Spatial Acquistion Device and the Four States of Space

A Series of Abstracts and Technical Research Notes

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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).

Dimensionality	***Conservation Experiment***	***Stage of Piaget's Theory***
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.

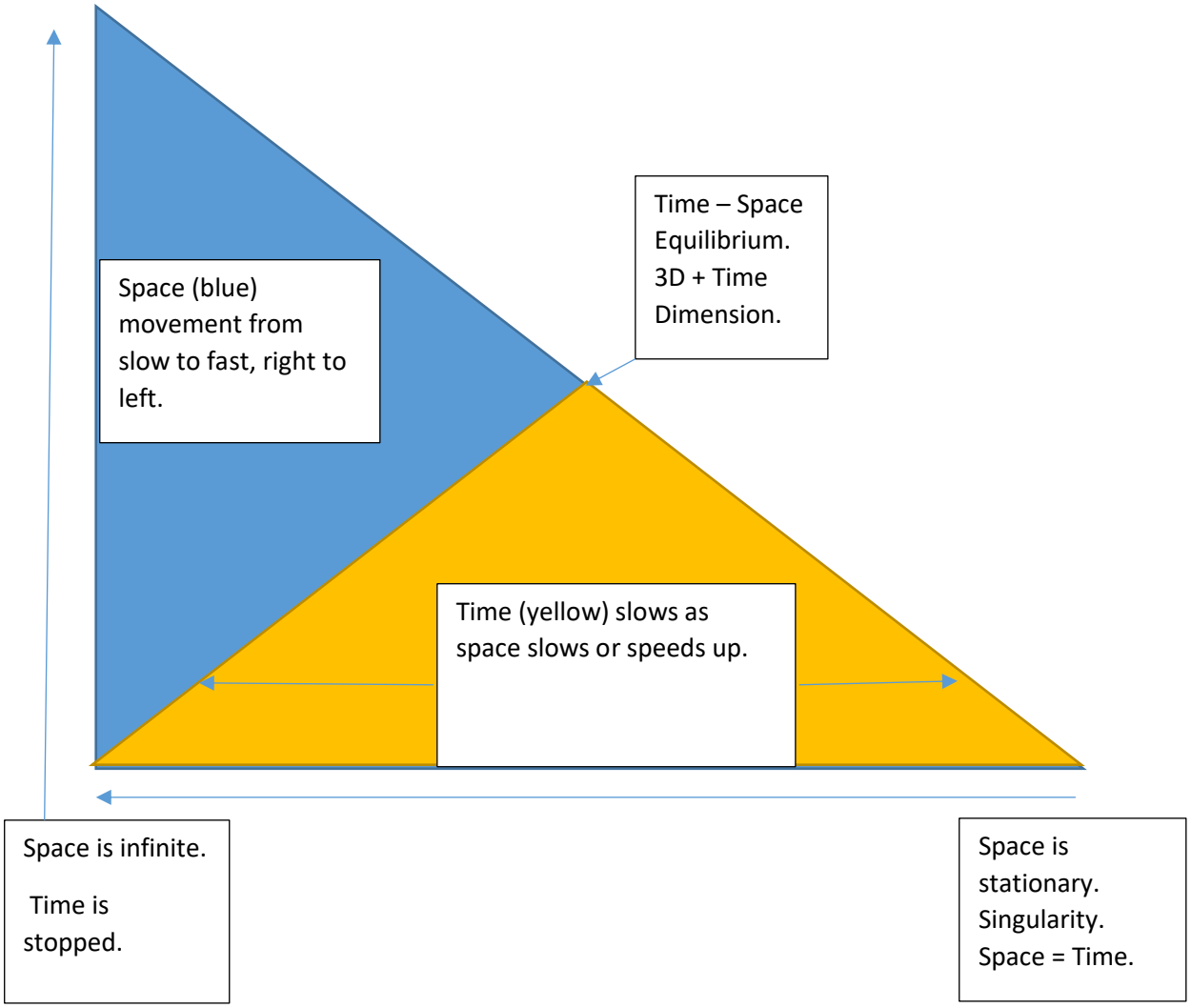
The stationary space represents a black hole as a singularity where time has lost meaning and different events could occur at the same time, such as having a cat that is both alive and dead. Space equals time. When time has become stationary, space as represented by filled space, Mass, is moving at or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

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:

Four States of Space	**Filled Space**	**Empty Space**
Stationary Space	**Singularity**	**No Time**
Space in Motion	**Energy**	**Time**

Space: A Unified Field Theory

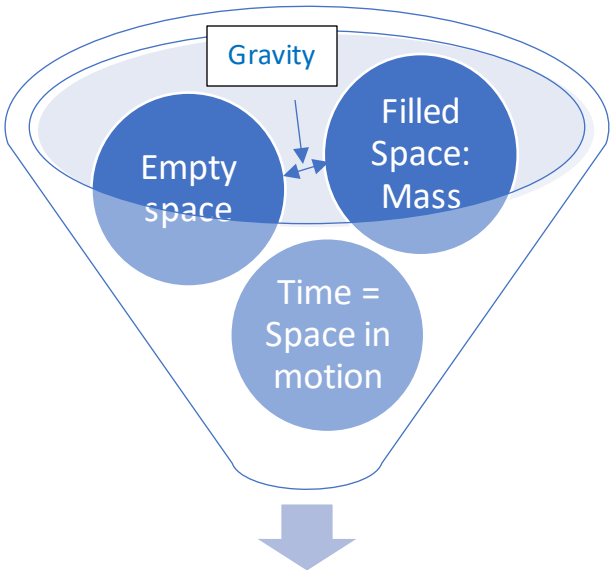
I am proposing space as a unified field theory attempting to provide a bridge for relativity and quantum field theory. This will be a philosophical treatise and not a mathematical presentation. This is from the perspective of a psychologist who has a research interest in how we develop our notions of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



Singularity: No time, Stationary space and gravity.

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	***Motion (Velocity)***	***Stationary***
Filled (Mass)	Momentum	Object Permanence
Empty	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.

Fiene, (2020, 2022). ***Four States of Space and the Spatial Acquisition Device*****, RIKINotes**

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?

Four States of Space Replacing Spacetime

Space and time have gone through various views in physics from Newtonian's absolute conceptualization of space and time to Einstein's relative conceptualization of spacetime. I would like to propose a further conceptualization of space and time in just dealing with space without the need for time.

I am proposing space as represented by four states: stationary, moving, empty and filled.

Let me elaborate on each of these.

Stationary space is as it says, it is empty space that is not moving but as we know the universe is expanding and it is accelerating in its expansion. So empty space as we define it is not stationary. In fact, the only place where space is not moving is in a black hole in which space becomes a singularity. Black holes are like the anchors of the universe allowing it to expand in a controlled fashion, not expanding out of control.

Moving space is my replacement for time. Since the universe is in constant expansion mode it is relatively easy to replace time with this movement of empty space. It is linear, measurable and all pervasive. The interesting nuance with this expansion is its acceleration which will need to be dealt with since each measurement of empty space moving will increase with each successive expansive move.

Empty space is empty space, it is a vacuum. Are there particles present, yes, but it is absent of any filled space which is just another term for mass. Empty space is the background, it is the canvas upon which filled space is painted. It tells mass how to move.

Filled space is mass/matter. It is us, it is the planets, it is the stars. It tells empty space how to curve. The interaction of filled space and empty space is our definition of gravity. It is this unique geometry that demonstrates how filled space fits within empty space. No forces are needed, just the geometric description of the interaction of filled and empty space.

The interesting expansion of filled space within empty space and taking gravity to its extreme is when gravity forms a black hole and space becomes stationary which is the first state of space as mentioned above.

I think this proposal dealing only with space and not introducing time into the conceptual mix simplifies the paradigm of understanding our basic components of physical reality. No two moments are the same because space is in a constant state of expansion leaving what we just experienced behind and moving forward. Expanding space gives us an easy interpretation of past, present and future.

The four states of space are more parsimonious in explaining the fundamental pillars of physics when it comes to gravity, space, time, and mass.

Some final thoughts to ponder:

1) It is time to rid ourselves of time and replace it with empty space in motion.

2) Once time is introduced reality becomes linear, without it, its true nonlinear nature becomes apparent.

3) Space outside a light cone is nonlinear, space within the light cone is linear and is moving = time.

4) Gravity is not a force but rather the interaction of filled and empty space.

5) Linear vs non-linear is the essence of spacetime. This is the deep structure.

6) Special relativity = space in motion = time; space is stationary = black hole, no time.

7) General relativity = filled space + empty space interaction = gravity.

8) Speed of light = universe's speed limit.

9) Black hole = universe's stop sign.

10) When filled space overwhelmes empty space = black hole.

11) At the speed of light = singularity = black hole. Time stops = empty space is stationary. Same result.

12) Gravity takes over when filled space overwhelms empty space.

13) The universe is expanding at an accelerating rate today but that accelerating rate is slower than 1 billion years ago and slower than 1 billion years before that. It is gradually slowing as filled space becomes dominant and forms black holes which is the dark energy and dark matter we are detecting. Once filled space (dark matter) is 100%, the universe will collapse into a singularity and another big bang will occur.

14) If one accepts time = space in motion then time dilation at the speed of light = spaghettification in a black hole.

15) Nothing is denser than a singularity within a black hole.

At the Intersection of Psychology and Spacetime

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This is an essay about an interest I have had my whole career as a research psychologist in which I have been able to do a great deal of thinking and theorizing about the subject of how we develop our concepts of space and time. My day job took me more into the public policy arena as a regulatory scientist and that is whereas a scientist, I have made most of my contributions.

My interest in space and time (spacetime) began in graduate school in my studies of developmental psychology and cognitive theory, in particular Piaget's Theory of Cognitive Development and how children develop their concepts of space and time. I have written about this elsewhere (for the interested reader, please check out https://rikinstitute.com/blog/); there you will find my various excursions into the concepts of space and time and many other arenas. I promise in this essay not to delve into math equations and algorithms as so much of my work is dominated by, but I have found that "mathematics is the language of the sciences" and I have utilized it a great deal in my work as a research psychologist and regulatory scientist.

In my research into developmental psychology and cognitive theory, I was so impressed in how Jean Piaget developed and tested children's abilities to understand the basic concepts of space and time. In fact, I have theorized that we are innately born with a Spatial Acquisition Device just like Noam Chomsky's Language Acquisition Device. Just as we learn language to communicate, we learn about spacetime to understand our physical surroundings in a meaningful way. In fact, I have also theorized that potentially spacetime may only involve space and there really is no need for the concept of time, but that is later in this essay about the psychology of spacetime.

In Piaget's cognitive theory, he demonstrates how children progress through the various dimensions of space in a sensorimotor fashion to a representational fashion of exploring and understanding the three dimensions of space and the fourth dimension of time. I am not going to delineate the details here because it will get us off track; but the interested reader can go to the link above to get further information regarding this sequencing.

Here are some of the topics I would like to cover in this short essay which I will also share some anecdotal tidbits along the way: quantum mechanics, relativity, proposed theory of space, and linear & nonlinear reality.

I have always found it so interesting in how we deal with our birthdays when it comes to representing time: we make such a big deal of the early ones, I guess because we haven't had many yet; and the later ones, especially if we make it to 100, I guess because we realize we don't have many left!! Opposite ends of a continuum but with the same conceptual lens.

I made the leap from psychology to physics in my pursuit of attempting to understand spacetime with such classics as "*The Tao of Physics*" and the "*Zen and the Art of Motorcycle Maintenance*". I now realize that I probably stretched my understanding a bit, but it was an interesting ride. It is the proverbial "A little knowledge can get you into trouble, but you need a lot more knowledge/insight to get you back out".

After my transition, I started to get serious reading the classics in physics and how space and time were separate and absolute concepts. This, of course, all changed with the theory of relativity and spacetime was introduced and has now for over 100 years been the predominant model of the universe on the macro scale. On the micro scale where atoms come into play, quantum mechanics is the dominant theory. The problem in physics today is reconciling these two theories.

This pursuit of understanding or lack thereof brought me to try to understand how all the pieces fit together. In my day job as a regulatory scientist, I did a great deal of data analysis looking for patterns in what to most people look like random events. Over the years I have discovered several patterns but probably the most significant and far reaching is my regulatory compliance theory of diminishing returns where program quality is compared to regulatory compliance with rules. When one initially examines the data, it appears very random until you begin to put the data into policy decision making buckets, such as full compliance, substantial compliance and low compliance. Once one does that a ceiling effect or plateauing effect appears which gives meaning to the data in moving from apparent randomness to a more linear, albeit curvilinear, relationship.

So, I applied this frame of reference to my readings in spacetime in attempting to ascertain a deep structure which could explain the apparent discrepancies between relativity and quantum mechanics. This notion of randomness is very prevalent within quantum mechanics but not so with relativity. It would appear that a deeper structure would be to think of quantum mechanics in a more nonlinear fashion and relativity in a linear fashion. Looking at this deep structure and the most parsimonious way of describing this deep structure, I was led back to our basic concepts of spacetime and began to think in just terms of space and eliminating time in the following way: Time = Space in Motion. When one did this, it still explained special relativity and helped to explain quantum mechanics because without time it removes a linear relationship that appears not to exist at the quantum level.

That helped to explain special relativity, but what about general relativity? If we extend the concept of space from stationary space and space in motion to also include filled space and empty space, we can deal with gravity as the interaction between filled and empty space. No forces needed, just an interaction of the two.

I am sure you are asking how all this relates to the psychology of spacetime. Very honestly, so did I, as I researched more and more into the basic concepts of physical reality. Being a scientist, I have always been driven by data and empirical evidence to support the research I have done over

the past 50 years. Now, as I approach the twilight of my career and my life, I have been thinking a great deal about what is on the other side. Does this excursion help me understand where we are in this universe. I have suggested replacing time with "space in motion" but let's face it, that doesn't really change anything, I can't get off of space and bypass the end of time for myself on this earth. Call it what you want but none of us get out of here alive.

It is interesting that my theory of space when I postulate the difference between space in motion as representing time, and stationary space is represented as a black hole, a singularity (again for the interested reader, please see the link above that will provide more information on the Theory of Space: Four states of space). So far black holes are one of the least understood entities in physics. Why should the end of our lives be any different. The death part is easy to figure out via autopsies; but what happens after isn't as easy to figure out. Although becoming a singularity holds promise!!

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Object Permanence and Quantum Physics

Richard Fiene PhD

Below is depicted a proposed object permanence quantum physics matrix showing the relationship amongst perception, internal representation and object permanence and where quantum physics and potentially relativity play a role. Object permanence is suggested as a link between the two conceptually.

Object Permanence Quantum Physics Matrix

External Perception Dominates		Internal Representation Dominates
Quantum Random	Object Permanence	Relativity Linear
Internal Representation Secondary		External Perception Secondary

It is possible that object permanence could be a solution to quantum physics and psychology related to consciousness, but there is no scientific consensus on this yet. Some physicists believe that the concept of object permanence could help to explain the phenomenon of wave function collapse, which is a key concept in quantum mechanics. Wave function collapse is the process by which a quantum particle's wave function, which represents all possible states of the particle, collapses into a single state when it is observed. Some physicists believe that this collapse is caused by the conscious observer, and that the concept of object permanence could help to explain how this happens.

In psychology, object permanence is the ability to know that objects continue to exist even when they are not visible. This ability develops in children around the age of 7 months, and it is thought to be a key milestone in cognitive development. Some psychologists believe that object permanence could be related to consciousness, and that the ability to understand that objects exist even when they are not visible is a fundamental aspect of consciousness

Random Observations of Living in Both a Linear and Non-Linear Reality

Richard Fiene, Ph.D.

Now in my senior years, I have had the opportunity to reflect on many basic elements of my life and reality as I think we understand it from a research psychologist's point of view. I have always been fascinated about time and space and how we construct these basic tenets of our reality. As a research psychologist, I have studied Jean Piaget's Theory of Cognitive Development and Epistemology and his very interesting experiments with young children as they develop their notions of number, area, and volume, our three dimensions of spatial reality.

I have also done some reading in physics and quantum mechanics and the difficulties of unifying this theory with the theory of relativity. I find this also fascinating that physicists are having the same difficulties in trying to explain predictions as we have within psychological research in trying to explain human behavior.

And lastly, I have spent more time than I would like to admit in data analysis and statistical analysis in looking for patterns and trends and making predictions within public policy and regulatory compliance. If you think doing research involving individuals is daunting, you haven't seen anything that approaches ambiguity as you will find in the public policy and regulatory compliance arenas.

Believe it or not, I am going to try to put these three areas of thought together.

The dominant paradigm in thinking about reality is that we live in a linear world. All we need to do is look at the developments in mathematics to realize how all pervasive this paradigm is. However, not all of reality can be defined via a mathematical algorithm precisely. Many behaviors in psychology, if not all, do not fit neatly into a mathematical formula. The best we can do is via statistics and probabilities by taking advantage of large samples of individuals and predicting how the majority of individuals will react.

Time is linear with a past, present and future. We all experience it, albeit in very individual ways. I wonder how space influences our perception of time. The denser the space, time slows down psychologically. Or does it speed up? Anyway, you get the idea that time and space interact and are not absolute from each other.

Mathematics is very linear. We start with zero and we can either add or subtract from our beginning point. The only difference between mathematics and time is that we can't go back in time, or can we? In mathematics we have many formula, such as $C = \pi d$ or $A = \pi r^2$. The beauty of mathematics is that the formulas, the math, work every time, for every case. However, in psychology, that is not the case where for each individual, it works every time. Now, let's take the circle and the relationship between the circumference and diameter that is defined by $C = \pi d$ and let's pick a random point within that circle. It is not on the diameter or on the circumference but just randomly somewhere in the circle. Let's find another random point within that circle which is not on the diameter or circumference. What

can we say about these two random points. Not much!! By having these two random points, can we determine the circumference or the diameter? Not really. So how do we deal with the two random points. Use statistics. We can talk about their relationships to each other via correlations, can't say anything about causation though. Are these two random points part of non-linear reality? Do we learn about these random points by collecting as much data as possible and look for relationships like we do with big data projects? We can run correlations on anything, but is it meaningful or not? Many times it is, but I have seen as many times where that is not the case.

So, is the limit to mathematics, the statistics we have on groups? Is randomness the nature of reality in general and mathematics is defining only a small segment of what can be seen and touched. Is the majority of reality probability based and the best we can do is statistically predict it via correlations and not causation? Or is mathematics pre-programmed in our brains like language and space/time? Do we have a mathematical acquisition device (MAD) just like we have a language acquisition device (LAD)? And can we say the same thing about space/time (SAD)? Are we attempting to overlay linear relationships in a non-linear reality?

Quantum Hologram Theory of Physics and Consciousness (QHTC) & the Spatial Acquisition Device

Richard Fiene PhD

This short abstract will propose an additional element to the Quantum Hologram Theory of Physics and Consciousness (QHTC) called the Spatial Acquisition Device (SpAD). The QHTC needs a basic building block in how we organize and internalize our thinking about time and space. This basic building block can be found in Piaget's Cognitive Developmental Theory in which he demonstrates through a series of conservation experiments how children internalize the basic notions of time and space.

Piaget's theory has four stages: sensori-motor, pre-operational, concrete-operational and formal operations. All of us in our development go through these stages albeit not necessarily on the same time frame as has been demonstrated by research validating his theory. However, the invariance in the stages is solid. I have taken these stages and placed them along a spacetime continuum which will eventually lead us to the proposed Spatial Acquisition Device (SpAD).

The first stage focuses on sensori-motor (Birth-2yrs) learning in which the child learns via movement through space by raising their head, sitting up, rolling over, crawling and then by walking. The child experiences all the various dimensions of space from one dimensional space to three-dimensional space. A key component during this stage is the development of the concept of object permanence where an object continues to exist even

if it can no longer be seen. Prior to the development of object permanence, out of sight is out of mind, non-existent.

During the pre-operational stage (2-7yrs), the child begins the initial tasks of conservation and begins to internalize the concept and not being influenced by perception and how things change. Conservation of number occurs during this stage. In the concrete-operations stage (7-11yrs), the child moves on their conservation journey by acquiring conservation of area, length, weight, and volume completing their walk through the dimensions. Once the child has completed this dimension journey by internalizing these various levels of conservation when it comes to number, area, length, weight, and volume the Spatial Acquisition Device now governs how s/he will interact with the world on a spatial plane.

Let's return to the Importance of object permanence, Piaget's most important discovery. As far as the child is concerned prior to object permanence everything is a wave function and perceptual, not internally represented. Once object permanence takes hold it provides the basis of internalization and representation of external reality within the Spatial Acquisition Device. It is the beginning of the child's life arrow establishing the concept of linearity. Up to that point it is a non-linear relationship as far as the child is concerned.

The conservation experiments and the notion of figure-ground relationship and how children are perceptually bound is critical in their development. The ground part being the wave function which influences initial thinking and then object permanence comes into play and establishing one to one correspondence which moves the perceptual bound to internal understanding and doing this for 1D, 2D, and 3D. Number, area, and volume. Once

this occurs the SpAD is complete, but it all starts with sensori-motor and the child moving through space via stationary to raising their head, to crawling, to sitting, and then to walking as described earlier.

SpAD is similar to the Language Acquisition Device (LAD) as proposed by Noam Chomsky. It is hard wired into our circuity and just as the LAD is our template for language and linear thinking, SpAD is our template for understanding our surroundings and non-linear thinking. It is how we make sense of our three-dimensional framework. It is a framework, template for understanding but at the same time it is a limitation in how we interact with that world. The SpAD has evolved in humans over the millennium, and it is the filter that we use to our knowledge base and how we interpret the world.

For additional information about SpAD, please check out the following:
https://www.yumpu.com/en/account/magazines/edit/68498611

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