spirituality/swedenborg/proving god notes

based on the book:

Proving God: Swedenborg's Remarkable Quest for the Quantum Fingerprints of Love
by Edward Sylvia, M.T.S. Staircase Press, 2009

Emanuel Swedenborg, Ian Thompson, Lee Smolin, Roger Penrose, Brian Josephson, Ian J. Michael Heller, William Tiller, Paul Davies, Fred Allen Wolf, Rudy Rucker, David Bohm, John Wheeler, Richard Feynman, Peter Russell,

God, spiritual, metaphysical, Love, Truth, Big Bang, singularity, inflation, dark matter, dark energy, general relativity, quantum physics, quantum vacuum, quantum gravity, Schrodinger equation, pre-geometry, geometry, path integral, gravity as Love,

http://books.google.com/books/about/Proving_God.html?id=7ccFPwAACAAJ

red: important points

blue: PSN comments

**Foreword** by Ian J. Thompson, PhD

Emanuel Swedenborg lived from 1688-1772, and claimed to have received extensive instruction in philosophical, spiritual, and theological knowledge after his "inner sight was opened" in his 50s. Before that he demonstrated a very independent and scientific mind, and published a principia to explain his theory of how physical objects may be constructed by the rapid spiral motions of microscopic points.

Swedenborg and Sylvia see the spiritual world as continuously existing "alongside" the physical, and continually generating the physical world to sustain it in apparently stable forms.

## Chapter 1 In The Beginning (We Have A Problem)

An inflationary model of the Big Bang was later developed to explain why everything seems isotropic, or equally spread out as it expands. This model holds that for a time the

expansion of the universe took place at an inflationary rate; ie faster then the speed of light.

The cosmic background radiation is taken as the strongest evidence supporting a Big Bang beginning.

However, it was later discovered that the expansion of the universe is actually accelerating. The expansion can no longer be explained as the momentum from an original cosmic event. Dark mater and dark energy have recently been added to explain why the expanding universe keeps accelerating. Dark matter helps gravity hold the universe together, while dark energy pushes the universe apart. Dark energy is winning.

British astrophysicist Paul Davies describes the Big Bang singularity as "the nearest thing that science has found to a supernatural agent." The BB singularity must contain everything including time and space in a non-physical state.
p. 2.

The concept of a singularity puts materialistic philosophy on shaky ground because without time and space the cosmic beginning could not have had a physical cause.

> The two pillars of modern physics do not support a unified universe

As we move back towards the beginning of time, general relativity and quantum physics, themselves incompatible, come into greater conflict. In general relativity, spacetime is squeezed into a singularity whose radius is zero. But in quantum physics spacetime fluctuates, coming in and out ex existence anywhere (called the quantum foam.) How can the probabilistic froth of quantum mechanics coexist within the shrinking radius of a singularity?

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It seems that a new paradigm is needed. Scientists such as Roger Penrose, Brian Josephson, Ian J. Thompson, Michael Heller, William Tiller and Lee Smolin are embracing possible new paradigms.

Physicists have backed themselves into a corner by positing an infinite something that resides in a void.

A singularity consists of infinite curvature and a quantum state of infinite coexisting possibilities. Normally physicists avoid infinities, which suggest flaws.

On the other hand, Big Bang cosmology and quantum physics offer today's theologians an idea they can embrace; that the universe emerged out of some infinite dynamic; i.e., they support a creation event. BB and quantum physics also support the idea from Genesis that creation emerged out of a pre-space void or vacuum. Even more suggestive is the quantum idea that consciousness plays a role in the foundation of physics and the nature of the physical universe.

p. 4.

Is science to be founded on mind and consciousness?

The theme of this book is that physical laws and forces are actually spiritual laws and forces constrained by what exists in space and time.

Mental and physical processes can be described by similar properties, patterns, and sequences (dynamics). I am not talking about poetic metaphors.

To do this we need a new understanding of substance and love.

> fundamental substance is propensity and endeavor

Science tells us that within the quantum vacuum, reality consists of pure propensity. Physicist Fred Allen Wolf

p. 5

describes these pre-space states as fundamental "tendencies to exist." These propensities pop out of nowhere and somehow strive towards embodiment as forms of stabilized matter. This is nature's endeavor.

In quantum theory, propensity and endeavor are fundamental substance.

Over 250 years ago, Emanuel Swedenborg (ES) made a similar claim: the essential substance of a "thing" was it's dispositional properties. *

* Theoretical nuclear physicist Ian Thompson has done a masterful job of applying sophisticated kinds of dispositions to the Schroedinger equation. See "Derivative Dispositions and Multiple Generative Levels" at

http://ianthompson.org/philosophy_papers.htm

> But ES would have issues with the anti-geometrical nature of quantum theory's probabilistic features and its failure to meet the requirements of the correspondence principle.

ES took the idea of a non-physical primal substance into theological territory by stating that propensity and disposition were derivatives of spiritual Love.

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When Love is understood as primal substance, it will lead us to a better understanding of the laws of nature and physical processes. In fact, Love can lead us to an exact science. By the end of this book you will see that Love, as causal agent, requires both the principles of least action and the fine tuned constants of law in order to manifest as a physical actuality. Love is the origin of these laws because Love can only create through self-representation. As we shall see, Love and its dispositional properties organize force, action, and form into coherent unified wholes. Love is the key to the mystery of self organization in the universe, in physical as well as psychological terms.

Since love is a living conscious force, it is also the means by which intelligent processes work in nature and why biological complexity, over time, emerges out of Love's eternal endeavor towards the perfection of distinct things trough increased unity.

Causal principles, based on dispositional essentialism and the inflow of active information from a non-physical and Divine Source open the door for science to be founded on wider and more dynamic principles that transcend the physical world (and free science from scientism).

p. 8.

**Chapter 2: Emanuel Swedenborg: Who Was He?**

In 1734 he completed two books; the *Principia*, which addressed the creation of the world from the infinite, (and proposed that energy and matter are interchangeable 150 years before Einstein), and *The Infinite and Final Cause Of Creation*, addressing philosophically the connection and causal link between the Infinite and the finite world.

As we will see, he theorized the existence of a zero dimensional point of pure action that acted as a medium between God's infinite activity and the finite world.

p. 19.

In his own words, during the years from 1710 to 1744, he was led by the Lord into the natural sciences and prepared for a more important purpose. After several direct encounters with the Lord, he gave up his scientific works and began writing a series of strange books entitled Arcana Coelestia (Secrets of Heaven), and to the shock of

European readers, described things “seen and heard” in the world of spirits by an anonymous author.

At the age of 57, he gave up his explorations of the natural world, and began a three decade long exploration of the spiritual world. In the spiritual world he witnessed Christian events. He discovered that the Second Coming would not be a physical event, but the infusion of new information for the people of earth. This new information would cause a big shake up.
p. 25.

Was Swedenborg Schizophrenic?

Those wishing to diminish the validity of Swedenborg’s claims have offered additional diagnoses such as temporal lobe seizures from the strictly materialistic viewpoint that all mental phenomena leading to transcendental experience are pathological states.

Those suffering from mental abnormalities generally cannot function without medication or profound care. Swedenborg was never under a doctor’s care during this time, yet became increasingly active in society and government. He was never dysfunctional.

His assumed pathology has been assumed from his writings,  not from his behavior around others.

p. 30.

Summary

Emanuel Swedenborg (ES) grew up in a religious and scientific environment

His scientific studies included chemistry, hydrostatics, mechanics, magnetics, math, pneumatics, geology, anatomy, astronomy, hydraulics, optics, metallurgy, acoustics, physiology, psychology, cosmogony, cosmology, and dynamics.

He was the first to theorize a nebular hypothesis for the formation of stars, the first to propose the idea of numerous galaxies in space, the first to theorize that matter and energy are interconvertable, and the first to introduce a neuron theory of the brain.

He invented new scientific doctrines that went far beyond the models of his era.

He gave up his scientific pursuits to serve God.

He explored the spiritual world for 30 years.

He witnessed the “Second Coming.”

He wrote numerous volumes on theology, which he claimed to be a new dispensation from the Lord God.

**Chapter Three: Time, Space and Matter From The Infinite**

"It is my opinion that our present picture of physical reality, particularly in relation to the nature of time, is due for a grand shake-up…."

-Roger Penrose
The Emperor's New Mind

If a singularity represents something where both space and time cease to exist it should be obvious that it could not have a physical cause. Physics cannot tackle the problem of creation.

In God & the New Physics, Paul Davies states that while there is no consensus concerning singularities, the issues surrounding them are at the "frontier of modern theoretical physics" and give "a new slant to the debate about God and the existence of the universe."

ES believed the physical universe had its start at a non physical location, which he called a *first natural point*. As some of today's cosmologists, he imagined this first natural point to be a door between two worlds, one that existed prior to the creation of the world.

This pre-geometric condition would have to allow for curvatures of spacetime and principles of action.

Interestingly, the idea that spacetime is not fundamental, but derived from "pregeometry" has been credited to physicist John Wheeler.

Also, as Ken Wilber noted, rather suddenly, in the 1970s, some very respected, sober and skilled researchers-physicists, biologists, physiologists, neurosurgeons- were talking religion in an attempt to explain the hard data of science. The very facts of science, they were saying, seemed to make sense only if we assume some sort of implicit or unifying or transcendental spaceless and timeless ground, or ground of being, underlying the explicit data.

Karl Pribram's studies of the brain led him to the conclusion that the brain operates, in many ways, like a hologram, (in the frequency domain). Ie; the whole is in every part. David Bohm, at about the same time, working in quantum physics, concluded that physical entities which seemed to be separate and discrete in space and time were actually linked in an implicit way. In Bohm's terms, under the explicate realm of separate things and events is an implicate realm of undivided wholeness, also in the frequency domain, and this implicate whole is available to each explicate part. In other words, the physical universe itself seems to be a gigantic hologram. With Pribram's concept of the holographic brain, and Bohm's concept of the holographic universe, the holographic paradigm was born. Both Bohm and Pribram reasoned that the quintessential religious experience of mystical oneness might well be a genuine experience of this implicate universal ground.

The Holographic Paradigm and other paradoxes
Edited by Ken Wilber Shambhala 1982, p. 1-2

ES was clear that his first natural point was generated by God, as a boundary between the physical world and a non-physical spiritual world whose standard of measurement is psychical. The singularity is the medium by which spiritual laws and forces are transformed into physical laws and forces.

> The Reality of the Infinite p. 35-37

Rudy Rucker: infinities in the foundation of math could only be avoided at the cost of great artificiality. The precise description of a line, as well as calculus, require infinities.

19$^{th}$ century Georg Cantor came up with a system for describing a hierarchy of types of infinity called transfinite numbers.

John Polkinghorne, Rudy Rucker, David Bohm, and Paul Davies all seem to agree that physical existence cannot be rooted in anything finite.

ES reasoned that for something finite to exist, something prior and less finite first had to be limited. He takes this argument all the way back to the infinite; i.e., the finite universe had to come from the infinite. So, as one probes deeper into reality, things get more complex and subtler; one is moving closer to the infinite. This flies in the face of traditional scientific reductionism (TSR), where things get simpler as you look at smaller bits of the universe, (but this TSR is seen to be invalid in the quantum world) It also suggests a source for complexity.

Lewis F. Fite points out that ES did not simply see "the Infinite as a mere postulate of rationality, but as a moral and religious principle of controlling influence."

God is an infinitely conscious Being with an eternal goal. This goal is the belt drive of the singularity.

> God's Grand Unified Field p. 37-39.

ES describes how God's Love and Wisdom project out like a sphere or unified field. God puts limits on his infinity by sending out spiritual substances from himself. These qualities lack fixedness and permanence, so are not real. They are potentials seeking to be manifested in time and space.

God must convert the psychical measurements of Love (substance) and Truth (form) into physical measurement. This geometrization of spirit requires a special medium or pre-geometrical entity. This is the singularity; an entity with placement, but not yet in time and space. This singularity is a perpetual attempt to generate force, kinetic energy and velocity.

Force and kinetic energy remain a potential unless they accelerate a mass, and just as in quantum field theory, these singularities are virtual events as in the quantum vacuum, having a dressed or metaphysical mass. This dressed mass is a density of information.

> A Conceptual Universe p. 39-42

Lee Smolin, in his book The Trouble With Physics, says "We need a theory about what makes up space, a background independent theory." Some believe that a background independent theory is the key to unifying general relativity with quantum physics, and will to a correct theory of quantum gravity.

David Bohm and Michael Heller believe that the Cartesian geometric description of space must be challenged; that it is too rigid and inadequate for uncovering new and hidden orders of reality. Bohm states: "Notions of wholeness, non-locality, and indivisibility are at odds with the Cartesian order." Heller believes a more flexible method for defining space can be based on algebraic concepts and functions. The geometry of spaces structured by a function (a mathematical trajectory). But something dynamic must generate this structure in reality.

ES offers such a theory of structured or differential spaces based on dynamic functions. He did not view space as a background upon which events take place, but it derived and resulted from the event. A space could be described as a physical action as well as a mental or spiritual action. Spacetime contains discrete levels of structure.

ES's model of the causal structure of space is hierarchical. In this model, gravity not only can be described as discrete units (quanta), but also qualitatively distinct units of flux that operates in different "kinds" of spaces and under different geometrical principles. Later in this book we will explore how gravity has its analog in mental and spiritual dynamics. The possibility of non-physical gravity is beyond what most of today's physicists are expecting.

ES's model fills all of Smolin's requirements for a successful model of quantum gravity.

The universe obeys mathematical rules. Physicists shy away from the idea that the intelligent order of the universe comes from intelligence itself.

There is no spacetime until it has coherent structure, orientation, and lawfulness. It becomes manifest through the kinematic display of a rational concept.

A singularity can have a trajectory in either a pre-space condition or in real space.

One thing moving in the universe has no meaning. You would need other singularities, which would also allow you to determine if the singularities were moving in an orderly way.

ES's theory of creation starts not with one singularity, like the Big Bang, but with an infinite number of them filling the prenatal universe (quantum vacuum). Since one singularity rules out a quantum mechanical beginning, Steven Hawking has also surmised that the universe could contain an infinite number of singularities. [Black Holes?]

ES's prenatal (structureless) universe is very similar to the quantum vacuum, but there are differences. Unlike the wave mechanics of the Schroedinger equation, which describes no trajectories (a state of being in many places at once), his ideas are more like Richard Feynman's idea of quantum events as consisting of all possible trajectories (called path integrals). The velocity of ES's singularities is indeterminate and can express all possible angles and curvatures. Such singularities can only produce a measurable outcome through cooperation; ie, coherent spacetime structures emerge through some incarnation of Love.

> The Emergence of Space and Time p. 42-46

Existence is relationship. Spacetime structure does not emerge until singularities form coherent and stable relationships.

According to ES, God's ultimate scheme involved creating a heaven from the human race. This involves both an outward movement, from God's non-physical realm to creation, and an inward movement, back towards God, through the evolution of intelligence and consciousness, of the non-physical human heart (will) and mind (understanding).

ES's singularities each share a perpetual endeavor to move from a center to a periphery, and from a periphery to a center (a dynamic reciprocation that unified motion and therefore is a physical analog or image of Love.-a cosmic heartbeat.

fig 3.1: five concentric swirls next to one another

fig 3.2: the 5 swirls cooperate to form a vortex that has spatial extension; an inside and outside.

[Note the similar vortical structure of Anu, the ultimate atom, described by Theosophists Charles Leadbeater and Annie Besant.] see PSN papers electron models.doc, gunify.doc, Grand Unification.doc. etc]

From being mere possibilities (fig 3.1), singularities may lawfully conform and begin to coexist as a coherent unity, producing a geometrical form with a real physical periphery (fig 3.2) Co-existence is from the spiritual principle of Love, the essence of which it to unite.

These virtual events conspire towards a unanimous form from their continuous actions, which cannot be sustained or conceived except in a spiral (vortex) figure.

Fig 3.2 represents a discrete unit (quantum) of spacetime. In this cosmological model, spacetime emerges, its structure is discrete, from top-down causality.

Since action precedes spacetime, fig 3.2 is background independent. It is a structured or differential space as opposed to a "manifold" space described by a coordinate system.

spacetime must be understood in this way for science to make more advances.

Relative motion traces out both time and space. Time has no meaning if it is not periodic. This means that kinetic energy must loop itself into a coherent, continuous, repeating cycle, like that of a spiral vortex. Think of fig 3.2 as a space-clock that temporalizes space and spatializes time.

ES's model agrees with Max Planck that action comes in wholes (holonomy).

> The Emergence of Matter p. 46-47.

At the same time that the spiral vortex of ES's fig 3.2 exists in spacetime, it will also have actual mass, without a Higg's particle.

In a similar way, some physicists believe that matter and energy are deeply connected to spacetime.

Brian Greene writes, in The Fabric of the Cosmos:
“the distinction between spacetime and more tangible material entities would largely evaporate, as they would both emerge from appropriate aggregates of more basic ingredients in a theory that’s fundamentally relational, spaceless and timeless.”

> God’s Character displayed in the Creation Event p. 47-51

> Advancing Science Through New Insights About Love p. 51-54.

God can only create by conjunction; Conjunctive Design (CD) (an idea missing from the current view of Intelligent Design.)

CD explains why the universe is expanding and why this expansion is accelerating.

ES, as Einstein and David Bohm, believed there was a real objective world out there (unlike the Copenhagen interpretation where reality depends on an observer.

He also believed signals could travel faster than the speed of light. Recently two German scientists are proving that faster than light speeds exist in the universe.

ES uses forms of curvature to define units of action and builds spacetime geometry from geometrical functions. One of the main features of general relativity has been to redefine the curvature geometry of spacetime as gravity. ES’s concepts embrace those of the two main developments of modern physics: quanta and curvature of space, which he believes have theological considerations.

The author wants to show that the superposition principle of quantum theory can be teased out of ES’s thinking.

[ But keep in mind the author has already said that ES’s universe differs from Schroedinger wave equation presentation of quantum theory, where reality is described as waves of probability.]

**Chapter 4 Love and Quantum Gravity**

The process of creation is a top down sequence of distinct events and successive stages moving from a non material realm to a realm of space time and matter.

ES claimed that self love is diametrically opposed to true spiritual love, which seeks “someone outside of self and by whom one can be loved in return.” Therefore Divine Love necessitates the creation of a distinct finite world with finite beings in whom there is nothing of the Divine (but who can love the Divine.

The  Schroedinger equation formulation of QM doesn't portray any "jump" to support the idea that the fundamental world of possibilities collapses into real measurable outcomes [and the collapse only occurs upon observation, which the author says ES disavowed.]

[The wave and particle formulations were shown to be equivalent by Paul Dirac in his transformational QM]

So there is a big problem with our fundamental understanding of the microworld and how it correlates with the behavior of the larger world we can experience.

This opens the door to new interpretations.

I propose that the current formulation of quantum physics is wrong (some physicists already sense this) [However, this formulation is incredibly accurate, and has been the source for dozens of technological innovations.]

While the math of QM is very successful in portraying the idea of superposition (that a subatomic particle can exist in a mixed state of multiple locations simultaneously) [is this the definition or meaning of supeposition?] it does not describe what is really going on in the microworld. The reason is that a particle existing in the ambiguous state of superposition (also called wave particle duality) is a magical condition never observed in the real world.
[Both wave and particle characteristics have been predicted and observed in the macroscopic world, as for example …… *Through the Wormhole* ref ]

This is why quantum theory is faced with the measurement problem: how does the fundamental realm of quantum potentials  "choose" one actual outcome over others? Or, how does something like a wave of probability collapse into a clear single actuality upon observation or measurement?

In the Schrodinger equation, wave functions do not collapse. The notion of collapsing was added on later in a forceful attempt to make the math fit the observations.

Some physicists have tried to get around the question of how a wave function "chooses" a particular outcome. In 1957 Hugh Everett suggested a Many World Interpretation, This allows every quantum probability of the wave function to lead to a real outcome in a "parallel universe."

In the 1950s, David Bohm proposed that waves and particles maintain their separate reality, but that quantum possibilities, rather than collapsing, operated as hidden variables within what he called pilot waves. [The pilot wave concept was initiated by Louis DeBroglie, who showed that electrons in orbit are also associated with a wavelength.]

For this idea to work, quantum particles must have subtle and complex inner structure (like a radio) and the pilot waves must be instantaneously sensitive to all information in the universe. This instantaneous transfer of information is called non-locality.

While Bohm does not require a wave function to collapse, he preserves the Schrodinger equation and non-locality by adding this complex ability of instantaneous change to the force of the wave function, called the quantum potential. [??????]

While there is no measurement problem in Bohm's theory it is unclear how wave influences lead to the ubiquitous principle of least action found in the classical world of Newtonian physics.
p. 57-61.

> A Non-linear Approach to Superposition p. 61-63

Quantum physics does not satisfy the correspondence principle. Quantum indeterminacy does not correspond to the determinate processes and order we see on larger scales. Fundamental randomness at one end of the spectrum does not produce order at the other end. A true correspondence principle involves more than a math gimmick to recover the classical laws that operate macroscopically.

ES's spiritual approach to mixed states of potentials in the microworld is based on the unifying principle of Love. He gives the simultaneous superposition of coexisting paths a real interpretation through complex spiraling curvatures or vortices.

For ES, these infinite trajectories of spirals are not random dispersal, but ordered flux. This geometrical approach also gives us something resembling a “collapse”, whereby a state of potentialities (singularities) makes a discontinuous jump into a specific outcome (quantum particle). The correspondence principle emerges because the quantum particle forms a likeness of the effort of component singularities to cooperate in moving from center to periphery and vice versa.

> Quantum Gravity p. 63-70

Roger Penrose believes the key to finding a correct theory of quantum gravity (TOQG) is to not modify general relativity, but rather use Einstein’s ideas to modify quantum mechanics. Most physicists take the opposite view.

ES would agree with Penrose, who prefers to bring the principles of curved spacetime to bear on the rules of quantum theory.

The author repeats what he has already said about the vortex and its representation of quantum gravity. ES refers to the curved paths of the trajectories of the singularities within the vortex as “infinite direction”, or all possible directions. Where there is spacetime curvature there is also gravity. This geometrical insight of the vortex allows us to conceive of a unit of gravity, the graviton. If ES is right, we have a solution to the measurement problem; that is how potentials “choose” a actual measurable outcome.

A center of gravity can be defined for the vortex, and a preferred overall potential direction. At this point ES says the spiraling singularities create an axillary or compound overall rotation. Contemporary science calls this particle spin. This particle spin can generate flywheel momentum. Since the center of the spiral is not exactly the same as the center of the sphere, the axillary spin will be able to impart a force to the center of gravity which give it the power to accelerate.; i.e. local motion, in a curved direction; i.e. the motion of the new “real” element of spacetime will itself mirror the movement of the singularities within the element of space time.

> The Origin of Physical Mass and Law p. 70-71

The creation process of the universe continues as aggregates of spacetime elements form new and more complex levels of reality.

Gravity, using the ES model vortex, can become equivalent to any dynamic function-including brain function. Gravity expresses not only quanta, but also can change its own quality. According to ES, gravitation of different orders can be used to describe different geometries of space, each with different "dispositions" for organizing action into systems of varying complexity; from galaxies to the human brain and even the belief systems of non-material mind.

> The "Gravitational" Organization of the Universe p. 71-73

The tendency and disposition in the universe to grow structure is directly related to gravitational systems. But ES augmented the notion of gravity by linking it to Love.

Peter Russell also links gravity to Love in *Waking Up in Time*, where he argues that gravity and Love are similar in that they are forces pulling things towards unity. He quotes Buckminster Fuller, who said "Love is metaphysical gravity."

ES's *Doctrine of Forms* shows, from geometric principles, a multi-level model of spacetime that allows for gravitational organization and complexity to arise on al levels of reality, from material to spiritual.

> Reformulating both Relativity and Quantum Theories p. 73-75

Professor of Philosophy and Vatican cosmologist Michael Heller is seeking the possible unification of quantum mechanics and relativity through the concept of pre-geometry, and believes that the laws of physics have their origin in the pre-geometric realm, where "points" are not defined.

A prespace measurement (metric) would be one that describes "distance" between states instead of distance between points. What would remain of causality if it were freed from its involvement with time and space and was involved only with states?

> Multi-dimensional Spaces and Forms derived from Measures of Love p. 75-76

What would remain of causality? ES's answer is the dynamics of the spiritual world.

Our mind consists solely of states. The causal structure of the spiritual world is based on states f Love, and it's metrics consist of thoughts (the measure of what we Love and intend).

ES was able to [model] strict conditions on the laws of nature by describing multiple invariant values within the causal structure. This allows the universe and the constancy of its laws to be so finely tuned that humans can appear in creation.

Penrose believes the physics governing brains may well involve some new kind of physical action. ES introduces new kinds of actions and their distinct geometries in his *Doctrine of Forms.*

**Chapter Five: The Doctrine of Forms**

"As a man who has devoted his whole life to the most clear-headed science, to the study of matter, I can tell you as a result f my research, about atoms, this much:
There is not matter as such! All matter originates and exists only by virtue of a force which brings the particles of an atom to vibration and holds this most minute solar system of the atom together…. We must assume behind this force the existence of a conscious and intelligent Mind. This Mind is the matrix of all matter."

- Max Planck

The human mind cannot comprehend anything unless it can be given some form.
…Indeed, nothing can exist unless it has form, including God.

A top down progression from supranatural to natural requires an interpretation of forms changing through distinct qualities in their transition from spiritual to physical forms.

p. 79.

ES believed that dynamics are not limited to the dimensions of ordinary space.
Trajectories (fluxes of energy) can have qualitative differences and describe directions in completely different kinds of space.

The current model of superstring theory makes use of a classical filament of vibrating energy (which is not quantum mechanical) and a "calabi-Yau" shape. The "calabi-Yau" shape is a mathematical depiction of a unit of spacetime geometry, upon which the

strings of energy vibrate, supposedly creating all the laws, forces, and particle properties of the universe.

p. 80.

In *The fabric of the Cosmos*, Brian Green notes that development of a background independent version is the greatest unsolved problem facing string theory.

As already noted, ES saw the energy fluxes as creating their own space time structure, being background independent.

ES's doctrine of forms may provide the key to finding the proper geometrical forms of extra dimensions.

He takes the concept of form and action back to their pre-space conditions. He believed that the foundation of physics lies in a pre-geometrical world that is spiritual and consists of Divine conscious action. The purpose of the created universe is to give fixedness to the infinitely complex flow of spiritual force, which exist in pre-space.

Spiritual forces gain fixedness by constrains and increased resistance to change, making quantum uncertainty action with fewer constraints than the natural world. action that is therefore more expanded, nonlocal, and indeterminant.

ie he seems to suggest that quantum uncertainty is a transition between the natural and spiritual world.

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Constraints on action are the laws that structure the universe into layers of exiatance.

God Geometrices

Plato is said to have coined the term "God Geometrices" but ES shows how.
He brings a geometrical and topological approach that straddles classical and non classical physics by showing they are lawful extensions of each other.

He identifies 7 distinct "genera" of form which define the hierarchy of the universe. and the geometrical framework by which the laws of the universe are to be given. They form a process ES called the Circle of Life.

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The lowest geometrical structure in ES's Doctrine of Forms is the angle form, which includes triangles and rectangles. In nature these forms can be found in large geological formations, mineral structures, and directional bonding of molecules. This form is the most constrained.

By tying geometrical principles to the human anatomy, ES sets the stage for divine purposefulness.

But how that ES's Doctrine of Forms actually r3epresnets God's way of doing things?

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Each step up increases a new variable to infinity.

The Circular Form.

Next in order is the circular form, which has the property of infinitely continuous variation. Nature employs the circular form for continuous motion, as in revolution of planets around the sun.

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Next in order is the spiral; yet another geometrical constraint is removed: radius is now now varying "infinitely."

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The spiral form is especially suited for signal propagation. "it allows a mode or modification of it's form to be instantly transferred , making it a perfect wave guide to receive, accommodate, and promote the transfer and flow in information.

his anatomical research led him to believe that nature uses the spiral in biological structure whenever there is the need for signal transfer. He observed that the medullary nerve fibers and the cerebrum are folded around and drawn into spirals. The same coiling is found in DNA, microtubules, and the complex folding of proteins that carry information and transmit signals. Protein folding involves a huge number of proper conformational states to transfer signals correctly.

In ES's model, biology makes use of nature's disposition to "curl up" into different spacetime structures. This is similar to the Kaluza-Klein idea of multi-dimensional space used in string theory, but is background independent. ES believes that the curling of space resulted from action principles removing

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resistance and physical constraints as they move closer to God.

This is where consciousness enters the geometrical picture. The spiral form provides a geometrical mechanism by which organic life can become aware of its surroundings.

It is the form in which sensitivity becomes embodied in nature. Intelligence increases as forms become more variable.

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Why curvature?

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Nature prefers curvature.

In "When Science Meets Religion", theologian and nuclear physicist Ian Barbour refers to Ilya Prigogine's work on system dynamics, where order appears out of disorder, by way of curvature, like a vortex that raises from a turbulent river.

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David Bohm speculated that higher orders of organization might be described by increased curvature, where differences become different, such a sin spirals.
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The Vortex Form

Unlike the spiral, which gyrates around a static center, the vortex gyrates around a center that is moving.

ES ties phyics and cosmology to anatomical design;
The neurons of the brain are composed of this form

ES understood that a single level neural network was not sufficient for explaining higher cognitive functioning or abstract thought, or mystical experience.

p. 92

Scientific models are judged by their ability to explain and predict. ES's Doctrine of Form predicts that each successive form represents a discrete form and each level evolves by successive removal of restrictions.

However, this is not the way theories are expected to predict. ES's prediction is just how the model is generated. Normally the prediction is of things outside the model.

The next chapter will show the DOF provides a means to construct a comprehensive multi-layered cognitive theory that modern neuroscience lacks, and the neural basis for religion that modern theology lacks. He supports a spiritually based framework that supports the concept of discontinuous morphological evolution that Stephan Jay Gould and Niles Eldredge call "punctuated equilibrium". They challenge the Darwinian paradigm because it is clear to them that the fossil evidence does not support a smooth and continuous evolution. ES noted there were "jumps". His DOF supplies the blueprint needed to account for these jumps

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His cosmological model of a layered universe is the same as his model for the cognitive architecture of the human brain.

The first natural form or singularity.

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Physicist John Wheeler was the first to suggest the notion of pregeometry to formulate theories of causal processes that were not based on Cartesian coordinates. ES described the structure of spaces not in terms of coordinates, but in terms f forms generated out fo "functions"

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Author equates supernatural with pre-geometrical

the next form is the singularity as discussed in Chapter 3. Physics calls this realm the quantum vacuum, which consists purely of "tendencies to exist"

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Notes to be continued