Exploration on the Relationships of Existence, Probability and Measurement Outcomes and Their Implications for Entanglement and Causality

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Abstract

Choosing premises, or first principles, or base of argument, from which further deductions are made. Discussion of the following subjects: Existence, space from an argument about object permanence and the question: is the Moon there when nobody looks?, vision: seen things, categorization error, time; answering what does uni-temporal mean?, measurements (likened to scores), beables, the relation of existing and probability and scores, quantum physics including what happens to results not measured, an answer to: what is quantum mechanics about? Superposition including description of and history and analysis of schrödinger's cat thought experiment, the entanglement idea, thought experiment showing 'unspooky' correlation is to be expected, predicting the effect of non quantum correlations.

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EXISTENCE: BEING

What is existence? Simplest is base existence, which could be thought of as the field or plane of existence. In which other arrangements are actualized, that is have become actual or real. Though it should not be thought of as just a 2 dimensional plane. Nor does it have the dimensions associated with an observer viewpoint. Here all things have absolute relation to other existing things in the environment within the base.

Objects have extent and distribution, (of their differentiated existence), and relation to existence around it, effecting and being effected accordingly. They do not exist together with height width, depth, measurements being unseen and unmeasured Which are comparisons with a scale of measurement of standard size. Somethings, that can be in theory differentiated, (that is, identified as being different), from the plain, simple base. The base is often disregarded.

The different kinds of existence are different patterns, that endure within the base. For example an atom is a kind of pattern with parts in relation to each other, an electric field is another different pattern. This is proposed, because we know different forms of existence, can change into or produce other forms of existence. A moving electric charge is an electric field. Particles are in some circumstances able to form other kinds of particles. Objects are formed from arrangements of particles.

We also know there is transmission of electromagnetic radiation, magnetic and electric fields and gravitational fields which can all be actualization from differences in distribution of the base existence; in response to the presence of matter, presence of the co-ordinated motion of electrons in matter, moving electrons or other differentiated existence

Existence does not have to be sensed or detected to be. It is *observer independent.*

Some patterns of existence are detectable or sensed. No detection does not necessarily mean no existence, a hole in existence. We can think of it as a soup with identifiable ingredients distributed within a base. The soup has no holed between ingredients.

What is sensed or detected, meaning it is accessible to our senses, is known by the product of our senses and the product is assigned a description, qualitatively or quantitatively or both, That is ‘what’ and how much. Eg. 10volts, 3 pigs. The beep of a detector giving a score (detection: hit) is not the same as the existence it detects. The observation or measurement (aka outcome: hit) is production of a *new product* that didn’t previously exist.

SPACE

Object permanence

Things continuing to exist when not seen. For example, when eyes are closed

Not existing and not being seen are not the same situation. The fun of peekaboo is in the 'magical' reappearance of an object, often a face, that had disappeared from view. Older children are not amused by the game, having awareness that objects obscured from view probably still exist unseen. Coming into and out of view is ordinary.

"Psychologist Jean Piaget conducted experiments with infants which led him to conclude that this awareness was typically achieved at eight to nine months of age." "He claimed that infants before this age are too young to understand object permanence." Wikipedia peekaboo, https://en.wikipedia.org/wiki/Peekaboo

Where is the unseen existing object located? If the child observer isn't constructing an observation product semblance in 'observation product spacetime'.

The observation independent existing thing exists in *another space than the products of observation*. A space that is not relative to an observer, (*there is no reason for it to be relative*), but absolute. Here things are existing in relation to other existing things forming a unitary pattern of all existing.

Is the Moon there when nobody looks?

Is the Moon there when nobody looks? A question of Einstein's.

There are two questions that can be asked about the question, which is ambiguous.

1. What is meant by - the Moon?

It could be referring to the observer independent materially existing Moon. Or the observer generated relative observation products called the Moon too. There are also other perceptions related to the mental concept of the Moon. That may be 'in mind' without observing the Moon.

There is also potential sensory data emitted by the Moon but not yet received by an observer, so neither existing moon nor yet observation product.

2. What is meant by 'there'?

It could mean within the configuration of existing things independent of observation? But it doesn't mean that because the questioner was Einstein and he didn't differentiate observer independent existing things from observer relative semblances of existing things.

He wants to know if the existing Moon is in Spacetime when not observed.

It is not there, in space time. The seen Moon is seen as an Image semblance of the existing Moon which is a spacetime image. It is not formed if potential sensory data (electromagnetic signals) are not received and processed into the observation product called the Moon.
The existing material Moon is an observer independent actualization. We know from the idea of object permanence that it is likely the Moon still exists when not seen. Existing in an absolute configuration of existing things which is not in observation product spacetime, but elsewhere.

VISION : SEEN THINGS

The semblances (likenesses) of objects that are seen are constructed from signals arriving over time and so time is built into the product. (it takes time for the signals to arrive from their material object source. (Such as 'light' reflected from a material object or emitted by a light bulb)
Delay due to signal travel time, and temporal spread, from amalgamation of signals with different temporal (When) origins arriving at the observer close together, can occur. A spacetime amalgamation is made. Time is built in so it has a virtual time dimension.
Usually 'light' is reflected from the surface of objects and this is what is received by an observer. That shows in the semblances of objects formed by the sensory system or device, such as a camera. This can be called Image reality, fabricated as relative spacetime by the observer.
Special relativity can be reinterpreted as describing observation products produced by the observer from received electromagnetic signals. Each reference frame is unique to the individual observer. The reasons for the paradoxes of Special relativity can then be understood.

(PARADOX
Observers produce observation products. They can be described either as being or possessing a reality interface. That is a converter within the observer independent existence that receives input from it and using the input generates (usually) surface semblance, that is in some ways similar to the source of the input but not the same. It may appear to be made of the same chemical substance but is not. It has perspective, looking smaller than its existing form the further from the observer. Just the surface is seen usually, it, the image alone has no inside beneath the surface appearance. This is not obvious as the seen spacetime image can overlay part of the existing object i.e. the part of the object, from which sensory input is received in observer independent space. Making it seem that what is seen is an existing object rather than generated semblance. Objects that do not have reality interfaces do not generate spacetime observation products from a relative perspective. They have no point of view or reference frame. An example is the rivet in the bug rivet paradox. What the rivet sees has no relevance, when the

rivet doesn’t see. The rivet viewpoint is a fallacy. In other cases differences in signal receipt is leading to differences of appearance that do not apply to the unseen existing objects that do not depend on signal receipt. Grandfather type paradoxes are not possible because the people are existing in an absolute uni-temporal space as part of the singular configuration of all existing. There is no other time for existing things to travel to. *1. Continued in appendix)

CATEGORIZATION ERROR

There is a widespread problem in physics. Namely categorization error. Definition;
Categorization error: Failure to correctly differentiate [noumenal or observer independent, absolute, uni temporal] Object reality and [emergent, product, relative semblance] Image reality categories, or omission of a relevant category from consideration.
Category differentiation error: Failure to correctly assign different categories to the actualization, noumenon or beable and the associated manifestation or phenomenon, whereby it is known.
(Subset) Category omission error: Complete omission of consideration of a relevant category. (Woodward, G.)

TIME

What does uni-temporal mean?

It means one time. This applies to the pattern of all existing. The pattern does not have parts at different times. Existing is not smeared over time but wholly at one time after another. Each time being a new pattern of all existing. The changing of the configuration can be called Foundational or configuration time. The umeasured amount of change of the pattern varies for different parts. This is not time passing at different rates. It is more or less alteration happening within the same uni-temporal sequence of universal configurations. The current configuration, the only existing one is called Uni temporal-Now. Also it is the ‘Causality front’ when events existentially happen. It is unmeasured, so clock time which is a comparison against a standard regular process, forming a scale, doesn’t apply. The when of all existing , Uni-temporal-Now, is before all semblances of parts of it. And measurements of them. This is because the semblances of it are formed as a consequence of signal transmission, which takes time.

MEASUREMENTS LIKENED TO SCORES

The word ‘score’ is used here to refer to individual outcomes of note, that may be recorded or memorized, such as; a goal , result, detection

An existing basket ball must pass though an existing basket ball hoop for a score of 1 basket. The score does not exist until the existential ball through hoop, happening is completed. This is correct causality, The score is a result, an effect. The ball going through the hoop is a cause. The effect comes after the cause. A tally of misses could also be kept. A miss is counted each time a basket score is attempted but the ball fails to pass through the hoop. This too is an existential happening prior to the score or miss outcome. The counted score, or miss, is a new abstract entity that did not exist prior to the happening, acquired each time a basket is attempted, Neither result nor tallies are the basket ball or ball/ hoop system.

A magician's rabbit must be in the hat, as a material existing object, prior to extraction. A rabbit being present in the hat, but its presence being unknown to the audience is the crux of the magic rabbit illusion. The rabbit inside hat lining is not detected by the audience, even with a quick glance into the dark hat interior.

Therefore *their observer's model universe does not include the rabbit being in the hat.*

The rabbit is extracted. Hey presto!

The rabbit is perceived. (The members of the audience have each formed an observation product with semblance of a rabbit, using the EM radiation they have received) Presence of an existential rabbit in the local universe needs adding to the observer's conceptual model of the universe.

Rabbit identifying token or term suddenly appears in the model.

This can be used as an analogy for particle measurement outcomes, knowledge about the particles, suddenly appearing in model replacing prior unknowns.

The particles must exist (in absolute but unknown relation to the other existing things in the environment) prior to measurement, so that the measurement relations of particle and apparatus can be established. Like the rabbit concealed in the hat, unknown by the audience.

The measurement outcome term is something new that didn't exist in the universe before measurement.

In that way it is unlike the extracted rabbit and more like a Polaroid photo taken of the rabbit still inside the hat. The photo is a new product. The audience members visual semblance of a rabbit too is new. A new observation product (not the existential rabbit itself -but this is more obscure, less obvious.)

* 2. Continued in appendix

In a uni-temporal existential reality, a premise of this explanation, there is no after extraction, or after test, state prior to rabbit extraction or particle test happening. There is not a prior to extraction (or test)

post extraction (or test) observation product in the universe. (Unlike in the space time continuum model.) That does not mean there is no existing, rabbit.

Not recognizing the existing brings about a causality error, as cause has not been properly attributed, in both the rabbit trick and particle measurement cases. Measurement does not cause the definite being of the particle anymore than extraction of the rabbit causes a rabbit into being.

BEABLES

In 1975 John Bell presents a paper called The theory of local beables. He states "increase in precision might be possible by concentration on the beables, which can be described in "classical terms" because they are there. The beables must include the setting of knobs and switches, the currents in coils, and the readings of instruments. He declares "Observables" must be made, somehow, out of beables. The theory of local beables should contain, and give precise physical meaning to, the algebra of local observables." (Bell, J. 1975)[7]

He is trying to tie measurement of observables to seen reality. He tries to use his theory to give a way causality can work. But existing things do not exist in spacetime nor is their interaction there. *Special relativity is also not considering observer independent existence.*

<u>Existing and probability and scores</u>

Existing has one configuration/ pattern at a time.

A die hidden in a fist, is associated with probability 1/6 of landing face no.6 up when cast.

Simultaneously there is its existing as a six sided object with a singular current absolute orientation at a time.

When it lands it is still a six sided object with a current absolute orientation. It is no longer regarded as probability 1/6. Only the upper face is considered. Like a coin toss only considers the exposed face. There is a protocol that decides what will be considered the result. Catch, then palm open to expose coin or catch, flip onto back of opposite hand, expose coin. The two methods give opposite results so must be selected before the coin toss.

The result is a particular outcome of a happening I.e. which face is up, -*the measurement result* is *new because it is a 'state' outcome, considered separately from the entire materially existent source.* Which is still 6 sided. It should be thought of in the way that a single basket score is different from the material existing or seen basketball. The basket ball hasn't become the score. The score is a ***new abstract entity*** representing a certain type of happening. It if a fixed state or value. since production

independent of the source object and measurement apparatus and procedure that were involved in its production. Serving as a record of a happening that has occurred if recorded or memorized.
Where are the dice throw outcomes not thrown? They were never actualized. i.e. made real, actual. The die didn't land with the other faces fixed as the top surface. So the alternatives didn't go anywhere they just stopped being (normal circumstance) possibilities.
Many worlds violates conservation of energy. Matter is doubled each time a split of reality happens, forming a new alternative. It fails Occam's razor, by suggesting there is a multiverse of universes, constantly being formed at each choice. Thereby proposing far more material substance and complexity than other models.

QUANTUM PHYSICS

Quantum physics is about measurement. Prior to measurement there is not a clear singular description of the state that exists. When the existing thing is detected or observed a clear singular description can be given replacing the uncertain placeholder. This is called de-coherence or wave function collapse. Depending on the theory used. It is said that the certain state measured causes de-coherence or wave function collapse resulting in the being of that state rather than the other/s not measured.

What happens to the result not measured?

The many worlds theory has both measured and unmeasured results forming different branches of reality within a multi verse where all possibilities are actualized. *This is violation of conservation of energy*. Branching causes two outcomes where there was jut one. One ball becomes two, one hoop becomes two so that the existential ball can pass and miss simultaneously. The result not measured was not formed by a corresponding existential happening. When a basket ball goes through a hoop making a basket score there is no need to imagine simultaneously a basket ball missing the hoop though it has been a possibility until the score happens.

What is quantum mechanics about?

"Associated with every measurement, there will be a set of possible numerical values for the measurement – the spectrum of the measurement. With every value in the spectrum of a given measurement there will be a quantum amplitude that we will find this value if we make the relevant measurement. Quantum mechanics is the science of how to calculate such amplitudes given the results of a sufficient number of prior measurements. (Binney, J. and Skinner, D., 2008) [1]
It is concerned with measurement and prediction of measurement. It is not concerned with existence.

SUPERPOSITION

Superposition of states is a part of quantum physics prediction and measurement theory.
Bohr said [Quote, underlining added for emphasis] “Only if one can interpret a quantum measurement as an interaction between an instrument and an object, whose state is literally represented by Schrödinger’s wave function, and therefore taken to contain all potential values of observation, does it make sense to claim that the measurement forces the object to manifest one of these potential vales. Indeed, such a literal interpretation of the state vector implies that these values are somehow intrinsically present in the object with a certain probability all at once. In contrast, Bohr believed that particular kinematical and dynamical [*i.e. to do with moving of something, and change happening] properties are relational because their attribution to a quantum system makes sense only in relation to a particular experimental set-up and therefore that these numerical properties could have a specific value only during a measurement.” *added plain English in [ ] [8]

Basketball scores compared to measured states in quantum mechanics

Basket (scores) only come into being as the ball is thrown though the hoop) Failure to make a basket score might be noted. They too only come into being as the ball is thrown, but missing the hoop. *Basket scores are not basket balls coming into being*. The existential ball isn’t really in a goes through and doesn’t go through state prior to being thrown and a relation to hoop being established.

Outcomes

Outcome states or values, like scores, only happen when there has been the necessary inter-relation of existing measured thing and the apparatus., as it is encountered. The result of this apparatus , encountered this way, using this protocol.
The existing particle is not all outcomes. it is in an absolute relation to all other existing things prior to establishment of the one defining measurement relation with the apparatus. That imposes one particular ‘view’. Going from an absolute object to a relative score like, outcome. One interaction, out of many that could have been. I.e. this kind of interaction, applied this way, using this method)
The outcome is not the tested object.

Bohr explained, “the state of the object and the state of the instrument are dynamically inseparable during the interaction.” “The measuring instrument establishes the necessary conditions under which it makes sense to use the state concept.” [8]

Schrödinger’s cat

"This thought experiment was devised by physicist Erwin Schrödinger in 1935 in a discussion with Albert Einstein to illustrate what Schrödinger saw as the problems of the Copenhagen interpretation of quantum mechanics.”Wikipedia

It was his follow up to Einstein's exploding not exploding gunpowder scenario. Essentially highlighting the same untenable situation of there being two mutually incompatible states in the model, which they were discussing. Schrodinger's 'picture' is also highlighting two incompatible states in the model. The cat story is the more famous.

A radioactive source, is placed in a box together with a flask of poison and a live cat. There is a radiation detector and apparatus which will cause the poison flask to be shattered if a radioactive decay product is detected. According to the Copenhagen interpretation of quantum mechanics after some time the cat will be both alive and dead in superposition unseen in the box. Fitting the mathematical superposition representing the unmeasured cats vitality status. But when the box is opened the cat will only ever be found alive or dead. So arises the measurement problem of quantum mechanics. Which raises the question of when wavefunction collapse happens (being causal by the Copenhagen interpretation), if happens at all.

He was presenting a ridiculous scenario to point out the logical issue/problem with the model. Quantum physics is about measurement outcomes, the absolute condition of the cat is an ignored fact and is not assumed to influence the outcome which is considered a random occurrence. An 'impotent' neither live nor dead cat precedes the outcome in the model. The outcome then causes the definite state of being of the existential cat. Getting causality the wrong way around.

What would really occur in such a situation

Cat encountering poison is like basket ball going through hoop; The existential relationship outcome. Opening the box and noting the condition of the animal is like writing on the score card. The score- like, state outcome has come into existence upon box opening, preceded by the existential condition of the animal.

The basketball does not posses the score prior to being thrown

“the theory of relativity reminds us of the subjective character of all physical phenomena” (*ATDN*, p. 116)[9]. Rather, by referring to the subjective character of quantum phenomena" he was expressing the epistemological thesis that all observations in physics are in fact context-dependent. There exists, [according to Bohr], no view from nowhere in virtue of which quantum objects can be described.” [8]

He is not considering existing things in absolute relation to each other and everything else that exists locally.

ENTANGLEMENT

In quantum mechanics the value of an observable is usually unknown and its outcome is a matter of probability, until measurement.

“Famously, in quantum mechanics a particle’s location, polarization and other properties can be indefinite until the moment they are measured. Yet measuring the properties of entangled particles yields results that are strongly correlated, even when the particles are far apart and measured nearly simultaneously. The unpredictable outcome of one measurement appears to instantly affect the outcome of the other, regardless of the distance between them”[4] Samuel Velasco, revised 2021

This being so, there might seem something strange about a particle pair having corresponding predictable values after the first measurement. But this is found. If produced as a like pair, after separation the same test such as ‘will it pass through a vertical polarizer’, gives the same result. Opposite tests on each gives opposite results.

Pairs generated as anticorrelated pairs give anti correlated results for sane tests.

This is odd as the value of the second observable’s outcome ought to be (according to quantum mechanics) a matter of probability. Yet it has a certain outcome correlated to the first measured outcome.

A particle beam can not be tested in two polarizer directions simultaneously and passing through a first polarizer effects what happens at the next. So instead pairs of particles that behave in a correlated manner can be used. The pairs can be set tests that are incompatible for a single particle. Due to the correlation of same test outcomes, we can know what outcome *would have been* found for the partner particle, *if it was* tested in that way.

Some history:

Einstein found this kind of behaviour bothersome as it seemed to him the first measured particle must in some way influencing the outcome of the separated partner particle to coordinate its outcome with

the first measured. Which would require faster than light communication or the particles to be non local acting as if one in both places. This is why he used the phrase ‘spooky action at a distance’ to characterize the occurrence.

“Einstein, Podolsky and Rosen introduced the concept of entanglement in 1935 in an attempt to demonstrate that quantum mechanics is not a complete theory, this includes a discussion of what is reality and what is a complete physical theory.” [2] The later half of the paper describes a thought experiment. “In the penultimate paragraph of EPR ….. they address the problem of getting real values for incompatible quantities simultaneously.” [2]
Quote: “Indeed one would not arrive at our conclusion if one insisted that two or more physical quantities can be regarded as simultaneous elements of reality only when they can be simultaneously measured or predicted. … This makes the reality [on the second system] depend upon the process of measurement carried out on the first system, which does not in any way disturb the second system. No reasonable definition of reality could be expected to permit this.” [3] “The phenomenon of entanglement was first proposed by Albert Einstein and colleagues in the 1930s. At that time, many questioned the validity of entanglement, including Einstein himself.” (Whitney Clavin, W., 2019) [5]

“A paper by Bohm and Aharonov (1957) went on to outline the machinery for a plausible experiment in which entangled spin correlations could be tested. Experiments of this type were called EPBR.”[3] Fifteen years later in 1964, “John Bell utilized the EPRB set-up to construct a stunning argument “….. “Bell considers correlations between measurement outcomes for systems in separate wings where the measurement axes of the systems differ by angles set locally”... “In certain of these EPRB experiments, however, quantum theory predicts correlations that violate particular Bell inequalities by an experimentally significant amount.” [3]

According to The Stanford Encyclopedia of Philosophy “Bell inequalities follow from a number of assumptions that have intuitive plausibility and which, arguably, are rooted in the sort of world-view that results from reflection on classical physics and relativity theory. If one accepts that the experimental evidence gives us strong reason to believe that Bell inequality-violating correlations are features of physical reality, then one or more of these assumptions must be given up. “[6] *The Stanford Encyclopedia of Philosophy,* 2021

Bohr’s way of addressing the puzzle was to point out that individual states of a pair of coupled particles cannot be considered in isolation, in the same way as the state of the object and the state of the instrument are dynamically inseparable during measurements. [8]

Absolute existence with a relation of orientations, bestowed at particle pair formation can account for correlation. Same orientation for correlated pairs and 90 degree difference of orientation for anti-correlated pairs. Each particle need only respond individually to the test it encounters. The absolute orientation of each, a consequence of the pair formation process will give the correlations without having to co-ordinate what each will do. By assuming an unmeasured particle takes on a random condition upon measurement, the influence of object permanence and the particle having a particular absolute orientation within the pattern of existence is not considered. If they are taken into account it makes the hypothesis of spooky action at a distance accounting for matching of separated pairs of particles unnecessary.

The unnecessary spacetime complication and restoring correct causal happening

"In a relativistic spacetime, events at spacelike separation are taken to have no temporal order. Any system of coordinates will assign time coordinates to each of any pair of events, but, if the events are spacelike separated, the time coordinates assigned to a pair of events at spacelike separation will differ in their ordering, depending on which reference frame is being employed. If we take all of these reference frames to be physically on a par, it must be concluded that there is no temporal order between the events, as relations that are not relativistically invariant have no physical significance". [6]

The issue of non simultaneity of same events seen by different observers is not relevant to the relation of existing particle and apparatus. As they, the existing entities, are not within space-time but exist unseen within absolute uni-temporal space.

Physics and chemistry happens to existing things that are in absolute relation as part of the uni-temporal configuration. Change is unambiguously sequential because different viewpoints of it (and would be associated signal time delays) are not involved. Clearly thought about in this way, there is unambiguous sequential order of events and from that causality.

The two popular models of Special Relativity and quantum physics should be recognized for considering different aspects of reality. Not the same and each incomplete. *QM is looking at measurements, outcomes and probabilities* not accounting for the effects of pre measurement *existence*. There has been some debate about what the status of unmeasured things such as experimenters and apparatus should be.

Showing ‘unspooky’ correlation is to be expected

Why rabbits and doorways

Addressing the specific concern that quantum effects are only detectable at the exceedingly small scale of ‘quantum’ objects: I'm trying to show how we do not need the 'quantum effects' explanation. It is not a law of nature. 'Spooky' action at a distance is a misunderstanding, The pattern of results is real, the interpretation isn't. Size doesn't matter in establishing that.

It is necessary for the analogy to have something moving capable of having orientation. A perfect uniform sphere or point would not do. Rabbits being quadrupeds with long ears on top and legs below and twitchy nose in front and tail behind have the required asymmetry to have orientation.
To be clear rabbits and movable walkways are representing photon polarization and movable doorways represent polarizers with changeable orientation. For facilitation of visualization of the coming together of polarizer and wave component of a photon and what will occur. For some people the analogy will be helpful for others an unwelcome layer of abstraction. It should be remembered what the rabbits and doors represent as this will not be constantly re-iterated for readability and brevity. ‘The term ‘entanglement’ if used here only refers to the process of pair formation, it is not implying that there is ‘spooky’ connection between spatially separated particles.

The basic apparatus

Suitably rabbit sized doorways are fixed into movable walls, allowing the door to be rotated. The two doors are in walls that face each other, separated by two move able walkways, one approaching each wall. The walkways can be adjusted independently of the walls and each other. Rabbits are set moving in opposite directions, along fenced pathway to a door from the center of the apparatus. The orientation of the two rabbits at separation is an important part of the pair formation. A pair of rabbits are used in this way for each test. A movable barricade behind each rabbit, (or assistant’s hand) can be used to prevent rabbits retracing path back to center.

Rabbits in space

Existing rabbit and existing doorway have an absolute orientation. Which is their unmeasured and unknown spatial orientation relation to all other existing things in the environment. How it appears to, the observation product generated by, an astronaut observer is a relative viewpoint.
(How can absolute orientation relate to, what is considered by mainstream physics, a point-like photon particle? There is a wave component associated with a photon that can account for wave like behavior.

That wave can have an absolute orientation.) Only photons are being considered here but the motion of other kinds of particle can have orientation too allowing wider relevance of the argument.

What is important for a rabbit getting through a doorway is the relation between their absolute orientation, (rabbit-door), upon meeting.

Physical interactions are not happening in Space time. Spacetime is emergent from signal processing. The photon particles even before measurement do have a relation of their absolute orientations reflected in the anti-correlations for partners from pairs prepared together. The rabbits (unseen but existing even if you are blindfolded) have absolute orientations as do all existing things. Seeing an observation product semblance of a rabbit and declaring it does not make a rabbit with orientation happen into being. It just is giving a definite term for putting into the partial model of reality being used.

Imagine now the pathways the rabbits are on are fully rotate-able independent of the doorways and each other.

This could be conducted as a blind test in which the result noting experimenter doesn't know anything about the rabbits being used. He only hears a noise such as a beep as a sensor in the floor is activated, or jingle bells being rung as rabbit passes by them upon entering the room beyond the doorway. Representing only knowing the outcome of particle test, and not the condition of the particle before testing.

A practicality, an attractive stimulus beyond doorway should encourage passing through. Eg. food or other rabbits.

Passes doorway, yes or no, is a score-like result added to model of the universe. It is not appearance of an existential rabbit in the universe. Likewise the particle test results are new, but they happen because of the relation of existential particle and apparatus. The particle is not becoming existentially real because of the result.

The rabbits are fitted with magnetic bootees, holding them on the walkway. To prevent them floating away in zero gravity. The bootees allow the rabbits take small hops or walk easily through a doorway that is *vertical relative to the orientation of the rabbit on the path.* But the magnetic force holding the rabbit boots to the pathway is too strong to allow it to jump a door turned horizontal relative to the orientation of the rabbit on the pathway. A 45 degree relative angle of doorway to rabbit

on pathway, gives an obstacle intermediate between impossible and easy to negotiate. Passable 50% of the time. The closer to vertical orientation relative to rabbit on the pathway upon meeting, the easier and more likely to pass. The closer to horizontal relative orientation upon meeting the harder and less likely to pass.

Preparation of rabbits

Rabbits can be prepared to be a correlated pair.

In which case their walkways are level with each other. Meaning the rabbits approach the door at the same angle of approach. eg. Flat horizontal floors and vertical doors, or orientations giving the same relation relative to each other, allow both rabbits prepared have same orientations pass through or both fail to pass. If both of the rabbits orientation is at 90 degrees to vertical because of a tilted walkway both will be stopped by the vertical doors.

The rabbits can be prepared as an anti correlated pair.

In which case their walkways are at 90 degrees relative to each other. A pair of rabbits prepared to be anti-correlated will both pass though 90 degree difference in orientation doors, if their own rabbit orientation if sufficiently aligned. Either going through means the other goes through. Both fail to pass through if their own orientation is sufficiently misaligned. Either not going through means the other does not go through.

Rabbits with a mix of orientations that are not prepared to be the same in orientation or 90 degrees to each other, that is just two rabbits of any orientation not specially prepared as a pair, produce random outcomes that show no particular correlation or anti-correlation.

Results to be expected

The following experimental conclusions must be fulfilled.

1. A pair of **same** orientation/ polarization photon wave components or same orientation rabbits must give a correlated, ie **same outcome** for the **same test, parallel** polarizers or doors, as they are a similar pair.

If they are a pair of **opposed** polarizations, or 90 degree difference in angle of orientation they must give an **anti-correlated** i.e. **opposite** result for a same test.

2. tests at 90 degrees to each other give 100% correlation i.e. same matched result for ‘opposed orientation, 90 degree different pairs’ [For 90 degree separation of door angle and 90 degree difference in rabbit angle there can be exact alignment or exact misalignment as we don't know which situation will occur, The 90 degree door may get a 0 degree or a 90 degree rabbit lets say. Both will pass or both will miss.] and anti-correlation for similar orientation pairs.

For the 90 degree fixed relation of rabbits (photon wave component orientation) to each other, I.e. (opposed polarizations), and 45 degree set angle of doorways (polarizers) relative to each other, brought together randomly for testing: 50% of pairs have matched outcomes. The breakdown-
Two doorways, one on each pathway, at 45 degrees relative to each other, (for example a vertical door and a doorway at 45 degrees relative to it. Or a doorway at 15 degrees past vertical and a doorway at 60 degrees past vertical.), give a matched result 50% of the time. This doorway combination is encountered by rabbits that are at 90 degrees to each other if prepared as an anti-correlated pair. If in this case if one rabbit goes through easily, its orientation closely matching that of the door, the other meets an intermediate between easy and impossible 45 degree misalignment. Gone though 50 % of times the challenge is encountered.
With equal misalignment of rabbits and their doorways both are likely to pass through. The challenges being 22.5 degrees rather than zero and 45 degrees, This gives an increase in matching. However Increasing the misalignment for one rabbit, decreases it for the other giving greater likelihood of a mismatch.
The collection of co-incidence of same or oppositely matched detection pairs depending upon the prepared ‘entanglement’ should show that the probabilities for different separation angle of doors or polarizers is not a simple linear relationship. Quantum physics experiments for ‘perfect alignment of prepared particles show the graph of outcome probability against angle of difference between polarizer orientation is sinusoidal.
The correlation of pairs at creation of the pairs, alone means there has to be correlated or anti-correlated outcomes for pairs at 0, 90,180 and a special relation outcome for 45 degrees

We have no measurement that shows their relation to all that's existing including each other and doors but the absolute orientation *is* nonetheless. Existing things, unseen and unmeasured have absolute orientation making the pattern of all existing at unitemporal Now. Other than the special cases mentioned the outcomes for other pairs of angles are uncorrelated.

There are 4 possible outcomes 1,1 match,1,0 mismatch 0,1 mismatch and 0,0 match. lets say 1 is a pass through, 0 is stopped. The outcome is not entirely equally random between the given possible outcomes. The angle of the door affects the ease or difficulty of passing through presented. When they

meet. If it is easy-ish i.e. close to easy there will be more 1s in the mix of outcomes. If it is hard i.e. closer to impossible there will be more 0s in the mix of outcomes. This gives the s shaped pattern of matched outcome probabilities said to be only accountable by quantum physics explanation. There is no need for spookiness at any angle to account for results obtained. Above 45 degrees and rising; close to easy-ish, easy-ish, easy. 45 degrees= medium difficulty. Below 45 to 90 degrees; close to hard, hard, impossible. Chances of match affected by ease /difficulty, more 1s if easier, more 0s if harder. Below 90 degrees to 180 degrees is the other half of the S shaped curve That does not require accepting faster than light communication of spatially separated particles or objects. It is to do with the effect of rotation on likelihood of transmission of a subject having absolute orientation and that consequently affecting pair matching occurrence, It will be necessary to do a computer simulation of the analogy to obtain comparable numbers of results. It does ultimately require accepting the change in metaphysics that allows unambiguous absolute relations.

The probability of a match is affected by the angle of rotation which is why we shouldn't expect a straight lines relationship.

Photon experiments involve vast amounts of photon pairs per second which can't be realistically simulated with live rabbit apparatus or cut outs and lines on paper trying to represent the possible experiments. Computer simulation of the rabbit experiment would allow enough trials to be comparable.

Conclusions

Uni-temporalism will provide unambiguous sequential time necessary for restoring causality to physics , while allowing retention of relativity too. Relating primarily to electromagnetic signal transmission and processing into visual images. Other stimuli and products can also be considered similarly.

Argument for a space, other than seen relative spacetime, in which there is a uni-temporal configuration of all that is existing, has been given.

There has been discussion of the relationships between existing, probability and measurement outcomes (individual scores). Measurement outcomes (individual scores) are shown to be new abstract products.

Entanglement is shown to be un-necessary as an explanation of correlations of pairs of measurements of prepared pairs of particles; if the metaphysical background, in which physical interaction occurs, is taken to be absolute spatial relations and uni-temporal passage of time. This is

preferable to proposals of faster than light communication between particles in spacetime or their being spatially separated but somehow connected in spacetime.

By changing the metaphysics thought to apply as herein recommended, not only does the matter of supposed entanglement get resolved but causality is restored and the reasons for the various paradoxes of Special relativity can be understood as being consequences of using an incorrectly interpreted and incomplete metaphysical background, or of not understanding the necessity of having a reality interface in observation.

References

[1] Binney, J. and Skinner, D., The Physics of Quantum Mechanics, 2008

[2] The history and concept of quantum entanglement lecture 1 The KTH Royal Institute of Technology, abbreviated KTH, Stockholm, Sweden.

[3] Fine, A., and Ryckman, T. A., "The Einstein-Podolsky-Rosen Argument in Quantum Theory", *The Stanford Encyclopedia of Philosophy* (Summer 2020 Edition), Zalta, E.N. (ed.), URL = <https://plato.stanford.edu/archives/sum2020/entries/qt-epr/>.

[4] Velasco, S., How Bell's Theorem Proved 'Spooky Action at a Distance' Is Real, Quanta Magazine, online article, revised 2021

[5] Clavin, W., 'Untangling quantum entanglement', Caltec magazine, Oct 2019

[6] Myrvold, Wayne, Genovese, M., and Shimony, A.,"Bell's Theorem", *The Stanford Encyclopedia of Philosophy* (Fall 2021 Edition), Zalta, E. N. (ed.), URL = <https://plato.stanford.edu/archives/fall2021/entries/bell-theorem/>

[7] Bell, J.,S., The theory of local beables, CERN, 1975

[8] Faye, Jan, "Copenhagen Interpretation of Quantum Mechanics", *The Stanford Encyclopedia of Philosophy* (Winter 2019 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/win2019/entries/qm-copenhagen/>.

[9] ATDN Bohr, N. (1934/1987), Atomic Theory and the Description of Nature, reprinted as The Philosophical Writings of Niels Bohr, Vol. I, Woodbridge: Ox Bow Press.

Appendix

* 1. Andromeda paradox is unsure if traveling towards signals emitted from an event (that have the potential to be received and processed into seen semblance of the material event) effects the happening

of the event in question. Clear differentiation of the materially existing from images generated from received signals will make thing clear and restore causality. Moving towards the signals happens after the event producing them. The event that has already happened can’t be materially changed, after the fact. The sequence of, configurations of all existing things, of which the happening was a part, has been superseded.
More on the paradoxes of Special relativity can be found in Uni-Temporalism, the Relation of Human Beings to Time and the ‘future’ of Time in Physics, G. Woodward, 2016 URL= https://vixra.org/abs/1612.0389

* 2. There is an existing rabbit to show after extraction. It is not made in-accessible by extraction. Measurement of a particles can make the particles no longer free and detectable. Rather than destroying the rabbit at extraction, it would be better to release it into a large warren of rabbits from which it can not be identified and extracted for retesting. Analogy for absorption of the particle into the material of the apparatus.
*3. In response to the complaint that macroscopic animals can not be used for consideration of uniquely quantum phenomena. Rabbits can't be a useful analogy if the theory of non local superposition of states and actual entanglement of states is correct. *It is not*. The reason that we're not dealing with spooky action at a distance is there is an alternate explanation. The same sinusoidal pattern of distribution of matched outcomes is obtainable by the specific analogy developed. Giving another way of thinking about the issue. Rather than ‘buying into’ isn't it so strange hype. Such as...'There needs to be 'spooky' entanglement to account for the pattern of correlations Definite states of being only come to exist upon measurement.' Not so, absolute orientation in absolute space and uni-temporal time there is needed.

Physical interactions are not happening in Space time. Spacetime is emergent from signal processing. The photon particles even before measurement do have a relation of their absolute orientations reflected in the anti-correlations for pairs prepared to be at 90 degrees to each other. The rabbits (unseen but existing even if you are blindfolded) have absolute orientations as do all existing things. Seeing an observation product semblance of a rabbit and declaring it does not make a rabbit with orientation happen into being. It just is giving a definite term for putting into the partial model of reality being used.

In response to the criticism of not being serious and so on: The analogy is ridiculous but not impossible. Care must be taken to ensure the only difference between tests is the difficulty of traversing

doorway. To avoid interference of animal psychology on the results. Things like how well fed, ambient sounds, familiarity with the apparatus and so on.

The correlation of pairs at creation of the pairs, alone means there has to be correlated or anti-correlated outcomes for pairs at 0, 90,180 and a special relation outcome for 45 degrees [ignoring experimental errors in all cases] We have no measurement that shows their relation to all that's existing including each other and doors but the absolute orientation is nonetheless. Existing things, unseen and unmeasured have absolute orientation making the pattern of all existing at unitemporal Now. Other than the special cases mentioned the outcomes for other pairs of angles are uncorrelated. There are 4 possible outcomes 1,1 match,1,0 mismatch 0,1 mismatch and 0,0 match. lets say 1 is a pass through, 0 is stopped. The outcome is not entirely equally random between the given possible outcomes. The angle of the door affects the ease or difficulty of passing through presented. When they meet. If it is easy-ish i.e. close to easy there will be more 1s in the mix of outcomes .If it is hard i.e. closer to impossible there will be more 0s in the mix of outcomes. This gives the s shaped pattern of matched outcome probabilities said to be only accountable by quantum physics explanation.
The probability of a match is affected by the angle of rotation which is why I think we shouldn't expect a straight lines relationship.

Photon experiments involve vast amounts of photon pairs per second which can’t be realistically simulated with live rabbit apparatus or cut outs and lines on paper trying to represent the possible experiments. Computer simulation of the rabbit experiment would allow enough trials to be comparable and make a paper cut out version redundant.