

Developmental Time/Space Continuum Theory: The Dimensionality of Space and If Time is Space in Motion: A Technical Research Note

Jean Piaget has influenced cognitive theory with how children develop their concepts of space and time. The theory delineates a four-stage process of moving from sensori-motor to pre-operations to concrete operations and finally to formal operational thought. The developmental process is one of increasing complexity as the child internalizes and builds upon their concepts of space and time. It is almost as if they have a Spatial Acquisition Device (SAD), similar to Noam Chomsky's LAD – Language Acquisition Device.

One of Piaget's most important discoveries is the concept of object permanence in which the child begins to understand that an object exists even when it cannot be viewed. Prior to object permanence when an object is removed from a child's sight, it no longer exists. This acquisition of object permanence occurs in the first two years of life during a child's sensori-motor stage of cognitive development. The child develops the sense of being as having a permanent existence physically. So just as the child has learned about three dimensions physically through movement in the first two-years of life, the child begins a journey of internalizing how they learn about dimensionality over the next three stage of Piaget's theory in moving from one dimension to two dimensions and finally to three-dimensional space.

Piaget invented a very unique experiment to test for this acquisition called "conservation experiments" in which he devised experiments for one-dimension (number), two-dimensions (area), and three-dimensions (volume) (see the following chart).

<i>Dimensionality</i>	<i>Conservation Experiment</i>	<i>Stage of Piaget's Theory</i>
0 Dimension	Object Permanence	Sensori-Motor
1 Dimension	Number	Late Pre-Operational
2 Dimensions	Area	Concrete Operational
3 Dimensions	Volume	Concrete Operational

This acquisition is invariant, it may occur at different ages for children but they are not going to go from object permanence to area before going to number, for example. Recent research has demonstrated that Piaget's stages may occur a bit earlier than suggested by the theory, but the invariance of spatial dimensionality has not been challenged. This is an important discovery since it could lead us to a Spatial Acquisition Device (SAD), which has implications in how we interpret the world. Are our brains pre-wired to interpret the world within three-dimensions and if so what could be the next logical step in understanding the relationship between space and time. For example, is time (T) just space in motion (Sm) as depicted in the following formula: $T = Sm$. This idea and its potential implications are being developed in a way as suggested in the following section of this technical research note in attempting to

develop a deep structure within epistemology regarding space and time between the physical and cognitive worlds.

The Developmental Time/Space Continuum Theory: The Implications if Time is Space in Motion

The Developmental Time/Space Continuum Theory has gone through several revisions and enhancements since being first proposed in 1975. Over the past five decades it has moved from being a cognitive theory to more of an epistemology theory dealing with time and space as both physical and psychological concepts.

Picture two triangles, one a right-angled triangle, the other an isosceles triangle imbedded within the right-angled triangle. One of the triangles is space (right angled) the other is time (isosceles)(see figure at end of this narrative). As space increases or decreases in speed, time slows down. Now picture at the end of the space triangle there is a singular point where space is a singularity and is stationary. Time as depicted in the isosceles triangle shows time slowing down as it approaches the same singular point. The same is true with the triangles at the other end of the continuum where space is moving at least or close to the speed of light and time as depicted in the isosceles triangle has slowed to a crawl.

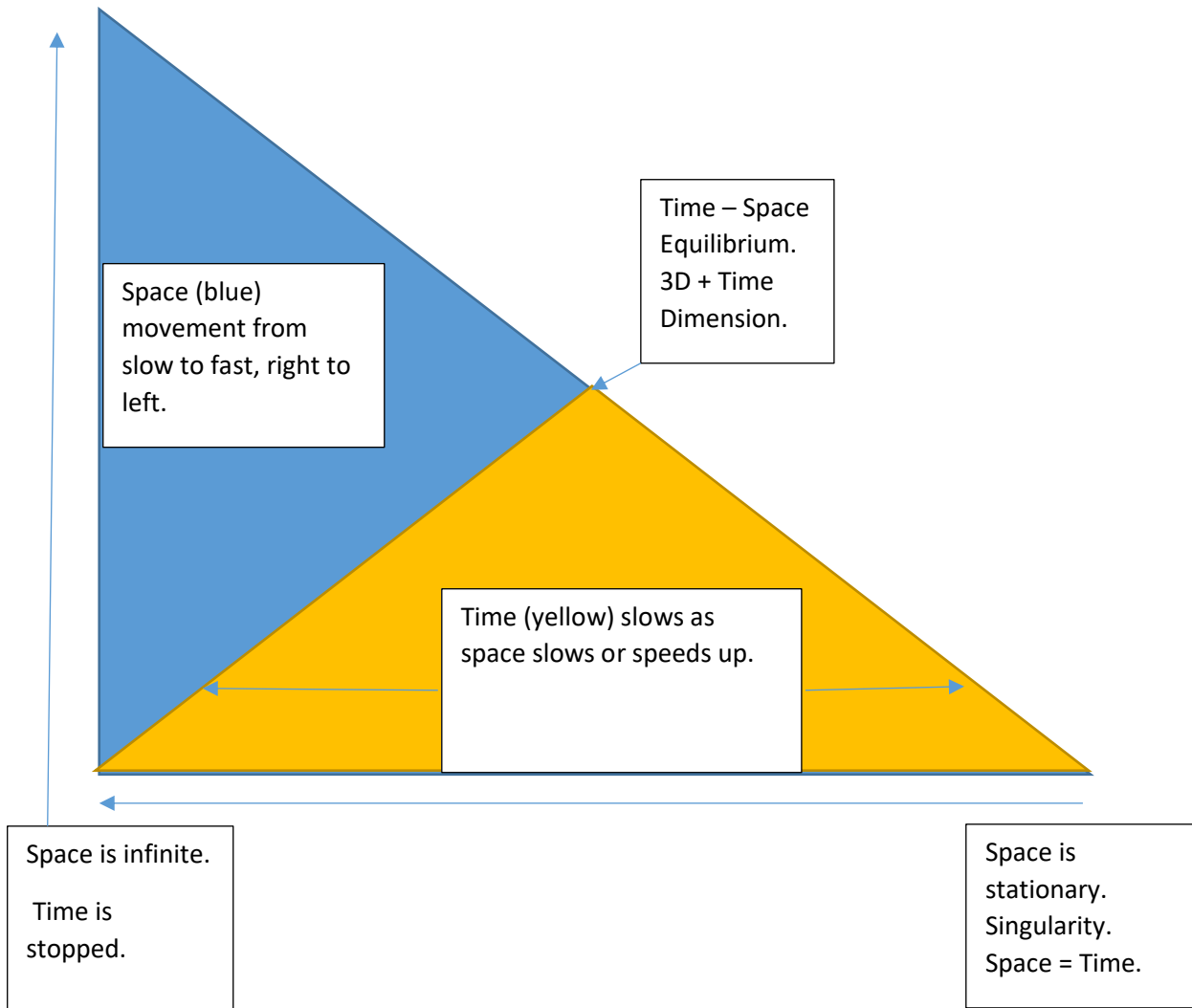
The stationary space represents a black hole as a singularity where time has lost meaning and different events could occur at the same time, such as having a cat that is both alive and dead. Space equals time. When time has become stationary, space as represented by filled space, Mass, is moving at or close to the speed of light and is transformed into Energy.

With these two imbedded triangles, both intersect at some point depending on how fast or slow space and time move. This intersection is our world, it is our reality, where the three dimensions of space and the dimension of time coincide.

I have suggested in previous iterations of this theory that black holes are the anchors to our universe and keep it from expanding out of control. Go back to the right-angled and isosceles triangles. At the beginning of the universe (The Big Bang) the time triangle dominates while the space triangle is at a minimum. Energy dominates with stars being born. It is only when they begin to die off and form black holes that the universe begins to slow down and a shift begins with the two triangles and the space triangle begins to grow larger and larger while the time triangle grows smaller and smaller until the stationary space singularities act as a drag on the universe and it gradually goes into the Big Collapse. And the universe does it all over again.

With this model, it supports the notion of multiple realities but in more of a sequential fashion rather than concurrent. As the universe regenerates itself over and over again in Big Bangs and Big Collapses it provides the opportunity when time and space intersect to form new realities, just not at the same time. The only way for that to happen where two realities can exist at the same time is when space is stationary and time does not exist which occurs in a singularity.

Time = Space in motion (T = Sm)



Outline Notes on The Four States of Space

Richard Fiene, Ph.D.

July 2020a3

The proposed Four States:

- 1) Stationary Space
- 2) Space In-Motion
- 3) Filled Space (Mass)
- 4) Empty Space

The Implications of the proposed Four States of Space:

- Space is stationary = singularity, no time.
 - Empty space in motion = time.
 - Filled space in motion = energy.
- Interaction of filled space and empty space = gravity.

These states and implications are summarized in the following matrix:

<i>Four States of Space</i>	Filled Space	Empty Space
Stationary Space	Singularity	No Time
Space in Motion	Energy	Time

Space: A Unified Field Theory

Richard Fiene, Ph.D.

October 2020

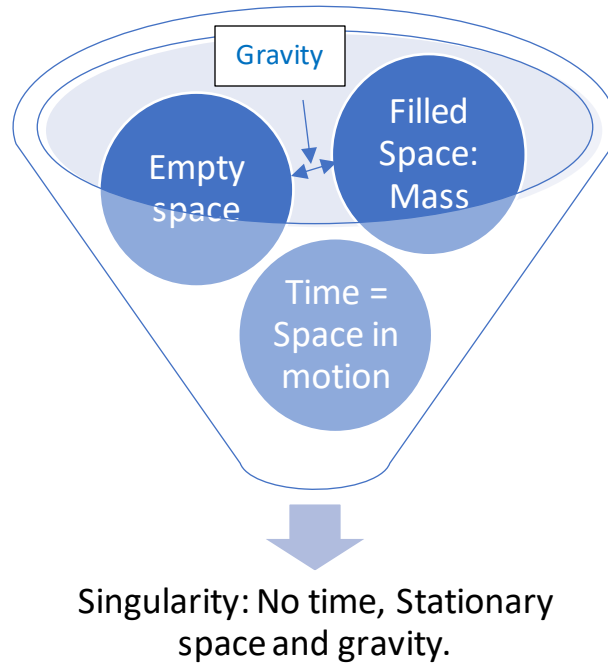
I am proposing space as a unified field theory attempting to provide a bridge for relativity and quantum field theory. This will be a philosophical treatise and not a mathematical presentation. This is from the perspective of a psychologist who has a research interest in how we develop our notions of time and space from birth to adults.

I am proposing that what we are experiencing or have developed concepts to understand may all be part and parcel of space just in various states. I am hoping that in viewing space in this unified manner may provide a catalyst to moving us to a new level of understanding the very large (relativity) and the very small (quantum).

Let me start with some basic concepts about space. First, space can be filled (mass) or it can be empty (massless). Second, space can be stationary (singularity) or in motion (time). Third, filled space can interact with empty space and is manifested as gravity. Space when it is stationary, it is non-linear, it is a point, it is discrete, a singularity. Black holes are the only example of space being stationary. Time is infinite when space is stationary. Space becomes linear when it moves and time can come into existence. Space now becomes continuous moving from its discrete packet state and has dimensionality. Thinking of space as both discrete and continuous helps us to deal with relativity and quantum field theories within the same paradigm.

The universe is inflating, expanding with energy overcoming gravity which is attempting to pull space into a stationary resting mode. This will continue until the number of black holes overpopulate and gravity overcomes the energy causing the expansion. Think of black holes as punctures in our universe which act as anchors keeping the universe from expanding uncontrollably. But a point will come when the sheer volume of the black holes will exceed the energy level and the universe will begin to collapse into the single singularity and a resulting big bang will reboot the universe.

Also, it is possible to think of space as both a particle being stationary (singularity) and as a wave being in motion (time). The same when space is filled (particle) or empty and is massless (wave). The speed of light is still a constant. Empty space is still warped by filled space and its resulting interaction is a gravitational wave.



Four states of space: In motion or Stationary; Empty or Filled (Mass).



The Four States of Space

The 2 x 2 matrix is an attempt to organize this new theory of space and to classify its proposed four states: space in motion or stationary; and space as filled (Mass) or empty. Once the matrix is constructed, the implications are displayed so that the intersection of motion (velocity) and filled space (Mass) is momentum. Stationary space and filled space (Mass) is object permanence. Empty space and motion (velocity) results in the creation of time; empty space and stationary space is a singularity.

Four States of Space	<i>Motion (Velocity)</i>	<i>Stationary</i>
<i>Filled (Mass)</i>	Momentum	Object Permanence
<i>Empty</i>	Time	Singularity

To continue with the above 2 x 2 matrix, the following additional implications can be proposed in which object permanence begins to move will result in acceleration. The interaction between filled space and empty space will create gravity: expanding in empty space; contracting in filled space. When object permanence and a singularity result in a black hole. A singularity interacting with time can present the notion of the big bang or big bounce. Object permanence moving to the time quadrant moves from the random to the linear. And lastly momentum intersecting with a singularity would develop the twin parallel of mass + energy and dark matter + dark energy.

Object Permanence --> Momentum = Acceleration.

Filled Space x Empty Space = Contracting & Expanding Gravity.

Object Permanence x Singularity = Black Hole.

Singularity --> Time = Big Bounce or Big Bang.

Object Permanence --> Time = Random to Linear.

Momentum --> Singularity = Mass + Energy to Dark Matter + Energy.

Intersection of Momentum + Time + Object Permanence + Singularity = Entanglement.

Outer Boundary of Momentum + Time + Object Permanence + Singularity = Hologram.

Our Expanding and Contracting Universe: Building off the Four States of Space

This post will follow up and build off a previous post on the four states of space. In the four states of space it is conjectured that the basic building blocks of the universe can be dealt with by only utilizing space as a concept. In that theory, space is organized by a 2 x 2 matrix into space as empty, filled, moving or stationary. This post attempts to further simplify that 2 x 2 matrix into a dichotomy of space as either contracting or expanding. Let's be as parsimonious as possible and reduce four states to a dichotomy.

Research has inferred that the universe is expanding. Let's take that assumption and apply it to the 2 x 2 matrix model and the theory of space. Does the expansion of space apply to empty space while contraction applies to filled space (mass) being determined by gravity? An added concept is as empty space is moving/expanding that this is our definition of time (Empty space in motion = time). And is the contraction of filled space (mass) ultimate result a black hole where gravity is at its ultimate as defined by a singularity where time no longer exists because pure space is truly stationary.

Is it possible to reduce the theory of space as defined by its four states to the delicate balance between the dichotomy of expansion and contraction? Think of our universe as a single slice of infinite flat possibilities within a sphere which expands out from the center in all directions but reaching an other limit as gravity overtakes expanding empty space (black holes are greater than the number of stars) and then contracts to a singularity and repeats the whole process all over again. Another random single flat slice within the sphere.

Quantum Relativity

Two previous posts introduced the Theory of Space as consisting of four states. This post applies the specific concept of time as empty space in motion from the Theory of Space and substitutes that concept within the General Theory of Relativity. When the General Theory of Relativity was proposed it was not known that the universe was expanding, it was assumed that the universe was in a steady state. The Theory of Space takes into account that we live within an expanding universe, constantly moving.

$$dt/dr = +/- 1 / (1 - (2GM/r))$$

In the above formula, replace dt with time = empty space in motion ($t = esm$) and how does that change how we think about the result. Prior to this adjustment we were tripping over the changes in time and space as defined within a black hole; now we are just dealing with the contraction and expansion of space within a black hole as a

singularity. As filled space becomes more dense, empty space approaches infinity. There is no need for time, just space.

This adjustment can then be extended to the quantum level since we are dealing with a singularity which combines filled (mass) space with empty space, the ultimate contraction and expansion of space. That is the missing piece of the equation. Once time is replaced by empty space in motion we have a singular model for dealing with relativity and quantum mechanics. It was time that was the major stumbling block to combining quantum mechanics with relativity.

Another thought related to black hole singularities. It has been hypothesized that the universe is a hologram. What if, the black hole singularity is a hologram? How would that change our thinking about spacetime and entanglement?