter. We are mind over matter but what is mind? For that matter what is spirit? Is spirit real? Is it a real force, a real power, and a real stimulus? Does mind pattern the brain or the other way around? We may not be able to find spirit substances in our material bodies, but we may be able to find some of the effects of spiritual luminosity on the solar radiometer of our mind as it influences our brain and nervous systems.

Pattern may be a fundamental blueprint of physical, mental, or cosmic reality. It may be the master design from which all copies are made. Pattern manifests as the organized arrangement of energy that has is configured and ready for replication. In this view, personality, mind, and life itself are superimposed on energy as distinct patterns; they are not inherent qualities of energy but the structured forms or "copies" that energy assumes when it is organized into living, thinking, or cosmic entities. Pattern is also versatile. It can be projected in material, mindal (mental), or cosmic-spiritual dimensions, and it is the medium through which creativity and evolution are expressed. Pattern may be the essential, immutable framework of creation, a unifying principle that underlies the evolution of the cosmos.

We may not be able to discern spirit patterns because they only exist “in relation to” space, and we may not be able to find spirit substances in our material bodies, but can we be warmed by cosmic energy? Can we use that energy to pattern our material energies and align ourselves with that life? Can we use our spiritual insight to see where the spirit luminosity that warms us is coming from, and then use that energy to move toward its source? Can we find some of the effects of that spiritual luminosity on the solar radiometer of our mind as it influences our brain and nervous systems and as it illuminates our thoughts and warms our feelings? Alternately, we can just go around in circles.

Solar Radiometer



Photons Warm the Dark Sides but Reflect off the White

Is the Greek figure of speech “the material is the shadow of the more real spirit substance” true? How can we be materially influenced by spirit forces? How does a progressing mind yield a progressing spirit? How might we become perfect even as the “I am” is perfect?

We will explore some of our physical functions that might show evidence of spiritual influence.

Cosmic Perspective

We are under the influence of material gravity from below, and a certain cosmic gravity from above. Gravity will ensure that our dust remains under the control of material gravity but our mind, as it guides our choices, decisions, and steadfastness, may allow cosmic-spiritual gravity to help transfer the seat of our material identity to our more enduring soul.

At the top is a perfect changeless God. At the bottom there is energy without pattern but with potentiality. There is a tension between these two extremes. Over time, energy patterns automatically improve their order and stability through an involuntary energy tension relieving process (with a corresponding increase in entropy, second law of thermodynamics), and continuous improvement of the organization of matter, including the encoded information in that matter, (second law of information dynamics SLID) (Ref 101) up to the stage of sentience (the so called thermo-contextual interpretation). After establishing sentience, the responsibility for improvement (using energy to advance information) may be, in part, passed over to the sentient beings. Notice how slow and incremental the progress of evolution was, to achieve this sentience! At our sentient stage, we can recognize the tensions and using our three fundamental cosmic intuitions of causation (mind-reason), moral duty and faith, we can continue stabilization, organization, and cooperation towards perfection. “Be you perfect even as I am perfect” may apply to us intellectually (in our lifetime) and it appears to be happening in nature (over billions of years).

First Causes

There are three theories of causation:

Upward: Scientific Causation - energy-matter makes us what we are.

> In this theory, everything that exists in the physical universe is dependent on the same fundamental entities and interactions (found by splitting matter apart down to the smallest possible scales). Living creatures can be divided into cells; cells themselves are composed of organelles; organelles can be broken down into molecules; molecules are made up of atoms; atoms are comprised of electrons and atomic nuclei (quarks and gluons which may be clouds of the hypothetical “sub-quark” particles called preons). These fundamental particles obey certain fundamentally inherent laws in their associations. From subatomic to cosmic scales, everything that exists depends on two things: charge and mass.

Downward: Spiritual Causation - God makes us what we are.

> In this theory, the fundamental laws of science are God’s preferred way of doing things and we have little or no contribution to the process.

Comparing these two theories from my personal perspective, if the universe was created based on a downward causation scenario, we might see large collections of matter fragmenting into smaller structures. If it were purely an upward creation, mutual gravitation would gradually bring matter together. Instead, our universe appears to be an amalgam of both. The universe is not described well by either scenario. In my humble opinion, a more plausible combined scenario is:

Up/Down: Scientific/Spiritual Causation - Energy becomes matter and evolves into sentient beings. Sentient beings continue the process.

We are going to examine some of the ways that we are resolving these top – down and bottom – up tensions for perfection, from both external physiological, and internal phycological perspectives, using our body (to feelingly experience) our brain (to discover, recognize and choose), and our mind (to build patterns of thinking to facilitate future improvement).

The areas we are going to investigate are:

1. The Consciousness Process
2. Consciousness
3. Personal Consciousness and the Whole
4. Brain, Mind and Consciousness
5. Current Theories of Consciousness
6. Consciousness as a Unified Mechanism
7. Physiologies of Body Consciousness
8. Intercellular Communication
9. Epigenetics
10. Neurotransmitters
11. Homeostasis
12. Brain Waves
13. Mental Picturizations
14. Activity Regulated Cytoskeletons & Synaptic Adhesion Molecules
15. The Maturing Brain
16. Spiritual Reception
17. Microtubules
18. Centrioles and Centrosomes
19. Microtubule Quantum Coherences
20. Electromagnetic Continuum
21. Physiological Continuum
22. Single and Multiple Quantum Coherences
23. Time
24. Time Consciousness
25. Multiple Physiological Clocks
26. Thought Feedback Loops
27. Near Death Experiences
28. Emotional Processes
29. Emotional Self-Mastery
30. Thought Processes
31. Sentience and God Consciousness
32. Top-Down and Bottom-Up Perspectives
33. Soul Physiology
34. Experiential Soul Fusion
35. Philosophy of the Physiology of Spiritual Influences

We are also going to look for ways to harmonize with, and to be more aware of, morontial or spiritual influences, and we will look for ways to discover, connect, and improve our thinking and behaving in these following methodologies:

1. Magnetic coherences
    a. Nuclear resonances
2. Electrical coherences
    a. Electromechanical resonances
3. Combined Mechanical and Optical coherences
    a. Microtubule/neurotubule coherences
4. Intellectual coherences
    a. Philosophy of the physiology of spiritual Influences
    b. Philosophical coherences

While examining these, you may want to look for personal coherences that involve:

a. Our actions
    i. Serving
    ii. Praying
    iii. Meditating
    iv. Worshiping
b. Our Soul
    i. Formation
    ii. Growth
    iii. Awareness
    iv. Soul growth and transition

This exploration will involve some mental gymnastics. In this exploration, I have done the research (see references below), but the suppositions and extrapolations are mine. The statements are always open to debate, and there are no right or wrong answers to any questions that may arise and there are many areas that call for further research. None of this is unequivocally provable. That's where faith comes in but hopefully the existence of plausible mechanisms will help strengthen that faith.

The Consciousness Process

Process philosophy (a branch of metaphysics concerned with the nature and relationships of becoming as proposed by Georg Wilhelm Friedrich Hegel and advanced by Alfred Whitehead) is an approach in philosophy that identifies processes, changes, or shifting relationships as the only real experience of everyday living. In contrast to the classical view of change as illusory (as argued by Parmenides) or accidental (as argued by Aristotle), process philosophy posits occasions of change or becoming are the only fundamental things of the ordinary everyday real world.

In physics, process distinguishes between the "physics of being" and the "physics of becoming". Process philosophy covers not just scientific intuitions and experiences but can be used as a conceptual bridge to facilitate discussions among ethics, aesthetics, religion, philosophy, and science.

Consciousness

> **"Everything changes and nothing remains still ... and ... you cannot step twice into the same stream. The river is not an object, but a continuing flow. - Heraclitus**
>
> **I propose that if two people agree upon the definition of consciousness, they will agree on the existence or non-existence of an afterlife. Deepak Chopra**

We intuitively know we are conscious, but what is consciousness? We can't discuss consciousness until we define it. We can't discuss self-consciousness, with the eventual extension to cosmic consciousness, without having an idea of what consciousness is. We are self-conscious before and after sleep or anesthesia. Are we conscious of anything during them? Consciousness seems to involve the process of rising entropy as it seeks its lowest energy state with a concurrent improvement in local pattern.

We have external and internal consciousnesses. We have body consciousness, perspectival consciousness, volitional consciousness, narrative consciousness, and social consciousness. Our individual and collective consciousness seems to change as we mature and as we pattern the electrical signals received from our senses (sight, hearing, touch, taste, smell, proprioception, nociception - sense of pain, vestibular balance and spatial orientation) and fit them into our current mental models. Self-consciousness may be our creative interpretation of sensory input and the conversion to thought output. Perspicacity (insight) then allows us to extrapolate self-consciousness, into cosmic consciousness.

Modern unified field theory describes the four primary force fields (strong, electromagnetic, weak and gravity) and how they consciously interact in their respective continuum as follows.

Strong Nuclear Force: This is the mightiest of the forces but operates over the shortest range—only within atomic nuclei. It binds protons and neutrons together in the nucleus and overcomes the repulsive electromagnetic force between positively charged protons.

Weak Nuclear Force: Though weaker than both the strong and electromagnetic forces, the weak force is crucial for processes like radioactive decay and nuclear fusion in stars. It operates over a very short range and plays a role in changing one type of subatomic particle into another.

Gravitational Force: Gravity is the weakest force but has an infinite range, making it dominant on cosmic scales. It pulls objects with mass together, keeping planets orbiting stars, and governs the structure of the universe.

Electromagnetic Force: This force acts between charged particles and has a much longer range than the strong force. It governs everyday phenomena like electricity, magnetism, and light. For example, it's responsible for the attraction between opposite charges and the repulsion between like charges.

Although all four fields have continuums of interaction, the electromagnetic field is the one we are going to focus on because it is the one that governs interactions between charged particles and all biologic functions. It's also responsible for electric fields (produced by static charges) and magnetic fields (produced by moving charges). The electromagnetic field is the combination of electric and magnetic fields, which propagate in waves, like light or radio waves. The electromagnetic force is described by Maxwell's equations and is mediated by photons, the force carriers of electromagnetism. It operates across macroscopic distances and plays a crucial role in chemistry and biology, binding electrons to nuclei and allowing atoms and molecules to interact. The electric and magnetic fields are mutually interactive. They are both quantum fields meaning that these fields are the sum of elementary oscillations, and we can treat each of these oscillations as a quantum harmonic oscillator, with discrete levels of energy. These discrete levels of energy are the field's quanta. For the electromagnetic field, we call the quanta "photons"; for the electron field, we call them electrons. What appears as a "particle" can be described by a Fourier-transform mathematical construct. A Fourier transforms a time-domain function (think finite) into a frequency-domain function (think pattern). Electromagnetic fields are present everywhere. When they interact, they exchange energy and momentum. When they don't interact, changes in the field propagate in the form of waves.

There is a crucial difference between the two fields, however: the quanta of the electron field also carry charge, in addition to energy and momentum (linear and angular). And these quanta have rest mass, which is to say, there exist configurations of the electron field that remain unchanged over time, with nonzero energy. We perceive such a configuration, e.g., as a stationary particle. In contrast, the combined electromagnetic field has no charge, no rest mass, and no such "static" configurations. Particles are not fundamental; fields are, and these fields are present everywhere; not just present where field excitations show up as particles.

An electron is a ripple in the electric field, and "it" is conscious of the electric field that surrounds it. Molecules (which include electrons) function in that same electromagnetic continuum and are conscious of other molecules that surround them. There is a cascading hierarchy of consciousnesses in the brain and body that becomes our total consciousness. We can be materially (electron/photon) conscious (aware of our senses), socially conscious (aware of our interactions with others) or even cosmically conscious depending on our ability to sense our surroundings.

Where do all these electrons, the electricity, for these electrical signals that we are creatively patterning and modelling, come from in the first place? Our guts go from acid to alkaline. This is analogous to charging a battery. Electrical energy is then used to make ATP (cellular mini batteries) in the electron transfer chain processes in each cell's mitochondria. (Ref 29) The electric potential (electrons), stored in ATP, facilitates motion and inter/intra cellular communication. All communications involve this biochemical electricity directly or result in either hydrophilic (positive negative binding) or hydrophobic (like charge repelling) interactions. Some fundamental intercellular communications are pain, effort reduction, tension relief and their corollary; pleasure seeking. As we manage the tensions between these voltage potential differences, the reptilian brain stem functions

as our sensory input/output hub. It passes electrical signals on to multiple areas of the brain for storage or reaction and they send back an "intelligent" electrical response as we continuously reflect, cross reference, and choose. I call this continuous sensing, reflection and choosing, our true consciousness.

Are there other types of consciousness? Consciousness is thought to be a multifaceted and complex phenomenon, and has been categorized in various ways by psychologists, neuroscientists, and philosophers. Here are some of the different types or aspects of consciousness:

Wakefulness or Arousal: This is the most basic sense of consciousness, referring to the state of being awake and responsive to the environment, as opposed to being asleep or in a coma.

Phenomenal Consciousness: This involves subjective experience or qualia — the 'what it is like' aspect of consciousness. It encompasses the sensations, perceptions, dreams, and feelings that are part of our experiences.

Visual Consciousness: Visual awareness, functioning between phenomenal consciousness and access consciousness. (Ref 25)

Access Consciousness: Defined by philosopher Ned Block, (Ref 73) refers to the brain processes that make information available for verbal reporting, reasoning, and the control of behavior. It's more about the functionality and utility of consciousness.

Self-Consciousness: A higher level of consciousness where one becomes aware of oneself as an individual, separate from others and the environment. It includes self-recognition and self-awareness.

Meta-Consciousness: Thinking about one's own consciousness including reflecting on one's own thoughts, feelings, and sensations.

Narrative Consciousness: The human capacity to link events and experiences into a chronological and meaningful story involving personal identity and memory, constructing a narrative of 'self' over time.

Altered States of Consciousness: A state that differs significantly from normal waking consciousness and can be induced in various ways, such as through meditation, hypnosis, drug use, worship, or dreams.

Collective Consciousness: A concept primarily used in sociology and anthropology, referring to the set of shared beliefs, ideas, attitudes, common to a social group or society.

Non-Conscious Processes: The mental processes that occur outside of conscious awareness, such as implicit memory, automatic skills, and subliminal perceptions.

Superconsciousness: A material aid to a subconscious reservoir of mortal experience, which we use for inspiration and guidance at the borders of contact with the spiritual.

Cosmic Consciousness: A philosophical doctrine, referring to a higher, all-encompassing form of consciousness that connects the individual to the universe.

Each of these definitions consider different aspects of consciousness, from physiological arousal to complex reflective philosophical or cosmic perspectives. Understanding the various definitions highlights how multidimensional consciousness is.

Personal Consciousness and the Whole

From a basic understanding of our individual consciousness, we try to become conscious of, and sense other consciousnesses. We try to sense our influence on others, and we try to sense their influence on us. We have a general sense of Ubuntu (I am because we are). From a spiritual perspective, we often try to sense our relationship to consciousnesses not seen.

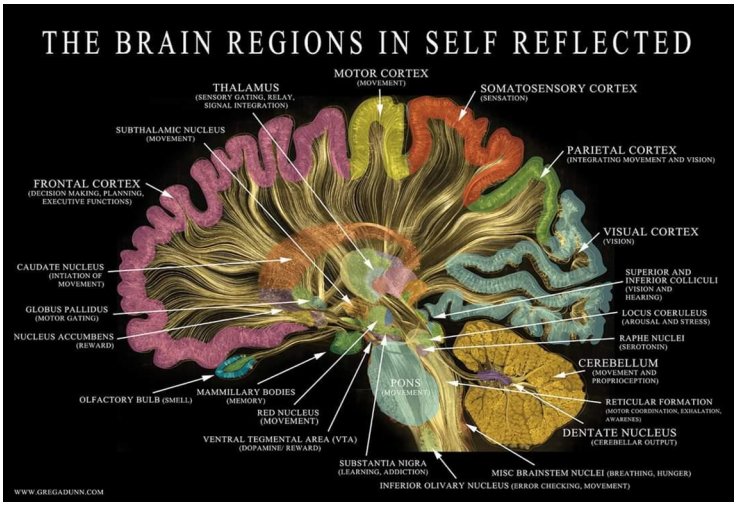
Can we connect our electrical signals to the whole universe? Can we connect science and spirit? Can we harmonize brain functions, thoughts, sights, and insights? Can spirit give us the ability to recognize valuable influences? Is insight the shadow of spirit luminosity? Can we be conscious of God? Let's examine some of the laws of physics that might be involved in the interactions between us and the whole, between the eternal and the temporal, the infinite, and the finite, the spiritual and the mindal, the morontial and the material, spirit, and brain.

Brain, Mind and Consciousness

The brain acts as an objective sensor, actuator and controller and gives us our subjective perceptions. Consciousness is the base from which we operate, and we operate on a hierarchy of scales. The material makeup of the brain spans many spatial scales of organization. From genes and molecules to cells, from protein complexes to 'molecular machines' such as ion channels.

A neuron has 10,000 synapses and is composed of computationally and functionally distinct and independent parts: its dendrites, the initial segment, the axon, and synaptic arborizations and there are many scales of organization above a neuron. Neurons connect with each other to form local neural circuits, which combine to form structures such as cortical columns. These connections involve ephaptic coupling which is a form of communication between neurons that occurs when the electrical field of one neuron affects nearby neurons. Neurons communicate in three ways, chemically physically and using ephaptic connections. Ephaptic coupling happens when a neuron fires an action potential creating an electrical field which interacts with neighboring neurons which can influence the electrical excitability of other nearby neurons. This can affect the timing and synchronization of other action potential firings in the neurons. Where does this happen? Ephaptic coupling can occur in the brain, where it may help form memory networks and it can also occur in cardiomyocytes (heart cells responsible for heart contraction and relaxation) where it happens in the narrow gaps between cells. Research suggests that myelination may reduce ephaptic interactions. For a video of this coupling in a mouse brain check out the video (Ref 148).

Eventually distinct anatomical and functional brain and body regions connect in increasing scales to the whole brain in networks of cells to networks of brain regions. (Ref 102) According to Ran Levi of Aberdeen University, the brain processes information in a "in a highly ordered way" in an eleven-dimensional configuration, with holes". This indicates that the network's neurons respond to prior inputs. They found that the brain builds and then destroys a tower out of various three-dimensional building pieces. It is called the algebraic topographical hierarchy. It starts with rods (1D), then moves to planks (2D), then to cubes (3D), and then moves to more sophisticated geometries with 4D, 5D on up to 11 dimensions. Activities move through the brain by building multi-dimensional sandcastles in a hierarchy of mechanical functions that cascade up to consciousness, and then, disassembles them (unless they are made more permanent). The building and destroying mechanisms are mathematically like the Fibonacci sequence. (Ref 124) There is a hierarchy of philosophical actions that cause cascades in our higher levels of thinking that lead to levels of spiritual awareness.



Self-Reflective Brain

Our mind differs from our brain. The brain is the material, tangible part of our body, whereas the mind is a consciousness or mindfulness of the brain's activities, and therefore, intangible. The brain harbors all the details. The mind solves the "binding problem"; the association of the parts into "gramma's face" or the Statue of Liberty. The brain and body together interactively prioritize the availability of the details, and they both have a pre-prioritized status.

Both the neurological and the intellectual hierarchies first occur in our brain and then in our mind. Let's first look at the brain. Our brain has two hemispheres. In very general terms, the right hemisphere acts like a parallel processor while the left acts like a serial processor and they are connected by the 300 million axonal projections of the corpus collosum. The right side is all about processing our present connections to sensor inputs. The left more linearly, methodically predicts our future based on our current predicament. Left brain is our "brain chatter", our self-definition, our "I am" and our "I will be". I like to think of the right side as Newtonian (macro, looking at the past) and the left side as Einsteinian (relativistic, extrapolating a probabilistic future). The corpus collosum (and microtubules which we will discuss in more detail later) facilitate the interactions between our stored past and our potential/predictable future.

Now let's look at the mind. Our mind is more the "consciousness" or "mindfulness" of the brain's activities. Our conscious identity is not just the electrochemical status of our brain or body, nor is it just our mind. Our personal consciousness may be more the realizations of the mind, using input from the body and brain, as it relates, harmonizes, and coheres in a superadditive analysis of their collective cooperation. Our consciousness is constantly aware of our current state, comparing that state with our past, and anticipating its consequences for our future.

> "The human mind is one of the great mysteries of modern science, as we cannot sufficiently explain how the brain in general, or consciousness in particular, works. However, it's a reasonable "null hypothesis" to presume that electricity, i.e., the flow of electrons, is the primary driver behind our perceptions that we are conscious. Although quantum effects may play a role, it's an unnecessary complication to presume that consciousness is anything other than the flow of electricity." **Ethan Siegel** (Ref 64)

Let's look at some of the "unnecessary complications" of living electrochemical activities of our animal brain and body. Some of the more widely accepted biological processes include the mitochondrial electron transport

chain, electron and proton tunneling in proteins, and magnetoreception. Let's see if we can find some of those intangibles that determine how we prioritize things with the goal of becoming more spiritually minded.

The different states of thinking, perceiving, and feeling, have many different levels of activity:

- unconsciousness – a disrupted connectivity state of the brain's input mechanisms.
- "cessation" – unconsciousness attained by advanced meditation. (Ref 95 & 96)
- subconsciousness – a state of suppressed input activity.
- deep sleep – a delta wave dominant, immune system strengthening, body repairing state.
- hypnagogia – a creative transition from wakefulness to sleep.
- light quiet sleep – a period of hypothalamus shut down when the endocrine/hormone system link is suspended.
- rapid eye movement (REM) – active dream sleep, when the noradrenaline, fight-or-flight response and thermostasis regulation systems are suspended.
- wakefulness – a beta wave dominant state of free will controlled thinking.
- superconsciousness - the pre-prioritized state of the brain that is not overtly involved in input analysis or decision making.

Side note: Microglia, a type of neuroglia or glial macrophage cleanup cell, and the brain waste removal processes are most active during deep sleep.

Looking at our multiple states of consciousness prompts some questions. What influences these various states of our brain's activity? What extracts, filters, or makes us more aware of our current thoughts than our stored memories or observations? How does our awareness shift from material to spiritual, from "me" to "we", from self to selfless, from adjutant to cosmic thinking? Where does our cosmic consciousness come from?

If we look at the evolution of primates into humans, we can see that there is an increasing ability for the mind to influence the evolving animal brain. We see an increasing ability to associate within specific subsets (instinct, recognition, consciousness, knowledge, counsel) as precursive steps towards the overall associative mechanism of wisdom. Brain-minded function seems to come into being and then be stabilized, by interactive resonances, once established.

Let's use our creative wakefulness (and perhaps our hypnagogia and our superconsciousness) to look for some logical connections between intelligence and consciousness, between brain and mind, between cellular interactions and spiritual receptivity.

Current Theories of Consciousness

Do physiological processes in the brain correlate with our subjective experiences? How do the dynamics of consciousness vary with observable physiological processes? These are the top 8 theories (Ref 35, 106) of consciousness:

Integrated Information Theory: IIT - Consciousness as a Web of Information (Ref 74)

The more interconnected or integrated the system the higher the "Phi" consciousness.

IIT provides a mathematical framework to quantify how much integrated information a system contains. It makes concrete predictions about which types of systems should correlate with consciousness and to what extent. Methods: This would be measurable by complex calculations of the integrated information from high-resolution images of brain activity. However, the practical calculation of Φ is still a major challenge for complex systems such as the human brain. Recent research by Massimini et al. (2015) uses the foundations of IIT to assess states of consciousness in clinical contexts, e.g. in patients with impaired consciousness.

Higher-Order Theories: HOT - Consciousness as Self-Reflection (Ref 75)

The brain represents its own higher order of perception or mental state. Conscious experience is the result of thoughts about thoughts, self-representation or metacognition. (Ref 50)

Biological Naturalism: Consciousness as a Biological Naturalism Phenomenon (Ref 76)

An emergent biological phenomenon of purely physical biological mechanisms in the brain where specific neural correlates of consciousness (NCCs) form a minimal set of brain mechanisms when producing a particular conscious experience.

Panpsychism: The Universal Consciousness (Ref 41)

Consciousness as a fundamental property of the universe, akin to mass or charge. All physical entities, from electrons to galaxies, possess some form of consciousness or proto consciousness.

Neural Darwinism: Theory of Neuronal Group Selection. The Evolution of Consciousness

Consciousness emerging through a process of selection among groups of neurons, akin to the principles of natural selection.

Global Workspace Theory: GWT - Consciousness as a Central Information Hub (Ref 77)

Consciousness arises from the integration and sharing of information across different brain regions and functioning as a central information hub, allowing various cognitive processes to communicate and cooperate. GWT is a recursive process with meta-stability based on the hypothesis that certain states of consciousness correlate with recursive processing loops. Neuronal signals are not only processed forward but also sent back and forth between different brain regions in complex feedback loops. A certain degree of recursion could correlate with a meta-stable state that could be characteristic of certain states of consciousness. Lamme and Roelfsema (2000) proposed that recurrent processing in visual areas is necessary for conscious visual perception. Their studies show that the first wave of activation in visual areas does not correlate with conscious perception; only the recurrent feedback loops show a strong correlation with conscious experience. Methods: The analysis of connectivity patterns and information flows between different brain regions using functional MRI imaging or complex EEG analyses could provide insights into these recursive processes. For example, Boly et al. (2011) have shown that certain states of consciousness correlate with specific patterns of effective connectivity between brain regions.
Recent research by Dehaene and Changeux (2011) emphasizes the importance of long-range feedback connections for certain states of consciousness.

Thermodynamic Theory:

> Consciousness arises as a complex, self-organizing patterning of energy, information processing, energy efficiency, and entropy reduction in the evolution of complex systems capable of exhibiting intelligent behaviors and subjective experiences. (Ref 82) This includes the concept of critical transitions in neural systems. According to this approach, certain states of the brain operate near a critical point which correlates with specific states of consciousness. At this point, small changes in neural activity could correlate with large-scale, qualitative changes in consciousness. Beggs and Plenz (2003) discovered "neuronal avalanches" in the cortex that follow a power law distribution — a feature of critical systems. They argue that this critical state is optimal for information processing and storage, which may be related to certain states of consciousness. Methods: The observation of power law distributions in the size and duration of neuronal activity clusters could provide clues to such critical transitions that correlate with changes in the state of consciousness. Hesse and Gross (2014) have developed methods to identify and quantify critical dynamics in brain networks. Recent studies by Tagliazucchi et al. (2016) show that the human brain operates closer to a critical point during wakefulness than during sleep or under anesthesia. This suggests that the critical state may be closely related to certain states of consciousness.

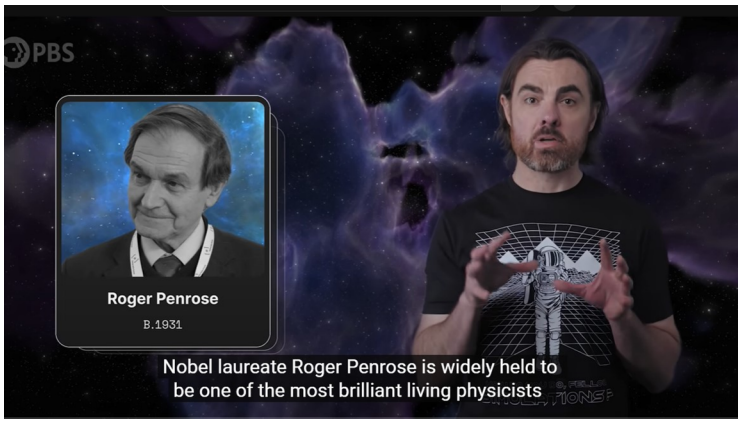
Quantum Consciousness Theory: Quantum Mind Theory (Ref 78)

> Quantum Consciousness Theory is based on the idea that microtubules, which are tiny protein structures found within cells with DNA, can facilitate quantum computations.

Each of these theories looks at consciousness from a different perspective, each looking for the simplistic basis for that consciousness but a fundamental aspect of all these biological systems is their inherent nonlinearity. This property has far-reaching consequences for our understanding of consciousness. In biological systems, including the brain, there are virtually no true linearities. Instead, nonlinear interactions are the norm (Laughlin et al., 2000). This means that the output of such a system is not proportional to its input, and that the behavior of the overall system cannot simply be understood as the sum of its parts. This nonlinear nature of biological systems supports the idea that consciousness should be considered as an integral part of our neural systems, not as something that is "generated" causally. Complexity and non-linearity make it possible to understand qualitative changes of consciousness without having to resort to reductionist explanations. Complexity and non-linearity seem to be most apparent in the feedback loop of observations and reactions. (Ref 129)

In this exploration, although we will look at numerous mechanisms that may be involved in many of these theories, we are going to focus on the Quantum Consciousness Mind Theory, because it has the longest reaction/reflection feedback time. I also like thinking of this complexity and non-linearity as existing at the intersection of the past that sets the stage, and our choices that adapt the stage for our future. Our past created our status by normal Newtonian mechanisms, but our future is probabilistically determined by how our thoughts influence our actions. (Ref 83)

Here's a good YouTube video highlighting how the Quantum Consciousness Theory works:



https://youtube.com/watch?v=xa2Kpkksf3k&feature=shared

Consciousness as a Unified Mechanism

Consciousness, a phenomenon central to our understanding of the human mind, and even our cosmic consciousness, has traditionally been divided (as we saw in the preceding section) into different categories and aspects. Separate concepts such as phenomenal awareness, access awareness, self-awareness and the distinction between conscious, subconscious and super conscious processes have long shaped research and confounded philosophical discussions. Here I suggest that consciousness is a hierarchical, flexible mechanism that can take on these different states and intensities, but that it always functions on the same underlying mechanisms.

This continuous processing, with various degrees of intensity concepts, provides for a more holistic simplistic approach. Different states of consciousness (e.g., wakefulness, sleep, meditation) can be understood as different configurations of the whole body's neural network, which is continuously, seamlessly, adapting to changing demands and focus. Modes of operation coincide with degrees of unification or synchronicity (resonances with pre-established or cosmic patterns).

Hierarchical consciousness allows for continuous balancing of global and local coherences. The degree of information integration can vary depending on our different states and intensities of consciousness. The flexibility of integration-differentiation enables processing of information in many different contexts. This highlights the importance of subcortical structures, especially the brainstem, for higher cognitive function. In this hierarchical perspective, these structures are initializing components. These subcortical structures such as the brainstem can act as the "accelerator", "brake" or "disconnect" for downstream consciousness mechanisms.
Consciousness is characterized by highly complex and dynamic neuronal patterns. Consciousness is associated with a high level of integrated information, reflective of the complexity of neural activity patterns. (Tononi and Edelman - 1998) and patterns in mind-altered states have shown that neuronal patterns are recognizable in states such as coma or deep anesthesia, but with reduced complexity and variability. (Demertzi et al. - 2019)
Characteristic patterns of functional connectivity, especially in the default mode network and other large-scale networks, correlate strongly with the state of consciousness (Vanhaudenhuyse et al., 2010). The gradual changes in pattern complexity (Mashour et al., 2020) and the dynamics during transitions between the different states of consciousness (e.g., from wakefulness to anesthesia) support our hierarchical concept.

Said mathematically:

The rate of change of consciousness is a function of the current direction of consciousness, times the current system status, times the sensor inputs, all multiplied by an exponential factor (representing the dynamics of the system e.g. the ballistic nature of the microtubules) complicated by an element of randomness. (Ref 133)

Physiologies of Body Consciousness

Our digestive system is involved in all the above-mentioned consciousness states. Our gut (sometimes called the second brain) has capabilities that may surpass our brain's intercommunication ability. It has its own nervous system, known as the enteric nervous system, and the cells in our body communicate with each other and have a direct pipeline to the brain via the Vagus (pneumogastric – lung heart) nerve. Our gut's bacteria also contribute dramatically to our wellbeing as well as our sense of self. (Ref 139 Ted Talk - Kathleen McAuliffe) Our gut's food processing mechanism moves serially from acidic to alkaline, charging the battery, and it is electrically aided by being grounded through our connection to mother earth. We eat proteins of one form (plant or animal), break them down into their constituent parts (amino acids, di and tri peptides) and then reassemble them into the configurations we need. The human body makes from 80,000 to 400,000 different types of proteins for many different purposes. The processes of using electro-motive power to extract and rebuild the necessary building blocks for the cells of our body co-evolved with us. We were designed and have evolved to be electrically active, but we also have some control in the ways we discharge the battery, and we will try to see how we can wisely direct that electrical discharge process.

Our cells communicate with each other mechanically, interacting with neighboring cells or by transferring electrically patterned peptide signaling molecules with hydrophilic (water attracting) and hydrophobic (water repelling) patterning.

> Side note: Single celled bacteria (that make up more than 90% of the cells in our body) use similar signaling molecules to communicate virulence "quorum sensing" to be aware of their species and that of other types of bacteria. (Ref 121)

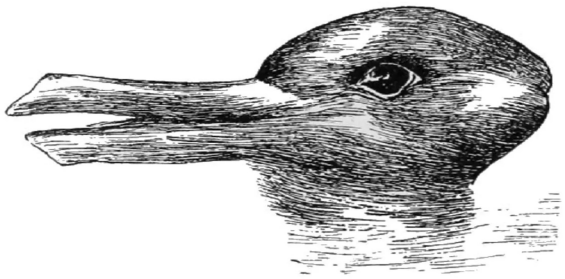
Interaction between cells is determined by the electrical surface properties (positive – negative being attractive and like charges being repelling). All cells possess a common genetic constitution, but they are influenced by their cellular environment, and their position in their nearby electrodynamic field. The thing that determines whether their DNA folds into a brain cell protein or into a gall bladder is its electrical environment. The cell's formation is controlled by an extra-biological guiding principle, called "entelechey" which literally means "the realization of potential". (Ref 48 & 94 Mike Levin Ted Talk) Subatomic particles exhibit wave-particle duality within quantum fields, atoms form through electromagnetic polarities within molecular structures, cells develop through genetic encoding within organisms, the brain forms concepts through subject-object relations within cultural contexts. Each level reflects the same fundamental process: consciousness dividing itself to create relationships and using those relationships to create structure.

> Side Note: Stem cells have the entelechey for the manufacture of every kind of cell. Very young children can regrow a lost limb, but we lose this ability as we age.

Peptides form the basis of non-immune system signaling molecules and there are up to seventy different types of peptides. Peptides are small portions of digested or manufactured proteins, and form signaling molecules like endorphins (Ref 13), hormones, and neurotransmitters. These signaling messenger molecules connect the cells of the body's endocrine (bodily functions), and nervous systems, cascading electro-chemical messages between cells, along nerves, up the spinal cord, to the brain stem, the amygdala, the hypothalamus, the thalamus, the pineal and pituitary glands, and then on to other areas of the brain for appropriate responses. These peptides form the base of the periaqueductal gray (PAG) area of the brain stem which is the hub for self-awareness and pain mitigation. This is also the hub for our qualia, the internal and subjective sense of our perceptions, the introspectively accessible aspect of our brain. The physical processes in the brain that give rise to "what is it like" or subjective experiences, is called the "qualia". Qualia is our self-organizing, self-referring and self-actualizing psychosomatic network that gives us our intrinsic properties of experiences (think sub- and superconsciousness). Peptides manage the biochemical overcontrol of our 34,000 possible emotions (Ref 80) and play a crucial role in assisting our qualia and the activities of our immune system, by integrating mental, emotional, biological activities and eventually our spiritual wellbeing. They change or predict our behaviors, affect our moods, and color our unique emotional tone (Ref 20) and interestingly, there are no hard-wired emotion control circuits in the brain. Emotional responses, as measured by our heart rate variability HRV, are controllable. The physical heart is responsive to our emotions. For example, excessive fight or flight triggers "tokosubo" cardio myopathy, "broken heart" syndrome.

Peptide-based compounds cause chemical reactions and as these reactions cascade along nerves, their "critical first stop" is the brain stem and medial limbic region of the brain (including the pineal gland) where they are sorted and prioritized before furtherance to the neocortex for responses or for memory storage. Sensory inputs are dealt with via the amygdala and the sympathetic (fight or flight accelerator) nervous system and balanced by the parasympathetic (think Vagus heart-lung) nervous system which regulates "rest and digest" "calm down" functions. There are 86×10^{10} neurons transmitting signals at about 120 m/s or 275 mph. There are 100×10^{14} synapses of which 250,000 are firing at any one moment. If we think of the synapses as the pixels of a camera and the firing rate as the number of pixels that are changing from frame to frame, then the refresh rate of the image occurs at $(100 \times 10^{14}) / 250{,}000))/ 275 = 1{,}454{,}545$ frames per hour or 24,242 per second. To handle the continuum of signals, the brain has constant communication between its 86 billion neurons and its 100 trillion synapses. This is 10 to the millionth power of possible states, so the flow of information is more like constantly moving three dimensional images. As a tiny example of this, the brain can form a three-dimensional image from the electrochemical signals received as light from an object hits dozens of parallel stacked "pigment" disks in the rods (for detecting dim light) and cones (for detecting red, green and blue/ultraviolet) of the retina (Ref 86). This process is called phototransduction. Each disk has a seething liquidity of receptor molecules (rhodopsin) moving in a "random" manner. If more than 6 light molecules are triggered within half a second it sets off a cascade with a nearby molecules in this semi liquid sea, transferring a small signaling molecule amplifying the signal and it takes billions upon billions of photons to create an image. Similarly, other cells in the body have "random" motion collisions with neighboring cells or they transfer messenger molecules which determine their interactions. In the case of the eye, these interactions cascade electrochemical signals in a chain reaction down the optic nerve to the visual cortex of the brain which creates the visual image, but our conscious image is made up of much more than just the visual image. Our conscious image includes everything that is happening, along with all our previous models, memories, related thoughts, qualia, gut actions, reactions, current and future intents. It is interesting to note that there are ten times as many neural connections coming back from the various cortex areas of the brain, as there are going out from it, so the mid brain is sharing the current inputs with all other associated areas of the brain for continuous reflection, cross referencing, model building and choosing. In effect, we are continuously

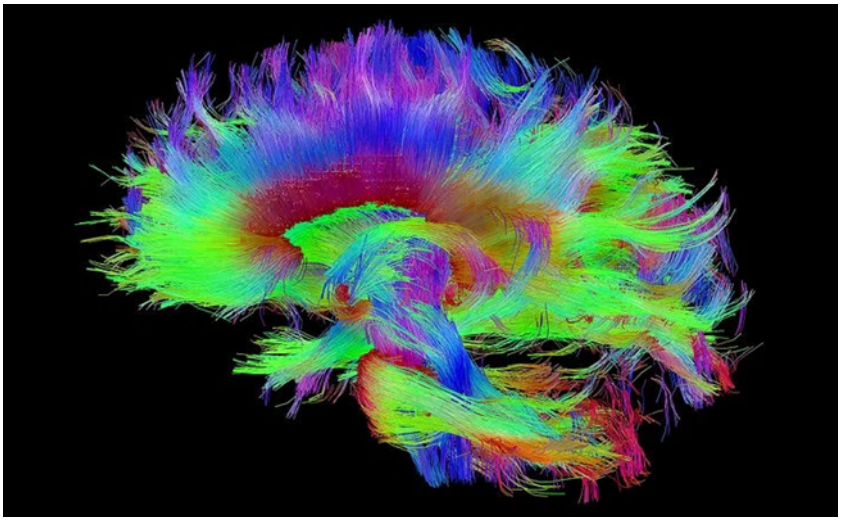
observing and relating our current self with our past self. (Ref 10) That we can perceive this ambiguous image in one of two ways is like the quantum superposition of states where it is only "fixed" once observed. (Ref 103)



Is it a Duck looking left or a Rabbit looking right?

Side note: The most important part of the brain, the neo-cortex, is almost the same everywhere. It manifests material uniformity.

Side note: Up to 30% of the brain is used primarily for adapting, deciding, reasoning, and planning.



Brain Wiring Networks

Intercellular Communication

Intercellular communication is not limited to the brain. Communication between individual cells is facilitated by cellular cytoskeletal structures (the hardware of cells), eicosanoids (in the immune system) and nerve cells (neurons). Cytoskeletal structures are in all cells, including neurons. They include microtubules and they are used to transport information and move substances to various parts of the cell. They also work closely with neighboring cells, rapidly changing their molecular structures, and intermediate filaments. (Ref 84)

It is important to distinguish between neurons and nerves. A neuron is an individual cell that processes and transmits information through electrochemical signals whereas a nerve is a bundle of axons (the long, slender

projections of neurons) in the nervous system. So, while neurons are individual cells that carry nerve impulses, nerves are bundles of these neurons.

Let's first look at nerves of which there are two types, sensory (incoming) and motor (outgoing). Nerves are made up of many sections varying in length from 0.1 mm to a meter and there are millions of miles of them in our brain. Nerve stimulation has a trigger voltage below which there is no response and above that voltage the nerve fires. Peptide neurotransmitters are chemical messengers that are released to communicate (fire), unidirectionally, between nerve segments.

The actual electrical energy that "fires" a neuron, also known as an action potential, is created by the movement of ions across the neuron's cell membrane. Here's a step-by-step breakdown of the process:

Resting State: When a neuron is not sending signals, it is in a resting state. During this state, the inside of the neuron has a negative charge relative to the outside due to the distribution of different ions across the cell membrane.

Depolarization: When a neuron receives a signal strong enough to pass a certain threshold, it triggers an action potential. This process, known as depolarization, involves the opening of sodium channels in the neuron's membrane, allowing positively charged sodium ions to rush into the neuron.

Propagation of the Action Potential: The influx of sodium ions changes the electrical charge inside the cell, causing the action potential to propagate along the length of the neuron's axon.

Repolarization: After the action potential has passed, potassium channels in the neuron's membrane open, allowing positively charged potassium ions to flow out of the neuron. This helps restore the negative charge inside the neuron.

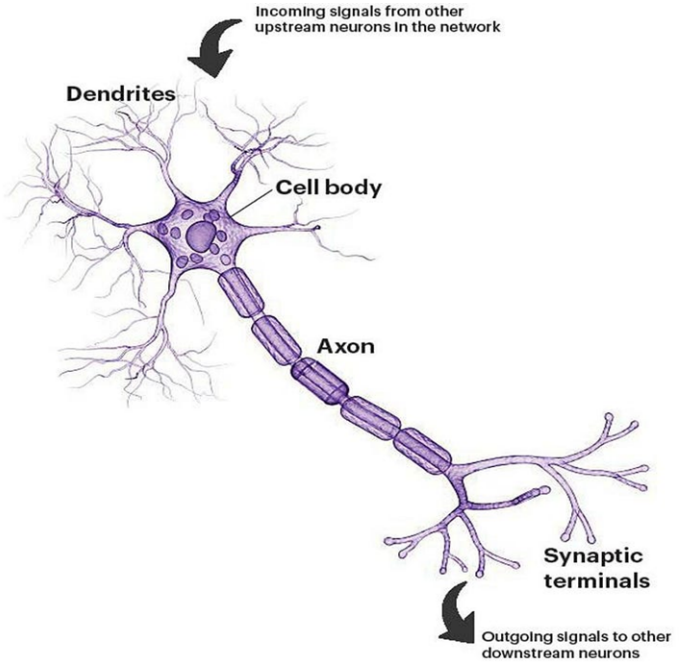
Refractory Period: After an action potential, there is a brief refractory period during which the neuron cannot fire again. During this time, the sodium-potassium pump works to restore the original distribution of ions across the neuron's membrane.

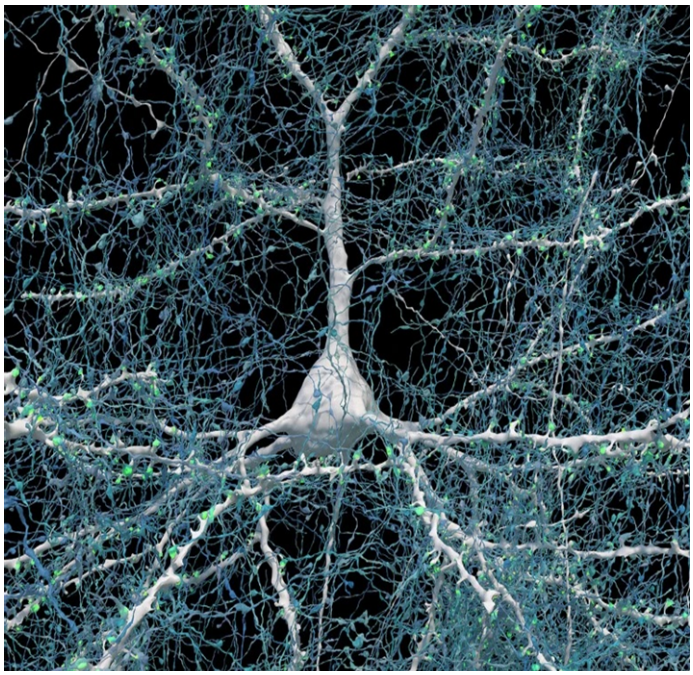
It's important to note that while this process involves the movement of ions, it is fundamentally different from how traditional electricity is generated. Traditional electricity is generated by the movement of free electrons, but the electricity generated by neurons results from the motion of sodium and potassium ions across the cell membrane.

The voltage and frequency of firing encodes the information as it is transmitted via the peptides and action potential along the nerve. Each segment intercommunicates at their intersections and these intersections do not actually touch, instead, they have a 40-nanometer gap between them called the synapse. At each synapse are the synaptic vesicles which contain these peptide neurotransmitters.

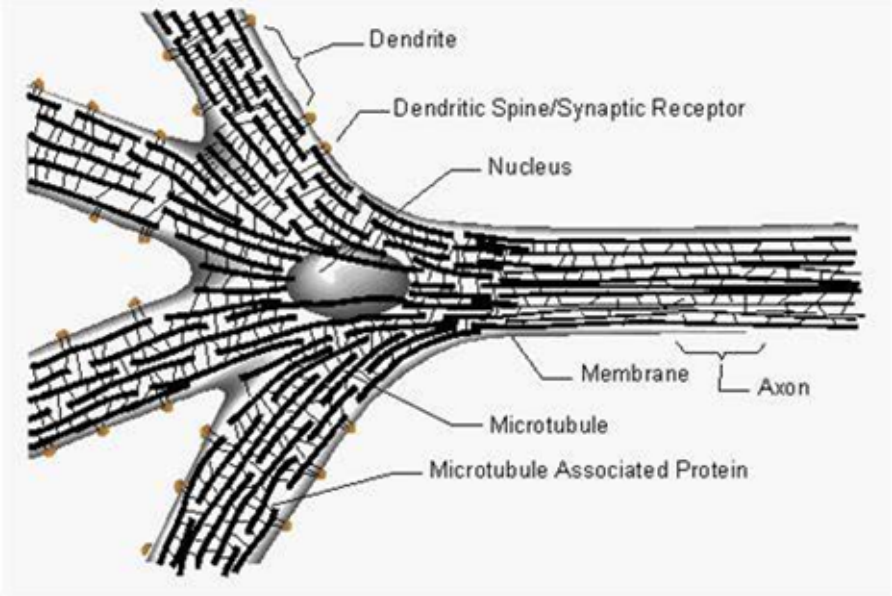
Neurotransmitters (which control the concentrations of sodium and potassium ions) are prepositioned at each synapse as a function of our emotional predisposition and transfer their influence as they are released. Their concentrations can be changed by two main processes: epigenetic methylation (the replacement of a methyl group in place of a hydrogen atom on the appropriate DNA gene segment) and our emotional self-mastery. An example

of epigenetic modification would be when a gene is modified to make the enzyme catechol-O-methyltransferase (COMT) which breaks down the neurotransmitters, dopamine, epinephrine, and norepinephrine.





Single Neuron



Microtubules in Nerves

The chemicals that are released from a synapse when triggered are a function of the genetic and epigenetically modified synapse chamber shape and their current electrical status. Their electrical predisposition (which is

influenced by previous activity) is determined by the local concentrations of calcium, potassium, and sodium ions (Ref 47) in and around, the neurotransmitter chamber itself. For example, abrineurin (BDNF or Brain-Derived Neurotrophic Factor) is a signaling protein that can enhance neuroplasticity, and its levels can be boosted by exercise (Ref 15, 141), ketosis, magnesium (L-Threonate) intake and good sleep. (Ref 57) One emotional condition, fear, involves the presence of calcitonin, a gene-related peptide, which is created by all fears and this peptide relays signals to other areas of the mid brain. Fear, with its related animal facial expressions and mannerisms, is mediated by dopamine from the amygdala. (Ref 9)

> Side Note: The gene Microcephalin (MCPH1) regulates brain size. It has evolved under "strong positive selection" in the human evolutionary lineage. This means that, once introduced, the microcephalin gene (and changes to it like that one that occurred 37,000 years ago) spread rapidly, which generally indicates some specific survival advantage or strong preference.
>
> Side note: Current research shows that fears can only be mitigated by building new stronger neural chemical pathways rather than trying to ignore the old ones.

Epigenetics

Let's look more closely at epi (above) genetics. Epigenetic changes don't directly alter the DNA's underlying code. Rather, they switch genes on or off or turn their volume up or down.

> Side Note: They are very closed corelated with aging. (Ref 140)

Epigenetic changes involve methylation when methyl groups latch onto cytosine (C), one of the four letters in DNA's code. This primarily happens at places in DNA molecules where C sits next to guanine (G), known as CpG sites. Epigenetic changes occur at the molecular, DNA level, making them difficult to observe directly, however, their effects can sometimes be observed in the form of changes in physical traits or health conditions.

Here are some examples:

Pregnancy Diet: The foods a biological mother eats while pregnant can cause epigenetic changes in the developing fetus. These changes can potentially affect the child's health and physical traits.

Early Life Trauma: Experiences of trauma at a young age can lead to epigenetic changes that may manifest later in life such as mental health issues or other health conditions.

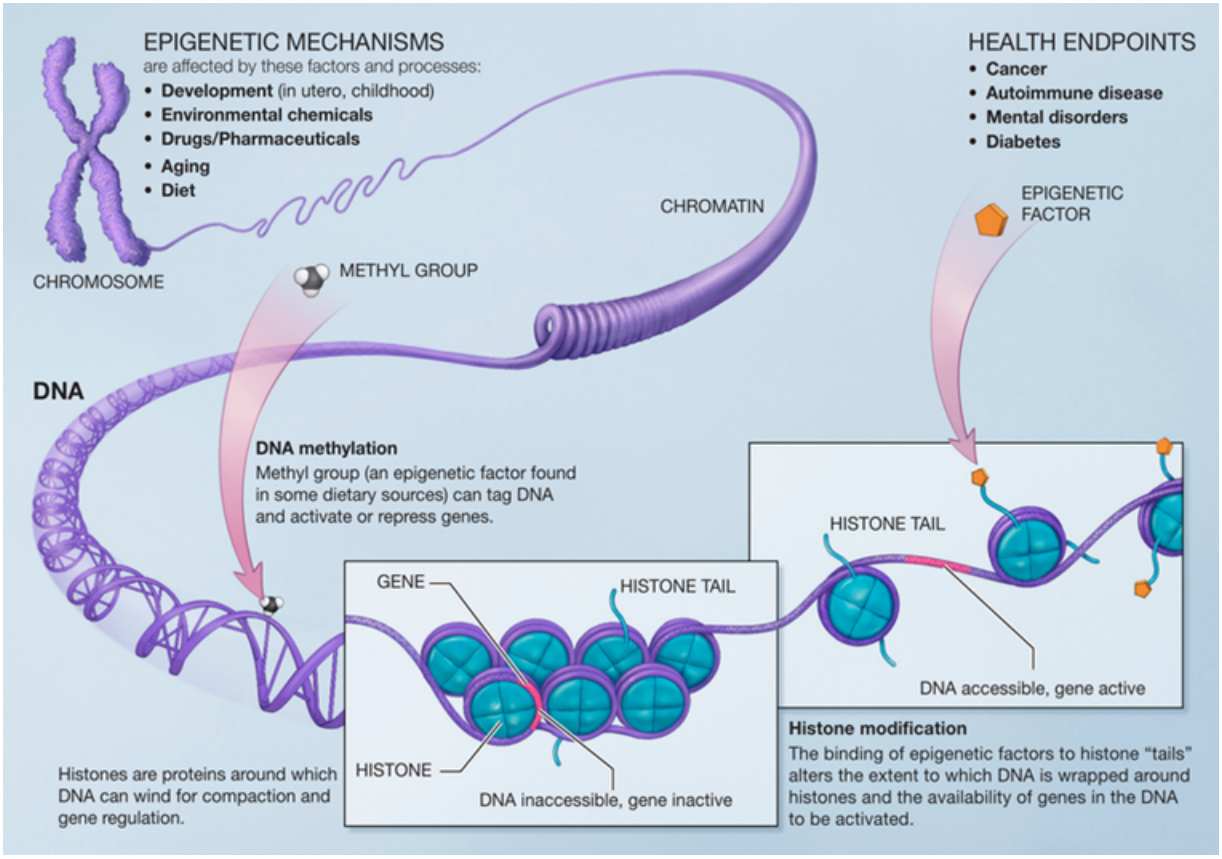
Cancer: Alcohol can disrupt the methylation processes, and those epigenetic changes can play a role in the development of some cancers (Ref 132). For instance, an epigenetic change that silences a tumor suppressor gene could lead to uncontrolled cellular growth.

> Here is a very good Ted Talk on human epigenetics:
> https://www.ted.com/talks/moshe_szyf_how_early_life_experience_is_written_into_dna?user_email_address=3d463761b7c72249f5eecc668bcd7124&lctg=62d1a7381c794c328cc68276

Cell Differentiation: Epigenetic changes are also responsible for cell differentiation, where cells with the same DNA become different types of cells (like skin cells, liver cells, brain cells, etc.) based on which genes are turned “on” or "off".

Note that while these changes can be influenced by environmental factors and lifestyle choices, they do not involve changes to the underlying DNA sequence. Instead, they involve modifications to how the DNA is “read” by the body.

There are two kinds of DNA; nuclear DNA located in the nucleus of all our eukaryote cells, and it usually has two copies per cell, and maternal DNA, located in the cell’s mitochondria, which contains 100 to 1,000 copies per cell. These DNAs are made up of two 1.8-meter-long strands of small nitrogen-containing nucleoside compounds; adenine (A), cytosine (C), guanine (G), and thymine (T). We can choose to be reactive or proactive in gene expression using epigenetic reprogramming and our emotional control. DNA is present in most of the cells in our body and the thing that determines whether it acts like a brain cell or gall bladder is the way it is folded. DNA is made up of segments called gene segments and the combinations of these patterns are called its “gene expression” or “allele”. The complete gene expression is called your epigenome. There are parts of the DNA that are called “supergenes”, and these segments are not open for modification but there are three things that can control DNA’s collective gene expression; its electrical environment, small DNA segments called “enhancers” and methylation “tagging.” These change the final folded shape, and the final folded shape determines the protein’s function, i.e. whether it is a brain cell or a gall bladder.

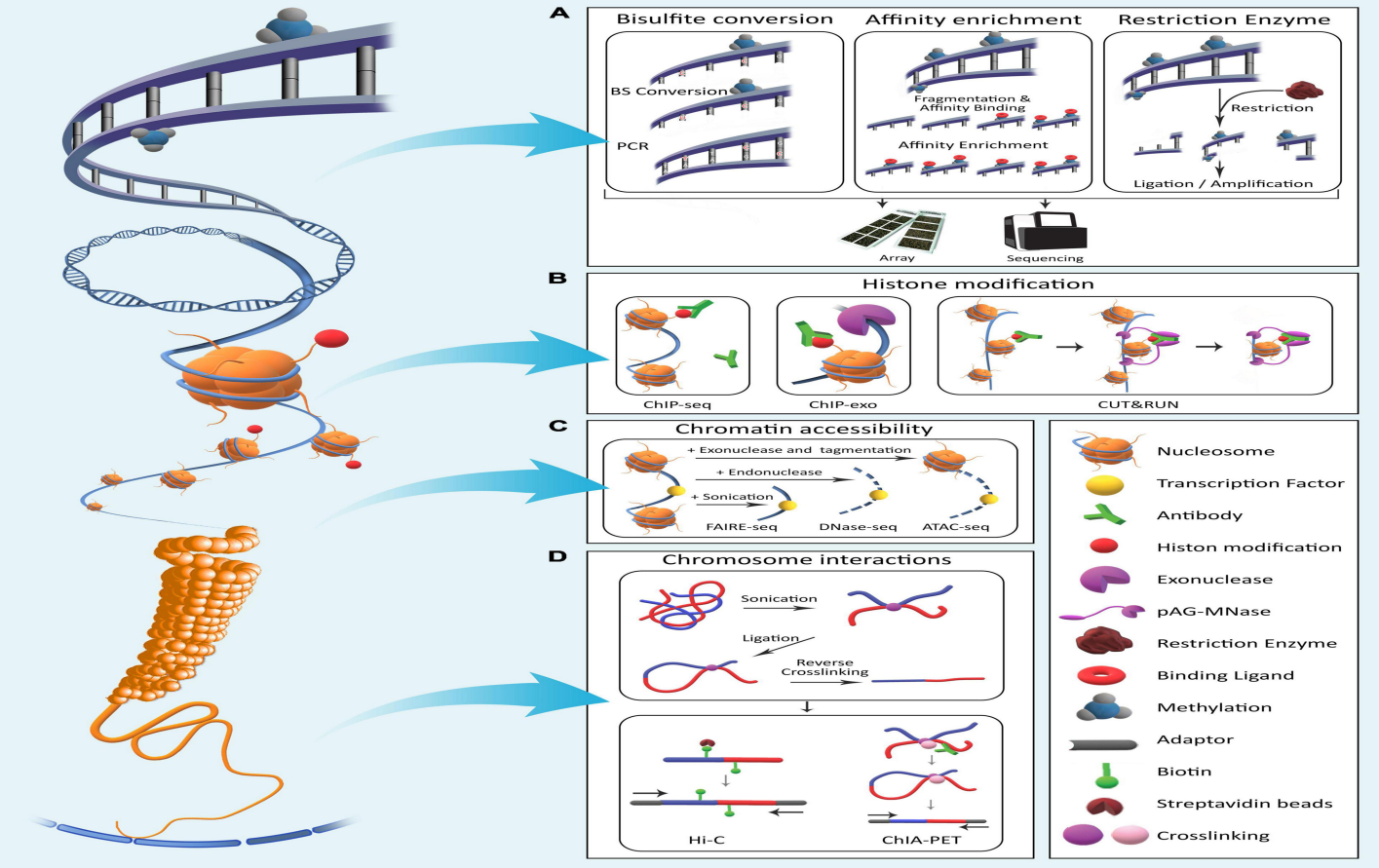


Epigenetic DNA Tagging

It is estimated that neurons in the human brain have over 4000 unique enhancers and 10 to 50-fold more glial cells (non-neuronal cells that do not produce electrical impulses) which are not shared by other primates. (Ref 81) Human neurons are more densely packed and consume more energy per neuron than other animals (6 Kcal per billion neurons). Gene expression (the DNA folding pattern) determines which proteins are produced and that shape can be changed by the addition of methyl groups at strategic locations along the DNA strands but there are three other major methods of "epi" (above) genetic tagging or modification: histone acetylation (adding an acetyl group to histone proteins), chromatin compaction (wrapping the DNA around another protein) and nuclear organization (spatially arranging the chromosomes).

There are long-term gene expressions (think brain or gall bladder) and short-term ones, like when some comment angers you. An emotional response causes changes in the gene expression of certain cells, which does things like increase your heart rate, increase your blood pressure, adjust your breathing, tense your muscles, or stand the hair up on the back of your neck.

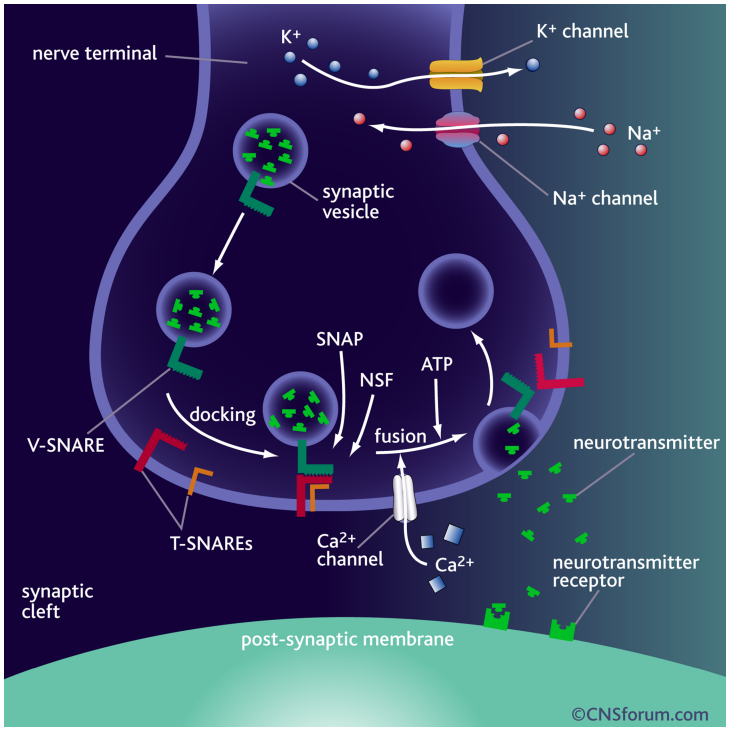
> Side note: Recent research, direct current-actuated regulation technology or DART (Ref 36), uses direct-current voltages to change gene expression.



Epigenetic change techniques

Neurotransmitters

The chemicals that are prepositioned at each of our nerve synapses are called neurotransmitters and they determine our predetermined thought and emotional tendencies.



Synapse

The electrical environment of synapses and the associated neurotransmitters, which are regulated by the activity of microtubules, plus epigenetics, determine neurotransmitter manufacture and release. Some of their main influences are as follows:

Serotonin (95% of which comes from the gut): anxiety, current happiness, sense of wellbeing, appetite, mood, memory, and sleep.
Dopamine: future anticipation of unexpected benefits, motivation, pleasure, future happiness

Note: Alcohol or sugar levels increase dopamine levels by activating the nucleus accumbens (pleasure/reward center) and this sets the "current expectation level" above which dopamine is then released. This is called "The Pleasure Trap" or addiction. (Ref 53) Alcohol is a carcinogen through 5 different mechanisms. (Ref 132)

Glutamate and Gamma-Aminobutyric Acid (GABA): balance, excitement versus the urge to be calm.

Note: The blend of these determines our level of maturity and is the most active of the neurotransmitters.

Norepinephrine (aka - noradrenaline): alertness, arousal, attention, cognitive function, and stress reactions
Acetylcholine: focus, learning and memory, parasympathetic (against emotion) nervous system
Oxytocin (a hormone and a neuropeptide with more pronounced, prolonged effect): orgasm, social recognition, pair bonding, anxiety, group bias
Endorphin (neuropeptide): current pleasure, self-esteem

Neurotensin (neuropeptide): like dopamine, but specifically for the differentiation of "good" from "bad" thoughts (stems from a survival perspective but may be involved with moral choices as well)
Melatonin (hormone): circadian rhythm (primarily from the pineal gland)

Cells in the synapse areas fall into two categories, neurotransmitters (function) and glial (protectors) except for glutamate astrocytes that function as both. Extracellular glutamate stimulates Ca2+ release from the astrocytes' intracellular stores, which triggers glutamate release from astrocytes to the adjacent neurons. (Ref 135)

Evolution gets huge credit here for developing the intricate channels in our cell walls that creatively change shape with electrical potentials to open and close allowing the flow of these motivating chemicals in this dynamic environment. The flow through the cell walls of the chambers and their surrounding conditions are affected by previous stresses, anxieties, and fears of the future (among other things).

By consistent, free will choice, we can slowly, incrementally, change our neurotransmitter predispositions.

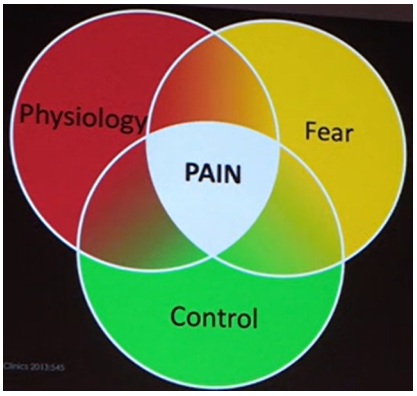
Homeostasis

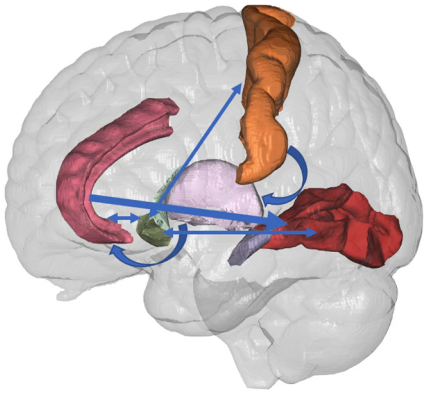
A major component in maintaining homeostasis and equanimity, is the hypothalamic-pituitary-adrenal (HPA) axis (Ref 43), which is an intricate, robust, neuroendocrine (nerve triggered hormone release) mechanism, that has similar physical attributes to neurons. It mediates the effects of stressors by regulating metabolic, immune responses, and the autonomic nervous system (ANS). The HPA (Ref 16) cascades signals down endocrine pathways that respond to negative feedback loops involving the hypothalamus, anterior pituitary gland, and adrenal glands.

The word 'anxiety' has the root angh, which means 'tight.' The word fear has the root feraz, which means 'danger.' Anxiety puts us in a tense, fearful, fight or flight, response state resulting in reductions of noradrenaline, so we become less attentive and less engaged. The antidote is a reset strategy that brings your amygdala and locus coeruleus back to homeostasis by a balance of calm, meditative behavior or group worship and focused physical and mental exercise. (Ref 93)

> Side Note: 17 of our most lethal diseases are linked to a lack of physical activity.

Pain and the use of drugs (poisons with one beneficial side effect) to mitigate pain is a classic case of misinterpretation. Dramatic neural activity is interpreted by the brain as a need to pay attention. We can mitigate pain by distraction. Opioids don't block pain; they over stimulate the pleasure centers of the brain to distract the senses. We can distract the brain's focus on pain physiologically, with vibration, cold or other mental activities.





Distraction Antitheses

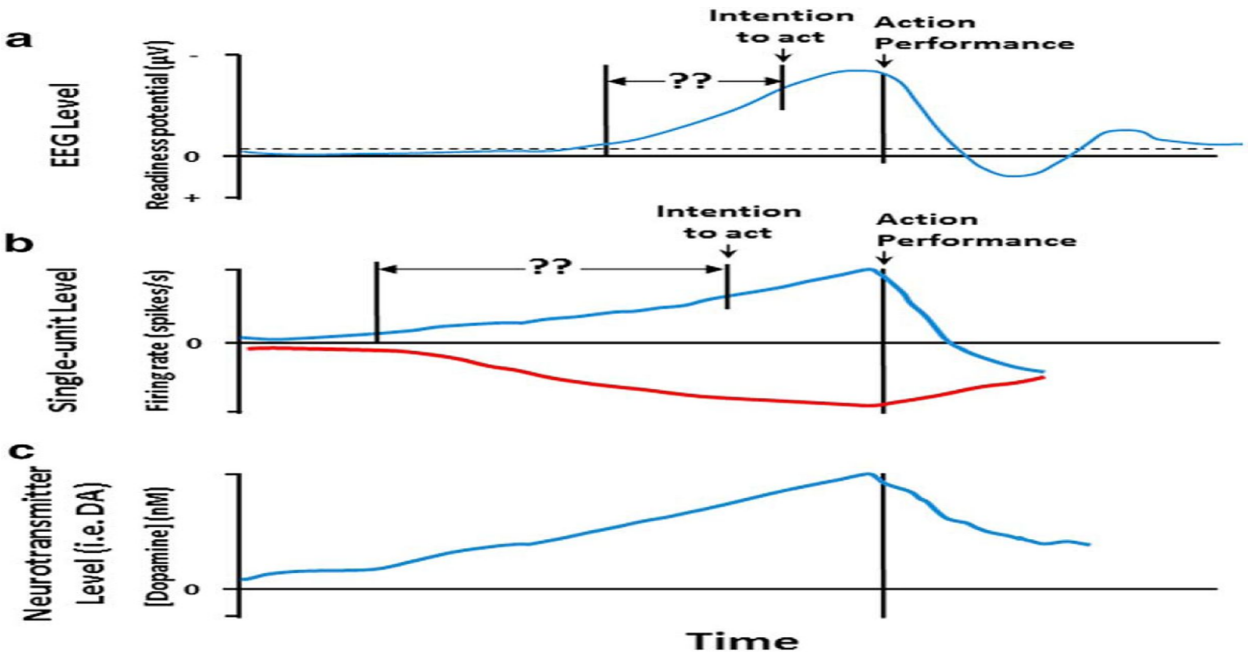
Pain is fundamentally subjective. (Ref 136) Peak alpha wave frequency and corticomotor excitability as measured by transcranial magnetic stimulation, is predictive who would experience more pain. Corticomotor excitability represents how quickly a signal gets from the cortex to the part of the brain that controls our muscles. There's a standard survey called the "pain catastrophizing scale" that is used to quantify the psychological impact of pain. Certain individuals tend to ruminate on pain more, or have more anxiety about the idea of pain, or feel helpless to manage that pain. At the moment of pain, psychology is a slave to biology and not the other way around, but we can influence how we will react to future pain.

Our initial emotional conditions relate to our calmness, which in turn relates to our trust in stable, unchangeable things, like a changeless God. Above this calm or frenetic initial electrical energy state, there is an on/off, nerve firing, transmission mechanism. The intensity and duration of the firing voltage, and frequency of firing repetition determines which neurotransmitters are released from the synapses. High voltage, high frequency, longer duration stimulations, are involved in more intense reactions and can be calmed by low, meditative, prayerlike or worshipful frequencies. Prayers may be likened to recharging our cellular batteries by focusing on what is important and worship may be directing our thoughts to be receptive to cosmic thinking.

Brain Waves

Benjamin Libet conducted experiments (Ref 71) that demonstrated that we unconsciously think about an action, up to 300 milliseconds before we are conscious of that thought. This implies that our superconsciousness or mid mind is the precursor of our conscious thoughts. Imagine this preemptive action happening at all our brain wave frequencies from the lowest at 4 Hz up to our highest functioning range of over 100 Hz.

All this precursive, thought triggering, neuro-peptide electro chemical activity eventually shows up as brain waves and these individual excitations cascade in waves of various overlapping scales of neural avalanches (thoughts).



One pulse of a neuron firing

Light Cascades as Neurons Fire
For the video see https://www.facebook.com/reel/3106752716139895

The lowest, delta wave frequencies, those experienced in deep meditation (Ref 21, 38) and worship, generally have the highest amplitudes, and interestingly, are the dominant frequencies in a young child's brain.

The higher frequencies and more entrenched ways of thinking (as the neurons become myelinated – coated to speed up transmissions) become dominant by age 25, except in perhaps periods of meditation, true worship, and deep sleep.

Electro-chemical signals between each nerve segment are triggered at 5 to 50 times per second and a propagation signal ripples along the nerve as a wave of action potential. These ripples of action along the nerve are a pulse above the base voltage, and they shuttle the electrical pulses at between 200 Hz and 300 Hz. On a related note (pun intended) the frequency of this wave of action potential varies for individual events and equates to musical notes between G 196 Hz and D 294 Hz. This may be why music is often relaxing, and it is interesting to note that live music is more effective in producing positive amygdala (think emotional) neurofeedback. (Ref 23, 54)

Electrical activity of the brain is usually divided into a hierarchy of three categories:

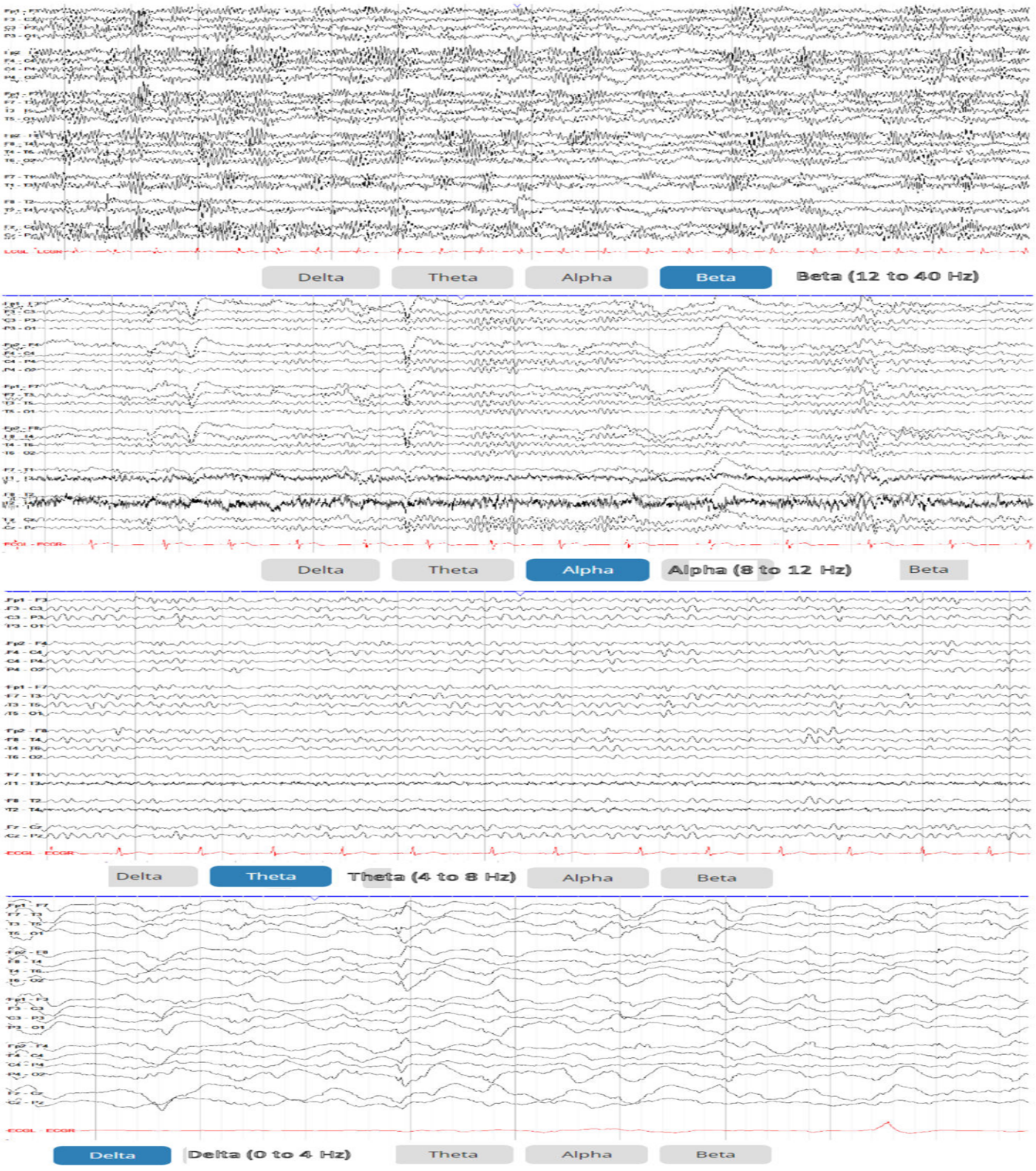
1. Spontaneous activity.
   Spontaneous activity is measured on the scalp or on the brain and is called the electroencephalogram. This signal goes from under 1 Hz to about 100 Hz and this activity goes on continuously in the living individual.
2. Evoked potential activity
   Evoked potentials are those components of the EEG that arise in response to a stimulus (electric, auditory, visual, or spiritual) and these signals are usually below the noise level and therefore not readily distinguished. One must use signal averaging to "see' these over the background noise.
3. Single neuron events
   Single-neuron events can only be examined using microelectrodes which impale the cells of interest. These include neurotubule events.

Our spontaneous brain activities (Ref 6,7) are quite frenetic, as can be seen in a typical electroencephalogram, EEG, snapshot of the electric fields emanating from the brain's activities. The electrically associated and massively cross-corelated bio electrically initiated signals of all the brain's synaptic interactions can be grouped and parsed into ranges reflecting their general functions as follows:

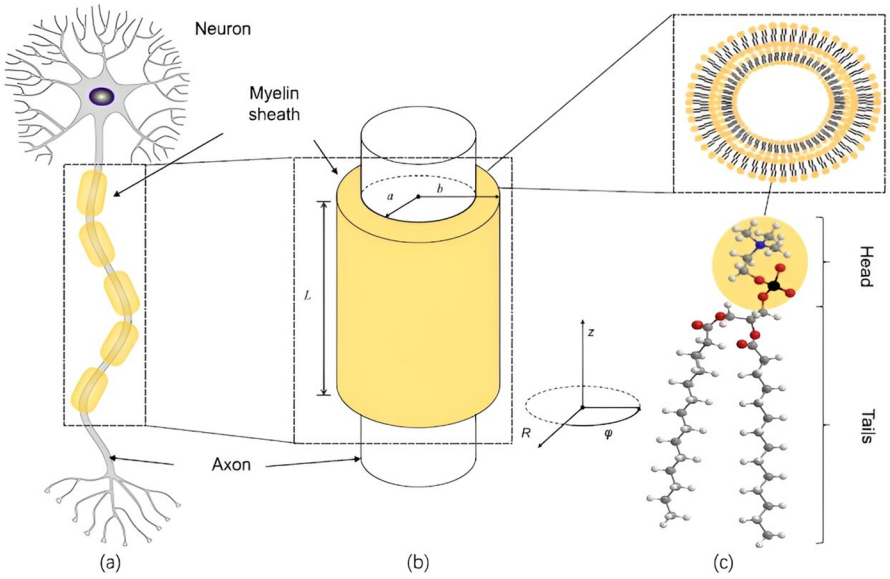
Gamma (40 to 100 Hz not shown) – involved in recent **intellectual activity**.
Beta (12 to 40 Hz) – involved in **executive functioning**.
Alpha (8 to 12 Hz) - involved in **relaxed cognitive functioning**.
Theta (4 to 8 Hz) - involved in light **meditation** and sleep.
Delta (0 to 4 Hz) - involved in **deep meditation.**
Voltage variations have a drift velocity of charge carriers (generalized patterning) that flow at about 1 – 2 mm per sec (0.006 ft/sec). Voltages in the electroencephalogram images shown here represent +/- 30 micro-Volts above the much higher action potential ripple voltage base (initial conditions) of -70 milli-volts. It may be that when we lower the base voltage, when we are calm, we make the "signal pattern" (+/- 30 micro volts) more "visible".

Nearly all our cells can generate electricity, but electrons don't flow like a wire, instead, a chemical ion with a certain charge jumps from one cell to the next and between one myelin insulated axon segment to the next until it reaches its destination. The myelin sheath is typically about 100 microns long, with 1-to-2-micron gaps between them. The speed of signals without the myelin is subsonic but myelinated signals seem to be entangled with photons released by the tricarboxylic acid cycle that releases a cascade of infrared photons that couple to the vibrations of the carbon hydrogen bonds in the lipid molecules of the myelin exciting them to a higher energy state releasing more photons. (Ref 98) The speed at which these electrical signals travel can vary greatly,

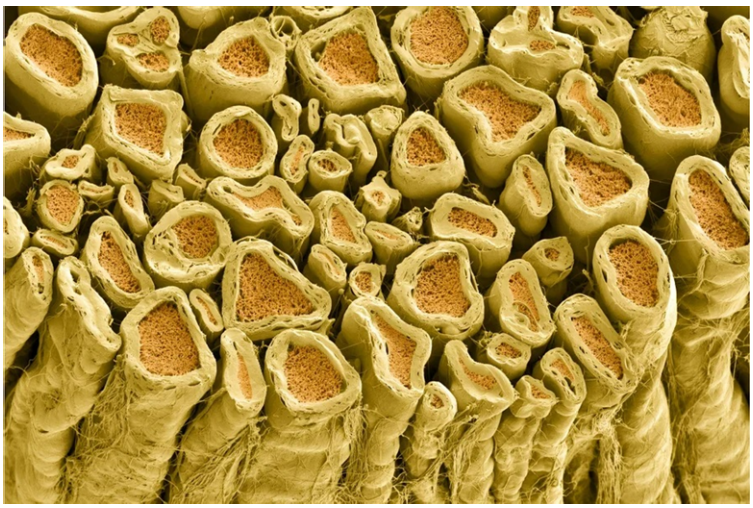
depending on the type of neuron and whether the neuron is myelinated, but speeds range from 1 to 100 meters per second.



Electroencephalogram



Myelin Sheaths over Nerve Axons



Rat Brain Nerves with Myelin Coatings

The myelin sheath, as a cylindrical cavity, facilitates the generation of entangled photon pairs. (Ref 108) Researchers in August of this year discovered that the specific vibration of C-H bonds in lipid molecules within the myelin sheath can produce entangled photons. Given the abundance of these bonds in neurons, this mechanism could be a significant source of quantum entanglement within the nervous system. This discovery hints at a possible explanation for how the brain utilizes quantum entanglement for information transfer, potentially explaining the synchronized neuronal activity crucial for consciousness.

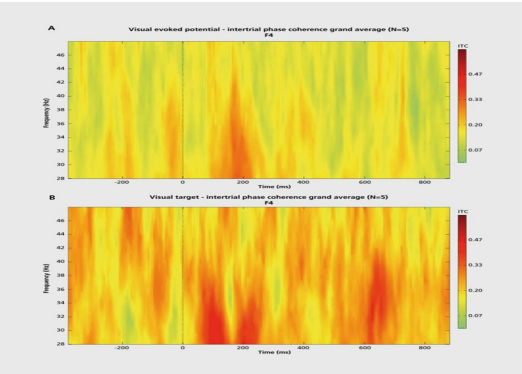
It is interesting to note that science finds no trace of myelin in the ancestral line that preceded the arrival of vertebrates, animals with backbones. (Ref 99 and 58:4.2 (667.6)) “Apparently”, a virus infected a vertebrate

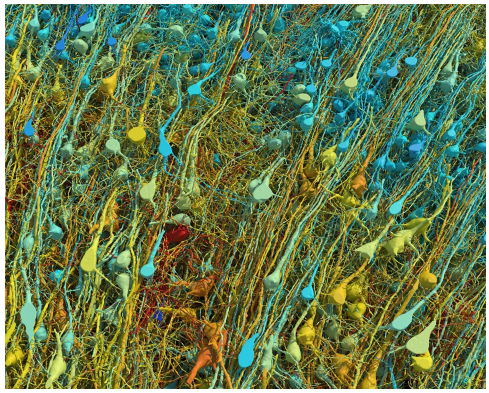
ancestor, slipping the genetic instructions for making myelin into its DNA. The evolutionary phenomenon represents an example of what scientists refer to as “punctuated equilibrium”, reflecting a speedy specialization pattern of significant evolutionary change. (Ref 62.) Curiously, myelin is wrapped around nerve fibers by entirely different cells in the body (Schwann cells) than in the brain (oligodendrocytes) and astonishingly, 40 percent of the DNA in mammals consists of remnants of these retroviral “infections”.

Before the solidification of the myelin sheaths, Delta waves and massive cross communication between nerves dominated. The delta wave frequencies (0 to 8 Hz) can be replicated in a deep meditative state, or worship. Perhaps complete parental trust in God would allow slower thinking and more cross communication between brain cells. Perhaps being humble, like a curious child, fascinated by discovering new things, or by enjoying a particularly soothing piece of music, we can regain that childlike faith.

Mental Picturizations

A published study in Science Advances in April 2022 shows that the brain passes information like waves throughout the brain. Picture a three-dimensional volumetric cascade of electro chemical excitations. The waves of particle interactions within this volume cascade into more wavelets of activity that move and create more ripples in the mind pool. Wave peaks and troughs interfere or augment and influence other neurons. Our thoughts are cross correlated in any one memory (smells, relationships, expectations etc.).





Two-dimensional image slice of three-dimensional brain activity

It may not be so much the dominance of a single frequency, as it is the harmonies of all the frequencies that give us the total picture. When we look at the complexity and unorganized nature of the EEG traces, you can see the way the electrical activity clusters. The larger red areas in the above two-dimensional slice represent stronger thought drivers.

As these patterns are influenced by, and tend to align with, cosmic patterns, the precursors to our reflective thinking, these will adjust our material reality via emotional and epigenetic management, as our neural activities try to harmonize, amplify, and align these 3-dimensional volumetric images.
Recent research (Ref 52) done on the brain at rest by Cremona, Joliot and Mellet (2023) derived “thought profiles” from a cluster analysis of data from nearly 1,800 French university students. In addition to “tried-and-true” measures, this group completed a novel survey of resting-state personality dynamics, the ReSQ 2.0 and found core pathological character traits or brain picturization groupings. (Ref 52)

Scientist Pulin Gong at the University of Sydney also found spiral patterns that exhibited intricate and complex dynamics, moving across the brain's surface while rotating around central points, known as phase singularities. (Ref 34)

If we think of a holographic fragment of cosmic reality, each fragment of that reality, as it steps out of infinity and into finity, could be thought of as a low-resolution image of the whole of creation. To improve the resolution image of the whole, we can cumulatively add our own low-res image perspectives with other people's images and understandings, to get higher and higher resolutions and visualizations of the overall image. With each perspective we get a better understanding of material creation and the forces behind it.

This image contains the pattern of unity and polarity and gives us our frame of reference. This creates a triadic structure fundamental to our reality: the observer, the observed, and the reference frame.

Activity Regulated Cytoskeletal Peptides & Synaptic Adhesion Molecules
ARCs and SAMs

In the process of becoming human, DNA is the code for allowing information to be transferred from cell to cell and from generation to generation. RNA (ribonucleic acid) and DNA (deoxyribonucleic acid) are both essential molecules in the biology of life, but they differ significantly in structure, function, and location.

Structure:

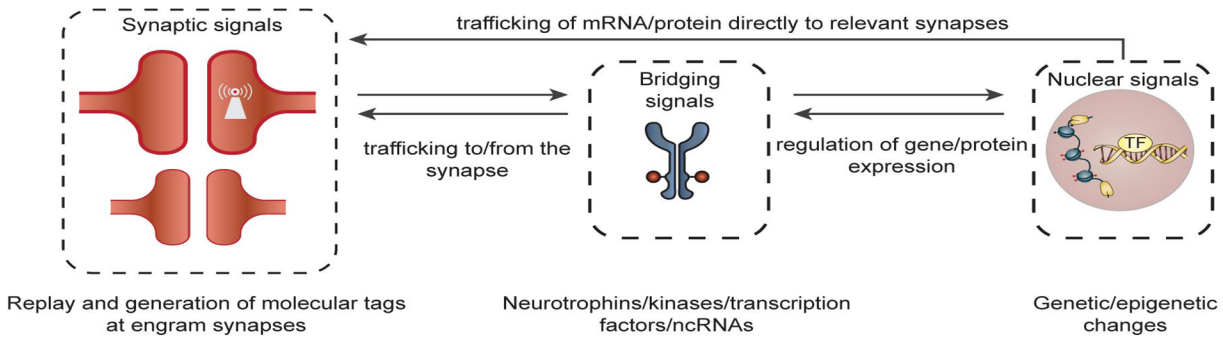
DNA is double-stranded, forming a famous double helix. It has a sugar called deoxyribose, and its bases include adenine (A), thymine (T), cytosine (C), and guanine (G).
RNA is single-stranded. It contains a sugar called ribose and replaces thymine (T) with uracil (U) as one of its bases, pairing with adenine (A).

Function:

DNA is like the master blueprint, storing genetic information that guides the development and functioning of organisms. It's primarily responsible for long-term information storage.
RNA acts as a messenger and functional molecule. It transcribes DNA's instructions and helps translate them into proteins. Some forms of RNA, like ribosomal RNA (rRNA) and transfer RNA (tRNA), have specialized roles in protein synthesis.
Location:
DNA is mostly confined to the nucleus (in eukaryotic cells) and a small amount is found in mitochondria.
RNA can move between the nucleus and cytoplasm, performing its functions within the cytoplasm.

In short, DNA is the keeper of genetic data, while RNA is the worker bee, turning those instructions into action.

At the base of life itself is this RNA process. Ribonucleic acid (RNA) is a polymeric molecule that is essential for most biological functions, either by performing the function itself (non-coding RNA) or by forming a template to produce proteins (messenger RNA) where the information from one cell is packaged and communicated to nearby cells. (Ref 27, 115)



Messenger RNA Process

Side Note: There is also an mRNA process controller called Micro RNA (miRNA) that binds to and regulates (by negative regulation) the messenger RNA preventing certain general processes from becoming overabundant. Micro RNA has been linked to the development of cancer (it affects all the attributes of malignant cells), neurological, cardiovascular, autoimmune diseases and has been shown to regulate insulin secretion and sensitivity in type 2 diabetes.

Communication between brain cells is essential and the RNA messenger process is aided here by activity regulated cytoskeleton (ARC) peptides which are proteins in our brains that spread information through a messenger RNA (mRNA) like process. These Arc's encapsulate the mRNA within its shell, protecting it from degradation. Neurons release these extracellular vesicles (EVs). This phenomenon mirrors how viruses carry genes inside their protective capsids and may have been introduced by the life carriers in the Devonian age as the first function of neuron like memory activity. (Ref 88) Within a cell, mRNA carries the genetic instructions from the DNA in the nucleus to the ribosome, the site of protein synthesis. The ribosome then translates these genetic instructions into proteins.

There are also SAMs that are like a peptide glue that cement our nano-scale neural networks. The mRNA molecules carry genetic information and make special proteins that change the firing voltage at synaptic junctions and influence the combinations of inputs from other nerves.

For memories, neurons that fire together wire together, and neurons that fire out of sync, fail to link. (Think thought coherences.)

Cementing our memories is a complex process and is still an intense field of investigation but it involves dendrite (short, branched extensions of a nerve cell) and these dendrites contain abundant microtubules. (Ref 117, 143) Out of all the possible energy states, the system will converge (be SAM glued) to a local electrical minimum, also called a local attractor state. Local attractor minima states are existing memories and influence our future ways of thinking.

ARCs influence local electrical minimum by causing a protein to fold in a specific manner, called a capsid which moves from neuron to neuron creating preferred pathways. This process of RNA sharing exchanges information between synapses for specific functions such as memory correlation and then SAMs strengthen and confirm these relationships. (Ref 107)

These established relationships primarily impact the synapse receptors found in the brain, and they are the foundation of human cognition and intelligence (Ref 44).

Some of these foundational areas of the brain are as follows:

Frontal lobe: Voluntary movement, attention, short term memory tasks, ***motivation***, planning, and speech.
Parietal lobe: Proprioceptive and mechanoceptive, involved in language processing.
Temporal lobe: ***Decoding sensory input*** (visual and auditory) into ***derived meanings for retention*** of visual memory and language comprehension.
Occipital lobe: Taste, visceral, pain and vestibular functions.
Limbic lobe: ***Emotions***, modulation of visceral and autonomic functions, ***learning and memory***.

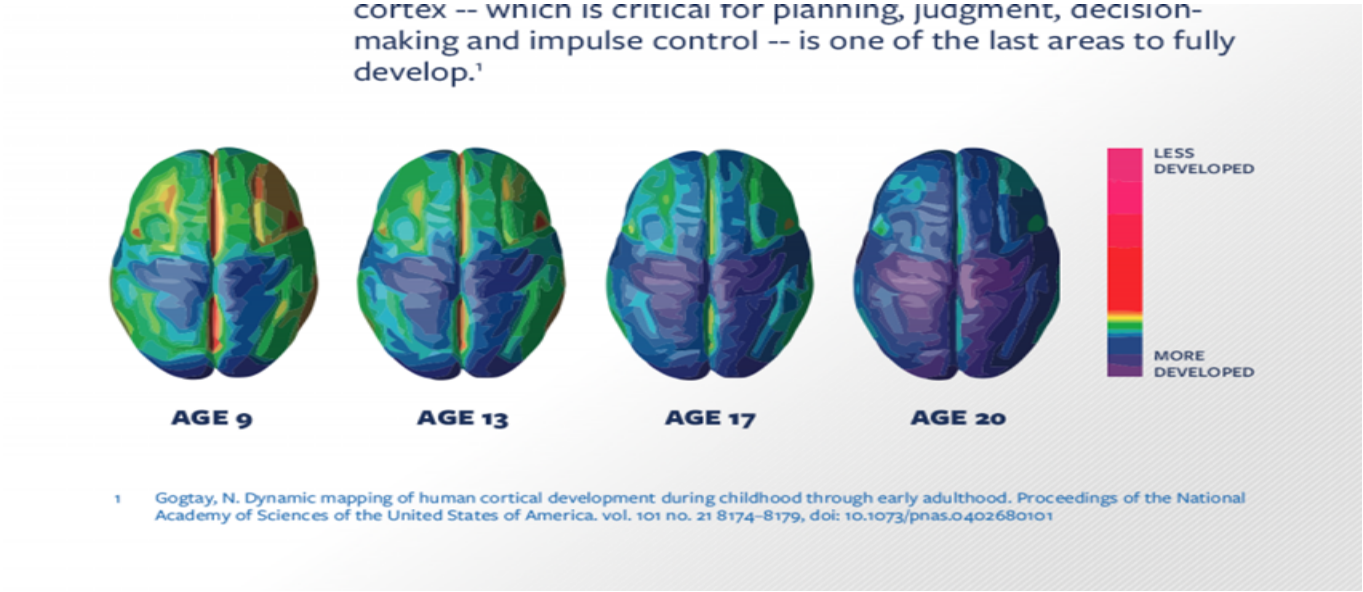
We are likely most interested in those functions shown in ***bold italics*** since these are ones that help us grow our souls in certain trying intellectual and testing social situations.

It is interesting to note that the dominant frequencies for the lobes of interest range from 10Hz to 23Hz. The frontal lobe (motivation) is 22 to 23Hz and the temporal lobes (derived meanings) are: superior 10Hz, middle 23Hz, inferior 10Hz.

The Maturing Brain

Maturing areas of the brain include the frontal and parietal lobes, the insula, and the subcortical structures. But a more interesting feature of the maturing brain involves the “white matter” that gradually envelopes the nerve cells in all these areas. This “white matter” coats and insulates the active transmission portions of the nerves by the formation of the myelin sheaths we talked about earlier.

These onion skin like protein insulative coatings thicken with age and allow much faster information propagation but limit their cross communication as the pathways become more defined and we become more fixed in our ways of thinking. We are defining the preferred voltage pathways, and the corresponding voltages required to "get out of the rut". Before these insulating sheaths formed (up to about age 25) our thoughts are slower, much more cross connected, more influenced by emotions, socialized thoughts, and highly influenced by peer pressure.



Adolescent Brain

In our early "formative" and presumably more trusting, stress-free years, the child's brain is more open to trial-and-error type learning (e.g., walking, talking, socially interacting). What we are forming are our basic 4 million neural connections called your "connectome", and this forming or patterning continues up to about age 25 after which this neuroplasticity slows down. It is interesting to note that the balance of glutamate to GABA, (excitement versus the urge to be calm) changes throughout childhood and into adolescence, as glutamate levels increase then level off as adulthood approaches.

Cosmic-Spirit Reception

Related to the early child brain plasticity, is our first moral decision, which begs the questions: What peptides in the brain are involved in moral choices? What parts of the brain are involved in moral sensitivity, emotion, motivation, cooperation, ethics, respect, and the differentiation of good and evil or other altruistic behaviors? What level of learning and neuronal depth goes from trial-and-error learning to cognition, language, concept and flexible imaginative learning which all include abstraction. Abstraction is the ability to ignore small differences and focus on bigger pictures. Moritz Köster's research published in Science Direct in 2021 shows that young children's "4 to 5 Hz theta rhythm" (Ref 51) increases when they meet unexpected events.

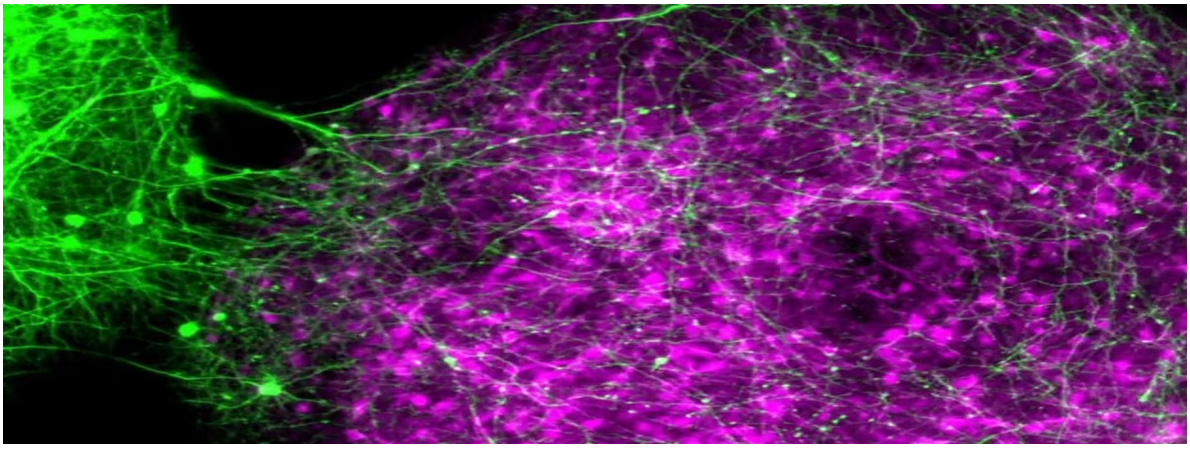
> "Give me a child until he is 7, and I will show you the man." **Aristotle**

One neurotransmitter that comes into play at this early age is neurotensin. Neurotensin is a neuropeptide that functions like dopamine in that it acts like a reward for appropriate behavior, but specifically for the differentiation of "good" from "bad" thoughts. Like dopamine it establishes a threshold level and then "rewards" when behaviors elevate above the current level of behavior. It stems from a survival perspective where we learned which behaviors

benefited our survivability where it was likely related to the energy of the adjutant of counsel. At our stage of evolution, it may now be more involved with moral and cosmic choices. It is interesting to note that this "reward for improved thinking" mechanism is built into our basic thinking processes. As we age, we are establishing our preconceived opinions, settled ideas, and long-standing prejudices the "old dog", Zen teaching may apply: "A full cup cannot take on more water."

Even with age, our ability to evolve or "take on more water" is still possible because certain foods (chocolate, tea, blueberries) and lifestyles (less stress, exercise, more love) can create up to 700 new neurons a day and these new neurons, plus epigenetics and our free will emotional control, allows us to improve our thinking habits. Our brain's ability to adapt involves several mechanisms and new neurons and neuroplasticity also helps us to shape and fine tune our spirit receptivity. Adaptability, cross pollination and growth mechanisms involve many physiologies including microtubules, microtubule-associated proteins and activity regulated cytoskeleton peptides.

There is an area of the brain which specifically deals with tenacity and willpower. It is called the anterior midcingulate cortex. It is involved in certain higher-level functions, such as attention allocation, reward anticipation, decision-making, impulse control, performance monitoring, error detection, and emotion control. It grows with the challenges that are found between the anvil of justice, the hammer of suffering, and the necessity for anguish and fear.



New neurons grow from one area and connect into another.

Let's look at some functions that are not age related.

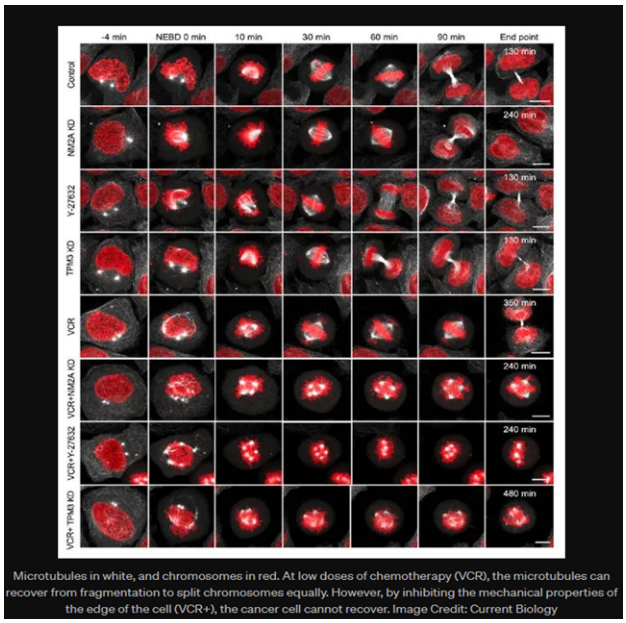
Microtubules

One of our main anatomical features, functioning at all ages and giving us time for silent receptivity, between sensor inputs and our reactions, are microtubules. Microtubules are hollow tubes filled with saltwater. The walls of the tubes are formed from uniquely arranged molecules. They provide the basic structural strength of the cell. Their unique construction and location allows for the transport of proteins between cells, and provides electrical communication between neighboring cells.

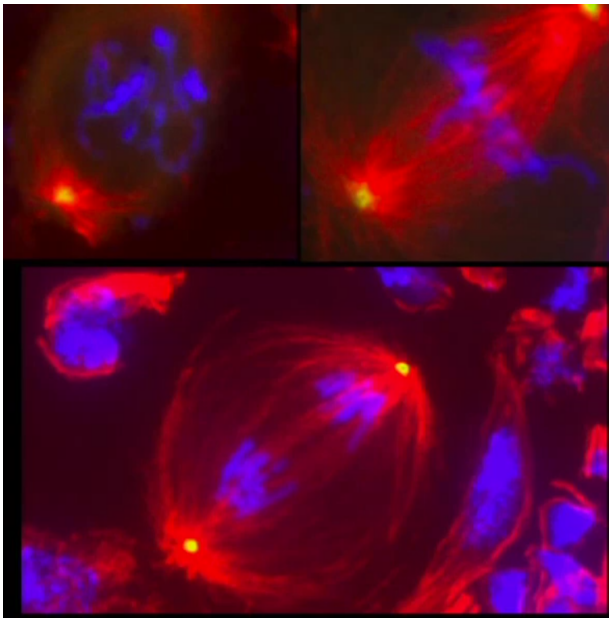
Some of the other functions of microtubules are:

1. Maintaining Cell Shape - Microtubules help maintain cell shape and stability with microfilaments and intermediate filaments. Together with the other cytoskeleton elements, microtubules form an architectural framework that establishes the overall polarity of the cell.
2. Cell Movement - Cells provide structure to cilia and flagella and thus help move bacteria and other prokaryotes. Motile cilia and eukaryotic flagella have the canonical '9+2' arrangement of microtubules where nine doublet microtubules surround a central pair of singlet microtubules. Microtubules in the trachea cells prevent mucus and dirt from entering the lungs. The fallopian tubes (female reproductive system) move the egg released from the ovary to the uterus.
3. Cell Division - During mitosis, microtubules play a crucial role in forming the mitotic spindle (spindle apparatus). The mitotic spindle helps to separate chromosomes during cell division so that the chromosomes can be partitioned equally into two daughter cells. The spindle apparatus also helps to form the contractile ring that separates the two daughter cells during cytokinesis. Three types of microtubules participate in mitosis: astral, polar, and kinetochore microtubules. Astral microtubules radiate from the MTOCs of a cell to the cell membrane, thus keeping the mitotic spindle in place. Polar microtubules link between two MTOCs and help separate chromosomes. Kinetochore microtubules attach to chromosomes that help to pull them apart. Intracellular Transport and Communication.

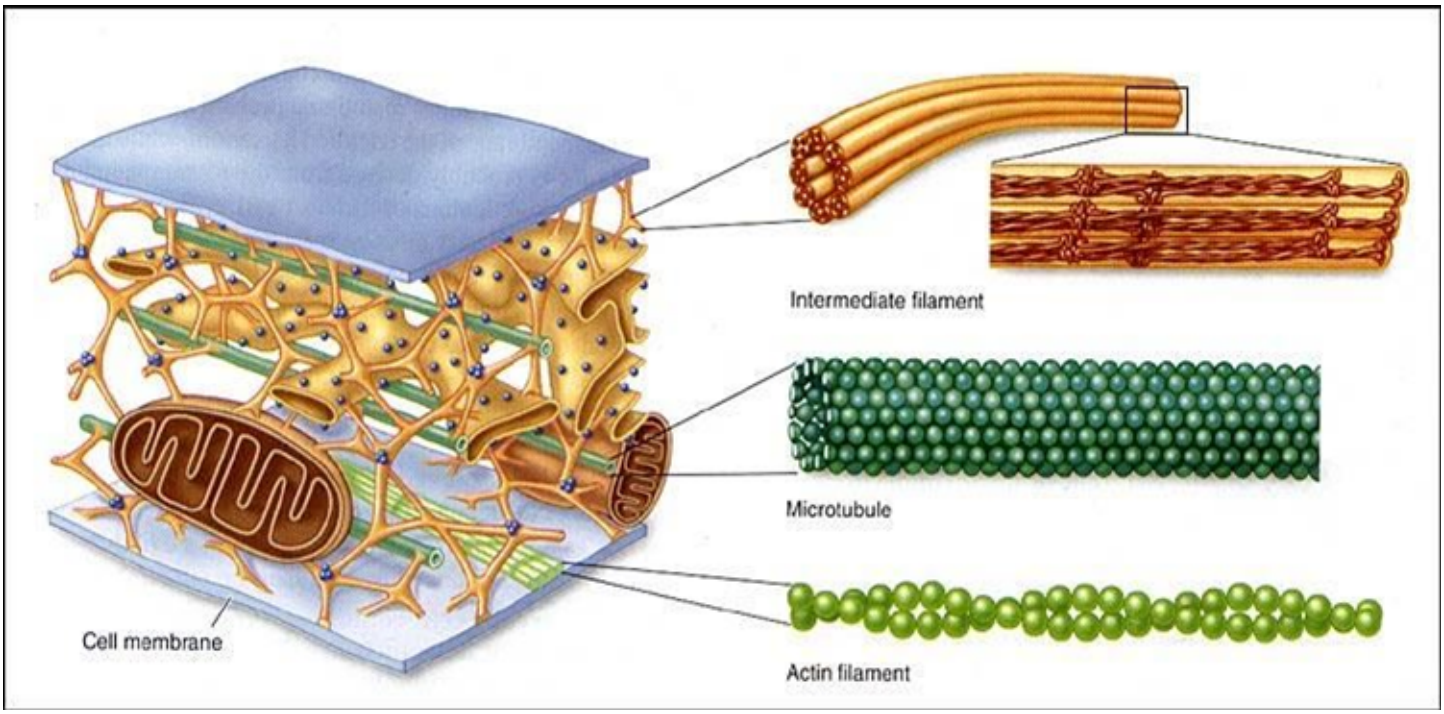
   The electric fields generated by the synchronized oscillations choreography of microtubules, centrosomes and chromosomes during mitosis and meiosis are beautifully designed by nature. Finely regulated and synchronized movements of these super-macromolecular complexes against the thermodynamic forces within a dividing cell ensure the fidelity of the genetic material in both daughter cells. (Ref152)



Microtubules in white, and chromosomes in red. At low doses of chemotherapy (VCR), the microtubules can recover from fragmentation to split chromosomes equally. However, by inhibiting the mechanical properties of the edge of the cell (VCR+), the cancer cell cannot recover. Image Credit: Current Biology



Microtubules and chromosomes interact at every cell division.



Microtubules

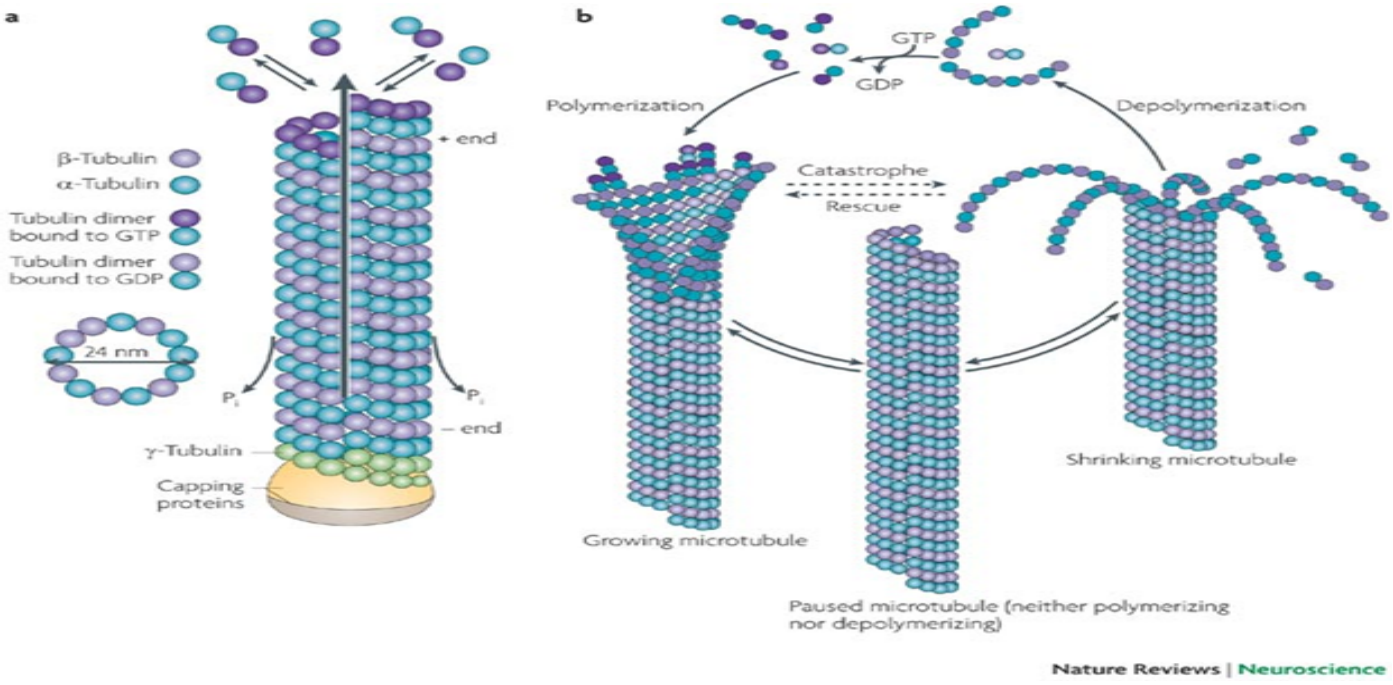
As part of the cytoskeletal network, microtubules help move organelles inside a cell's cytoplasm. Microtubules also help the various cell components to communicate with each other. They form an internal transport network for moving materials throughout the cell and between the exterior and interior of the cell. This trafficking is assisted by microtubule-associated proteins kinesin and dynein.
These videos show how microtubules provide the mechanism for intercellular transport and positioning.

https://www.facebook.com/share/v/13stEtibCb/?mibextid=wwXIfr
https://www.facebook.com/share/r/16D7jbtN7X/

As can be demonstrated by fluorescence resonance energy transfer (FRET) interactions between microtubules and their associated proteins, microtubules are seen to constantly grow or shrink in length from 0.000004 in (0.1 um) to 0.002 in (50 um**)** by a dynamically unstable process called treadmilling (technically, guanosine triphosphate hydrolysis) wherein the dimers (individual peptides) are lost at the negatively charged end, and more are added at the positively charged "centrosome" end.

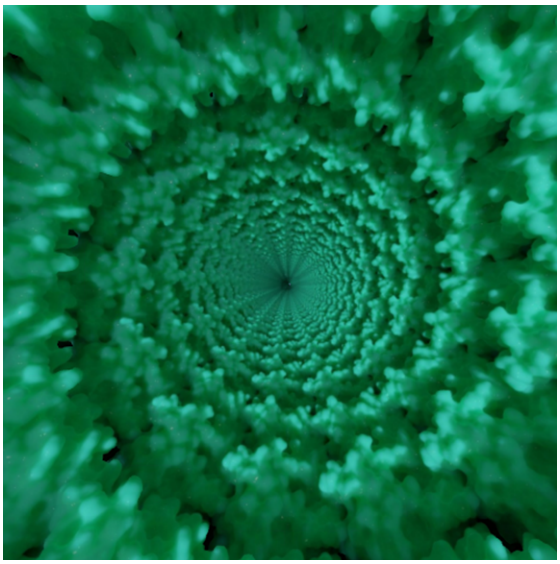
The growth rate depends on several factors, including the concentrations of the tubulin, the presence of microtubule-associated proteins (and/or tau proteins), and intracellular electrical environmental conditions. Under certain physiological conditions, neurotubules can grow at up to 10 μm/minute, with an average of about 5 μm/min under optimal conditions so they can grow to their maximum length and shrink back to minimum length over the course of 15 to 30 seconds.

Growth is offset by dynamic instability, meaning that the microtubules undergo phases of growth and shrinkage, which influences their overall behavior. Specific growth rate can also vary by region (e.g., axons versus dendrites) and developmental stage, as neurons modulate their cytoskeletal dynamics during growth and repair.



Treadmilling

Side note: Chemotherapy drugs like colchicine and paclitaxel inhibit microtubule assembly resulting in the death of the cancer cells and all other fast-growing cells.



Inside a Microtubule

The individual tubes are made up of thirteen individual heterodimer (joined but different) tubulin polypeptide filaments, arranged in parallel, around a circular salt water filled cavity. (Ref 46)

The filaments have a distinct electrical polarity that can generate an internally coherent (integrated), soliton (self-sustaining), electromagnetic field (Ref 12, 37) along each of the 13 filaments, and collectively these tubules are sufficiently insulated from neighboring cells to prevent electrical interference (short circuiting) and facilitating decoherences (not being influenced by neighboring electric activities) in the order of 10^{-6} seconds (approx. 1 M hertz).

Microtubules are found in all eukaryotic cells (cells with our DNA in the nucleus) so this strengthening and weakening of the cellular intercommunication process is going on throughout the body although we are probably most aware of its influence in the brain where these microtubules are called neurotubules.

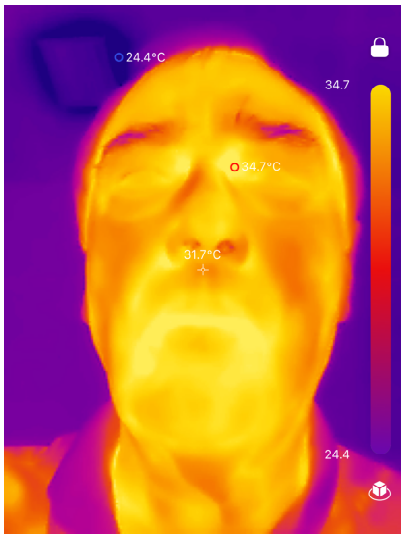
Microtubules, are made up of crystal-like protein dimers, with internal, hydrophobically protected, water pockets, surrounded by a partially electrically conductive salt water filled inner core, that shuttle electrical pulses from cell to cell as the pulses move down the individual filamentary strands by a process of cascading luminescence and the length of the tube causes a delay in the propagation called "delayed luminescence". The signals along the tubules are communicated at about 8 MHz (in the radio wave and ultrasound range) but resonate at twelve specific frequencies clustered in 4 ranges: kilohertz, megahertz, gigahertz, and terahertz frequencies. Specifically, 100–400 KHz, 10–30 MHz, 100–200 MHz, in the mechanical vibration range, 1-20 GHz (11.8-to-5.9-inch wavelength) in the radio wave range, and at 526 and 686 cm−1 (THz) in the heat, far infrared range (molecular bond stretching and bending) and 276 and 334 nm in the ultraviolet (electron jump) range. These resonances create sweet spots along the tubule that communicate to the kinesin molecules as they transport proteins down the tubule. (Ref 91, 146,149, 150) It is the unique ultraviolet frequencies that we are most interested in as this may be the frequency range where quantum coherences (same frequencies, form, and phase) may occur.

> Side Note: The cosmic microwave background (CMB) radiation which constantly bathes us, contains a wavelength of 1-millimeter (0.04 inches or 160.4 GHz) microtubules can grow to over 50 micrometers (0.002 inches) a nice ratio of 500 implying that coherence with the CBM is feasible.

We can only see our ultraviolet image using a special UV camera. Here are my pictures in the UV, visible and infrared or heat frequency ranges.

Ultraviolet Image

Visual Image

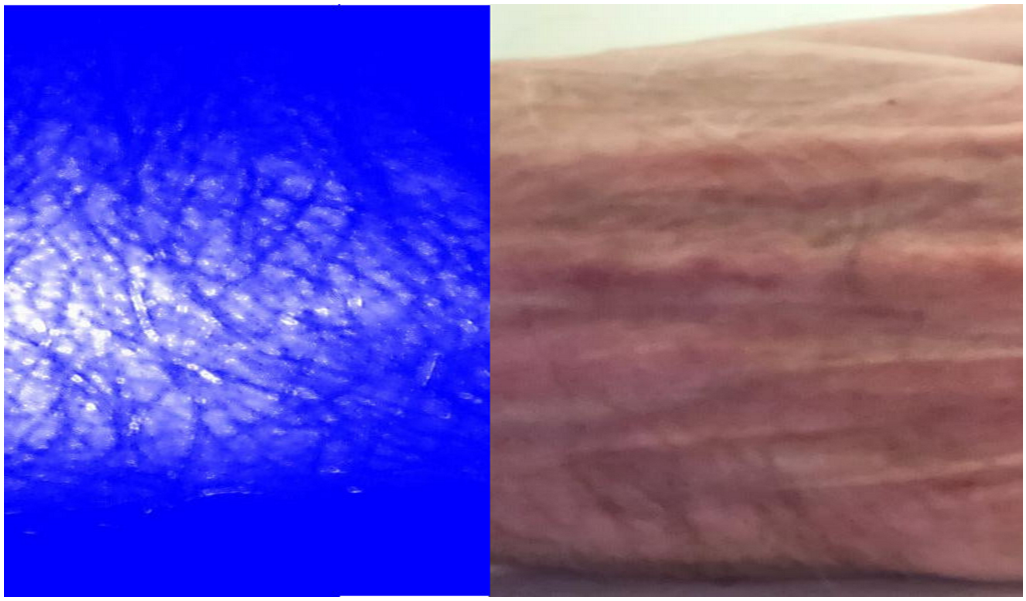


Infrared Image

Note that in the ultraviolet image above, the frequency of the UV has been limited by using a bandpass filter with a peak frequency of 335nm meaning that it represents primarily the contributions from the higher of the two microtubule UV frequencies (276 and 334 nm). Only 1% of our blood (white blood cells) contains our DNA and therefore would have microtubules, an ultraviolet image of the back of a hand, where blood vessels are obvious, should not show up in an ultraviolet image and sure enough, they do not. Also, once cells move to the outermost layer of the skin, like hair cells, they become keratinized, losing their nucleus and other organelles, including microtubules so human hair as shown in this image, do not contain active microtubule bioluminescence.

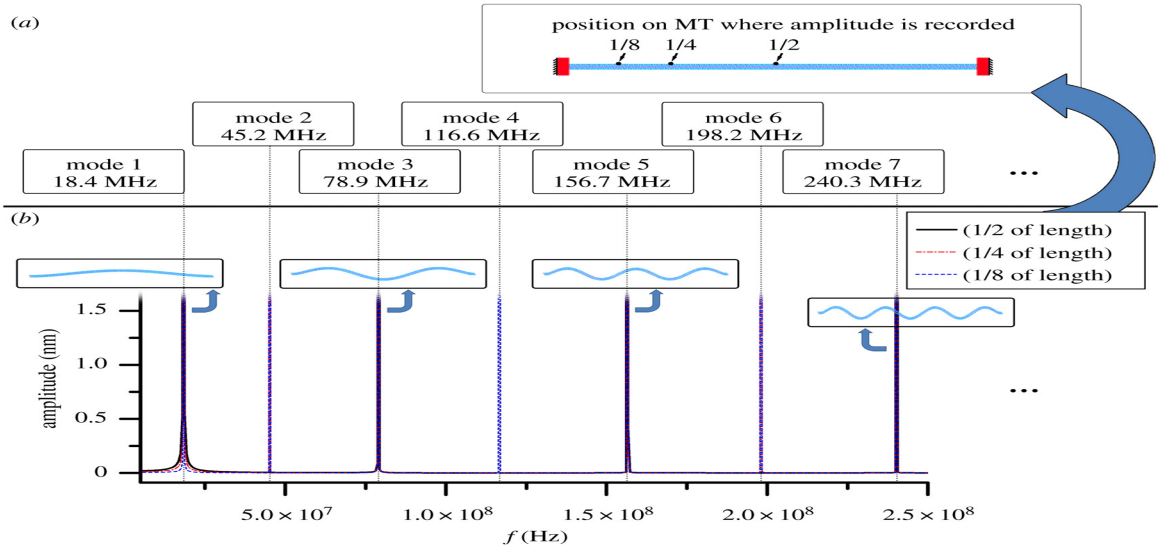
Side Note: Our ability to see UV light has diminished with generations as the fluid in the eye now protects the eye from UV radiation. The cones in our eyes can still detect UV light, but we have evolved this "protective" mechanism to block its reception (Ref 114).

Side Note: 334 nm has the same wavelength as sound at 1 GHz (gigahertz)

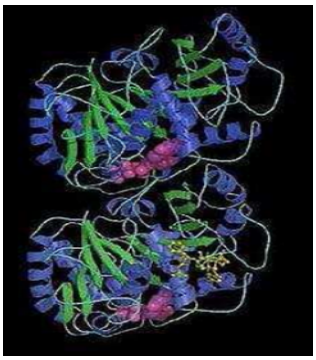


UV image of the back of hand not showing blood vessels

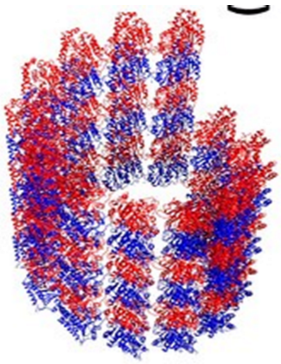
Another fascinating feature of microtubules is their nonlinear "ballistic" reaction ability. At certain frequencies the conductivity of microtubules increases by a factor of 1000. This interacting between the electro-mechanical MHz frequencies and the electro-optical ones (Ref 14), may be where we "delicately touch" (and perhaps cohere with) our morontial selves, our mid-mind, or our souls.



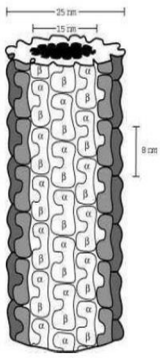
Mechanical Vibrational Frequencies of Microtubules

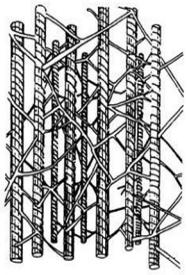


Individual Tubulin Dimer



A & B Tubulin Dimers make up the walls



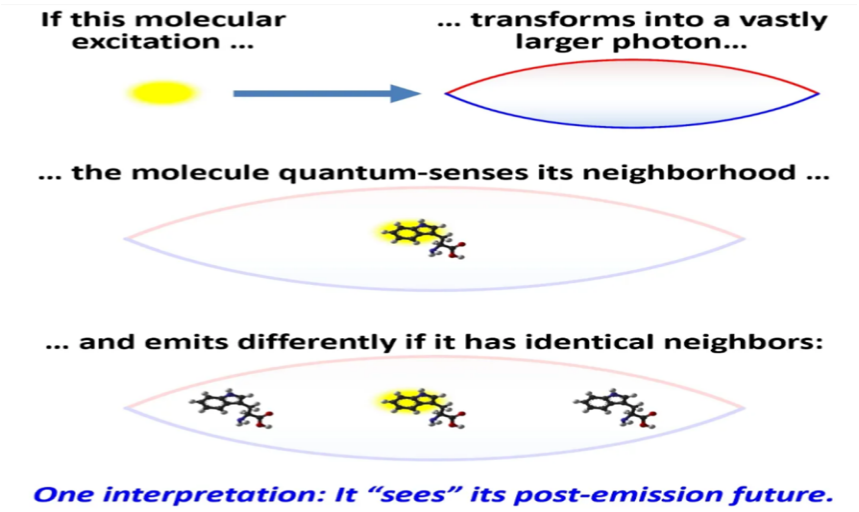


MAPs cross connect

Microtubules communicate between all cells with DNA but function most poignantly in the medial temporal lobe of the brain as a facilitator of cross-communication between brain cells. This is analogous to the cross communication of the child brain before the formation of the insulative myelin sheaths, but this cross communication is now controlled by the free will of our thoughts (think of this as the coordination of material light, intellectual insight, and spirit luminosity)**.**

Microtubule-associated proteins (MAPs), such as Tau and MAP2, are crucial for stabilizing microtubules during brain development. In early childhood, MAP activity is high to support neuronal growth and synaptic formation. By the time individuals reach their 20s, MAP activity becomes more regulated, maintaining microtubule stability in mature neurons.

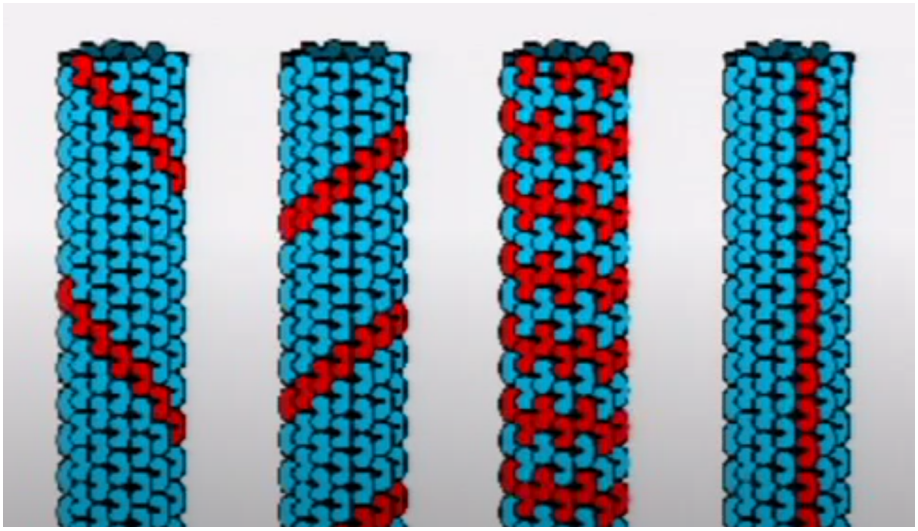
There are about 40,000 A and B dimers that make up the individual tubulin filaments and they have alternating current (AC) polarities with transistor like electrodynamic properties allowing their energies to be amplified and to harmonize with other energies by a form of electro-optical coherence. (Ref 60 & 90) Moreover, the transmitted ac power and the transient fluorescence decay (single photon count) are independent of the microtubule length. Even more remarkable is the fact that the whole microtubule is more conductive than any single protein molecule that makes up the microtubule. The microtubule's vibrational peaks condense to a single mode which controls the emergence of the electronic/optical properties and facilitates automated noise alleviation. Thus, a monomolecular saltwater channel residing inside the protein cylinder displays an unprecedented control in governing the electronic and optical properties of the microtubule. This provides for bioluminescent optical coherence which happens when a wave travelling down the filament, splits into two or more separate streams (in this case cascading down neighboring filaments) and then these streams interact with each other in a phenomenon called superradiance and sub-radiant eigenmodes. Superradiance means that they act both individually, collectively and coherently, as if it were a single cell (like how a LASER works). A sub-radiant eigenmode means it displays transparent optical properties in nontransparent media (Ref 92). It is also hypothesized that since photons travel at the speed of light (essentially being outside of time) they can sense their surroundings and anticipate the field into which they are propagating.



Photon Sense

Side Note: Light is nothing more than an electromagnetic wave, with in-phase oscillating electric and magnetic fields perpendicular to the direction of light's propagation. The shorter the wavelength, the more energetic the photon is, but the more susceptible it is to change in the speed of light through a medium.

It is interesting to note that there are three essential amino acid molecules in our body, isoleucine and tryptophan (both used to make proteins), and l' arginine, that are also bioluminescent and are involved in biological signaling, like in the neurotransmitter serotonin. The primary ingredients of the tubulin are a sequence of amino acids, including tryptophan (an aromatic amino acid) and they form a unique scaffolding as one of the primary structures in microtubules. The tryptophan in the microtubule with its strong ultraviolet absorption, combined with its phenomenon of ultraviolet induced superradiance (the cooperative emission of photons by a collection of excited molecules, leading to enhanced fluorescence) and assisted by its significant absorption/emission differences, form an ideal fluorescent reporter of biomolecular dynamics. It is also highly sensitive to its protein, solvent, and electrostatic environments. (Ref 91, 92, 147)



Multiple Patterns of Possible Interaction Mechanisms

The organization and patterning of the time delays both along and between tubules, allows them to function as information modifiers. (Ref 144) Because microtubules are arranged in specific patterns and because they are connected by microtubule-associated proteins (MAP1, MAP2 and tau proteins) which act through a process of phosphorylation, and because of their interconnected "nodes" they act as traffic signals and tune or "orchestrate" the optical oscillations in what is called "Orchestrated Objective Reduction" (Ref 1, 2, 3,) they may form the basis for our self-consciousness.

Another way to look at brain patterning is called gradient ascent. Gradient descent is a method for unconstrained optimization by energy flow in the direction of the gradient leading to a trajectory that maximizes the final energy state. Technically it is a first-order iterative algorithm for minimizing a differentiable multivariate function. This concept is supported by being biologically plausible.

For example:

> Contrastive Hebbian learning, which is a learning rule where neurons that fire together adjust their connections, describes how local activation differences drive error-based synaptic changes.
>
> Dendritic error signals propose that specific synaptic and dendritic mechanisms can carry information about errors directly to the synapses that need adjusting.
>
> The prediction-emotion connection suggests that reducing prediction errors can be interpreted within an optimization framework.

To facilitate this process. A brain's microtubule protein arrangement symmetry allows it to act as a nanowire where the conducting state is written in the wire itself enabling it to store and process approximately 500 distinct bits of information with 2 pico amp resolution between 1 nano amp and 1 pico amp activation currents in an almost hysteresis free fashion. (Ref 89) Rings of these microtubules then form qubits (quantum oscillating dipoles) since they are superpositioned (situated vertically on top of one another) in resonant rings and in helical pathways throughout the lattices of the microtubules. Depending on the orientation of the electric fields to the microtubule (or actin filament) axis, there could be three types of ionic waves generated: (a) Longitudinal waves propagating along the protein polymer's surface where the polymer acts like a conducting electrical cable with its inherent resistance and capacitance. (b) Helical waves propagating around and along each protein polymer, and there could be three or five such waves propagating simultaneously corresponding to the 3-start or 5-start geometry of a microtubule. (c) Radial waves propagating perpendicularly to the protein polymer surface. If an electric field is oriented at an angle to the polymer axis, all these wave types may be generated simultaneously. This allows the microtubule to function as a qubit that can carry information in more than just a binary manner. Theoretically they can encode information in an infinite number of ways.

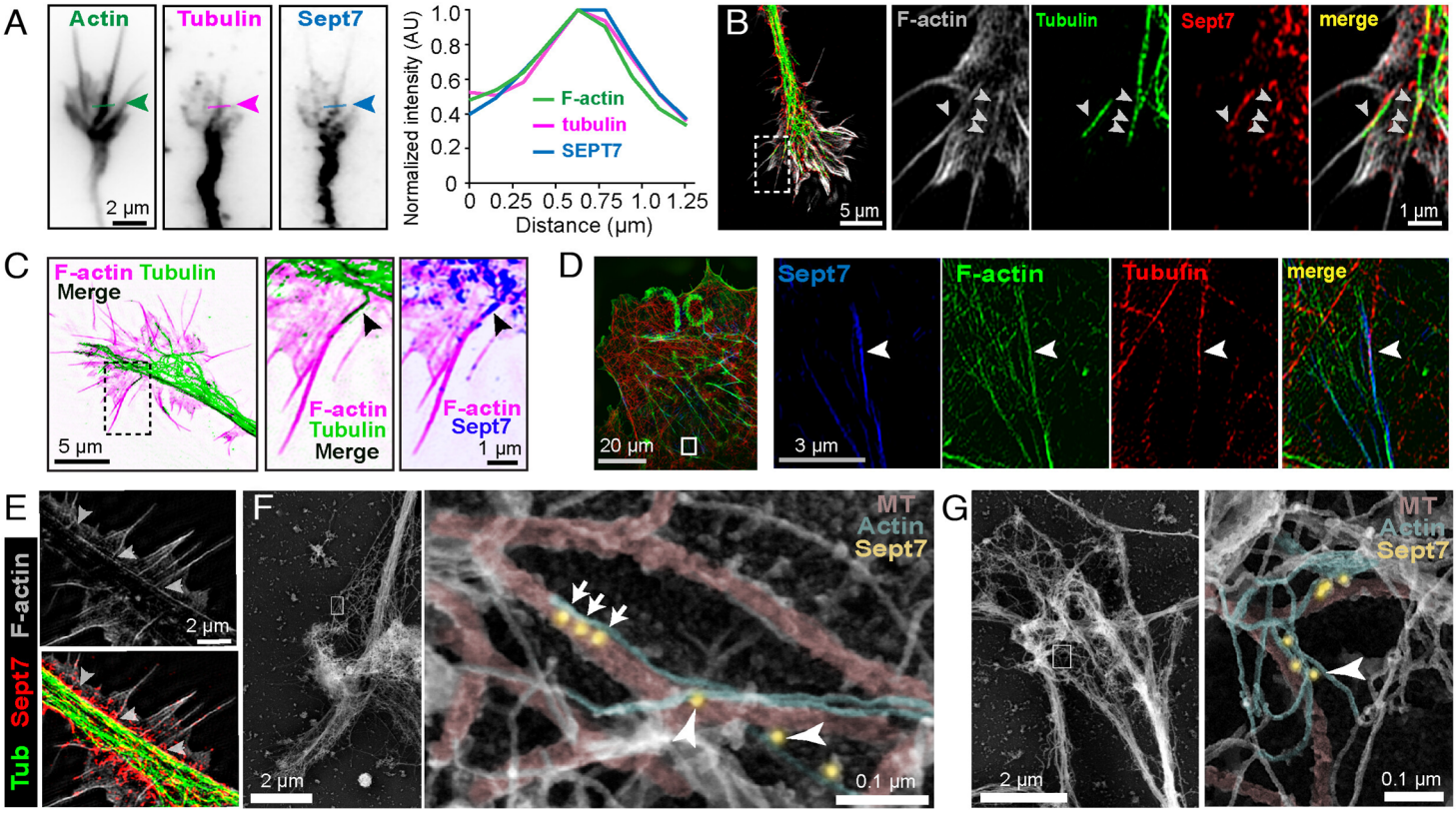
Orchestrated Objective Reduction is presumed to function in discrete tiny units of time related to the Plank scale of 10^{-35} seconds, that collapse mesoscopic (intermediately sized) objects on a timescale relevant to neural processing.

Since microtubules can respond to four octaves of vibration (mechanical, radio, heat, ultraviolet) they may facilitate up stepping or down stepping of the higher frequencies between our low frequency materially functional ranges and higher morontial frequencies. At their lowest electric energy frequencies, they vibrate due to their molecular charge separation, and at the highest frequencies they vibrate due to their electron or nuclear spins. This "orchestra" not only gives us a time delay between a sensory input, but it also affords us the overview of our

reaction to that input. It is a kind of pre-consciousness which allows for the consciousness of our consciousness. It does this by introducing a time delay of up to 500 milli seconds between the electrical impulses from the sensors (proprioception, vision, auditory, tactile, vestibular, interoception, and taste inputs etc.) and the post processing of these stimulations.

> Side note: Olfactory stimulations, smells, go directly to the frontal lobes. It's well known that impaired olfactory function is often associated with cognitive decline and researchers have now developed a simple at home "peel-and-sniff" test that used to screen for cognitive impairment.

Microtubules also play a critical role in axonal transport (movement of mitochondria, lipids, synaptic vesicles, proteins, and other organelles to and from a neuron's cell body), neuron structure, and plasticity, and when altered, lead to neurodegeneration. Microtubule abnormalities are heavily implicated in Alzheimer's disease pathology.



Septins and Actins (binding proteins)

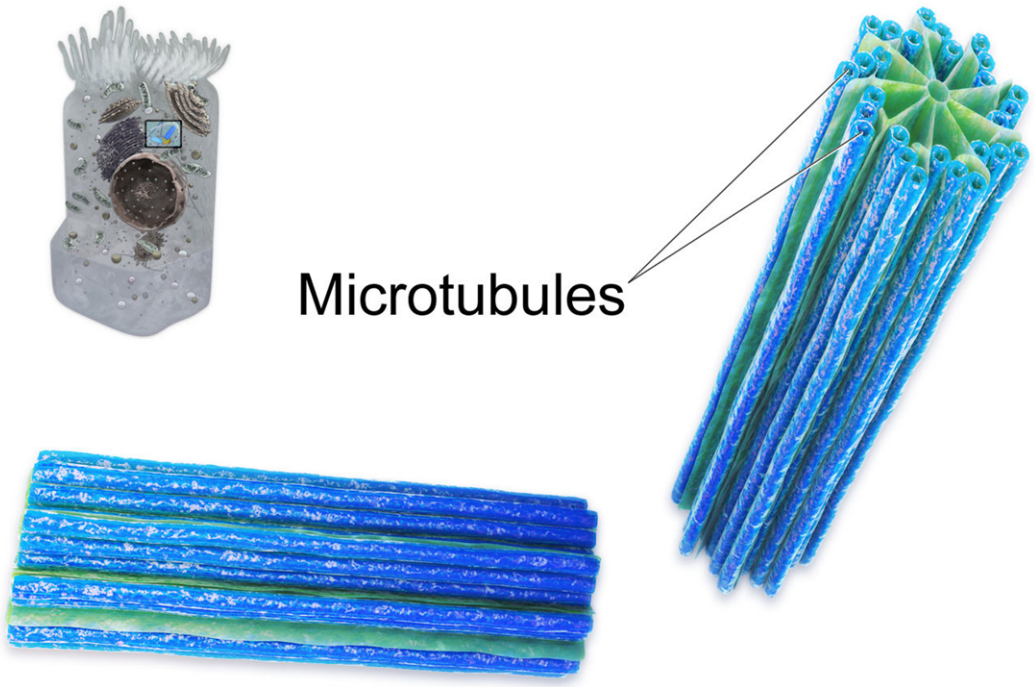
Septins colocalize with overlapping microtubules (Ref 40) and together with actin filaments facilitate intercellular crosstalk.

For a look at the physics and biology of the functioning of microtubules as it relates to Orchestrated Objective Reduction, check out this video: Clarifying the Tubulin bit/qubit - Defending the Penrose-Hameroff Orch OR Model (Quantum Biology)

https://www.youtube.com/watch?v=LXFFbxoHp3s

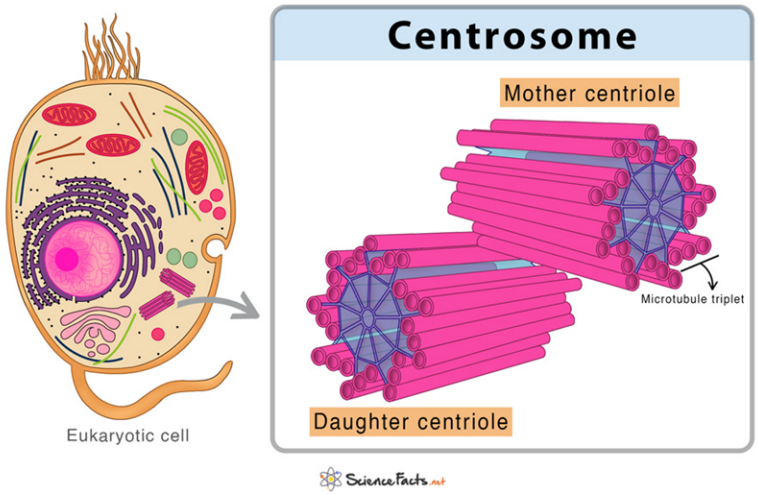
Centrioles and Centrosomes

Microtubules are self-assembled linear hollow circular tubes with inner and outer diameters of 17 and 25 nm, respectively, growing from the centrosome in the center of the cell forming a radial system. A centriole is a cylindrical organelle composed of α, β and γ tubulins organized differently from their α, β subunits of microtubules. Each centrosome comprises two centrioles, which are composed of nine triplets of microtubules. The two centrioles are arranged perpendicularly and surrounded by an amorphous mass of dense material (the pericentriolar material). As in microtubules, an electric field would be generated by synchronized oscillation between the α and β tubulins within the microtubule triplet of the centrioles.



Centriole

Centrioles come as a pair oriented at right angles to each other. They are light sensitive and align themselves with that light. They are a fixed length and are typically made up of nine sets of short microtubule triplets, arranged in a cylinder.



Centriole and Centrosome in the Cell

Centrioles are a very important part of centrosomes, which are involved in organizing microtubules in the cytoplasm. Centrosomes are required for survival of the organism. The position of the centriole determines the position of the nucleus and plays a crucial role in the spatial arrangement of the cell especially during cell division. In human reproduction, the sperm supplies the centriole that creates the centrosome and microtubule system of the zygote

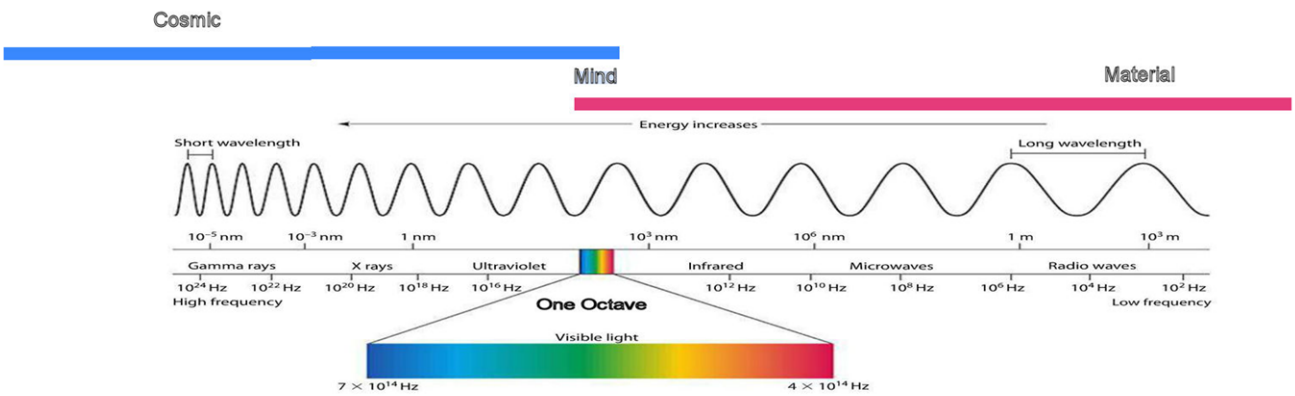
Microtubule Quantum Coherence

Electromechanical energy interacts with electro optical energy in microtubules in a coordinated fashion by reversibly exchanging energy for momentum, back and forth. Two things are "conserved": momentum (linear and rotational) and energy. Energy is eternal but it can be temporarily transformed into momentum. This looks like discontinuous mechanical motion but the continuous can't be reduced to discontinuous. You can't separate the part from the whole. Neither can you separate the parts of the body from the whole body nor the whole body from the universe. At the quantum level, things directly act as aspects of the whole and they derive their very definition and meaning from that whole. In our case, quarks, being a part of the material whole, may be our localized presentations of the two "wholes" (material and spiritual). One possible overlapping continuum between material, temporal, transcendental, spiritual energies and "the whole" is quantum electromagnetic energy. (Ref 33) Keeping in mind that "quantum" is not just physical, quantum it is relational.

Let's first review quantum electrodynamics. In QED, there are two fields: the electromagnetic field and the field of electrons. The electromagnetic field is a vector field for every point in space and time. The excitation quanta of the electromagnetic field are photons. The field of electrons, or electronic field, is a spinor field (think vectors of the "square roots" of rotations) for every point in space and time. Electrons are the excitation quanta of this field. The electrons could be thought of as being rotational, locationally specific, and photons might be their directional influence.

If, there are three energies, spiritual, mindal and material, then the electron field might be thought of as the material, the mindal as the photonic and the spiritual as the cosmic (whole) field, then we are looking for ways in which they can interact, and that interaction is likely only at the quantum level.

If we visualize the frequencies of these separate energy fields (material, photonic, cosmic) as parallel lines arranged from lowest to highest frequencies, the upper range of one might be able to interact with the lowest range of the next. One possible arrangement puts the optical range as a possible overlapping-interacting, frequency range with mind energy as the modifier/patterner of the electromagnetic energy.



Cosmic material overlapping Energy Ranges

With this overlapping in mind, let's look at those areas of the brain and nervous system that function at the quantum level. The probabilistic quantum level has some interesting overlaps with the timelessness of spirit energy like, time simultaneity, quantum tunnelling, and action at a distance. (Ref 8, 110)

Electron quantum tunnelling, for example, is associated with ferritin in the substantia nigra pars compacta (SNc) midbrain dopaminergic neurons, as well as all other areas of the body where iron byproducts are found. Ferritin has unique properties that provide for an electron switching mechanism using a Coulomb blockade mechanism where different arrangements are made for different conductivities. Normally electrons carry a negative charge and repel each other. However, when electrons tunnel between quantum wells, like those formed in the core of ferritin, they can experience collisions with other electrons that result from the electrons trying to tunnel to the same place. Because only one electron can occupy a space (has ubiety), a second electron that also tries to occupy that space will be repulsed. Ferritin acts as an electron switch that is sensitive to its surrounding electric field. (Ref 111)

The "whole" has meanings at every hierarchical subsystem. The universal system has been called many things; the ether, the quantum field, the quantum vacuum, the metric field, Higgs condensate, a cosmic superconductor, or even an overall instructional interaction where matter tells spacetime how to curve and spacetime tells matter how to move. The Quantum Consciousness Theory states that the quantum phenomena such as those occurring in microtubules, facilitated by their unique properties, involves quantum mechanisms, such as quantum tunnelling (boring through things that would normally appear as impenetrable), superposition (which says that a quantum system can exist in multiple states simultaneously until it is measured or observed - thought), entanglement (which describes a quantum connection between particles that persists regardless of the distance separating them) uncertainty (which states that certain pairs of physical properties, such as position and momentum, cannot be simultaneously measured with arbitrary precision) and wave-particle duality (electrons, photons and even larger, composite entities, for example behave like particles but also like waves sometimes being called a "wavicle".) (Ref 145) These phenomena all allow for the generation of consciousness in ways that classical physics cannot

explain. It supports the idea that particles exist in a state of entangled probability until observed. In our case, the collapse of the wave function is observed by us as a thought.

> Side note: Werner Heisenberg originally called the uncertainty principle, Ungenauigkeit (inexactness) or Unbestimmtheit (un-determinedness), whereas his mentor and collaborator Niels Bohr often used the term Unsicherheit (unsureness). There is nothing unpredictable or even uncertain about the "Uncertainty Principle." The principle relates the quantum wave-function with the whole by saying that any velocity or position of a particle (a quanta) cannot, by Netonian mechanics, be defined more accurately than by an interval - as opposed being an exact point. You could say that there is a fuzziness to the tiniest constituents of reality. They are not particles; they are kind of like packeted wavelets.

> Side note: Neurons individually transmit at about 100 m/s and there are 100 billion neurons x 200 firings per second x 1,000 connections each = 20,000,000,000,000,000 bits of info being transmitted per second, so thought/mind/pattern functions are well above the speed of light and therefore could be considered to be functioning outside of time.

Microtubules have an ability for quantum superposition creating their ability to exist in multiple states simultaneously until a measurement or observation is made, at which point the system collapses into one definite state. Quantum entanglement occurs when particles (because they come from the same source) become interconnected in such a way that the state of one particle directly influences the state of another, even when they are separated by vast distances. They demonstrate the reciprocal interaction between field and particle. This quantum coherence is an area where classical mechanical behaviors overlap with the wholistic ones and may involve our interface with Supreme spirit energies (Ref 119).

> Side Note: Entanglement is the normal state of everything. Common descriptions of it make it sound special, but it's pervasive. However, we have no idea what the details of the entangled states around us are. When scientists do entanglement experiments, they need to create a known state of entanglement. This means dis-entangling the particles in the experiment with everything else and entangling them only with one another.

Newtonian mechanics looks at past events while quantum mechanics describes the probability of future events happening. The wave property of particles appears when we start looking into the future of that particle. It is a probability wave because the future is probabilistic. Wave function collapse is what we perceive as the present moment and is what differentiates the past from the future. General relativity (GR) involves making measurements in the observed past and therefore, is predictable. Quantum mechanics (QM) attempts to make measurement predictions of the unobserved future which is unpredictable except for our free will control.

The quantum level of our material consciousness may interact with spiritual consciousness in the equivalent of the collapse of the wave function. (Ref 11)

> Side note: At the center of every galaxy is a black hole which stabilizes the mass of all the stars and planets in that galaxy. Our Milky Way galaxy has a super massive black hole.

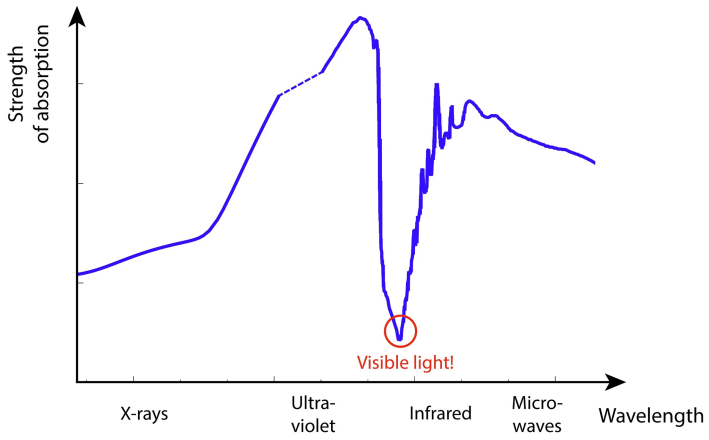
> Side note: At near absolute zero (no molecular motion) matter can take on new forms (Chiral-Bose state, Bose-Einstein condensate). Paradise has no molecular or electron motion, so it would have an unbelievably dense rest mass.

So why do we care about all this? Because thoughts have biological consequences (think blood pressure, heart rate, epigenetics), but more specifically your thoughts control the growth of these microtubules and may affect your spirit receptivity.

The speed of neuron transmission from sensor input to reaction determines the thought cascade. If thoughts of hate and anger are faster than love and forgiveness, they tend to dominate. The body can't differentiate what or who you are loving or hating, it just goes into love or hate mode. So, where's the spirit influence in all this?

Quantum coherences only occur at subatomic levels and to a limited degree, in the ultraviolet (electron jump) range. The bioluminescent to mechanical cascade mechanism is made possible by the interactions of the ultraviolet resonance frequencies with the mechanical movements of the microtubules, and this allows us to cohere with non-local energies. Quantum coherence could facilitate influence from the Spirit of Truth, God the Supreme or the universal absolute.

It is interesting to note that water (which changes from 75% when we are young to 50% in old age) preferentially blocks ultraviolet light energy. UV light is 99% blocked after only 5 mm of water.



Photonic Absorption

This graph shows how strongly water absorbs each wavelength. The smaller the value, the more transparent water is to that wavelength. (This is a double-logarithmic plot, meaning the absorption varies by about 11 orders of magnitude from highest to lowest. NIST for X-rays/Gamma and Wikimedia)

Here are a few other luminous possibilities to consider:

Perhaps the mid-mind is optical in nature, just above our electromechanical MHz frequency range. Luminosity is nothing more than electromagnetic waves, with in-phase oscillating electric and magnetic fields perpendicular to the direction of light's propagation where the shorter the wavelength, the more energetic the photon, the more susceptible it is to spiritual influence or changes in the speed of light as it moves through a medium.

It is interesting to note that scientists can make light behave like atoms and molecules by forcing different environments. They call this "hard light". (Ref 67, 68, 69, 142) Photons normally have no mass and travel at the speed of light but researchers found that bound photons acquired a fraction of an electron's mass, and these

weighed-down light particles were also relatively sluggish, traveling about 100,000 times slower than normal noninteracting photons. (Ref 130)

Let's take a little side trip here to talk about mass. What is mass? Considering that mass and energy are fundamentally the same, what differentiates them? I like to think of everything as ripples (momentum) in the electromagnetic field. Small ripples result in photons that don't protrude far enough into what the Urantia book calls "primordial force" blanket of space, what scientists call the Higgs field, and they don't meet with any resistance in their travels. Matter makes a bigger bump, that protrudes into the Higgs field and is slowed down by space (the Higgs field) and appears to have mass. The Urantia Book says that photons are particles and have mass but at this stage their influence on the Higgs field is not big enough for us to detect that mass.

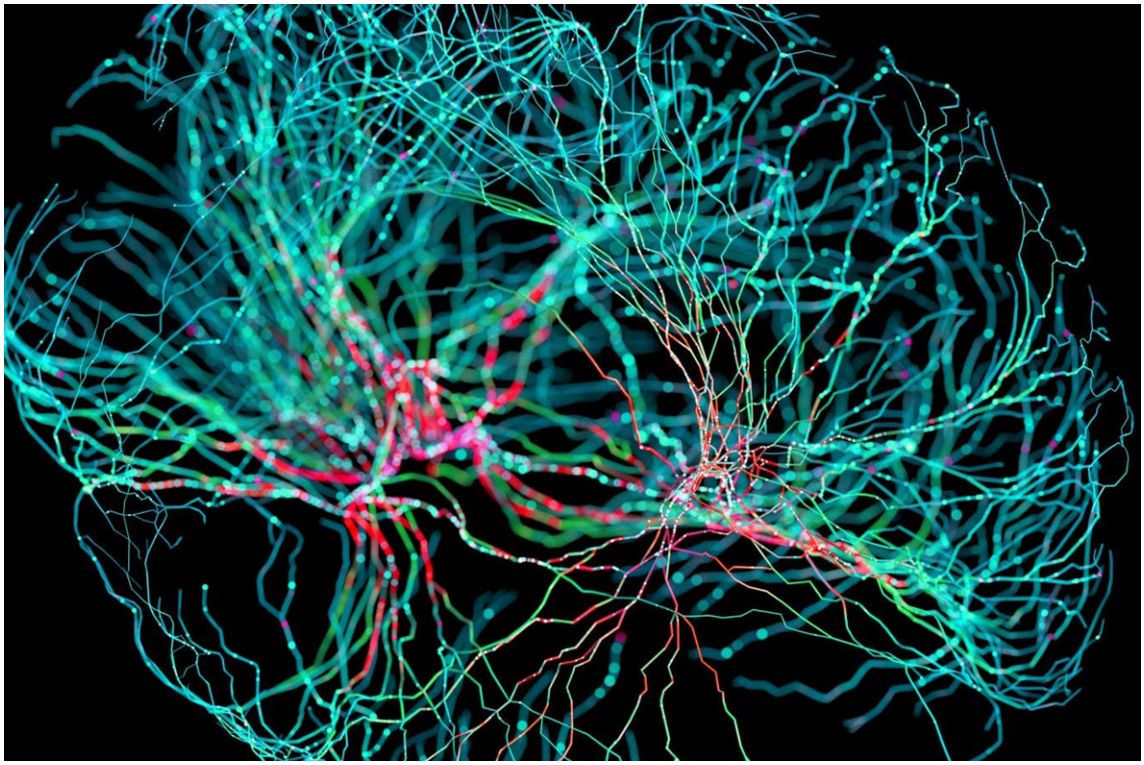
Side note: Science says that the "vacuum of empty space" isn't empty. It contains gluon field fluctuations.

Perhaps the bioluminescence of the microtubules is hinting at concept of a "pilot light"?
Perhaps the bioluminescence of the microtubules is the "light of truth"?

As we said before, bioluminescence of microtubules functions most poignantly in the medial temporal lobe of the brain as a facilitator of cross-communication between brain cells. This massive cross communication is like the child brain, before myelin sheaths formalized and sped up our thinking patterns but these neurotubules in the brain later in life facilitate this cross communication and they are controlled by our free will. These particle interactions in the mechanical range and the quantum interactions in the optical range are not only coupled locally with each other, they are also entangled with the cosmic whole by Quantum Coherence.

Since at the quantum level, individual things act as an aspect of the whole and derive their very definition and function from that whole, the Quantum Consciousness Theory says that the quantum phenomena in the microtubules, facilitated by their unique electrically isolated properties, involves all these quantum mechanisms, superposition, entanglement, and wave-particle duality. This link between the atomic and material levels allows for consciousness in ways that classical physics (think mechanical brain activity) cannot explain.

Microtubules, more appropriately neurotubules, hold a state until a measurement or observation is made, at which point the system collapses into one definite state (a thought). Quantum entanglement occurs when particles become interconnected in such a way that the state of one particle directly influences the state of another, even when they are separated. This can be locally in the brain or over vast distances. Quantum coherence allows for the overlapping of local mechanical behaviors with wholistic ones. At the quantum coherence level, our material consciousness may interact with spiritual consciousness in the equivalent of the collapse of the wave function.



Electric Focal Hubs in the Brain

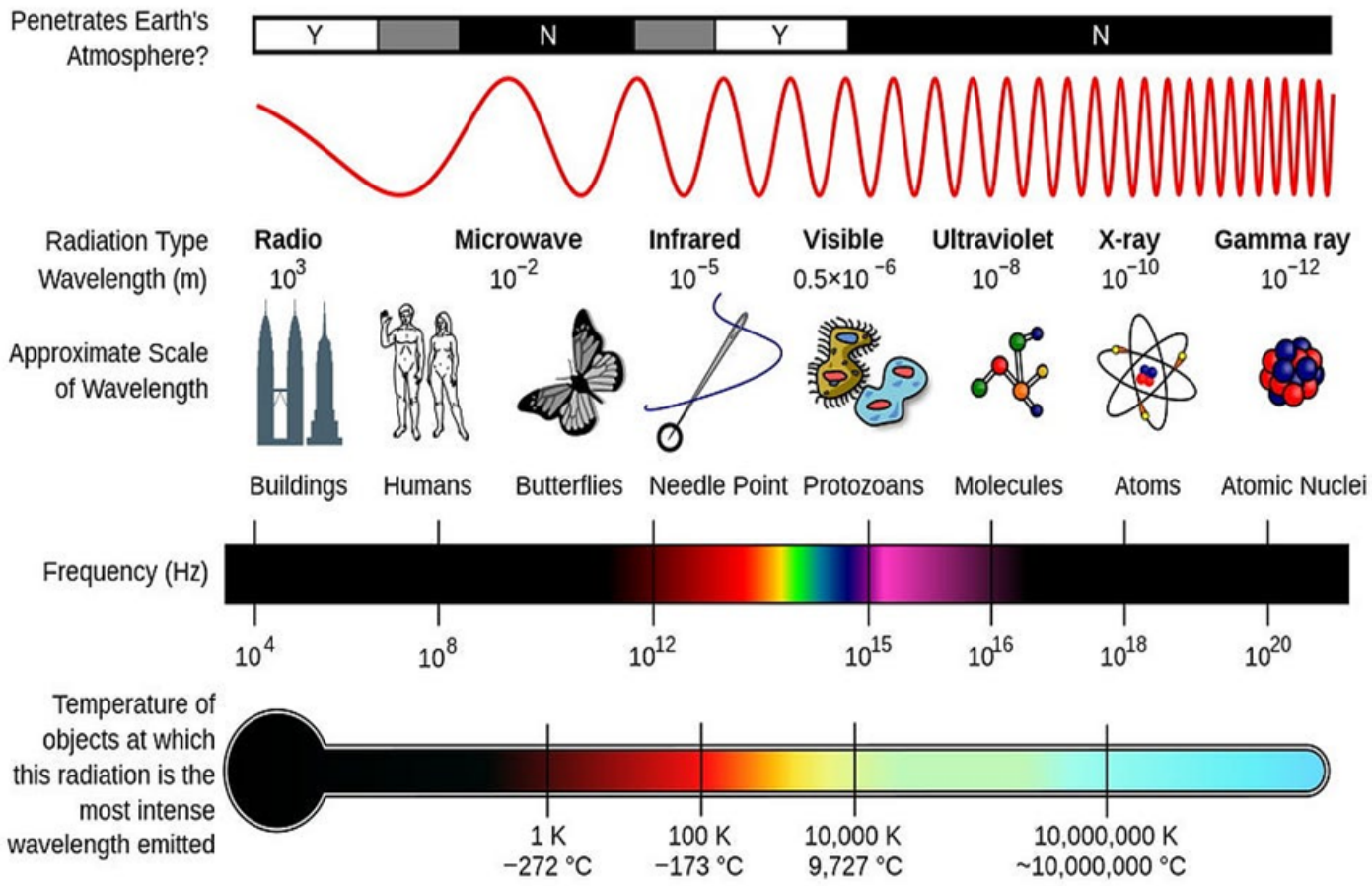
> Roger Penrose (originator of the OOR theory & 1990s Nobel laureate for physics) says it this way, "consciousness arises when a large number of microtubules in the brain reach a state of quantum coherence, called a "self-collapse of the wave function."

Electromagnetic Continuum

Electromagnetic vibrations range from the low mechanical to the highest cosmic levels. Light is part of this electromagnetic continuum, which means it is a rapidly varying electric field, which creates a magnetic field, which then in turn creates an electric field again, allowing the wave to move through space.

Normally electromagnetic energies only interact within their respective energy range, but the unique structure and function of microtubules allow them to interact across a wide range of frequencies, and all those frequencies are a part of the overall electromagnetic continuum. Let's look at this from an overall perspective.
At our stage of existence, we convert electromagnetic energy into electrochemical energy and then into motion (temporally, unidirectionally) via the transfer of electrons between chemicals. This electromagnetic transfer of electrons involves the conversion of electrical energy into waves of magnetic energy, by-directionally, without loss of energy. The stuff that makes us what we are, and how we think, involves the interchange of these two fundamental properties, energy and momentum. Material energy (motion) involves momentum and is temporal while optical energy (light) involves pure energy and is eternal. Both material and optical mechanisms involve the movement of energy.

The size, wavelength, and temperature/energy scales correspond to various parts of the electromagnetic spectrum. You must go to higher energies, and shorter wavelengths, to probe smaller scales. Ultraviolet light is sufficient to ionize atoms. (Credits: NASA and Inductiveload/Wikimedia Commons)



Electromagnetic Spectrum

> Side note: The more correct term when speaking of a photon is neither electrical nor magnetic. It should be electronuclear for there are two kinds of atomic fields that oscillate and generate photons, electrical fields and nuclear fields. Electrical fields have enough energy to generate photons up to and including x-rays, but only nuclear fields have enough energy to generate gamma ray photons.

We live and move and have our being in an electromagnetic continuum and whenever anything changes in our everyday life, there is an exchange of light photon energy and the movement of charge. When objects touch, it is charge that makes contact. Whenever the atoms bond and break there is an exchange of photon energy and the movement of charge. There is a spherical geometry (Huygens' Principle) where every point on a wave front may be considered a source of a secondary spherical wave, which spreads out spherically at the speed of light. This forms part of a continuous process because the absorption and emission of light is spontaneous. Light waves (eternal energy) are continuously interacting with the electrons (material energy) forming photon electron couplings or dipole moments. We can think of this as a process of spherical (think tri concentric) symmetry forming and breaking. When this spherical ($4\pi r^2$) symmetry breaks (becoming a dipole), it has the potential of forming a spiral. A self-limiting dead end. Nothing has lower entropy than a sphere and the absorption of light

always comes before the emission relative to the reference frame of the object or life form that is radiating that light. This forms a direction in time with an uncertain future that is not totally random. There is a built-in potential for ever-greater symmetrical formation, and this can be seen in cell life and evolution.

> Side Note: The lowest electromagnetic vibration of the Earth is at a frequency of 7.83 Hz, Schumann resonance – named after the German physicist Otto Schumann, who predicted and mathematically described the phenomenon in 1952. Commonly known as "Earth's heartbeat". This extremely low frequency resonance has a wavelength of about 40,000 km – comparable to the circumference of the Earth.

Within each octave, energies have an inherent ability to interact. At very low frequency (infrared and below) interactions cause heat. Higher frequency interactions are involved in the bond oscillations of molecules. Even higher octaves result in the formation of material atoms. It is my conjecture that octaves higher than these are the realm of morontia energy, essentially "hard" or Supersolid" light when light acts like material atoms but is made entirely from photons and even higher octaves may be spirit energy formations.

My supposition is that we function in the MHz and lower optical range, soul involves the ultraviolet range (hard light comingled with matter).

If spirit energy is high frequency stuff and if it is going to interact with finite energy, it needs to find ways to influence material energies using sub harmonically resonant frequency mechanisms. The pattern and organization of the body's biological system is established and maintained by a complex electro-dynamic field. This electro-dynamic field is determined, in part, by its atomic bio-chemical components, which in turn determines the behavior and orientation of those components. This field is electrical in the physical sense and by its properties it relates the entities of the biological system in a characteristic pattern and is itself in part a result of the existence of those entities and can be influenced by the whole through coherences.

The challenge then is to learn which frequencies (likely above the 10^{24} Hz range) can find sub harmonic resonances with our low frequencies. This is where the microtubules come in with their ability to interact with both light frequencies (ultraviolet in the 10^{15} Hz range), and our material neurons functioning in the kilo Hz range. Microtubules, with their combined mechanical and bioluminescence mechanisms, might be a sub harmonic resonant step-down mechanism.

Microtubules grow best when the energies of fear can be utilized by calm reflection. We can choose what we do in those few milliseconds between sensory input and our reaction, our free will intervention time. We can either choose to remain animally, fear based, materially conscious, or we could pattern our microtubules by co-creatively focusing on fearless consciousness. Our microtubules will grow and shrink as required to maintain those prechosen superconscious patterns of thinking. Evoking the "fear not" peace filled "mind of Jesus" (activating the Spirit of Truth) may allow temporary changes to microtubule lengths that facilitate temporary Christ like thinking and with repetition these patterns might become our homeostatic norm. I am not saying that microtubule patterning is souly (pun intended) responsible for Spirit of Truth reception. There are likely several mechanisms involved, and it is up to us to use our three cosmic intuitions (causation, duty and worship) to interpret and implement what our senses are telling us.

Microtubules and their ultraviolet "picture" of our bioluminescence and quieting our mind chatter, may allow us to better "see the light". The available interactions may involve quantum coherences where the material parts of us sense being a part of the cosmic whole.

John 9:5: "While I am in the world, I am the light of the world."

John 8:12: "When Jesus spoke again to the people, he said, "I am the light of the world. Whoever follows me will never walk in darkness, but will have the light of life."

Morontia Material – Hard Light

Perhaps, in the electromagnetic ascension continuum, we move up in frequencies from matter, to morontia to spirit energy formations. We might ascend from the very slow rotational energies of matter (fermions and bosons) to artificially maintained soul material, (bosons with mass), to the massless (and hence eternal) bosons of spirit energies. Note that bosons are carriers of force while fermions are different generations of matter.

In support of this idea, a few universities have successfully forced light to behave like atoms with the addition of different energies. They have slowed light to have small amounts of mass (about 100 times that of an electron) and make it exhibit the natural tendencies of matter to form compounds. (Ref 67, 68) This "hard or solid light" may be our first glimpse at soul matter.

Psalms 119:105: "Your word is a lamp for my feet, a light on my path."

Side Note: The energy balance between dark matter and dark energy in the Universe (where "dark" means unseen) has changed from being about 80% dark matter to around 70% dark energy and since dark matter clumps and dark energy appears to be smoothly distributed throughout space, I suggest that dark matter may be morontia material, since dark matter is found by using gravitational lens mapping, to be spatially collocated with regular matter in astronomical mapping. (Ref 70)

Physiological Continuum

Just as there is an electromagnetic continuum, from the high frequencies of spiritual realities, down to the megahertz ranges where we function, to the stationary isle of paradise, there is also a physiological electromagnetic continuum. At the very base of our individual physical identity, there is our fundamental descriptor, our DNA. Our DNA gives us our potential. Our DNA has the potential of creating the multiplicity of proteins that make up the various cells in our bodies. Based on our DNA, each cell creates the proteins necessary to be what it is supposed to be. Some become brain cells while others become gall bladders. How does DNA know what to become? How does it know how to fold to become a brain or a bladder cell? It turns out that the electrical environment of the cell has that "knowledge". As the cells are multiplying, as the DNA strands are unzipping, as the cells are dividing, their positions and orientations are maintained by their microtubules, and they are influenced by the electric fields that surround them. Their folding is also modified by epigenetic manipulations of the local electric field, and this determines what proteins are being formed. In other words, the same DNA folding in the brain electrical milieu becomes brain cells and those folding in the bladder electrical patterns become bladder cells. This was experimentally demonstrated by Michael Levin (Ref 48) in his work with flatworms. Electrical intercellular communication is facilitated in part by microtubules because of their electrical surface charges and their ability to maintain the relative position of all the parts. This intercellular communication

based on its electrical interactions, not only determines what is being formed but it also establishes the cell's cooperation with neighboring cells.

> Side note: Cancer cells are still the original cells (brain or bladder), but they have stopped communicating with neighboring cells. Cancers have typically reverted to a more primordial fermentation process of making ATP that does not require oxidative communication. (Ref 45) They have rebelled and think they can make it on their own.

Although the human body may be too large and complex to be quantum entangled in the literal sense, our subjective experiences of connection with others may often mirror this quantum phenomenon. The deep social bonds we form with loved ones, the sense of shared experiences, or moments of profound empathy where we seem to feel another's emotions as our own, all these experiences evoke a kind of "psychological entanglement" reminiscent of quantum connections and the non-local nature of quantum entanglement finds a parallel in how we maintain these connections with others across vast distances. There is a sense of connection when thinking of a loved one far away. There is also the phenomenon of simultaneous invention where multiple people develop the same idea (kindred minds) independently, which hints at a kind of entanglement in the collective human psyche.

The sensing of our electromagnetic environment, (Ref 49) with its associated communication mechanisms, determines our flow, from DNA to protein, from cell to neighboring cell, from neighbor to neighbor, from man to God, from day to day, from year to year, from here to eternity. It's all about local relationships.

These relational senses or flows are all influenced by our body, our self-awareness, our calmness, our local focus, and our overall God consciousness. All these processes incrementally influence how we proceed and we in turn, influence the people around us, enhance our sense of connectedness, and increase our sense of cosmic citizenship, the Supreme, and God himself.

Single and Multiple Quantum Coherence – SQC and MQC

First, we should define what we mean by quanta. Quanta, in physics, is a discrete quantity of energy proportional (in magnitude) to the frequency of the radiation it represents. Essentially it is the smallest transferable/exchangeable energy packet. In light it is a photon, in electromagnetism it is the gluon, in gravity, physicists are still looking for a graviton.

Some notable examples of electromagnetic quantum effects in biology are:

1. Photosynthesis: In plants, algae, and some bacteria, quantum coherence is believed to play a role in the efficiency of energy transfer during photosynthesis. Excitons (packets of energy) travel through light-harvesting complexes, and quantum effects allow them to find the most efficient path to the reaction center.

2. Magnetoreception in Birds: Certain migratory birds are thought to use quantum entanglement in their ability to sense Earth's magnetic field. This involves a protein called cryptochrome, where quantum spin states of electrons help birds navigate.

3. Enzyme Catalysis: Quantum tunneling is a phenomenon where particles pass through energy barriers they wouldn't normally overcome. This has been observed in enzymes, which use tunneling to transfer protons or electrons, speeding up biochemical reactions.

4. Olfaction: The sense of smell might involve quantum tunneling. Some theories suggest that odorant molecules are identified not just by their shape but also by their vibrational frequencies, which could involve quantum effects.

5. DNA Mutations: Proton tunneling in DNA can lead to spontaneous mutations. This occurs when protons in hydrogen bonds "tunnel" to different positions, altering the genetic code.

In the electromagnetic nature of our physiology, there may also be possibilities for magnetic coherences with spiritual forces. For example, water forms a dipole since oxygen is a big fan of electrons and attracts it more strongly than the hydrogen atoms. For this reason, electrons like to spend more time around oxygen, creating a (partial) negative charge on the side of oxygen.

Recent research into the nature of consciousness (Ref 65, 104) found evidence of multiple quantum entanglement using fast nuclear magnetic resonance (echo planar) imaging, to study brain protein physiology. They found that the thought processing areas of the brain functioned at the quantum level and using an intermolecular approach known as multiple spin echo (boosting the initial water induced echo) they found that different areas of the brain demonstrated multiple quantum coherences. In addition, there was evidence of single quantum coherence in the cerebral fluid itself showing up in the dipole-to-dipole interactions like the normal T1 (fat enhanced) T2 (water enhanced) relaxation and rotational symmetry measurements.

Let’s reflect for a moment on magnetic resonance. The magnetic resonance process involves placing the subject in a strong magnetic field and then superimposing a variable radio frequency electromagnetic field. The nuclei of the individual molecules, aligned by the strong magnetic field, are vibrated (jiggled) out of alignment, and the time taken to realign (T1 fat, and T2 water, relaxation times) are a function of the properties of their nucleus. The fact that water has a strong tendency, and most other molecules have a general tendency to align with a magnetic field, implies an overall reference field. In the magnetic resonance machine, the nuclei align with the coils, on Urantia the nuclei align with the earth’s magnetic fields, in the universe fields align with the energies flowing out of Paradise. We have a magnetic orientational relationship (coherence) to Paradise.

> Side note: There is also a coherence between our light sensing and our magnetic orientation. (Ref 113) This light sensing is aided by a networked hierarchy of intrinsic amino acids like tryptophan in microtubules. This is significantly different from other photoreceptors, which rely on a separate cofactor (such as flavin adenine dinucleotide in blue-light sensitive photoreceptors) or pigments (such as chlorophyll) to enable light detection and harvesting. Recent observations of UV light-harvesting from Trp networks in MTs (54) and of the Trp network as a photoreduction mediator in cryptochrome (14) are consistent with an emerging picture of extended protein scaffolds that harness the symmetries of hierarchical Trp networks to promote biological function.

> Side note: To build a reference map, time consciousness is required. To orient the map, we need a cosmic orientation. The nuclei of our cells may be providing that orientation.

By using cross-recurrence-quantification-analysis, to characterize and quantify interrelationships between nonlinear time responses, researchers also found a 300 to 450 millisecond delay between the EEG signal and the

related blood flow pulse oximetry signal. (think heart mind relationships) This delay was found to be location specific and was a function of awareness and wakefulness.

> Side note: Quantum coherence in microtubules is temperature dissipation limited. "Warm, wet and noisy" environments cause decoherence, so mental noise or things that raise our core body temperature and inflammation prevent coherence. Remember too, that thermoregulation stops during REM sleep so stay cool, calm, and collected. (Ref 4)

Magnetoencephalography (MEG) studies show brain oscillations of specific frequencies can be found in the cerebral cortex. For example, localized frequencies between 80 and 200 Hz have been related to epileptic seizure events. Magnetoencephalography may also demonstrate a magnetic alignment or orientation with Paradise since our cells have this tendency to exhibit magnetic bias or orientation.

There is a “brain atlas” (voxel map) that shows the various frequencies that dominate the areas of the brain and MEG is a tool that has been used to study the dynamics and connectivity of these large-scale brain activities (as opposed to atomic level connectivity) and their interactions with the body and its environment in functional body and other brain states. MEG measures the magnetic fields produced by the electrical activity of the brain (as measured in delta, theta, beta, gamma wave activity) using arrays of SQUIDs (superconducting quantum interference devices) or SERFs (spin exchange relaxation-free) detectors.

Remember the **“**random” nature of molecules transferring their signaling molecules as they bump into their neighbors? This so-called randomness may be another possible area of spirit influence, at the small-scale brain activity, and this would show up here as another form of coherence.

Time

We can talk about “relaxation” times but what is time? The material ego needs time and is impatient because it feels limited by time. Spirit is eternal. Spirit is patient, timeless, because it has all the time it needs.

But what is time? The philosophical debate about space and time is a dichotomy between two perspectives - absolutism and relationalism. Absolutism maintains that space and time are real and exist independently of human experience. Relationalism, according to the theory of relativity, neither space nor time are fixed entities; they instead arise from the relationships between objects and events throughout the cosmos suggesting that everything is based on information derived from our knowledge, our observations, and our measurements, aligning with the ideas proposed by philosopher Gottfried Wilhelm Leibniz.

Time then, is not just another dimension. Time is fundamentally different from the dimensions of space. You can stand still in space but not in time. Time is a parameter used to relate distances in space only because the speed of light is common to all observers. For example, 13 milliseconds is the time for a photon to traverse the distance between New York and Los Angeles. More specifically, time is only “perceived” by the analysis of motion and motion can only occur in space. Are you spatial or temporal? What part of material space is the real you? Does time allow the materially finite to coexist with the spiritually infinite?

“Now” is the intersection of “what was” and “what is yet to be”. Other than the present moment, time only exists as the apparent sequence of spatial events. It only exists as a memory or prediction in the brain or mind. We can

remember the past, we can predict the future, but the intersection of the two is the only "time" real to us. "Now" can be described as what is materially real (a photon's current magnitude and direction) whereas "what will be" can be described materially, probabilistically, by Feynman diagrams and "virtual" photon pathways. When you feel the warmth of the sunlight or see objects illuminated by moonlight, you are experiencing the effects of interacting with real photons. The effect they have on your future is under your control and guidance.

We have used different motions to measure time, burning candles, water, a pendulum, a vibrating crystal, atomic motion and given the instantaneous communication between photons, and other apparently simultaneous phenomena we should question the reality of time. IMHO time is a convenient mathematical tool to predict the future based on our observations of the past. i.e. a tool based on Newtonian observations. Our brain and mind, however, are not bound by Newtonian physics. We can choose to function at the quantum relativistic level of consciousness and incrementally nudge our future.

I have a position in space and a movement through that space. I also have a depth of personality with drives, attitudes of self-realization and reactions to my environment. I can, over time, also develop a breadth of insight, a coordinating and unifying ability, giving my life future meaning and value. (Ref 112:1.5) It could be that the I AM in me, slowly trading time (the shadow of spirit) for the real value in a light based morontia dimension as I grow my soul.

Material things change with time, truth does not. The search for truth is the search for timeless things. As we age, we have more past to refer to as we are solidifying in our minds our chosen path from the many possible paths opening to us at each moment. As we age, the present moment becomes a smaller and smaller part of our total existence. As we age, we have more experience from which to draw the wisdom required to make the right choices. Infinity is the sum of all the possible outcomes of time.

Our sense of indivisible unity transcends time and space.

Time Consciousness

To understand how our physiology interprets time, we first need to understand what makes us conscious of time and sequence. The entorhinal cortex (EC) is the early critical first stop area of the brainstem/midbrain and it functions as a network hub for memory, navigation, and the perception of time. For material processes, our perception of time is really our conscious perception of the previous patterns of electrical energy at multiple levels in our bodies.

To achieve the "integration of diverse elements, relationships, or values" (Webster's definition of coherence) we need to cross-reference time and space. To relate space, the EC has grid cells that fire when we move (imaginatively or actually) that gradually build a memory map or grid reference of our location and since we measure motion by time, we need a time reference. We need time references for all relationships, even a personal relationship to our own progress. We need time for our relationships to others, our relationship to Paradise, and our relationship to God.

To perceive time duration, the brain needs either a repeatable or stationary reference. There are a few ways to get a time reference. One would be our circadian rhythm; another would be the rhythmic pulsations (3.75 to 7.5 Hz) coming from the limbic hippocampal regions as seen in the Theta waves. Another would be the gradual buildup of different chemicals. Yet another possibility would be if the EC could reference something stationary or "outside of time". This could be the influence of our changeless personality, our homeostasis, or a changeless God concept.

Side note: The suprachiasmatic nucleus (SCN) is a specific brain region that helps regulate our circadian rhythms (sleep-wake cycles). Through its interactions with light input, neurotransmitters (glutamate and GABA), hormonal signals, and clock genes, the SCN coordinates the timing of sleep and wakefulness, linking our internal clock with our external environment. The SCN is a tiny yet sophisticated region in the hypothalamus, a part of the brain situated above the optic nerves. (Ref 138)

The EC with its time derived grid map, is also the main interface between the hippocampus (limbic, "fight or flight" declarative memories and spatial relationship) and the neocortex (computation, attention, thought, perception, and episodic memories). The EC-hippocampus system can time sequence the past, present, and future as related variables so it plays an important role in autobiographical, episodic, semantic, and spatial memories including their formation, consolidation, and optimization during sleep. The Thought Adjuster and Theta wave periodicity are both most prominent during sleep.The entorhinal cortex hub of the brain, with its myriads of logic circuits, continuously responds and adapts to stimuli, strengthening some connections, and weakening others. The process of intercommunicating and strengthening or weakening also involves the lengthening or shortening of the time delays of cytoskeletal microtubules. (Ref 39)

We see time as the observation of things evolving and there are two kinds of time:

1. Mind time: the observation of energy/matter changing its location (motion).
   Chronos - time duration as measured by a chronometer.
2. Spiritual time: Spiritual progress or our movement towards cosmic unity.
   Kairos – representing information at the right or opportune time.

Our different perspectives of time tend to influence our actions. We experience time materially as a sequence of events whereas we experience time spiritually by the effects of time on our sense of peace, happiness, and security. Memories too need sequence, and we need memories to evaluate our progress. The genes in our DNA give us our geological and ancestral memory, and our life experiences give these ancestral memories, current, localized, present day, meaning. We relate our history to our current location and time sense, and then integrate that into the larger chronological, cosmic, and timeless perspectives to give it more meaning.

Side note: Recent Alzheimer's research has found that the EC is larger for those individuals who live longer. A larger EC can look further back in time and extrapolate further into the future.

Side Note: The Hippocampus is where Alzheimer's disease originates due to these factors: oxidative stress, vascular insults, Stress, inflammation, genetics. (Ref 131)

Multiple Physiological Clocks

The entorhinal cortex, with its relationship to theta waves and other time sensitivities give the brain a fundamental sense of time but there are many other ways to sense time. Pulse gives us a rhythmic time sense. Special "time cells" in the hippocampus are linked with "place cells" by shared firing properties. Other cells measure time (like it's time to rest) by the buildup and breakdown of proteins. At the yearly level there are also biological markers of our "age". The lengths of telomeres (tail ends of our DNA strands) get shorter during cell manufacture and result in things like grey hair facial wrinkles and even change facial temperatures (cooling of the nose and cheeks).

Our circadian rhythms, at the daily level, are sensed by the rotation of the earth in the brain's insular cortex region of the brain, our pulse gives us a moment-by-moment sense and radiation from pulsars may give our atomic nuclei a time sense for interstellar correlations. Our circadian sense of time is also related to the buildup of chemicals and our detection of blue light by a pair of neuron clusters in the hypothalamus situated directly above the optic chiasma that receives photic input from the retina via the optic nerve (Ref 112). In the case of daily tiredness, it is the balance between adenosine and melatonin. At the hourly level, we are aware of chemical changes (hunger, thirst etc.). Microtubules give us an awareness at the millisecond level, and nuclear spins give us a reference at the attosecond level. All these evaluations are made in the present, although the past created these current conditions.

Remember, there is mind time (material motion) and spirit time (cosmic movement). Our body senses time electrochemically by relating to its surroundings, perhaps we should intellectually sense our spirit time, by sensing and relating it to the cosmos.

Thought Feedback Loop

The locus coeruleus (LC, sometimes called the "Blue Spot" of the brain) is an area of the brainstem that is the primary source of neurons known as "catecholaminergic" neurons, because they produce the catecholamines, dopamine and the neuromodulator norepinephrine (Ref 110).

> Side Note: The neurotransmitter norepinephrine is also made in the liver when we eat fats and is balanced by the production of insulin. An overabundance of norepinephrine is thought to be a precursor of insulin resistance and obesity. (Ref 122)

The LC is involved with our physiological responses and is critical for numerous functions including the response to stress (Ref 19), attention, emotion, motivation, decision making, learning and memory. The locus coeruleus-norepinephrine (LC-NE) system with its phasic (time sensitive) and tonic (amplitude sensitive) microtubules, functioning at the quantum level, is capable of instantaneous, as well as time-based influencing of our thought processes, and could be the basis of our reflective thinking, thought feedback loop. We are not our thoughts. We are the observers of our thoughts, and the observation of thoughts is what I call the thought feedback loop. That is: first there is the thought, then the reflection of the consequences of that thought which then triggers rethinking. Slight changes in the time delays may be one way that the adjutant mind spirits or our Thought Adjuster or for that matter the Supreme, might nudge our thinking towards mid-mind functioning.

The Thought Adjuster may influence our thinking by nudging the time delays of the cascades of electron jumps as they flow through the brain on route to the executive areas, around this feedback loop, and then, more importantly, back again (times 10) for more reflective thinking. This may be most effective at the thought precursor stage (based on our preauthorized allowances) because after that, our active free will takes full control of the thought processes. Exceptions may be in the case of deep meditation, (Ref 32, 38) and worship where the lower frequencies can be given a few more milliseconds for reflective cross pollination of our thinking.

Heterophenomenology is the study of first-person phenomena, from the third-person point of view. This may be another name for our awareness of this feedback loop, between the thought precursor, the thought, and the realization that we can (with spirit guidance) physiologically influence that self-reflective thought process.

Near Death Experience – NDE

One instance where this thought process undergoes dramatic change is during a near death experience. Most NDEs (Ref 17) result in positive transforming changes and sudden spiritual growth. People often report (a) separation from the body with a heightened, vast sense of consciousness and recognition of death; (b) travel to a destination; a meaningful and purposeful review of life, involving a critical analysis of all actions, intentions, and thoughts towards others; (c) a perception of being in a place that feels like "home", and (d) a lack of time sense (e) a return to life. The near-death experience may have a spiritual result but let's look at some of the electrochemical physiology that might be involved in this spiritual uplift. As blood flow drops, there is a loss of ATP, anoxia and cellular electric potential also drop. This is known as anoxic depolarization, and it starts in the neocortex. (Ref 137) Also, near clinical death, there is a burst of electrical Gamma frequency range signals called the way of death, probably related to an intercellular capacitance reduction. (Ref 72) Our intercellular communication and our thoughts, are normally separated and specifically cross connected through troughs and zones of "local minima" voltages. A reduction of available energy to maintain these voltages may facilitate massive synapse cross communication (think life review, calmness, connectedness). It may also reduce the veto power of our free will and allow the adjuster's patterning to dominate our thinking. Some drugs, (Ref 30) like tryptamines ("vine of the soul" ayahuasca, psilocybin and N-Dimethyltryptamine, which are structured like serotonin, sometimes called "Spirit Molecules,") (Ref 125), may have the similar effect of lowering the voltage walls of our thought channels allowing for decrease segmentation, longer temporal thought processing, and massive neuronal hyperconnectivity.

Rick Strassman, the first American researcher to receive government approval to study hallucinogens between 1990 and 95, as clinical associate professor of psychiatry, administered roughly 400 doses of N,N-dimethyltryptamine (DMT) to nearly 60 patients at the General Clinical Research Center of the University of New Mexico Hospital. His findings were initially confined to clinical work recording the physiological effects of DMT, such as heart rate and blood pressure, but he couldn't deny the overwhelming religious experiences reported by participants and he reported these in his book, DMT: The Spirit Molecule. (Ref 85) Strassman also relates this to the pineal gland and near-death experiences.

> "This tiny organ, the 'seat of the soul' or 'third eye' of the ancients, might produce DMT or similar substances by simple chemical alterations of the well-known pineal hormone melatonin, or of the important brain chemical serotonin. Perhaps it is DMT, released by the pineal, that opens the mind's eye to spiritual, or non-physical, realities." - Strassman

There is evidence (Ref: Robin Head of the Psychedelic Research Group within the Centre for Psychiatry at Imperial College London) that when taking drugs like psilocybin the brain's default mode network (DMN) reverts to a childlike "selfless" state. The brain's default mode network, which mediates self-referential behavior, moral reasoning, and imagining of the future, probably influenced by our superconsciousness, is most active during resting states (such as meditation and worship). (Ref 123)

Emotional Processes

First, we should define some terms. The word feel comes from the Old English word felan, which means 'to perceive.' A feeling is a perception. It is a sensory input which we then deal with through our nerves, brain and bodily responses. The word emotion comes from the Latin ex, which means "out" and movere, which means 'to move,' and therefore denotes an 'motion outwards.' Our emotions then are our actions as we respond to our feelings.

Emotions (Ref 18), which are controlled by peptides in the amygdala, are a function of the difference between what we anticipate and what we experience, and this is, in turn, a function of the time delayed processing of the sensory inputs that trigger those anticipations and our related reactions. Processing delays give us time to appropriately respond, rather than animalistically, immediately, reacting to those sensory inputs. This delay allows us to control our emotions, rather than having our emotions control us. Happiness results when our expectations match our experiences. Happiness evolves when we trust that whatever occurs is not only acceptable but beneficial (Ref 120). When we trust in the unassailability of our spirit nucleus, when we have a real faith-trust in a changeless cosmos.

The placebo effect has been scientifically validated, and its effectiveness is primarily due to an emotional confirmation and by the appropriate application of faith. The ventromedial prefrontal cortex (vmPFC) comprises several distinct cytoarchitectonic areas in the medial temporal lobe. It is a key brain region supporting our decision-making processes, and it has been shown to be one of the main hubs of the Default Mode Network. (Ref 31, 109) The Default Mode Network is a superconscious network activated during calm states such as meditation, hypnagogia (Ref 24) and light sleep that mediates self-referential behavior, moral reasoning, recollection, and imagining the future. The vmPFC is a relay center that provides somatic markers (physical sensations) and can help guide how people respond to situations connecting mental representations with secondarily associated emotions. When mental representations are being compared, contrasted, selected, and singled out, it's the somatic, gut level, (think serotonin) intuitive markers that dominate. (Ref 28) One of the vmPFC's functions is to filter out the less relevant inputs, prioritize and connect the rest, in patterns for future reference.

The Default Mode Network in the context of a hierarchical consciousness concept, first described by Raichle et al. in 2001, is not only associated with consciousness, but represents a fundamental aspect of consciousness.
The Default Mode Network is an active part of the consciousness process, especially in relation to self-referential and the introspective aspects of consciousness. It represents a continuous stream of conscious activity that persists even in the absence of external tasks. The states of consciousness arise from the dynamic interplay between DMN activity and the activity of task-oriented networks. The uniqueness and balance of the DMN are in constant fluctuation and reflect the specific patterns of activity that are variable in time and can switch between different "states". (Allen et al. - 2014, Andrews-Hanna et al. -2010, Finn et al. – 2015.) The DMN also exhibits specific activation patterns during certain cognitive tasks, especially in tasks that involve self-referential thinking. Spreng et al. (2010)

> Side note: A familiar drug, ecstasy, (MDMA or 3,4-Methylenedioxymethamphetamine) causes the continuous release of serotonin and dopamine and blocks their reuptake mechanisms causing a sense of equanimity and positive self-regard that enables the user to calmly and compassionately reexamine past events. It also has neurotoxicity if used more than once. (Ref 79)

Side note: The adjutant mind may be a very restrictive filter on the infinite mind, limiting our discernment to those things necessary for survival whereas the cosmic mind may be a less filtered version of mind that allows more connected reflecting. (Ref 148)

French philosopher Henri Bergson said it this way: "The function of the brain and nervous system and sense organs is in the main eliminative and not productive."

Consciousness of the connection between our emotions and our memories allows us to look before we leap, as we imagine a cosmic plan, our participation in it, and calmly anticipate any future joy that may result from it. Emotions and our creative anticipatory imagination are influenced by curiosity (self-consciousness), aesthetics (material consciousness) and ethical sensitivity (cosmic consciousness). The prefrontal cortex can also be an experience simulator capable of both the anticipation (looking) and the realization of the consequences of that anticipation (leaping) and their related emotional reactions (reflecting). We can simulate the cosmic plan, our potential contribution to it, and our emotional reactions from our anticipated participation in it.

Passionate emotional involvement may be particularly useful in the zeal of execution, but we may want to limit those emotions that often distract us from confidence in our preparatory thought processes.

Emotional Self-Mastery

Our amygdala (our emotion control center) preprocesses input signals before sending them onto other parts of the brain for rational overcontrol. An emotional response causes changes in the gene expression of certain cells (which results in hormones, neurotransmitters, and other messenger molecules) which do things like increase your blood pressure, adjust your breathing, tense your muscles, or stand the hair up on the back of your neck. (Ref 22)

One example of an emotional condition, fear, involves the presence of calcitonin, a gene-related peptide, which is created by all fears and this peptide relays signals to other areas of the mid brain. It is also a hormone that blocks the activity of osteocytes that break down the calcium in your bones and act within the central nervous system to inhibit gastric acid secretion. Fear is mediated by dopamine from the amygdala. Can you see how the physiological dominos are all influencing each other?

What things are, or were, in our control?

- our emotional state, where we are, our brain state, our current level of fear, our interpretation of the situation, our environmental memories, memory interpretations, physical status, hormone levels (testosterone and other stress hormones, calcitonin GABA, etc.), neuroplasticity, experience, epigenetic modifications.

What things do we have no control of?

- cultural or genetic predisposition and our base DNA.

There are implicit (emotional), explicit (intellectual) and functional memories in our schema or current mental model. Some implicit memories are present at birth. Our hippocampus centric, explicit memory, aided by our

cognitive processes of thinking and understanding are different yet deeply interconnected to our implicit emotions, our feelings, and sensations.

There are six brain circuits involved in these processes: the default mode circuit, the salience circuit, the attention circuit, the negative effect circuit, the positive effect circuit, and the cognitive control circuit.

Default Mode Circuit (DMC):
- Active during rest and when the mind is not focused on external tasks.
- Involved in self-referential thoughts, introspection, and social cognition.
- Includes regions like the anterior medial prefrontal cortex (amPFC), posterior cingulate cortex (PCC), and angular gyrus (AG)

Salience Circuit:
- Detects salient changes in the environment, both interoceptive and external.
- Signals the need for cognitive control and attention.
- Includes core nodes in the anterior cingulate cortex (ACC), anterior insula (aI), and sublenticular extended amygdala.

Attention Circuit:
- Focuses on external stimuli and maintains attention.
- Involved in tasks requiring sustained attention and selective processing of information.

Negative Affect Circuit:
- Processes negative emotions and threat-related stimuli.
- Includes regions involved in fear and sadness.

Positive Affect Circuit:
- Processes positive emotions and reward-related stimuli.
- Includes regions involved in pleasure and motivation.

Cognitive Control Circuit:
- Involved in executive functions, such as planning, decision-making, and functional memory.
- Includes regions like the dorsolateral prefrontal cortex (dLPFC), ACC, dorsal parietal cortex, and precentral gyrus.

The three main areas of the brain that control our emotions are:

The amygdala which controls our emotional responses, our memory, learning, visceral and autonomic functions, from within the limbic system.

The prefrontal cortex which controls decision-making and can override our emotional responses.

The hippocampus, controls memory formation, contributes to cognitive and emotional processing, and intricately weaves together their functionalities.

Emotional control is managed by the prefrontal cortex which has a slightly different structure to the rest of the brain. Most of the prefrontal cortex is identifiable as the brain region having a distinct cell layer with a high concentration of “granular” neurons. These granular neurons are small, with short connections, mostly massaging/messaging other adjacent neurons and every cell has neurotubules communicating with every nearby cell both physically and bioelectrically. The prefrontal cortex receives long projections directly from the mediodorsal nuclei of the thalamus, a midline structure deep in the brain. The neurotransmitters serotonin,

dopamine, and norepinephrine originate within tiny structures even deeper in the brain, and they send neural projections to the mediodorsal thalamus as well as directly to the prefrontal cortex to respond to or mitigate reactions to sensory inputs. Some researchers loosely divide these executive functions into "cold" and "hot" categories. Cold being executive functions of logic, thought processes, mechanical processes like memory and planning, and are localized towards the sides of the prefrontal cortex. The hot functions involve emotions, motivation, and impulsivity, and are centered more along the midline and underside of the prefrontal cortex.

Hormones and neurotransmitters manage the biochemical overcontrol of our emotions and play a crucial role in assisting the activities of our immune system, by integrating mental, emotional, biological activities and eventually our spiritual wellbeing. They color, predict, and change our behaviors, our moods, and our unique emotional tone. For example, the hormone ghrelin determines our hunger, insulin triggers a gain of body fat, incretin tells us we are full, and leptin responds to too much body fat. It is interesting to note that when we are obese ghrelin and insulin stay active but leptin activity drops. The balance of hormones and neurotransmitters influence our emotions and there are no hard-wired emotion control circuits in the brain. Our emotional responses are free will controllable, but that control is incremental. Patience, determination, and consistency are required to gradually change the neurotransmitters at each nerve synapse as they relay our emotional response signals. They are first established, and then they are modified by epigenetic methylation and our newly established emotional predisposition. (Ref 5, 56)

Recent research by Melisssa Hogenboom (Ref 63) showed that mindfulness and meditation reduced the structure of the amygdala (which indicated less stress) and an increase in the size of the cingulate cortex (indicating improved emotional control).

The main neurotransmitters involved in emotional responses are:

Glutamate and Gamma-Aminobutyric acid (GABA) give us our balance of excitement versus the urge to be calm and ensures our homeostasis. It is improved with drugs such as Lithium (with devastating long term side effects) or with ketosis, and good sleep.
Calcitonin relates to our fear.
Dopamine is the body's future reward system, which includes feeling pleasure, achieving heightened arousal, and learning, unexpected benefit, motivation, and future happiness.
Norepinephrine, **AKA noradrenaline,** relates to our sympathetic nervous system alertness.
Opioid peptide (oxytocin) is involved in orgasm, social recognition, pair bonding, anxiety, group bias.
Epinephrine AKA adrenaline controls our fight or flight prep.
Serotonin (95% of which comes from the gut) controls our anxiety, current happiness, sense of wellbeing, appetite, mood, memory, and sleep.
Purines (adenosine) is a neuromodulator involved in suppressing arousal and improved sleep.
Endorphins relate to our current pleasure and self-esteem.
Neurotensin acts like dopamine but is more specifically for the differentiation of "good" from "bad" thoughts.

Our initial emotional conditions relate to our calmness, and our ability to handle new challenges which in turn relates to our trust in God.

Emotional Relationships

Side Note: The drug Adderall temporarily links dopamine to noradrenaline which links focus to pleasure and we naturally link past pleasure with future goals.

Thought Processes

Some might visualize their thinking as a linear (male) process. Others may picture it as a plainer more matrix cross referencing (female) evolution of thoughts. Thinking may be more like dynamic volumetric sculpting, and the Thought Adjuster may be able to "see" the value as a sculpture that exists within the wholeness image of our thoughts, and it may be that manipulations of the time delays would give the Thought Adjuster the ability to mold the overall dynamic sculpture. To help, we might think of changing the lighting to be more of a top-down illumination or turning up the contrast to make the shape more cosmically recognizable. This might be done by "effortless attention" to thought precursors (continuous communion with God) and cooperating with the Thought Adjuster's (fear not) efforts. Perhaps at times when repetitions are involved (such as in music) we can be more helpful since we have multiple chances at fine tuning that picturization. Practice with quieting the unnecessary clouding of sensory inputs from the body and minimizing non-valuable, higher frequency thoughts, may also help.

In a spiritual sense our curiosity about cosmic consciousness and our willingness to be influenced (to share the inner life) may allow us to imagine the source of that illumination and to creatively extrapolate, from that mental spiritual safe zone, the realization of the resultant enduring peace.

The attainment of cosmological levels of emotional equipoise, calmness, equanimity, and happiness may involve time delayed responses. It would be like *injecting a fragment of eternal timelessness* into our frenetic thinking. It can likely be encouraged by the "effortless attention" and "restful spiritual exertion" of worship.

Quantum coherence occurs when particles act in a coordinated manner, effectively behaving as a single system. This coordinated behavior allows for phenomena like superconductivity and superfluidity. To find calmness in subjective experiences, we may want to look for a process similar to the quantum coherence of certain mental states, and visualize mental processes aligning seamlessly, creating a sense of effortless action which might lead to heightened performance.

It may also be aided by a truly relaxed approach to:
Curiosity - Hunger for harmony and thirst for beauty. Persistent attempts to discover new levels of harmonious cosmic relationships. The satisfaction associated with satiated curiosity.
Aesthetic appreciation - Love of the beautiful and ever-advancing appreciation of the artistic touch of all creative manifestations on all levels of reality. The calmness is associated with being in beautiful surroundings.
Ethic sensitivity - Through the realization of truth, the appreciation of beauty, which leads to the sense of the eternal fitness of those things which impinge upon the recognition of and cosmology values.

All these processes may lead to emotional calmness and a sense that it is a friendly universe.

Sentience and Cosmic Consciousness

Let's look at the bodily functions that help our mind to calmly relate to the cosmos as creator, controller, and upholder. It is possible that time delays, combined with quantum coherence, and the other physiological processes we have talked about, are proportional to our degree of sentience, our self-consciousness, and cosmic consciousness.

Intuition (instinct), understanding (rationalization), courage (loyalty), knowledge (ideology), counsel (socialization), worship (zeal), wisdom (symmetry) may be related to evolutionary patterning and cross communication of cells in our bodies and brains.

Intuition (the energy of instinct):

> The relationship between instinct and physiology is likely traced back to some of the earliest multicellular organisms. Evolutionary biology suggests that even in primitive life forms, the connection between physiological mechanisms and instinctual behaviors existed as a fundamental survival tool.
> For instance, reflex-like responses to environmental stimuli can be observed in simple organisms like hydra or jellyfish. These creatures, with their rudimentary nervous systems, developed instinctive behaviors such as withdrawing when touched—an evolutionary adaptation to avoid harm. This relationship marks one of the first signs of instinct rooted in physiology, as these actions were governed by nerve nets and cellular signaling. As evolution progressed, more complex organisms emerged with centralized nervous systems, enabling increasingly sophisticated instinctive behaviors. Early vertebrates, like fish, exhibited instincts related to predation, mating, and escape from predators, driven by their developing brains and hormone systems. The limbic structures, now central to modern instincts, began to form in these early vertebrates. The true breakthrough came with mammals, whose instincts became

deeply intertwined with advanced physiology, especially brain development. Complex instincts like parental care, social bonding, and territoriality emerged, highlighting the evolutionary refinement of this relationship. In essence, the first signs of instinct being tied to physiology appeared when organisms developed mechanisms to sense and react to their environment, a landmark in evolutionary history.

Understanding (the energy of rationalization):

Rationalization is tied to the development of the human brain, particularly the prefrontal cortex, responsible for complex decision-making and reasoning. As primates evolved, rationalization emerged as a survival mechanism, enabling us to plan, solve problems, and justify actions. Early hominins who could rationalize decisions, like strategically hunting prey or solving social conflicts, were more likely to survive and pass on their genes. This cognitive process is deeply rooted in neural networks and neurotransmitters, such as dopamine, which are involved in reward prediction and decision-making.

Courage (the energy of loyalty):

Loyalty is associated with the evolutionary need for strong social bonds. In early primate groups, loyalty to family or tribe enhanced cooperation and collective survival. This trait is linked physiologically to oxytocin—sometimes called the "bonding hormone"—which plays a crucial role in creating feelings of trust and attachment. The limbic system, which governs emotions, also contributes to loyalty by fostering feelings of security and belonging within social groups.

Knowledge (the energy of ideology):

Ideology evolves from our cognitive and social tendencies to seek patterns, shared beliefs, and group identity. Early humans who adopted shared ideologies—like rituals or symbolic communication—enhanced group cohesion and cooperation, vital for survival. Physiologically, ideology engages areas like the prefrontal cortex for abstract thinking and the amygdala for emotional salience. Neurochemical processes, including serotonin and dopamine regulation, also support the sense of purpose and fulfillment often tied to ideological belief systems.

Counsel (the energy of socialization):

Socialization has clear evolutionary advantages, as early primates relied on cooperation and communal living to thrive. Physiologically, socialization taps into our mirror neuron systems, enabling empathy and understanding of others' actions. Hormones like oxytocin and endorphins reinforce positive feelings during social interactions. Over time, the evolutionary drive for socialization shaped human behaviors like language development and cultural exchange, solidifying our status as highly social creatures.

Worship (the energy of zeal):

Zeal, the intense enthusiasm or drive, has its roots in evolutionary survival. Early humans who displayed zeal often had the motivation to hunt, gather, protect their community, or innovate, increasing their odds of survival and reproduction. Physiologically, zeal is closely tied to the brain's reward systems. Dopamine, the "feel-good" neurotransmitter, plays a significant role in reinforcing energetic, goal-oriented behavior. The limbic system, especially the hypothalamus, helps regulate arousal and motivation, driving a sense of

purpose and vigor. Interestingly, zeal can also be linked to stress hormones like cortisol. Moderate levels of stress can enhance focus and energy, fueling passion and drive. Over evolutionary time, zeal likely became associated with leadership and ambition, traits that benefited both individuals and groups.

Wisdom (the energy of symmetry):

A sense of symmetry has both aesthetic and survival implications. Evolutionary, humans and other organisms have favored symmetry due to its association with health and genetic fitness. For example, symmetric physical features are often seen as indicators of good genes, which explains why symmetry plays a role in mate selection. Physiologically, our brains are wired to detect and appreciate symmetry. The visual cortex processes symmetrical patterns efficiently, creating a sense of balance and satisfaction. Mirror neurons may also contribute, helping us recognize and replicate symmetry in behaviors or designs. The evolutionary connection extends to art, architecture, and cultural practices that favor symmetry, further reinforcing its importance in human life.

These evolving traits, as manifestation of the increasing influences of the mind adjutants, underscore how our physiology gradually evolved and changed our behaviors to allow increasing adjutant influence, enhanced survival, reproduction, social cohesion shaping our most defining characteristics as humans and developing our God consciousness. Each time the energy of the mind adjutant influenced our material desires and patterns; they harmonized with and were stabilized by their reciprocal resonances. The quality and future stability of each of the traits determined their degree of harmony and their intensity determined their attunement.

The functioning of the above, especially for worship and wisdom, might also be related to microtubule lengths and their associated introspective time delays, (Ref 61) and their MAP cross patterning in the brain. Microtubules don't function until there is dissipation-less electrical energy transfer (insulation from surrounding tissue) and this is critical for allowing quantum coherence. This only occurs when microtubules are suitably insulated and are greater than 10^{-6}m in length. (Ref 127) Is this the initial condition needed in the evolving primates for the adjutants of worship and wisdom?

During early childhood (around age 3), microtubules in neurons are actively involved in brain development, supporting rapid synaptic growth and plasticity. As individuals approach adolescence and early adulthood, microtubule dynamics stabilize, reflecting the maturation of the nervous system. However, subtle changes in microtubule length may still occur in response to environmental factors, learning, and stress.

Some brain/mind/adjutant examples: the Spirit of Intuition, may provide the foundation for basic survival instincts and reflexive thinking, could be seen as interacting with the brain's more primitive structures, such as the brainstem and limbic system. These areas govern instinctual responses and basic survival mechanisms, fostering immediate awareness and reaction to environmental stimulus. Understanding, which enables associative thinking and reasoning, may correspond to the brain's higher-order cognitive functions, particularly those associated with the cerebral cortex. This facilitates the ability to connect ideas and discern patterns, processes that are deeply tied to the brain's capacity for learning and memory. Courage, which inspires initiative and perseverance, might be linked to the brain's reward systems, such as those involving dopamine and neurotensin pathways. These systems motivate action and reinforce behaviors that align with personal survival and goals, reflecting the adjutant's role in fostering determination and resilience. Knowledge, which supports the accumulation and application of experiential learning, could be associated with the hippocampus and other memory-related structures. These areas of the brain are crucial for storing and retrieving information, enabling mortals to build upon their experiences and apply them to new situations. Counsel, which fosters social cooperation and group harmony, may interact with the brain's social cognition networks, including the prefrontal cortex and regions involved in empathy and interpersonal understanding. This encourages collaboration and the ability to work effectively within a community, aligning with the neurological basis for social behavior. Worship, which elevates the mind toward spiritual realities and divine communion, might be linked to the brain's capacity for abstract thought and transcendental experiences. Studies on spiritual practices suggest that regions such as the parietal lobe and the default mode network are active during moments of deep reflection, prayer, or worship, potentially serving as physiological correlates for this adjutant's influence. Finally, Wisdom, which integrates knowledge, experience, and insight into balanced decision-making, likely engages the brain's executive functions, particularly within the prefrontal cortex. This area is responsible for planning, judgment, and the synthesis of complex information, aligning with the adjutant's role in guiding mortals toward higher understanding and moral discernment. The Spirit of Truth may consolidate and unify all these responses.

Are microtubule lengths or patterning related to our abilities in these areas? Are microtubule lengths related to the universal receptivity of the Spirit of Truth after Pentecost?

The Spirit of Truth may function to provide a bias superimposed on the overall patterning of these microtubules, and their associated ARC propagation time delays may function both individually and collectively. This patterning may also be a general electrical bias overlayed in the white matter surrounding the brain, together with the patterning of the microtubules themselves as influenced by the flow of ARC activity. This patterning may allow for the functioning of the Spirit of Truth and this patterning may have been derived from *the patterning of Jesus' own microtubule structures* as he arranged them, in his own brain and body, 2000 years ago. Reception by the apostles and others after Pentecost may have been a repatterning of their microtubule lengths to facilitate their reception of the Spirit of Truth.

Our biases result from the lengths of the tubules and established trigger voltage thresholds which are constantly changing. The fact that we can influence the lengths of these microtubules in these para crystalline-like structures, and our calmness (think base voltages versus trigger voltages) suggests that over time, we can develop "habits of thinking" (patterning our thoughts the way Jesus did). The stable patterns of these cascade phenomena may become our religious habits of thinking and our conditioned spiritual reflexes and since we become more like the one we worship, this may be the basis for our soul growth and stabilization of purpose.

One final thought on the Spirit of Truth. Could it be that during Jesus' incarnation he learned how to manage his own emotional control, biological processes and microtubule patterning? Did he learn how material bodies function and how best to fine tune their physiological functions for improved spirit reception? Did he learn the patterns of neurotransmitters and neurotubule lengths best suited for the cosmic reception and increased spiritual influence? Can we religiously manage our own reaction patterns and emotional responses to life's situations? Can we learn to be more Christ like?

Top-Down and Bottom-Up Interpretation

Top down, spiritually**,** consciousness seems to proceed from thought-value, through the word-meaning, to the fact of action. From our bottom-up perspective, our progress seems to proceed from facts to thoughts, to meanings and then to the value of those meanings.

Materially, the bottom-up perspective might be thought of as organizing electrical energy, volitionally as we use our free will to control our thoughts and organize them to be receptive to spirit energy symmetry. Our task may be to harmonize our thinking with a top-down perspective.

It seems to me that cosmic attainment involves material (think epigenetics), intellectual (think emotional) and spiritual (think faith trust) progress. Education may sharpen and unify these patterns of thought processing in our mind. Civilization may express these meanings and values; life may experience them, and religion may ennoble them. There is a calmness associated with the realization of their inevitable perfection. During our formative years we are functioning primarily at the animal (fear your enemy) survival level. Once we have confidence in an afterlife and a cosmic plan or process, our task becomes to invert this bottom-up, survival of the fittest, mentality to a top-down love our enemy, cosmic perspective. This may require that we gradually, over time, change our thinking and entrench the Jesus's inverted ways of thinking. I call this the Jesus flip (think, "love your enemy", beatitudes, inevitabilities, selflessness).

Soul Physiology

It seems to me that there are two fundamentals that need to be captured to transfer our soul's identity for resurrection.

We will need our memories, those spiritual associations of thoughts from reactions to our experiences. The value of these past experiences and their associated spiritually valuable memories. We will also need our characteristic physical traits. We will need a representation of the state of our brain and body with the physiological patterns that gave rise to those spiritual reactions. These brain states might be re-remembered, in the soul.

What might be a mechanism to capture, at any instant, our mental patterns, material status and possibly a snapshot of our mid-mind, for transfer/transition to mansion world number one? The body's microtubules and the brain's neurotubules (with their associated infrastructures) are representative of the way we react to our experiences. Our guardian angel may be aware of this "mind-matrix" or "mind patterns", as well as our base DNA and its epigenetic tagging and other modifications. Our microtubule and neurotubule lengths and their associated ultraviolet light patterning, are a part of our body, mind, mid-mind matrix, and may represent the combined spiritual/physical status of our whole body, brain, and nervous system. At death (or any suitable time before death) a snapshot of this information, could be reduced to a 3-D image or a numeric sequence, essentially a digital or analog representation of our luminosity, our bio luminosity frequency uplifted to be our spirit luminosity.

A fully grown human adult might have between 80–100 trillion cells. About 4 trillion of them do not have our own genetic material so we are not so concerned with them, but what about the information, relationships, and intercommunication patterns that the DNA modified cells have developed over our lifetime? Are they preserved and if so, how?

The second law of quantum complexity says that complexity, like entropy, always increases up to a local or global maximum. We are living in a locally and globally entangled reality. This is demonstrated by the life after heat death, of a black hole where even after thermal equilibrium (heat death) complexity increases due to quantum entanglement. The investigation of possible states takes longer than the time to get to thermal equilibrium. This is analogous to computer circuit complexity in a physical system. It is like a reverse cypher code (the code required to break a cypher). It implies that after material death (material heat death), the soul could continue its search for complexity.

> Side Note: This so called the "black hole information paradox" is resolved by "nonviolent nonlocality". In this scenario, the insides of black holes are connected to their outsides through "quantum nonlocality" in which correlated particles share the same quantum state (think quantum entanglement and ubiquity). (Ref 126)

Light has momentum and momentum is a vector. The so called "Poynting" vector. i.e. it has magnitude and direction. In a four-dimensional Minkowski relativistic space, the equation is $E^2 = p^2c^2 + m^2c^2$ (where E = energy, p = the magnitude of momentum, m = mass, c = speed of light in a vacuum) or more simply E = pc. The concept of momentum transcends Newtonian mechanics. Momentum is a fundamental property that is conserved in all physical systems with *spatial* translational symmetry according to Noether's theorem (Ref 97). Similarly, energy is a fundamental property that must be conserved in all physical systems with *time* translational symmetry. This

implies that our biological luminescence and its associated patterns can have magnitude and direction, cosmic momentum after disassociation from our spatially patterned matter.

Every particle in the universe, no matter whether it's a fundamental or a composite particle, falls into one of two categories.

Fermion. With quantized half-integer values of Planck's constant: ±1/2, ±3/2, ±5/2, etc.

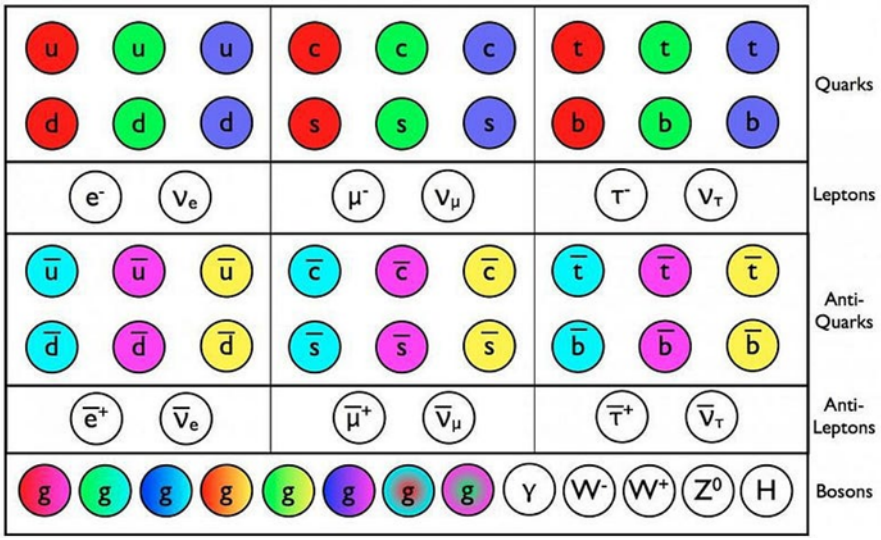
Boson. With integer spin values of Planck's constant: 0, ±1, ±2, etc.

That's it. In the known Universe, there are no fundamental or composite particles that fall into any other category. Everything that we've ever measured behaves either as a fermion or a boson; there are no particles that exhibit any other statistical properties.

Another factor to consider is the matter of collocation. It is interesting to note that most Bosons can interact electrically with the Higgs field (have mass). Massless gluons and photons (both bosons) do not interact with the Higgs field. No two fermions can occupy the same space or quantum state simultaneously (think fatherlike), but multiple massless bosons can. Gluons, (the particles that mediate the strong nuclear force) and the Higgs boson (the so-called God particle - think motherlike) are ubiquitous. Michael and mass are both spatially specific (they have ubiety), and our local universe mother spirit (and photons) can simultaneously be in multiple places at once, (they are ubiquitous). This also hints at the complemental (think electro – magnetic) and coherent nature of matter and spirit.

In the Standard Model, there are only a few particles that are required to understand almost everything:

- up-and-down quarks, which make up protons and neutrons,
- gluons, which hold protons, neutrons, and all atomic nuclei together,
- electrons, which bind with atomic nuclei to make neutral atoms,
- photons, which are the particles that mediate the electromagnetic force (the quantum of light)
- neutrino (and its antimatter counterpart, the antineutrino), which plays a major role in the weak nuclear interaction



Fermions (top4) and Bosons (bottom line)
(Credit: E. Siegel/Beyond the Galaxy)

There are 12 different bosons (force carriers) and they are grouped to describe their three interactions.

1. The 8 gluons mediate the strong nuclear force, and act only on particles with a color charge: the quarks, antiquarks, and other gluons.
2. The 3 weak bosons, the W+, W-, and Z^0, are all massive and mediate the weak nuclear force. If you can radioactively decay or be a product of radioactive decay (including all fermions), these bosons can interact materially with you.
3. Photon Y has no mass and yet is responsible for mediating the entire electromagnetic force spectrum. All charged particles experience electromagnetic interactions, including fermions, except for the low-mass, uncharged neutrinos and antineutrinos that barely interact with anything at all (think solitary messengers). Light can change its direction because it has momentum. This change of momentum results in a force.

It is also interesting to note that gluons, the smallest particles, have velocity and direction, but are massless. They facilitate the strong interactive force that hold the quarks together that make up the protons and neutrons. On the other extreme we have massless photons going anywhere and both extremes are functioning outside of time. (Ref 118) Photons also have geometry (shape). They are neither a wave, nor particle. They exhibit those appearances only when they are detected. They can become either a wave (time dependent ubiquitousness) or show the spatial, particle-like properties of ubiety.

Speaking of fields; there is the electron field, also known as the electron-positron (e-p) field, which is a "matter field." Its "quanta" (i.e. its packages of field energy) are the electron and the positron. This contrasts with the electric field, also known as the electromagnetic (EM) field. The quanta of the EM field are photons. Since photons have no mass, the EM is a "radiation field" rather than a "matter field."

It is interesting to note that fermions (whose mathematical spin is the positive square root of 1 i.e. +1) have a "color charge" which is triune in nature (think trinity) with color combinations (e.g. red, green, and blue for quarks, and cyan, magenta, and yellow for the antiquarks). Fermions are the basic parts of protons and neutrons that make up the nucleus of atoms and respond to magnetic fields. i.e. demonstrate a cosmological alignment tendency. The bosons (whose mathematically spin is the negative square root of 1 i.e. --1) however are dualistic (think male female, right wrong, God's will or not) and have only varying degrees of positive or negative charge.

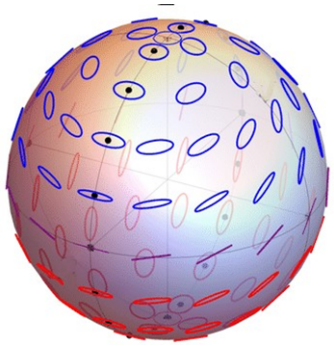
The atomic nucleus is made up of protons and neutrons, which in turn are made of three quarks apiece. Inside protons and neutrons, gluons and quark-antiquark pairs, are constantly being created, destroyed, emitted and absorbed.

It is interesting to note that three of the fundamental processes in the formation of matter involve a transmutation from circular to linear motion. This is most noticeable in the eye where three seemingly disparate physical phenomena: visual perception, quantum measurement, and photon emission come together. Light enters through the iris in a circular pattern yet must be transformed into linear signals along the optic nerve. This geometric transformation from radial (toroidal) to linear motion is not just a biological convenience. It represents a fundamental information bottleneck where the rich field of visual data must be compressed and serialized for neural transmission. This is like photon emission from excited atoms. An electron in an excited state occupies an

orbital, a probability distribution around the nucleus. When it releases a photon, this circular motion transforms into linear propagation along a spontaneously chosen axis suggesting a deep principle at work. This suggests that the architecture of perception itself might be shaped by these same physical principles. Just as a quantum measurement collapses possibilities into actualities, and just as particles spontaneously organize their motion along an axis, our sensory systems must transform the rich field of potential experiences into concrete perceptions (from circular potentials to linear actuals). (Ref 134)

When thinking of photons, although they are particles, try not to think of them as little balls. They are small, spherical ripples in the electromagnetic (wave influenced) continuum that we called particles. (Ref 100) These ripples or blobs radiate spherically in three-dimensional (time bound) space. If the photons came from the same source (say the bioluminescence of a microtubule), they are "entangled". When you "detect" (like in the rods and cones of the eye) you not only extract the energy (flatten the bump) by that detection, but you also affect the entire wave, so this energy extraction could be observed at the other locations around the spherical wave pattern (think reflectivity). Studies investigating the preservation of photon entanglement in polarization after one entangled photon propagates through brain tissue, indicates that the non-local correlations between photons are maintained even through complex biological tissues. (Ref 87) This is particularly poignant in the case of microtubules because of their qubit computational functionality and their magnetic field sensitivity.

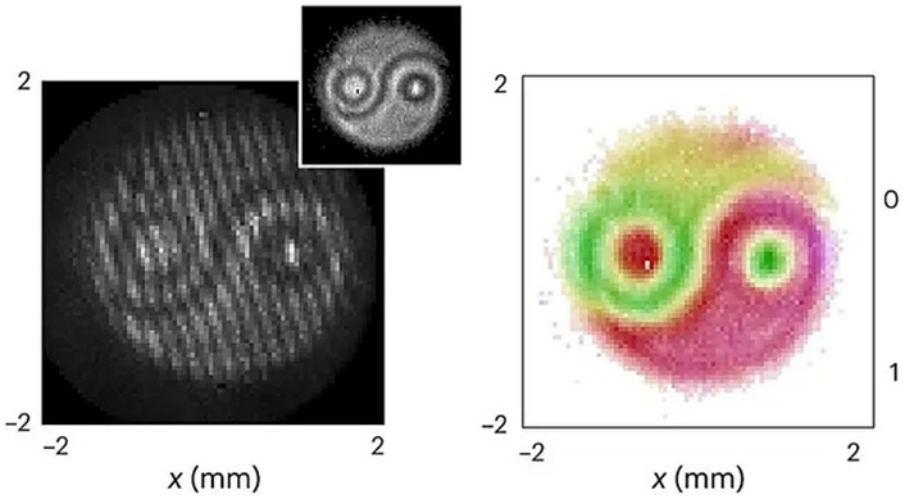
> Side note: Chris Watson's *Entropy Scale Factor* (ESF) theory published in *Reports in Advances of Physical Sciences* on July 19, 2023. Said there is no need for dark matter if we use entropy (total information, order vs chaos) to describe gravity. (Ref 66)



Poincaré sphere visualization of entangled photon states

Thinking more about the eternal aspect of photons, this means that the degrees of freedoms of photons do not change with time. Microtubules emit bioluminescent photons at specific resonant frequencies in the infra-red and ultraviolet ranges and this luminescence is representative of the way we think and react to external stimulations. photons are pure energy, have no mass and yet have momentum and photons are eternal. Photons are particles that can be influenced by the whole as demonstrated by their wavelike properties. It is possible that their light patterns (influenced by our reactions to the whole), once emitted, could be captured and might even continue after our physical mass comes to rest. It is possible that our guardian angel could detect this light pattern information, and relay it to mansion world number one while at the same time the numeric representation of our luminescent energy could be memorized (like taking a picture) and relaying the image, for initial patterning of our soul. It may also be that there is an intermediate state of the soul made up of the intermediate class of particles called hadrons that are composite particles of bosons and fermions. The word hadron comes from the Greek word "stout" or "thick" because they are analogous to molecules in that they respond to the electric force and make up our protons

and neutrons. Remember how the nuclei of atoms respond to cosmic magnetic alignment? This nuclear electromagnetic alignment might have a superadditive influence on our microtubule bioluminescence.



Reconstruction of a holographic image of two entangled photons
(Image credit: Nature Photonics, Zia et al.)

Experiential Soul Fusion

What does it mean to experience a complete spiritual alignment, with its a bottom to top, fear to faith, material to spiritual, self to selfless, me to we, 180-degree, Jesus likeness?

Our free will creative control of all our experiences may be in the quantum neuron limbic cerebral feedback loop of our consciousness, and perhaps our superconsciousness, where we *objectively* (materially) and *subjectively* (spiritually) experience the phenomenon of aspiring to be at peace and eventually, to be Jesus like. Our free will control may allow spirit dominance to align our neuronic activity to the soul's preferred path, a fusion of paths. A fusion of purposes. A fusion of minds.

What is inner union, a fusion of wills? In the physical world nuclear fusion occurs when the electromagnetic energies of two atoms get close enough to be retained by their uniting weak force releasing the extra energies that are no longer required. It takes energy to slow down fundamental energy to the electron level and the life flash of fusion may be the release of the extra energy that is no longer required.

It is conceivable that soul fusion may be like this phenomenon, wherein patterning of our neuronal material electro-chemical energies get close enough to the patterning of the soul-spiritual energies to be retained. If the spiritual energy runs in similar paths as our material energies, these harmonized electro-chemical neural energies might get close enough (in the soul) to combine energies, and both would fuse with the immediate release of the excess energy required to maintain noncoherent vibrational energy in "Chariots of fire**"**.

Philosophy of the Physiology of Spiritual Influences

Just as there are two kinds of time, there are two philosophical perspectives for our cosmic harmony. We can identify with the physical body and its material environment (being), or we can think from a soul base and its

cosmic reality (becoming). We tend to use our relatedness to our external reality to evaluate our physiological progress and our philosophy, with its ability to sense cosmic influences to gauge our spiritual progress, but our true progress is in our superconscious soul mind, where our creative soul's influence helps to transfer our identification with, and attachment to, our spirit core.

The processes we have investigated are akin to applying the scientific method to our spiritual, external, and hopefully our internal philosophical progress, and this can be viewed from at least three additional perspectives:

1. Discovery of facts as extrapolation of currently known facts.
2. Developing new techniques in ourselves.
3. Observing changes in ourselves during our investigations.

These processes may be integrated, and their individual strengths will then be a function of our different experiences and their memories. Each of these growth mechanisms will build on these new experiences as we move forward and integrate them internally with spirit influences.

There is also an evolutionary physiology of spiritual influences. By thinking about the cosmos and the service of man, and because of previously practiced familiarity with the developing idioms of cognitive neurobiology, we can learn to discriminate by introspection, the coding vectors in our internal axonal pathways, the activation patterns across salient neural populations, and their relationships to enhance our cosmic nature. This kind of thinking is called Transcendent Naturalism and has a circular cause/causality paradigm that can be broken down like this:

1. Matter/Energy

   There is a continuum between the quantum realm and the realm of classical physics when more complex forms of energy abruptly lose their quantum properties in a phenomenon called "decoherence." Quantum properties like entanglement suddenly disappear, waveform collapses, and matter becomes measurable. Classical matter has emerged from the quantum realm via this constantly occurring decoherence. This implies that energy/matter has an emergent foundation and a coherent destiny. This also implies a reciprocity of decoherence and coherence.

2. Life. Sentient Autopoiesis

   There is a circular pattern when something maintains and renews itself by regulating its own composition and conserves its own boundaries in a system of feedback loops.

3. Mind.

   There are mechanisms involving things like microtubules and other connection relationships that form the base of a 4E ("embodied, embedded, enacted, and extended) cognitive feedback loop. As we enhance the positive aspects of these feedback loops, we improve our spiritual receptivity.

4. Culture.

> Righteous minds try to ground morality in six innate, cross-cultural moral dimensions: care/harm, fairness/cheating, loyalty/betrayal, authority/subversion, sanctity/degradation and liberty/oppression. A moral culture is determined by the point in each dimension where actions become immoral. In other words, a moral system is defined by the 'weights' we give across and within the dimensions to different behaviors or expressions. As the cultures evolve, more sophisticated models emerge, culminating in "wisdom" which grows out of the wisdom of the individual as it is guided by top-down insight. There is not necessarily a direct connection between how things seem and how they really are. We are mostly WEIRD (Western, Educated, Industrialized, Rich, and Democratic). We often mistake our self-reporting of how things seem, unless we use a top-down perspective.

Is transcendent naturalism making us wiser? What is wisdom anyway? A common wisdom model is based on several different elements: metacognition (thinking about thinking) declarative knowledge (knowing what you know and don't know), procedural knowledge (knowing how to do things), conditional knowledge (knowing when and how to use what you know) and moral aspirations (trying to be 'good'). Are we improving our thinking about our thinking? Are we sure about what we "know"? Are we aspiring to be more moral. Are we becoming more loving? Let's review what we have learned in this exploration.

Summary

There are really three informationally entangled energy continuums, the material, the morontial, and the "more complex" spiritual. To show how two particles are entangled in the material world, we must first separate them from all other entanglements. By contrast this demonstrates the overall entanglement in the material realm. Persistence theory (Ref 151) states that this entanglement is the instantaneous sharing of information about the interconnectedness and mutual interdependence of wave functions. Coherence between particles is not local. It is topological and mutually sustained by the preservation of shared information about everything else's location and condition. When measurement occurs, entropy is injected, and the structure loses the ability to maintain its current state. It is not that a signal is exchanged but rather it is the collapse of what can no longer persist, materially and temporally.

The same information entanglement may be true in the morontia, where photons, which have been slowed to behave like matter, interrelate more cosmically and eternally. This likely persists at the spirit level where all information relatedness is truly eternal and potentially infinite.

> Entangle your information: recognize interpret and choose, thing meaning and value, physical-reality intellectual-reality and spiritual-reality, fact idea and relationship, truth beauty and goodness, health sanity and happiness, faith trust and assurance, self-consciousness social-consciousness and cosmic-consciousness, matter mind and spirit, thought wisdom and worship, hindsight insight and foresight, finite, absonite and absolute.

If you didn't understand all the intricacies of this exploration, don't worry.

Think of this as a story and when you listen to a story or a parable, your whole brain is emotionally and intellectually immersed in the story. Stories involve context, conflict and outcome. Perhaps, when approaching life, when watching the biology of our life story unfold, we may want to immerse ourselves in the bigger story.

The story of our eternal perfecting career of becoming more Godlike which at our stage may be more like the Greek translation of perfect "telios" which implies maturity and wholeness.

Dopamine, neurotensin, microtubules, MAPS, ARCs, SAMs, DNA enhancers, epigenetics, the DMN and HPA axis, the vmPFC, electromagnetic and optical quantum coherences, the consciousness of our consciousness, our creative mental picturizations, lower frequency thought cross pollination, time consciousnesses, controlled emotional responses and superconsciously patterned habits etc. are all striving for improvement, and they are all within our control. These processes are all subtle and incremental. They require effort, consistency, and faith (delayed gratification) that they will eventually work. (Ref 116)

Do the patterns of our electro-chemical energies involve some of the physiologies that manage our brain-mind connections? Have we touched on some experiments here? Mystery remains for a while longer while we discover the various physiologically ingenious ways of helping us find cosmic stability.

Take Home Anchor Points:

Perhaps these one-liners will trigger your own ideas of how to materially, incrementally, improve any interactions with your spirit helpers.

1. The physical to psychological link is bidirectional.
2. Your body supports your mind. Care for your body is care for your mind.
3. Your attitudes, thoughts, emotions, actions, and reactions all influence your chemistry and thus your spirit receptivity.
4. Patience and openness to thoughtful reflection, may help.
5. Childlike faith and trust in God with adultlike focus may help.
6. Creatively, leap from a stable, calm, confidence in a changeless plan.
7. Where your thoughts go, your energy flows.
8. Your emotions make epigenetic modifications to your gene expression on an instant-by-instant basis.
9. Aligning your anticipations with a top down, eternal perspective, may help.
10. Let Paradise be the stable material reference for your sense of electromagnetic alignment.
11. Let your soul be your stable time reference for your material motion and purpose.
12. Let the Spirit of Truth invert your consequential thinking habits to think like Jesus.
13. Try to be more aware of spirit time than material age.
14. Get a good deep sleep nightly, meditate and worship often.
15. Be still, and know, that the processes, of guiding us to find stability, are unfolding as they should.

Descartes's famous saying "I think therefore I am." becomes:
"My thoughts improve my electro-chemical responses; therefore, I am, and I will be."

Epilog

Inputs influence your nerves, which influence your amygdala, which influences your hypothalamus, which influences the release of peptides, which influence emotional and physical responses which influence future reactions to similar inputs either towards inner calm or chaos. Be a positive influence.

Said differently:

Your thoughts guide your physiology.
Your physiology guides your reactions.
Your reactions guide your character.
Your character guides your values.
Your values guide your intent.
Your intent guides **your thoughts**.

Let **your thoughts** be Adjuster guided.

Thank you.

Any thoughts or are you still looking for that "philosophic miracle" to make sense of all this?

Glossary:

Activity regulated cytoskeletal memory reinforcing peptides (ARCS):

- Peptides that function in an mRNA-like process that lay down memory tracks and sets up the ways we process thoughts.
- Responsible for creating our "… preconceived opinions, settled ideas, and long-standing prejudices."

Brain Waves:

- An electrical signal generated by a single neuron or a group of neurons sending signal(s) to another neuron or groups of neurons.

Coherence:

- Systematic or logical connections or the integration of diverse elements, or relationships giving rise to a sense of values.

Consciousness of our consciousness:

- Thought, realization of the thought, and reflection of the consequences of that thought.
- May also be the superconsciousness and/or soul consciousness of our wakeful consciousness.

Controlled emotional responses:

- Feelingly experiencing, without allowing emotions to highjack our intentions. The ability overt time to "rewire the brain" or change the preferred electrical pathways.

Creative picturization:

- True creativity can happen in the mind since it circumvents antecedent causation.

Cytoskeleton:

- The network of protein filaments and microtubules in the cytoplasm (the material or protoplasm within a living cell, excluding the nucleus) that controls cell shape, maintains intracellular organization, communication and is involved in cell movement.

DNA enhancers:

- Genetically inherited and epigenetically controlled gene folding that supports higher level thinking.
- 4000 are specific to humans.

Electromagnetic quantum coherences:

- May influences "random" electromagnetic interactions and motions.
- Implies that random motion is controllable by such things as, Cosmic over control, Thought Adjusters, mind adjutants, the Unqualified Absolute or the Supreme.
- Shares "the part and the whole" functionality. E.g., Individual/Supreme, material/spiritual, experiential/existential.
- Demonstrates coherence with Paradise.

Epigenetics:

- The study of controllable changes in gene function that do not involve changes in DNA sequence.

Epigenetic gene manipulation:

- Modifications to DNA that influences gene folding and the resultant protein shape and function.
- Influenced by our emotions, focus and repetitions.

Homeostasis:

- A relatively stable state of equilibrium or a tendency toward such a state between the different but interdependent elements or groups of elements of an organism, population, or group.

Microtubules:

- Hollow tubes that connect and communicate between cells.
- Lengths increase and decrease as a function of cellular interactions.
- Lengths are proportional to the time delays between reactions and responses.
- They can only exist if they are hollow, electrically cored, and isolated.
- Can be influenced by quantum coherence.
- Resonances are in the mechanical, far infrared (bond stretch), and UV (electron jump) ranges.
- The two optical ranges may relate to where "delicately touch" our morontial selves.

Microtubule-associated proteins (MAPS):

- Proteins that cross connect microtubules.
- Reinforced by repetitions of thinking patterns.
- Substitutes for cross communication that resulted from myelin sheaths.

Neurotransmitters:

- Chemical messengers that are made up of small amine (triangular pyramid, with the nitrogen atom at the apex) molecules, amino acids, or neuropeptides.

Peptides:

- A compound consisting of two or more amino acids linked in a chain, the carboxyl group of each acid being joined to the amino group of the next by a bond of the type -OC-NH. They are the building blocks of proteins.

Quantum:

- A discrete quantity of energy is proportional in magnitude to the frequency of the radiation it represents.

Slower lower frequency cross pollination:

- Taking time to consider the social, cosmic, and eternal ramifications of thoughts.
- Equivalent to the injection of a fragment of infinity into temporality.

Superconsciously patterned habits of thinking:

- Learning to use Spirit of Truth-like thinking (mind of Jesus).

Synaptic Adhesion Molecules (SAMs):

- SAMs are peptide memory glue.

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Foot Note: Schroedinger, in his 944 Book "What is life", argued that certain aspects of living organisms, such as both us and mutations (changes in the DNA sequence of a cell's genome or a virus), might not be explainable by classical physics but required quantum concepts, for instance quantum leaps.
Foot Note: H. Fröhlich suggested in 1950 that macroscopic quantum coherent phenomena may be responsible for dissipation-free energy and signal transfer in biological systems through coherent excitations in the microwave region(about 5 inch wavelength) of the spectrum due to nonlinear couplings of biomolecular dipoles.
Foot Note: A.S. Davydov, proposed that solitonic excitation states may be responsible for dissipation-free energy transfer along the α-helix self-trapped amide in a fashion like superconductivity: there are two kinds of excitations in the α-helix: deformational oscillations in the α-helix lattice, giving rise to quantized excitations ("phonons"), and internal amide excitations. The resulting non-linear coupling between these two types of excitations is a Davydov soliton, which traps the vibrational energy of the α-helix and thus prevents its distortion (solitons are classical field theory configurations with finite energy).
Foot Note: S. Hameroff and R. Penrose, noted that one may view the tubulin protein dimer units of the microtubules as a quantum two-state system, in coherent superposition.
Foot Note: John Eccles proposed that each of the 40 million dendrons is linked with a mental unit, or "psychon", representing a unitary conscious experience. In willed actions and thought, psychons (Ref 42) act on dendrons and, for a moment, increase the probability of the firing of selected neurons through quantum tunneling effect in synaptic exocytosis, while in perception the reverse process takes place.
Foot Note: The subjective experience of intuition and sudden insight bears a striking resemblance to quantum tunneling. Just as a quantum particle can appear on the other side of a seemingly impassable barrier, the human mind can make intuitive leaps that bypass logical steps, arriving at solutions or ideas that seem to come from nowhere. (Ref103)
Foot Note: Neoteny (the preservation of juvenile traits) may be part of the evolutionary civilizational process that encourages reversion to the "childlike mind".
Foot Note: In 2013 researchers at the University of Michigan discovered that DMT is produced in the pineal gland in live rats. It is unstable, most active during REM sleep and disappears immediately upon death.

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