

Physics Renovation

Author: Georgina P. Woodward

Excepts from the collection of work by G. P. Woodward, 'Time, Reality, the Universe. The categorization solution'. Giving the abbreviated solution to many puzzles of physics.

Contents

Uni-temporalism explored [Necessary background for later problem solving]

Two kinds of time

The arrows of time

Foundational arrow of time

The Informational arrow of time

The Emergent (experienced) arrow of time

The Physics of Reality (diagram)

Unification/non-contradiction of classic relativistic and quantum, non-relativistic, sequential type time models

Some definitions of category mistake/error

On differences between quantum and macroscopic objects

About quantum uncertainties:

Uncertainty and scale

Schrödinger's cat and the red herring

**Optical illusions, evidence of internally generated visualization
supplementing Image Reality**

Feynman's steak

**Category error within 'ON THE ELECTRODYNAMICS OF MOVING BODIES'
by A. Einstein June 30, 1905**

Is the moon there when I'm not looking?

Examining the 'light clock' argument

Periodicity

The concept of wavelength

About the observation of a constant speed of 'light' when travelling towards a light source

The Grandfather Paradox

Why the Grandfather paradox cannot occur

The Andromeda paradox

The bug/ rivet and barn/ pole paradoxes

Twin(s) paradox: Some ideas

Testing spin with the Stern Gerlach apparatus

Macroscopic analogue of the Stern Gerlach test: Allan's Invitations

Fire into white doves, transformation illusion: Double slit and half silvered mirror experiments

An alternative explanation of the double slit experiment

Rabbit from an 'empty' hat: Quantum decoherence or wave function collapse

The frog and the swarm of bees, different views of the universe

Justified true belief (JTB) and justified misinformed belief (JMB)

About Variables

Logic and truth values

Absolute (complete) Object reality, counterfactual definiteness, the law of non-contradiction and context

True, absolute relations V relations within spacetime images

On the accuracy of maps, related to physics modelling

Emergence

Thanks

Uni-temporalism explored

Two kinds of time

There are two different kinds of time that are of prime importance;

1. The passage of time independent of observation; This 'time' can be called the Foundational sequential time. It is the temporal expression of the sequence of uni-temporal Nows. Uni-temporal Now is a temporal expression that is analogous to the youngest actualized/ existing configuration of the Object universe.

2. Emergent time: this is the time that is experienced or measured by an observer (organism, device or sensitive material), via signal receipt. Important as a main component of a framework that resolves many longstanding issues in physics, including the reason behind the temporal paradoxes of Relativity and overcoming the temporal incompatibility of Relativity and Quantum mechanics.

'Uni-temporal' signifies just one foundational time. Uni-temporal Now 'time' is the same throughout the entire extant material universe. Uni-temporal Now is a unique pattern of the entire Object universe, each kind of 'time' corresponds to a different unique pattern or configuration. Change in the material configuration is the foundational passage of time. This description of passage of time agrees with J. C. N. Smith (2012)¹.

It might be said in this regard that there is no *foundational* time that is separate from the substantial configuration, and the passage of time is only a temporal expression of the sequence of wholly spatial configurations. Uni-temporal Now is **not** between *observed* past and a material, yet to be observed, future. It is the material 'moment' between what has substantially existed and what does not yet exist. It is foundational, sequential, belonging to the philosophy of

Endurantism. Clock time is related to this kind of foundational time because; “In a fundamental sense we do not tell time but count events”. (Clynych, J. R., 2003).¹⁶ Counting events that have occurred in material object reality, of a particular kind, according to its type, is what a clock does.

Emergent time: The observer’s ‘present’ is formed from the sensory data which is produced from received signal input. The seen product, the sequence of presents, is an emergent manifestation of passage of time. It is not synchronized with the external reality, and so also not synchronized with the uni-temporal passage of time. There is delay that increases with distance from the site of EM emission from the source object. The motion of an observer also affects when and where EM radiation (potential sensory data) is received and thus also the sequence of experienced ‘presents’ produced.

Therefore, it is informational and *relative* passage of time. The content of any observer’s present depends upon the input received and processed, which varies for each observer rather than being what exists at Uni-temporal Now, external to the subjective experience. The observed present, product, can contain images of objects in forms and relations that *did not co-exist in material reality*, because information that has taken different amounts of time to arrive can be amalgamated into the product. Likewise, the heard product is an amalgamation generated from sensory information input with different Uni-temporal Now configuration origins.

For an inorganic reality interface device, it is objectively related to the information input but for an organic observer there is additional processing making the product subjective; pertaining to the individual system and its function as there is biological variation, see David Eagleman’s work (2011)² on observer calibration of delays for example.

Both kinds of time can be described as sequences of configurations. Uni-temporal passage of time is the sequence of configurations of the Object universe.

Emergent passage of time is the sequence of products of an organic observer's sensory data processing; a changing present of image configurations (and other sensations, sensory processing products) experienced as real. Or it is the sequence of products of an inorganic device, that has received EM signal or other 'sensory' input, generating a product from it. Importantly for physics; time emergent from the processing of input signals, that are potential sensory data, allows non-simultaneity of events. While uni-temporal passage of time gives a singular unambiguous sequential temporal background for atomic and subatomic events.

Image reality and Object reality are not equivalent and although co-existing are not synchronized.

It is important to realize that the measurement obtained for passage of time from distant signal receipt is a product. When compared to the product from processing local signals, there is a difference in the appearance of the passage of time and not a difference of 'time itself'. *Time **itself** is a superfluous concept.* Time is either 'bound to' the spatial configuration of the Object universe, being temporal expression of it, or 'time' is the product of information processing that possesses a time dimension; related to the material/ temporal origins of the information from which it is generated. It is not merely what a clock shows.

The arrows of time

Using First and Second Premise:

1. There is one ever changing configuration of the (Object) universe that is uni-temporal, that is, the same time everywhere. The temporal expression corresponding to the existing configuration is Uni-temporal Now. Only the youngest, (i.e. current), configuration has substantial existence. Each configuration of the Object universe contains the relations between substantial bodies and the incumbent forces that act to produce the resultant configuration (with the new incumbent forces, and so on).

2. Change is continual, no part being static at all scales, from astronomic to sub atomic. The third premise: The speed of 'light' is not infinite but finite. Thus, traveling at the speed of 'light' it takes time for light emitted from source substantial object at A to get to an observer at B.

EM signals are produced by the interaction of EM radiation with substantial matter. The EM radiation is absorbed and re-emitted by the atoms of the source object, as photons with a frequency characteristic of the specific emitting atoms of the material of the source. As photoreceptors are sensitive to intensity of EM signals and have different sensitivities to frequency, EM signals have the potential to provide two kinds sensory information 'about the source'. Intensity information related to level of illumination and frequency information related to the chemical composition of the source.

The third premise, the high but not infinite speed of 'light', explains *why the image realities formed from received 'light' cannot show time reversal*. That would require travel of the observer to exceed the speed of 'light', to receive the EM information in the order younger (more recently produced), to older (less recently produced); rather than the obligatory, older to younger, order of receipt. This faster than 'light' signal receipt would give the observed effect of events happening in

reverse order. that is like playing of a film in reverse. Eggs could be seen to uncrack, and spilled water pour itself back into the jug.

Apparent events fabricated from received 'light', (EM signals), are distinct from the configurations of and interactions of substantial bodies; the sources of EM signals.

Motion of an observer is a particular pathway through the electromagnetic radiation (within the environment), giving image realities corresponding to the EM radiation received. Different relative motions can produce different apparent simultaneities, due to differences in when and where the EM information is received.

When a material body interaction or relation (the actualized event), occurs is invariant as it belongs to a configuration, or a sequence of configurations of the material constituents of the Object universe. A singular uni-temporal Now or singular sequence of uni-temporal-Nows. When an apparent event is *seen* to occur is variable. Depending on when the EM signals, emitted from the material body interaction or relation (the actualized event), is received. It is the electromagnetic input that is converted to sensory information. Which is processed by the brain and incorporated into a resultant Image reality.

Foundational arrow of time

This arrow is consequent from the sequence of change of the Object universe from oldest to youngest configuration. Only the youngest in the sequence of configurations exists. The 'flight' of the foundational arrow of time is happening at the causality front. The causality front, where material change happens, can be

thought of as the boundary between the non-existent, open, Unwritten future and the extant configuration of Uni-temporal-Now.

The Object universe, unobserved, has a configuration and within that properties and relations such as scales, masses, separations, relative orientations, and gradients that accommodate the forces that will act to allow, constrain, or prevent change to give the next arrangement, in a continual sequence. Each material configuration (and new set of associated relations) produced, is the next input upon which the laws of physics, and biology act. It is an irreversible arrow of time. This is the traditional 'direction' of the arrow of time; What was, to what is, traditionally called 'past to present'. This can now be better understood as Uni-temporal Now becoming the next Uni-temporal Now and so on. This applies to what is happening unobserved and so is non-relativistic. It gives the '*preferred foliation*' necessary for QM models, a singular certain sequence, without the necessity of abandoning relativity.

The Informational arrow of time

At its most basic this is the *order of receipt* of sensory stimuli from which sensory data is generated and thence from which experience is fabricated. Or order in which signals are intercepted by a sensitive device or material.

If *how* the perceived direction of time is formed is considered, it is the **Pre-written future** (potential sensory data from events that have already happened in Object reality) that is **becoming the present** and then becoming evidence of former being in **records and memory**:

Information in the environment -> Present experience -> Records/ memories.
(Though the brain does adjust the timing of the products from the accumulated data to give consistent causality stories, as described by David Eagleman.)²

This informational arrow is *theoretically* reversible, if the speed of the observer exceeds the speed of transmission of the EM signals (potential sensory data). However we do not have the means to travel faster than 'light'. An experiment using sound and microphone bullets as proof of principle can be considered. With signal receipt in reverse the product experienced from processing of the signals would be reversed compared to the order of production of the signals. Of course, this is not traveling back in time as the reversal of signal interception happens within the uni-temporal Object universe with unchanging passage of time. It is reversal of perception of (or device's detection of) events, the experienced or (device's output) manifestations. Meanwhile actualized events are occurring simultaneously within the continuing, normally 'advancing' foundational passage of time.

The Emergent (experienced) arrow of time

The third imaginary arrow is the arrow of time that is the experience of each present succeeding the previous, giving the impression of 'directional' passage of time. It is the subjective experience of *the sequence* of products of one's brain processing sensory information. Or the sequence of *products* of a sensitive device such as a video camera. As it relates to product rather than input the informational and emergent arrows are not identical. The timing of events within the product can be subject to delays introduced during processing.

Unification/non-contradiction of classic relativistic and quantum, non-relativistic, sequential type time models

The two kinds of time; foundational, sequential, uni-temporal, and emergent, informational, relativistic, allow physics using sequential time and physics using relativistic time to co-exist without there being incompatibility of the models. This is due to the different kinds of time used.

There needs to be recognition of which category of time applies to the physics modelled and to use the appropriate kind.

The paradoxes of relativity can be understood as stemming from a category error that confuses material objects and images of them produced by the information receipt and processing of observers.

References

1. Smith, J.C.N. (2012). Rethinking a Key Assumption About the Nature of Time. Retrieved from <http://fqxi.org/community/forum/category/31418>
2. Eagleman, D. (2011) on CHOICE (video) Retrieved from <https://www.youtube.com/watch?v=MkANniH8XZE>
FQXi.org/conferences/talks/2011

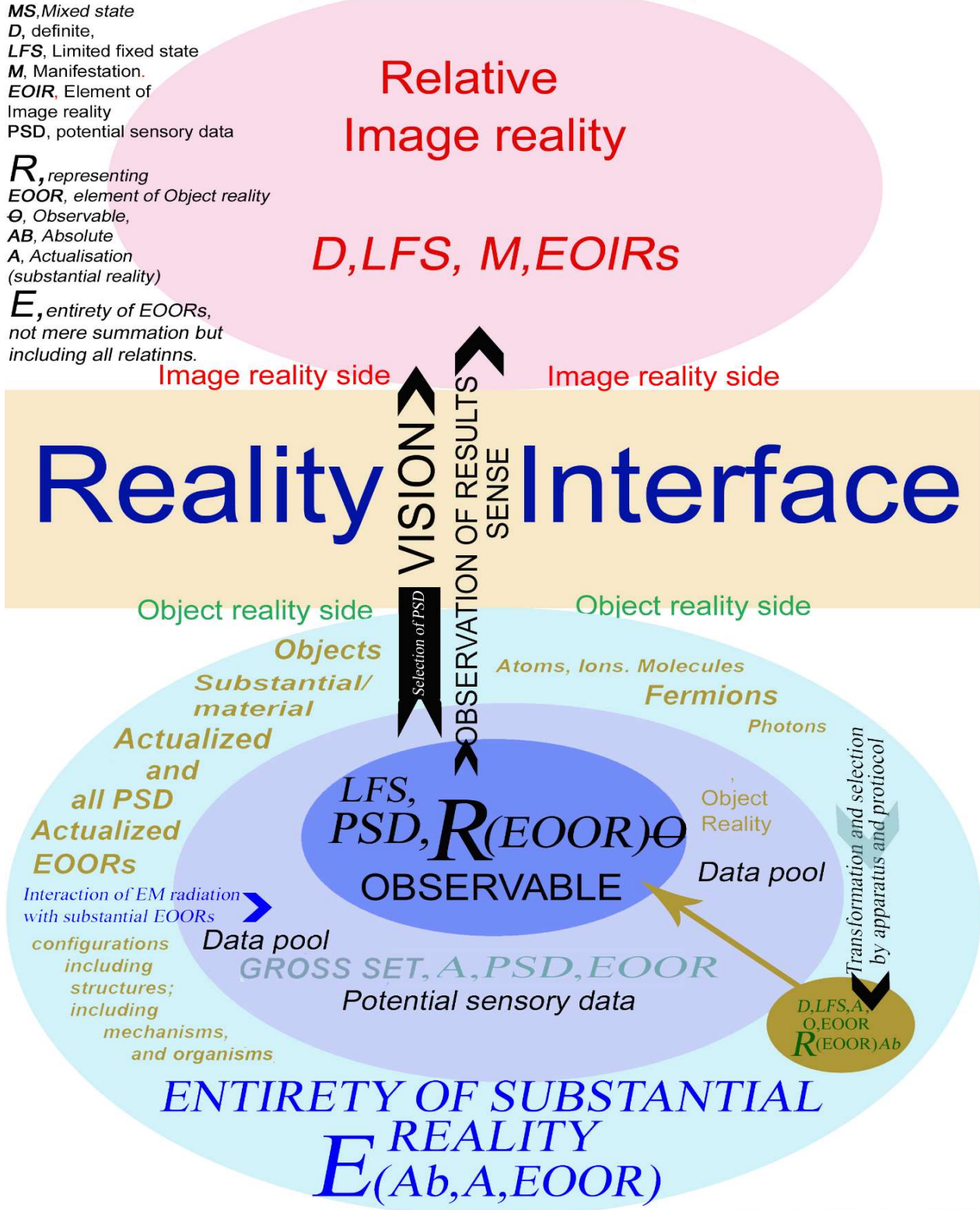
Key

MS, Mixed state
D, definite,
LFS, Limited fixed state
M, Manifestation.
EOIR, Element of
 Image reality
 PSD, potential sensory data

R, representing
EOOR, element of Object reality
 Θ , Observable,
AB, Absolute
A, Actualisation
 (substantial reality)

E, entirety of *EOORs*,
 not mere summation but
 including all relatinnns.

The Physics of Reality



Some definitions of category mistake/error

Category mistake/error: "The error of assigning to something a quality or action which can only properly be assigned to things of another category, for example treating abstract concepts as though they had a physical location."

Oxforddictionaries.com

Category mistake/error: "... a property is ascribed to a thing that could not possibly have that property. An example is the metaphor "time crawled", which if taken literally is not just false but a category mistake." Wikipedia July 18th, 2015

On differences between quantum and macroscopic objects

"The world of large things such as tables, planets, stars and galaxies, is extremely different from the world of small things such as electrons, protons, atoms, and photons. The most striking difference is that a table is never found in more than one place at the same time, whereas as electron or an atom can be in many places at the same time. Why should there be this difference? After all, a table is nothing but a collection of an extremely large number of atoms. Why is it that when a lot of atoms are put together to make a large object, the property of being in more than one place is lost?" Tejinder Pal Singh Sept 9th 2018 FQXi.org via <https://fqxi.org/community/forum/topic/3247>

There is a category issue with the introductory comparison of the electron particle and table. For the electron to be in a location it must be a be-able rather than a probability distribution of states/values prior to selection of the singular defining measurement, For the table to be in a certain location it too must be a be-able, (which is constituted of be-able particles). However if talking of the object

seen in space-time it is not a be-able but the product of processing of received EM (electromagnetic) radiation. It is not made of be-able particles, like the be-able table. What precisely is being compared is important.

If the location of a particular table in a conference room was mapped over several years a probability distribution for the table could be obtained. When the question is asked, 'where is the table?' One could refer to the probability distribution and say it doesn't have a singular location (Compare to electron). Or One could say, as a be-able is being considered (not an EM radiation processing product or a probability distribution) it must be in a location but it is as yet undetermined by direct (interaction with) measurement.

If the tables are pushed to the sides of the room between conferences and occupy the body of the room during conferences, there will be oscillation between the side locations and main body locations for the individual tables. If the conferences happen on a regular basis the oscillation will be regular. What will decide between most likely getting a side of room location or a main body of room location when a measurement is made is the choice of how that measurement is to be made. If it will coincide with maximum number of people present in the building or minimum number of people, for example. The addition of conference attendees will add slightly to the uncertainty of exact location that will be found as they may nudge or rearrange the tables slightly but are not the cause of the main body or side location (as the tables will likely have been arranged before their arrival and re-arranged after they leave).

The switch from thinking about a wave-function, (how the behavior of the beable particle/object changes over time rather than the probability distribution (the likelihood of finding the beable particle/object in a particular place), to knowledge of a singular location outcome is via interaction with the beable itself by the chosen method.

If vision or camera is used for a macroscopic measurement then it is not the beable itself that is known but the product of EM signal processing.

An EM signal processing product, (a seen 'manifestation'), a direct interaction measurement outcome, a beable, (an actualized material object), a probability distribution, (the distribution of likelihood of finding the beable object) and a wave-function, (about the beable's behaviour changing over time), are all different categories of 'thing'. They are not all the same object. Though they are related to the same beable object.

Measurement by interaction with the object will give a space location and time when that was true (local, to table and measurer, clock time, which is very close to the -Now due to the extreme speed of light). Rather than spacetime generated from signal receipt and processing. Due to the extremely fast speed of light the manifestation's location (relative to other local objects) in seen spacetime and the beable's location (relative to other local objects) in external uni-temporal space will be similar (for near objects, such as tables). Not *the same* as they are categorically different kinds of space. The macroscopic *seen manifestation* of a table, (without the assumed atomic structure), is categorically different from an actualized, existing -Now, material table object; that does have a structure consisting of atomic and sub atomic particles.

In the blog post Tejinder has written, "After all, a table is nothing but a collection of an extremely large number of atoms. Why is it that when a lot of atoms are put together to make a large object, the property of being in more than one place is lost?"

The comparison being made is between the probability distribution of an electron and a beable table. However if the probability distribution of an electron is compared to the probability distribution of a table, (such as the conference

room table I wrote about), the differences at the different scales that are causing puzzlement disappear.

The probability distribution of the table shows multiple locations. The probability distribution of the table is not made of atoms but individual location measurements collected over time.

The 'Objects' of different scales, belonging to different categories, should not be compared to each other. The noted differences, if that is done, is due to the difference of category not a fundamental difference between objects of the same type.

The wave function (the changes with time) of one beable object at the quantum scale should be compared to the (like) wavefunction of the macroscopic beable object. Such as, the electron wave function and the conference room table wavefunction. Or the two different probability distributions. Not one probability distribution (the electrons) and one beable table (or one seen EM processing product, a seen table 'manifestation'.)

Going from considering a probability distribution representation (likelihood of finding in different places) of an object, or a wave function representation (how the location is changing over time) to a single location measurement representation of the object is a switching of category under consideration. The singular result that will be considered has to come into being when measurement interaction with the beable occurs. Since there is a change in what is being considered the change in thought that occurs when the knowledge of the result is obtained is the switch. Though as the measurement method has already occurred what that knowledge will be is already decided. The wave function is a behavior over time representation not a beable thing. The wave function category is redundant once the singular measurement result is being considered instead.

References / sources

Singh, T., P., Space-time from Collapse of the Wave-function, (9th Sept. 2018). via <https://fqxi.org/community/forum/topic/3247> Retrieved 9. 9. 2018

Woodward, G., P., Replies to blog post 'Space-time from Collapse of the Wave-function', (9th Sept. 2018). via <https://fqxi.org/community/forum/topic/3247> Retrieved 5.10. 2018

About quantum uncertainties

Some 'properties' are relative attributes rather than intrinsic qualities, unknowable until the 'viewpoint' / relative to what, is imposed. Measurement can interact with and alter the relation with object or phenomenon being considered, so that the measurement product is different from what would have been, unmeasured. There is the impossibility of simultaneously having a fixed variable and the same variable changing. A certain position requires zero velocity whereas a certain velocity requires changing position, making the measurements mutually exclusive. This is known as "*Uncertainty principle*, also called *Heisenberg uncertainty principle* or *indeterminacy principle*, statement, articulated (1927) by the German physicist Werner *Heisenberg*, that the position and the velocity of an object cannot both be measured exactly, at the same time, even in theory."

Britannica.com⁰ These issues are about knowledge and descriptions, points of view, definition of observations, effects of interaction with the observed. They are not about the nature of unobserved external reality.

Physics experiments interact with the material reality, thus they impose a viewpoint or context necessary for the acquisition of measurements. To know 'it' there has to be a relationship with 'it' that is defining.

To illustrate: an object doesn't have a singular velocity, though experiments will be conducted to find it. A man standing on a moving walkway has a velocity of zero relative to the walkway or another person also standing on the walkway. Relative to the deemed stationary neighbouring pavement, and people standing still on the pavement, he is moving at 10kph (the speed of the walkway relative to the pavement). Relative to a man walking at 5kph relative to the neighbouring pavement he is walking on, the man on the moving walkway is moving 5kph faster than him. So, what is the velocity of the man on the walkway? Like all objects in the Object universe he has velocities relative to every other object however they are moving, not one single velocity that is an exclusively owned property. So velocity can not be considered as an exclusive property of the object under consideration alone. A singular value is a determination belonging to a specific context.

Uncertainty and scale

The Heisenberg uncertainty principle¹ was unveiled by Werner Heisenberg in 1927. It points out that even theoretically, the position and the velocity of an object cannot be measured exactly, at the same time. There can be no exact position and exact velocity together, of a singular object in nature. Though this might at first sound surprising, it is intuitive if one thinks that velocity requires a change in position with time and so position cannot be fixed, and exact and position requires a fixed state so it cannot be changing simultaneously. This is not a condition that applies to only quantum objects.

Uncertainty at the quantum scale: The accuracy of measurement of the position of an electron is limited by the wave length of the illuminating electromagnetic radiation. Very short wavelength 'light' can be used to increase accuracy of position measurement, however the shorter the wavelength the more the electron's momentum is changed, due to recoil from at least one photon impact.

It follows, Heisenberg reasoned, that simultaneously with the position measurement momentum is being altered and so cannot be accurately known.

Comparison with the macroscopic scale: It is worth thinking about how measurements are conducted at macroscopic and quantum scales. For the macroscopic object a coarse grained scale is used that is appropriate for the scale of the object. A football for example would not have its position measured in nanometers. So tiny variations in position, such as thermal vibration or changes in shape due to air pressure variation are lost in the generalized coarse grained measurement.

Macroscopic measurements can be made without touching the object itself, such as using a camera. The position relates to position at emission of the EM radiation, not at receipt of it; Inconsequential at everyday distances and speeds because of the extremely small difference (as 'light' speed is so fast)- but again this is a matter of the scale to which attention is being paid. The position of the macroscopic object isn't exactly known but what is known by measurement is considered good enough; scale appropriate. If the macroscopic object itself was measured the situation would potentially be the same as for quantum experiments, as interaction with the measuring apparatus would affect the object. Even though it would be possible to use a very small delicate sensor that would make very little difference, some energy would have to be lost in the interaction if the smallest scales are considered. However, because the measurement is scale appropriate such considerations are excluded.

The cut off in know-ability of position and momentum, velocity or energy applies to objects of all scales. However, because it is so small in comparison to a large object the accuracy of the measurement is never taken to that extreme of measure-ability. What we know for macroscopic objects is approximations, they can be really good approximation but still not absolute to the smallest possible resolution of measurement. The idea that in classical physics 'we can know

these values with certainty' is based on the certain values being acceptable scale appropriate approximations.

Reference

Hilgevoord, Jan and Uffink, Jos, "The Uncertainty Principle", The Stanford Encyclopedia of Philosophy (Winter 2016 Edition), Edward N. Zalta (ed.), URL= [https://plato.stanford.edu/archives/win2016/entries/qt-uncertainty /](https://plato.stanford.edu/archives/win2016/entries/qt-uncertainty/)

Schrödinger's cat and the red herring

Erwin Schrödinger wrote:

"One can even set up quite ridiculous cases. A cat is penned up in a steel chamber, along with the following device (which must be secured against direct interference by the cat): in a Geiger counter, there is a tiny bit of radioactive substance, so small, that perhaps in the course of the hour one of the atoms decays, but also, with equal probability, perhaps none; if it happens, the counter tube discharges and through a relay releases a hammer that shatters a small flask of hydrocyanic acid. If one has left this entire system to itself for an hour, one would say that the cat still lives if meanwhile no atom has decayed. The first atomic decay would have poisoned it. The psi function of the entire system would express this by having in it the living and dead cat (pardon the expression) mixed or smeared out in equal parts. It is typical of these cases that an indeterminacy originally restricted to the atomic domain becomes transformed into macroscopic indeterminacy, which can then be resolved by direct observation."¹

The red herring

Linguistically, live and dead cat are both cat object, i.e. same thing. The live cat though has functioning aerobic respiration and many processes occurring in the body that rely upon that biochemistry. The dead cat is not respiring.

Many processes are not functioning because of that and other biochemistry such as autolysis, the break down of cells, is happening. The live and dead cat are not the same object if the biochemistry is considered. Linguistically, broken and intact poison flask are both flask object, i.e. same thing. Their topology is very different though. Shards of glass are different objects to the intact flask if topology is considered.

Linguistically, decayed and non decayed radioactive particle are both the particle, i.e. same thing. However if an alpha or beta particle is lost, the particle is clearly not the same object anymore, if the structure and chemistry of the particle before and after decay is given priority over the language.

This argument may seem a bit pedantic but the use of language is failing to clearly categorize the objects as different things rather than same things in different observable states; before and after radioactive decay has happened, releasing the poison.

Different objects can't be in a state of superposition, only different states that might be observed pertaining to the same object. So the thought experiment is not a good analogy.

The Schrödinger's cat thought experiment does not provide an analogy of what is going on in quantum experiments because decayed and un-decayed can not coexist and nor can broken and unbroken, or dead and alive. The measurables in the thought experiment are not singular, limited fixed states merely representing individual viewpoint of the same object or singular, limited fixed states represent individual measurements of the same behaviour.

While a cat can not be in a superposition of dead and alive, a cat in a box could be in a 'superposition' of striped and spotted. The sides of the cat having different coat patterns. The singular striped state or singular spotted state happening when the position of the cat and the viewpoint of the observer provide a particular perspective, upon opening the box and the observer forming the visual product of the singular limited fixed state, from the EM signals received. No EM signal is received from the opposite side and so it, the opposite state is not a part of the observer's reality. (But could have been if circumstances were different.)

References / sources

1. Trimmer, J., D. (1980). "The Present Situation in Quantum Mechanics: A Translation of Schrödinger's "Cat Paradox" Paper". Proceedings of the American Philosophical Society. 124 (5): 323–338.

[Original paper] Schrödinger, E. (1935). "Die gegenwärtige Situation in der Quantenmechanik (The present situation in quantum mechanics)". Naturwissenschaften. 23 (48): 807–812. (Quote and above reference sources from Wikipedia, URL https://en.wikipedia.org/wiki/Schrödingers_cat

Woodward, G., P., Replies to blog post 'Dissolving Quantum Paradoxes'
<https://fqxi.org/community/forum/topic/3246> September 2018

Optical illusions, evidence of internally generated visualization supplementing Image Reality

Certain optical illusions clearly demonstrate that the brain can fill what would be gaps in Image reality due to lack of information. Or, as recent research shows, for ease of processing. An experiment was conducted in which test subjects observed different orientations of black Pacman like shapes while undergoing fMRI testing. With an orientation of 3 of the shapes (missing segments facing inwards towards a midpoint between them), a triangle appears to be formed. Such an apparent but not actually existing triangle is called a Kanizsa triangle, taking the name of the Italian psychologist Gaetano Kanizsa who was the first person, on record, to describe the optical illusion, in 1955.

“Using fMRI, they discovered that the triangle – although non-existent – activates the primary visual brain cortex. This is the first area in the cortex to deal with a signal from the eyes. The primary visual brain cortex is normally regarded as the area where eye signals are merely processed, but that has now been refuted by the results Kok and De Lange obtained. (Faculty of social sciences. Radboud University. 2014.)¹. “when the illusion was perceived, activity in cortical sites representing regions inside the illusory triangle was enhanced, and activity of sites representing the inducers suppressed. In addition, activity increased in the cortical site representing a Pacman that was not part of the illusion.

It appears that, depending on the precise cortical representation of the Kanizsa triangle, opposite neural effects occur that were overseen in prior studies as a result of averaging across neural regions containing both effects.” (Bartels, A. 2014.)²

This is evidence that ‘reality’, perceived by a human being, is processed product not external reality. Nor is it merely formed by receipt and filtering and

amalgamation of information by the receptor cells and nerve transmission channels to the brain.

References

Faculty of social sciences. Radboud University. (2014). Brain fills gaps to produce a likely picture. Retrieved from <http://www.ru.nl/sociology/@943986/pagina/> On 3/12/2016

Bartels, A. (2014). Visual Perception: Early Visual Cortex Fills in the Gaps. *Current biology* (24, 13), pR600–R602.

DOI: <http://dx.doi.org/10.1016/j.cub.2014.>

Feynman's steak

To confuse elements of Object and Image reality as the same kind of thing is a category error.

“A category mistake arises when things or facts of one kind are presented as if they belong to another.” (Blackburn, S. 1994.)¹

“The question of whether or not when you see something, you see only the light or you see the thing you’re looking at, is one of those dopey philosophical things that an ordinary person has no difficulty with. Even the most profound philosopher, sitting eating his dinner, has many difficulties making out that what he looks at perhaps might only be the light from the steak but it still implies the existence of the steak which he is able to lift by the fork to his mouth. The philosophers that were unable to make that analysis and that idea have fallen by the wayside from hunger.” Feynman, R. (1979)¹.

Though Richard Feynman said the above, he doesn’t seem to have taken it at all seriously. However, it is important. The differences between objects of substance and images are important.

Though they may bear the same object name, they are not equivalent. We should beware of the ‘what you see is all there is’ fallacy underlying the belief that macroscopic reality is of fixed limited states and only relative perception (because that is what is observed). Rather, it is the absolute reality of material sources associated with, simultaneously, all the existing states that might be detected and gross information pertaining to many potential viewpoints that could be observed, beyond impoverished individual perception.

The category error, not differentiating between externally existing objects, consisting of atoms and particles, and images being perceived (insubstantial

manifestations, products of sensory data processing) is identifiable within 'On the Electrodynamics of moving bodies', Einstein, A. (1905.)²

Quote:

Feynman, R. (1979). Douglas Robb Memorial lectures 1979, recorded at The University of Auckland (New Zealand), University of Auckland (NZ). Retrieved from <http://www.vega.org.uk/video/subseries/8>

Category error within 'ON THE ELECTRODYNAMICS OF MOVING BODIES' by A. Einstein June 30, 1905 [See in Einstein's paper, under 2. On the relativity of lengths and times, the two operations (a) and (b)]

Methods

(a) "The observer moves together with the given measuring-rod and the rod to be measured and measures the length of the rod directly by superposing the measuring rod, in just the same way as if all three were at rest."

NB "directly by superposing the measuring-rod, in just the same way as if all three were at rest"

"In accordance with the principle of relativity the length to be discovered by the operation (a)—we will call it "the length of the rod in the moving system"—must be equal to the length l of the stationary rod." Quotes from Einstein, A. (1905)
In scenario (a) it is the substantial object rod that is measured by superimposing measuring rod upon measured object, and the observer's Image reality that is formed comes from observing that superimposition of the measuring rod on the measured rod.

(b) "By means of stationary clocks set up in the stationary system and synchronizing in accordance with § 1, the observer ascertains at what points of the stationary system the two ends of the rod to be measured are located at a definite time. The distance between these two points, measured by the measuring-rod already employed, which in this case is at rest, is also a length which may be designated "the length of the rod." The length to be discovered by the operation (b) we will call "the length of the (moving) rod in the stationary system."..."This we shall determine on the basis of our two principles, and we shall find that it differs from l ."

Quotes from Einstein, A. (1905.)

Comparison of methods

In scenario (b) the observer is not measuring the object of substance itself. The observer is receiving, and processing EM radiation emitted or reflected from the object (rod) to be measured. That is processed into an image. It is where the image starts and ends at a time that is simultaneous for the observer that is determined by this method.

Comparing (a) measurement with (b) measurement is not comparing like with like. In (a) an object is measured, and that measurement is observed; in (b) a manifestation (emergent image) is measured. Einstein, A. (1905). wrote "Current kinematics tacitly assumes that the lengths determined by these two operations are precisely equal, or in other words, that a moving rigid body at the epoch t may in geometrical respects be perfectly represented by the same body at rest in a definite position". Was it true that "Current kinematics tacitly assumes that the lengths determined by these two operations are precisely equal"?

He is mistaken because the assumption he mentions requires that it is the substantial body (the material object) that is compared in both operations but method (b) does not allow direct measurement of the

object. There is now a category error because both (a) result and (b) result are considered to be comparable measurements. Whereas by method (a) an object is measured, and by method (b) an image is measured.

Considering the causal order of the measurements

There are different causal orders of events giving the result by each method. The procedures cannot be equivalent and so the outcomes are not comparable without incurring category error.

Procedure (a) measurement method involves interaction with the object itself by the placing of the substantial / material measuring rod upon the substantial rod subject (of measurement) itself. That procedure is done before EM data from the ensemble is formed into an Image reality. EM signals that will generate sensory data is received together from both measured and measuring rods in juxtaposition. The measurement comes to be known by the production of the Image reality, an image of the scale and image of the measured object juxtaposed.

Procedure (b) the Image reality is formed before use of a measurement scale. Sensory data arriving together, from the selection made at the selected time, is formed into the image of the seen length. The spatial positions (points) corresponding to seen front and seen back are noted and then distance between is measured with measuring rod. The length is created from the way in which the sensory data is received and processed, and it is the length corresponding to the length of the seen manifestation, not object, that is measured. This is a different, nonequivalent causal sequence of events.

Amalgamation of information

Remember, it cannot be assumed that the image is necessarily identical to the substantial object. The image displays only an aspect of the topology as it is formed from only the sensory data that is received. Observer viewpoint, and

relative motion, can affect which sensory data is amalgamated into the image. That allows sensory data with different temporal origin (from signals originating in different configurations of the Object universe) to be amalgamated, giving an image containing temporal spread of information.

Reference

Einstein, A. (1905). On the electrodynamics of moving bodies. Retrieved from <https://www.fourmilab.ch/etexts/einstein/specrel/www/> [See under 2. On the relativity of lengths and times, the two operations (a) and (b)]

Is the moon there when I'm not looking?

“I recall that during one walk Einstein suddenly stopped, turned to me and asked whether I really believed that the moon exists only when I look at it.”³

Einstein was questioning belief in quantum mechanical systems without objectively real properties that exist independently of observation. It was perhaps an attempt to highlight the philosophical consequences of such beliefs.

It can be demonstrated that the moon can in some sense not exist because of lack of information receipt but at the same time still exist in a different way. That title question fails to distinguish between all of the following: the knowledge / concept of the moon, the substantial moon object, a manifestation of the moon formed by an observer's sensory system or product of a monitoring or recording device, potential sensory data (EM radiation signals) pertaining to the

moon in the environment and EM signals pertaining to the moon input to a device or organism's sensory system.

It can be seen by the following argument that the question 'is the moon there when I'm not looking' is inadequate. It is inadequate because the category of moon; Moon source object, Moon related potential sensory data, Moon manifestation or Moon-concept has not been specified, an unspecific noun, 'Moon', has been used.

KEY

A- Actualized, a substantial element of reality

Ab- Absolute, no singular reference frame applied

Category error- Failure to correctly identify or discriminate between different kinds of element of reality belonging to the different facets of reality

D- Definite. Certain and un-altering in that respect)

EOIR- Element of Image reality

EOOR- Element of Object reality, not same as objective reality

FS- Fixed state. A selection giving one un-altering state

Gross Set PSD- Total potential sensory data in the environment emitted by an actualized source object

Image reality- Emergent reality, product from sensory data or measurement processing,

Individual observer specific, or objective via shared product or shared source of sensory data input

L- Limited (partial sample)

MS- Mixed state. A selection containing more than one state

M- Manifestation. Experienced product of sensory data processing

Object reality- Foundational, source reality of substantial objects and particles and potential sensory data

Objective reality- Multi-observer corroborated Image reality

PSD- Potential sensory data. EM radiation with the potential to cause generation of sensory data when received by suitable system.

oMoon-Material source object Moon

PSDMoon...EM info. pertaining to oMoon

iMoon...Product of EM processing, an image

PSYMoon... Concept/idea of Moon in thought and/ or records including memory

Solution

(Ab A S EOOD) oMOON Absolute Actualized source object	≠	(Gross Set A PSD) Moon Total potential sensory data in the environment pertaining to oMoon
(Ab A S EOOD) oMOON Absolute Actualized source object	≠	(D LFS PSD) Moon Definite Limited Fixed State sub-set of EM signals received by observer
(Ab A S EOOD) oMOON Absolute Actualized source object	≠	(D LFS M EOIR) iMoon Definite Limited Fixed State manifestation of Moon (iMoon)

When not looking: there is no (D LFS PSD) Moon, the sub set of potential sensory data received by the observer (because no receipt is occurring), and there is no (D LFS M EOIR) iMoon, manifestation, product. However, within Object reality, there is still (Ab A S EOOD) oMoon; The Absolute actualized object. There is also still, within Object reality, (Gross Set A PSD) Moon; the total potential sensory

data in the environment emitted by moon. The substantial actualized object and total sensory data in environment relating to Moon object, can exist without their Image reality manifestation counterpart. Likewise, the concept of the Moon, PSYMoon, within brain activity or mind, stored within connected neurons as memories and as information within books and other kinds of records exists independently of a currently observed image manifestation.

The concept of the Moon does not require the formation of the seen image for its continued existence.

(Ab A S EOOR)oMoon and (D LFSM EOIR) iMoon belong to different categories of elements of reality, belonging to different facets of reality.

Reference

Pais, A. (1979). Einstein and the quantum theory. *Rev. Mod. Phys.* 51, 863–914 (1979), p. 907

Examining the 'light clock' argument

To correctly extend relativity to 'light', (/EM radiation), electricity and magnetism, the concept must be held that those phenomena are, in foundational Object reality, unaffected by alteration of observer viewpoint and relative motion.

It would be helpful, in physics, to use the words "light" and "electromagnetic radiation" or "EM waves", and the like, to represent categorically different phenomena. "Light" for the product of processing of received EM radiation; and "EM radiation" and the like for the phenomenon in the environment which

might be input to an organism sensory system or a sensitive device. If the word "light" is used to mean EM radiation in the environment, it can helpfully be indicated by using, 'light', rather than light. Recognizing the differentiation while still using the traditionally used word. "Colour" could be helpfully reserved for products of processing EM input. Which are correlated to wavelength but not directly corresponding. As the colour product also depends on the processing that occurs, the chemistry of the photo-receptors or sensors or sensitive material used, and how the 'light' is being received, i.e. the relationship of the observer to the EM input. The EM waves in the environment (unseen) do not have colour, although they have the frequency and corresponding wavelength with which they were emitted from a source. Seen light is a quale (or qualia) and so categorically different from the unprocessed EM radiation input to a biological visual system, or processing device.

Using this categorization, the electromagnetic spectrum (in Object reality) is not defined as a spectrum of (seen) light but of the precursor energetic disturbances, EM radiation, that could potentially be converted into an Image reality light spectrum; that extends to non-light detection products at greater and smaller frequencies either side of the (visible) spectrum. This is a semantic aid to comprehension not an alteration of the physics.

Re. Einstein's 'light clock'

The 'light clock' is one of Albert Einstein's thought experiments. It consists of a beam of 'light' that is bounced between two mirrors. One return journey is a 'tick' of the clock. When the clock is moved laterally, it will seem that the 'light' must travel further between the mirrors. Pythagorean mathematics can be used to calculate the apparent difference in distance travelled for the moving light clock system compared to distance when it is stationary.

However, EM radiation within the 'light clock' cannot be travelling further within the clock in Object reality, because of the way the 'light clock' is observed. There must be one and the same physics occurring in the clock that is the source of different observation products.

It will be argued that; the time measured by the clock itself, is not slowed by the translation (translocation) of the clock. Even though this means disregarding the logic of the diagonal straight-line 'light path' argument. Though the period and frequency of the 'light' motion is unaltered in Object reality (traveling the same wave motion distance in the same time), from the relative perspective of the stationary observer the motion is extended over a longer spatial distance.

Demonstration

Three observers watch a click wheel with a constant period of rotation. A. is a co-moving observer. B. is an observer following in the direction of the wheel's motion but at half speed. C. is a stationary observer, watching the wheel move laterally away. To the three observers, the wheel has been translated different relative lateral distances. However, in each case it is the same motion of the material body that is the source of the observations. What is altering during the motion and is different for the different observers is the relation to the potential sensory data emitted from the material object.

When the observer moves together with the observed object the distance that the potential sensory data must travel from emission to be received by the observer is remaining constant. When moving at half the speed of the object there is an increasing distance that must be travelled by the signal for receipt and when the observer is stationary there is even greater growth in the increase in distance that must be travelled by the signal for receipt. This results in three different experiences of the motion via the products generated from the received potential sensory data.

That is three different image realities produced simultaneously from different sensory information, generated from different EM signals, all originating from the same material object source.

The image reality of the observer deemed, by a third party, to be stationary compared to the moving wheel will be produced from potential sensory information that has increasing delay between production and receipt, and will be the image reality formed from the oldest signal content of the three observers. The half speed observer will also be receiving signal content that has had increasing delay between production and receipt but will be more recent signal content than that being received by the stationary observer. The co-moving observer will have received the youngest signal content of the three and the delay will remain constant.

If these were very accurate clocks and very large distances the co-moving observer should see his clock keep steady time. Whereas the other two observers should see the clock slow. This is because the information to produce an accurate time has not been received due to the increasing delay, due to the increasing distance between clock and observer. The stationary observer sees the clock progressively slow the most as the object clock gets further away.

Periodicity

The categorical difference between seen light and the unseen causal phenomenon in the external environment is very important and deserves reiteration. To avoid ambiguity, it would be useful if in physics the term 'light' is used to refer to the seen product of EM receipt and processing and electromagnetic radiation (EM) is used to refer to the causal phenomenon within the external environment. As EM is not seen light, it is not seen while still in the environment. Light appearing to be in the external environment is an image product of EM receipt.

Electromagnetic radiation, also generally referred to as 'light' is a periodic phenomenon. In mathematics, a periodic function is a function that repeats its values in regular intervals or periods. Periodic functions are used throughout science to describe oscillations, waves, and other phenomena that exhibit periodicity. Electromagnetic radiation, considered as a periodic wave phenomenon, can be compared to other kinds of periodic motion. As the period of periodic motion is unaffected by linear translation (mathematical fact), it follows that the period of a 'light clock' *itself* is unaffected by linear lateral translation.

Mathematically the period of an ideal clock is unaffected by lateral translation. In Object reality, lateral translation is only an alteration of the spatial change that was already occurring as the 'stationary' clock moved with the motion of the Earth. That is observer independent change in the relation between the clock object and other material bodies.

The 'light' (EM radiation) traveling between the mirrors is not moving in a straight line like a ray but undergoing wave motion. Following an oscillating path that is the same whether there is relative translation or not. The notion that the 'light' takes a longer path when the clock is moved is based on the incorrect diagonal straight-line motion assumption. Instead it can be thought of as a fixed length of periodic motion with a fixed frequency, imagined as an extended spring like in the translated reference frame. Following the path along the coils of the spring, the imagined absolute motion, it is the same length whether the spring is extended or not. It is the same source 'spring' for both observer viewpoints, only their Image realities differ.

In disagreement with Einstein's thoughts, the diagonal light path seen has to be a product from processing of 'light' scattered from the beam that travels to the observers' locations, not light travelling between the material mirrors. This is necessary because of the way in which vision

works. It is necessary for EM radiation to be received for an image of the source to be seen.

The speed of 'light' is the same for moving and non-moving clock, and for the clock *itself* timekeeping is unaltered even though it *appears* that when the clock is moved the light is travelling further in a straight line at c (the speed of 'light'), making each tick period of the clock appear to be longer. Giving the saying that; 'moving clocks run slow'.

It is very important, for correct relativity, that the distance travelled by the 'light' (EM radiation) in the 'light clock' is the same in foundational Object reality, in both moving and stationary scenarios, being unaffected by observations. Relative motion alters the relation between the observer and the EM information scattered from the beam.

Increase in distance between observer and clock is important. The increasing separation increases the time delay between emission and receipt of the light. Lateral translation away from the observer causes the Image reality that is produced to have the appearance of a greater distance travelled by the light beam and a resulting slowing of tick. Simultaneously, for a same speed co-moving observer, for whom the clock apparatus appears stationary, the tick must be constant and unchanged. It is not correct to say that (because of Relativity) "a moving clock runs slow".

The generated image or representation of the moving clock, formed from information emitted by the distant material clock, can give the impression that the material clock is running slow, if there is an increased delay in signal receipt. A distant clock that approaches an observer should be 'seen' to become

increasingly less slow when compared to a stationary clock at his location, as the delay between signal emission and receipt decreases.

The concept of wavelength

Definition: 'Wavelength: noun, Physics. The distance, measured in the direction of propagation of a wave, between two successive points in the wave that are characterized by the same phase of oscillation.' *Dictionary.com*

Wavelength is a spatial distribution measurement that combines position due to periodic motion and linear translation in the direction of propagation. The amount of linear translation measured can vary according to observer location and motion, and observed frequency is inversely proportional to observed wavelength. It can be understood from the earlier investigation into the 'light clock' and planes problem that the periodic phenomenon *in Object reality* is not altered because of the change in relation of it and the observer, unlike observed wavelength and frequency.

Doppler shifts can be thought of as changes in the relation of an observer or reality interface to the potential sensory information produced by a source. Decreasing distance between source and receiver gives an increasing frequency of wave interception. As each wavelength is emitted it is closer to the observer than the previous emitted wavelength reducing travel time. The observer is also receiving more recently emitted EM signals, than if the distance between source and recipient was not altered.

Increasing distance gives an increasing delay in receipt, a decreasing frequency. As each wavelength is emitted it is further away from the observer than the previous emitted wavelength increasing travel time. The observer is also receiving less recently emitted EM signals, than if the distance between source and recipient was not altered. This means there is not only a shift in frequency of

the product but a shift in temporal origin of the signal (and information contained) from which sensory information, and thence experience and cognition, is generated. From this it can be understood that the frequency measurable is a characteristic of the relation between observer and the observed wave phenomenon in object reality. In this way observers with different relations to the same wave phenomenon in Object reality can measure different frequencies.

As the frequency is tied to the relation between observer and the emitted EM radiation and is a relative measure, red shift cannot be considered as clear proof of expansion of the universe. The relation to the radiation is different for ancient EM radiation, compared to more recently emitted radiation from the local group of galaxies, giving blue shifted frequency measurements too, not just red shifted ones. In a uni-temporal material universe the sources of the very ancient EM radiation do not exist and so their movement away from the existing Earth or near-Earth observatories is necessarily illusion.

Source

Woodward, G. (2017). Examining the Light Clock Argument, Clocks on Planes, Wavelength and Doppler Shift, in Relation to Object and Image Reality.
viXra:1703.0030 [pdf]

About the observation of a constant speed of 'light' when travelling towards a light source

For comparison: "By 1905 he [Einstein] had shown that FitzGerald and Lorentz's results followed from one simple but radical assumption: the laws of physics and the speed of 'light' must be the same for all uniformly moving observers, regardless of their state of relative motion. For this to be true, space and time can no longer be independent. Rather, they are "converted" into each other in such a way as to keep the speed of 'light' constant for all observers." Overduin, J. (2007).¹

Speed has a time component. If that time component comes from the received 'light' signal, then it varies as the relation of the observer to the 'light waves' varies. A confusion arises with the assumption that the spatiotemporal aspect of the product is a foundational spacetime reality. Or if it is thought that the time component must not be variable. Think of the 'light' travelled toward, approaching the source, as potential information. That information is content of the observer's present when it has been received (and processed in to what is seen). If the observers motion alters receipt of the signals that are potential sensory data, so correspondingly there is alteration in formation of the observer's present from what it would have been seen to be.

If the EM signals to produce the present 'product' are obtained more rapidly, (e.g. by moving towards the source), so is the info-temporal content. If the EM radiation to generate the 'product' is obtained more slowly, rather than remaining equidistant, distance between source and observer increasing,(such as by moving away from the source), its info-temporal content is obtained more slowly. Now imagine that the EM signal has come from a clock. Rapid interception of the signal will cause the experienced clock time to be increased. Potentially detectable by comparison with clock time seen using a close by, synchronized, material clock.

Slower interception will give a slower experienced clock time generated from the signals. Potentially detectable by comparison with clock time seen using a close by, synchronized, material clock. If the received signal time found by processing of the signal is used to time the speed of signal receipt it will be found to be constant.

Reference

1. James Overduin, J. 2007. 'Einstein's Spacetime'. Retrieved from <https://einstein.stanford.edu/SPACETIME/spacetime2.htm>

The Grandfather Paradox

The idea of time traveling, and the paradoxical possibilities appear to have been considered since the 1930s and possibly earlier. There are several variants of the Grandfather paradox. The Grandfather paradox occurs when a time traveller goes back in time, kills his own grandfather so his father is not born and so is unable to father the time traveller. Therefore, the time traveller cannot travel back in time to kill the Grandfather. Another version of the paradox is called Autoinfanticide, in which the time traveller kills himself as a child.

A number of possible solutions have been suggested. Such as the time traveller jumping onto an alternate past when arriving back in time. So, it isn't his own Grandfather that is killed but another version. Or by proceeding forward on an alternate time line after the fatal event. His original future remains unaltered, but he does not return there but to a different future. There being a physical rule that prevents changes occurring that will alter time have been suggested by others. That idea, that there is zero probability of events happening that lead to paradox due to physical prohibition, has been expanded on by Seth Lloyd and others, described by Laura Sanders in 'Physicists Tame Time Travel by Forbidding You to

kill Your Grandfather', Wired, 20 July 2010.⁵ Proposing that probabilities alter to prevent impossible outcomes.

Why the Grandfather paradox cannot occur

Realizing that different observers experience same events at different times and in different ways led Einstein to consider that events, past, present and future exist spread within a spacetime continuum. This reasoning provides the necessary physical background for the Grandfather paradox, and other paradoxes, to be possible.

Here is an alternative description. The EM signals contained within the Data pool (of potential Image realities) is distinct from the Object reality of substantial source objects now existing, that co-exist within Object reality together with the EM radiation distributed within the environment.

The Grandfather paradox is based upon that assumption; that non-simultaneity of events experienced by different observers of the same event requires persistence of material events in time rather than just persistence of the potential sensory data from which to construct Image reality present experience. It confuses Image reality with Object reality. *The Grandfather paradox is therefore based upon a category error.*

(Ab A EOR) Grandpa	≠	(D LFS M EOIR)Grandpa
Grandpa material object		Grandpa image manifestation

That there is non-simultaneity of experienced events, should not be used to suppose that the object sources of the potential sensory data received must remain unchanged. As the Image reality product depends only upon the receipt of EM radiation signals (with potential for the generation of sensory data), already emitted into the environment. The pool of EM signals allows different observers to receive and process radiation into different products; Location and motion relative to the EM radiation (potential sensory data) in the data pool determining what data is received.

The EM potential sensory data is not the substantial / material past, present and future; only the potential to enable forming of Image realities of former objects and events, when received and processed. The object sources can change, move, or cease to exist after the EM radiation is emitted.

The no longer materially existing, is unambiguously, different from that which materially exists and that which has not existed. EM radiation signals (potential sensory data) persist in the environment, receivable by different observers at same and different times, allowing non-simultaneity of the same events that are seen. There is no need to suppose there is a spacetime continuum in which events as substantial realities persist throughout all time. It is not necessary for physics that substantial events themselves persist. It is likely they do not persist, as doing so permits paradox.

With uni-temporal space containing distributed EM information rather than the Spacetime continuum, the possibility of time travel and all Causal loop or Bootstrap paradoxes are also eliminated. So too is the possibility of a working Tachyonic antitelephone. As there is no possibility of backward time travel even for particles; as there is no foundational time that is separate from the extant configuration of the uni-temporal Object universe.

If time travel, (outside of Uni-temporal Now), of material objects is shown to happen, with or without a spacetime Worm hole, it will disprove the hypothesis of uni-temporalism and the Object universe.

The Andromeda paradox

A paradox set out by Roger Penrose ⁶, drawing attention to how two different observers could have very different presents in relation to distant events.

“Two people pass each other on the street; and according to one of the two people, an Andromedan space fleet has already set off on its journey, while to the other, the decision as to whether or not the journey will actually take place has not yet been made. How can there still be some uncertainty as to the outcome of that decision? If to either person the decision has already been made, then surely there cannot be any uncertainty. The launching of the space fleet is an inevitability. In fact neither of the people can yet know of the launching of the space fleet. They can know only later, when telescopic observations from earth reveal that the fleet is indeed on its way. Then they can hark back to that chance encounter, and come to the conclusion that at that time, according to one of them, the decision lay in the uncertain future, while to the other, it lay in the certain past. Was there then any uncertainty about that future? Or was the future of both people already "fixed"?” (Penrose. R. 1989.)

The Andromeda paradox is understood by realizing there is a significant category difference between what is experienced as a present event through receipt and processing of EM information including the potential for such experiences, and events in which substantial elements of material reality interact, i.e. source events.

Interactions occur in Object reality that is uni-temporal (same time everywhere). It can be considered the Causality front; when an event happens in the source Object reality is definite, and uni-temporal. *That event having happened in Object reality is true for all locations.*

Potential sensory data is produced by reflection/ emission of 'light' from those events, which can be named the Pre-written future, (not to indicate complete determinism within physics, but that the data to form observable manifestations exists prior to their experience.) The Object reality or source reality, and Image reality experienced present manifestation are not synchronized.

When an event is observed via its manifestations (or potentially could be, as in this paradox) is variable, according to observer location and motion; The observer walking towards Andromeda is *getting closer* to the EM radiation that has potential for the generation of sensory data pertaining to the invasion, from which a present experience could be formed, compared to an observer walking away. Even though they are too far away to receive the radiation that could enable generation of potential sensory information pertaining to the invasion.

So even though no invasion data is yet received, as Andromeda is too far away, it can be said that for the observer walking towards Andromeda, the potential sensory data emitted from the invasion events on Andromeda are spatially closer to him, (as he is reducing the distance the signal has to travel to meet him.) Formation of that information into his present experience would be sooner. This does not however mean the source event occurred sooner. The source event occurs only once, and the time of that occurrence (iteration of the Object universe within the imaginary past sequence of iterations) is unique and unchangeable.

So; "Was there, then, any uncertainty about that future? Or was the future of both people already "fixed"?" (Penrose. R. 1989.)

If for one 'observer' the event has happened in Object reality, and EM signals (with potential to enable sensory information generation) pertaining to the event is in flight; it has happened for both. The launch event will have been superseded by more recent events and so be materially 'past'. Therefore, the invasion is a

certainty (if all goes to the alien plan) because of the material occurrences, that are *independent of the distant observers*.

When the material event occurred, EM signals will have been produced by reflection / emission. *The proximity of the particular signal to an observer does not alter the material event, only when the experience and thus knowledge of it happens.* The information not yet received can be regarded as a Pre-written future, though it pertains to an event that has already materially happened. ('Future' as it becomes present experience when received and processed.) Yes, there was uncertainty of timing when the 'observers' met (that relates to potential information) but also material certainty. That event in Object reality is true simultaneously for all locations. It has happened, so is certain though the distant observers do not yet have the information that would give them awareness of the occurrence.

Reference

Penrose, R. (1989). *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics*. Oxford. Oxford University Press. p. 392–393.

The bug/ rivet and barn/ pole paradoxes

A paradox of special relativity; the bug/ rivet paradox is about a rivet too short to squash a bug at the bottom of a hole accelerated to near 'light' speed. The different reference frames of the bug and the rivet produce two different estimations of the rivets length and ability to squash the bug. From the bug's reference frame, it is far too short for squashing but from the rivet's it is long enough. The different opinions on length are due to non-simultaneity of events in the different frames of reference affecting what is seen where and when.

Bugs can't be squashed because of the perspective given by a manifestation, an image. Only the actualized, rather than manifest image, dimensions of the substantial rivet and hole can squash it. The relative positions of the parts of rivet and hole are theoretically experienced differently for the different 'observers'. If they were both capable of being observers- they would be fabricating different experienced presents from the sensory data available at their location. A rivet is not such an object. It is not, nor does it possess, a reality interface that can convert environmental signals into a perceived product.

Background argument; Amalgamation of different spatial /temporal information by each observer into what is *seen* produces different experienced presents within the same absolute foundational time, Uni-temporal Now. The individual, information derived products do not affect substantial material objects, that are not within the perceived spacetime fabrication but are always only within Uni-temporal Now, the existing configuration of the Object universe.

What will happen is the substantial objects, material containing a hole and the rivet, that are sources for both reference frame perspectives will come together in relation to their material object measurements and the different reference frame perspectives will not be relevant to the material interaction.

The barn pole paradox is similar providing two different reference frames. One from atop or next to the doors of a stationary barn and one riding or moving with a rod at a significant fraction of the speed of 'light'. The paradox is around the idea of whether the pole can fit fully into the barn or not.

At rest the pole is too long to fit entirely inside. The different observers have different opinions on what happens simultaneously as well as seeing different lengths for the same rod. The person with the pole sees it too long and the barn contracted. The person at the barn sees the pole shortened and not the barn. This is very well illustrated by Mark L. Irons, (2004).

In Object reality neither pole nor barn are shortened. Differences in observed length are due to differences in the potential sensory data that is received and amalgamated together by the two different observers into their own product.

Although Mark Irons illustrations are explaining special relativity, they can also be thought of as an indication of how different sensory data obtained by the different observers is used generate their own Image reality products.

Reference

Irons, M. L. (2004), last updated 10 August 2007. The Pole and Barn Paradox. <http://www.rdrop.com/~half/Creations/Puzzles/pole.and.barn/index.html> (Last retrieved 26th Sept 2018)

Twin(s) paradox: Some ideas

The paradox concerns one twin who stays on the Earth while the other flies off in a spacecraft travelling close to 'light' speed before turning around and flying back to the Earth. According to Einstein's Relativity (Special and General for a full consideration of the problem) the space faring twin will have aged less.

The twins are in two different non-inertial frames of reference giving a highly asymmetric comparison. If this was a real-life scenario, the Earth bound will have the Earth's motion; rotation and translation of that rotation in orbit around the sun, during the other's long journey. The space traveller must accelerate out of orbit, cruise, decelerate, turn, accelerate, cruise, and then decelerate for landing. The space traveller is aware because of the acceleration that he is in motion. He feels the g forces as his motion changes, accelerating and decelerating.

Because of the asymmetry there will not be reciprocal differences in observations (via signal transmissions) by the two observers during the complete journey. This can be thought about in relation to Image realities, formed from EM information receipt.

Image reality, what is seen, does not (itself) affect Object reality.

In other scenarios there can be changes to Object reality that are due to the behaviour of observers in response to the Image realities seen.

In relation to Object reality: In a uni-temporal Object universe there is only one universal passage of foundational time, unaffected by motion.

Where the twins are located and how they move cannot alter that foundational passage of time. Motion of the observers cannot affect the relation between the material planets, the foundational Object reality of their separation and hence the travel time between them in Object reality. It can be understood that time dilation and length contraction do not pertain to Object reality. The twins motion *does* affect what they observe (via signal transmission and receipt). The Image realities they produce are non-reciprocal because of the very different motions of the twins.

Incidentally, microgravity and radiation exposure hazards in space are detrimental to the human body and will cause material changes akin to ageing. So the traveller will be biologically older.

Although 'the light clock' argument is used to show that time slows for an object in motion, 'the light clock' argument is flawed. 'Light', a periodic phenomenon, must be invariant in period with translation. That is a mathematical fact. So, period of a 'light clock' is invariant in Object reality.

Material changes in time shown on clocks, like in the Hafele-Keating 'planes' experiment, is likely to do with the way in which time is measured by

the clocks, and the effect of motion on that process (or experimental error). That is an effect on the function of a specific type of system that can not automatically be likened to other systems operating in different ways. Like should always be compared with like for a fair comparison. The metabolism and ageing of a human being is not the same as the frequency matching of an atomic clock.

Testing quantum spin with the Stern Gerlach apparatus

Is the Stern Gerlach apparatus sorting pre-existent differences or creating them? It will be shown that experimental results are indicating that the device is not a device measuring existing reality, an inherent property, but measurer of the created response it has produced, imposing orientation and relative reference frame. It gives a limited fixed state product, that pertains to the physical reality input from the environment (the particle) that has been affected in some other way because of the effect of the environment of the apparatus on it.

If y axis spin is produced, then x axis spin is potentially lost. This fits the evidence from experiments where x axis spin is tested first and then one resulting group of particles (let's say up) is y axis tested, and then x axis tested again. Former x axis spin 'supposed identity' has been lost by half of the particles undergoing the test (the spin measurement outcome has become 50:50 chance). But, if only half have changed, it would be necessary to explain why only half the particles lose their x axis spin; and why them in particular, rather than all being affected the same way?

A better proposition is: If y axis spin is produced then x axis spin is probably lost, as the particles re-tested along the x axis behave as if they have never been previously tested in that way. This means spin isn't an identity or inherent property (prior to exposure to the environment of the apparatus) but a response to what a particle has 'experienced'. Therefore, the product of conditions imposed

upon one partner particle, not carried out on the other, cannot be used to know about the one not tested in that way.

It isn't possible to know for example both x and y spin for one member of a pair of entangled particles; y from 'measurement' and x from knowing the spin of the entangled partner. The possibility of an x measurement does not come into existence until the necessary environment- particle relation is applied.

Investigating spins with Stern Gerlach type apparatus: The response to a test not carried out does not exist. Each different test with the apparatus is a different environment-particle relation producing a new response and there is no correlation between the responses for each axis.

The above premise suggests that the Bell's inequalities argument is a red herring, as Bell's argument requires the assumption that all measurements are of preexisting intrinsic properties. The explanatory framework (providing the necessary ontology for dispelling the paradoxes of relativity and allowing QM and relativity to exist without contradiction) places the particles in the uni-temporal foundational spatial configuration and not the spacetime continuum. This is a categorically different kind of local realism from the kind Albert Einstein supported.

There is, at unitemporal -Now, only what and where an electron be-able (beable) is; what and where it was and what and where it will be are not a part of the (Object universe).

At any chosen moment the variables that are relations with other beable objects that give the references necessary for relative qualitative or quantitative characterization of the particle form a unique profile set.

There is no communication of *required 'spin'* between the separated 'entangled' particle pair.

Source of information on experiment results

Video: "Introduction to Superposition MIT 8.04 Quantum Physics I" MIT Open Course Ware (Published Jun 18, 2014)

Retrieved via <https://www.youtube.com/watch?v=IZ3bPUKo5zc&t=1603s>

Macroscopic analogue of the Stern Gerlach test: Allan's Invitations

Allan is going to be invited to a few different social events. There are 3 different changing rooms, called X, Y, and Z. In each room he will receive an invitation and must dress appropriately for the occasion.

If he goes into X he will find an invitation to a formal dinner and the dress code. He has the choice of a dinner jacket and cravat or a smoking jacket and bow tie. He makes a choice. If after leaving he re-enters the same room X, or another room X, he does not have to choose how to dress because he is already wearing appropriate attire.

Though if he goes into Y he will find an invitation to a causal house party. He is given the choice of track pants and hoodie or blue jeans and sweater. Now he will have to get changed because he can't attend in formal wear. Likewise, if he enters Z, where he gets an invitation to a pool party. Here he must choose between board shorts and multi-coloured beach towel or swimming trunks and plain bath towel.

Any changing room of the same letter, entered directly after a room of that letter, will give the same attire outcome. It is understandable that there is no motivation to change if already suited to the circumstances presented. It makes sense that there is no change unless it is required by the circumstances presented. For any different letter room for the following test there is an even chance of either

clothing option (outcome). A 50:50 result will occur if a different letter retest is done many times.

The analogy works with the assumption that Allan has no inherent preference for any particular clothing type. (Compare; Having a prior affinity for up or down does not give a correlated outcome for another orientation of test.) Because of that Allan can be imagined tossing a coin inside the changing rooms to choose.

To clearly demonstrate the change from certain outcome for same rooms, one after another, to probabilistic 50:50 outcomes, for rooms that are different (and when the same one is entered once again after a different one in between), it would be necessary to send many Allan clones through (or at least people similar enough to be considered as equivalent to an Allan). Another group can watch the outcomes from the sequence of changing rooms entered and marvel at the similarity of their apparel choices to electron spin measurement outcomes, for different orientations of measurement.

Inspiration for Allan's Invitations and explanation of Stern Gerlach experiment results

Video: "Introduction to Superposition MIT 8.04 Quantum Physics I" MIT Open Course Ware (Published Jun 18, 2014)

Retrieved via <https://www.youtube.com/watch?v=IZ3bPUKo5zc&t=1603s>

Thanks to Allan Adams for his excellent teaching.

Thanks to Lawrence Parry for criticism and suggestions for improvement.

Fire into white doves, transformation illusion: Double slit and half silvered mirror experiments

Illusion relies upon some information being concealed or otherwise unavailable, thus not forming part of the perception of how the event happened. For example, the highly repeatable fire into white doves, transformation illusion.

Paper is put into a metal pan and ignited. The lid is put on the pan. When lifted again live doves fly out. This works because the information that the doves are inside a pan liner attached to the lid is concealed from the audience. Thus, it is the lack of information that prevents drawing of a justified true belief from a reliable cognitive process; i.e. to know or have knowledge of what has occurred. That is why illusion needs to be suspected in the double slit and half silvered mirror experiments. If something is happening that is imperceptible except through its effect, it (the cause) may not be built into the perception of how the events is happening. Imperceptible is not the same as nonexistent. There can be disturbances that are sufficient to disturb a single particle but not provide a quantum of information that our senses or devices can detect. The alternative is to discard what we trust about objective reality and believe in magic.

The double slit experiment might be understood as the wave effect of the vibration of an electron passing through both slits and then interfering and affecting the particle path rather than the particle passing through both. It can then be seen as an interaction with the environment that feeds-back rather than just an independent behaviour. It is, when viewed that way, a concrete interaction (rather than an abstract effect) that can work with the mathematics. The suggested medium does not provide electromagnetic information whereby the interference pattern could be seen and identified. It is proposed that nevertheless it can interact with electron entities and guide their paths. Such a medium is not a necessary part of Einstein's Spacetime continuum or Minkowski's Spacetime representation and, as the medium of empty space provides no direct visual

evidence of itself, it is not a part of the seen "Image reality product", formed by observers. Yet the behaviour of the electron giving the results that are seen provides evidence of the interaction. The effect of an electron on the environment can be separated from the electron entity rather than considering the effect as the thing. (It seems that quantum field theory would have all effects and no causal thing.)

A flash of light from detection of a photon is not a photon itself but product of processing information generated from the received EM signal; Likewise, the click of a photo-multiplier. An undetected photon might be regarded as a potential quantum of information. (From the viewpoint of a detector), indivisible by the barriers in experiments such as double slits and half silver mirrors. An accompanying disturbance of the electromagnetic medium that is less than a potential quantum of information would be undetectable. The quantum of potential information, not being broken up by the barrier/s, has to take one path or the other but the accompanying undetectable disturbance will take both and can be reunited giving an (unobserved) interference pattern affecting the path of the quantum of potential information that will be detected as the photon.

The explanation provided is simple and does not require endowing photons with ability to know what an experimenter has done and the ability to adjust what it is in response. Nor does it require going against the principle of causality, becoming what it needs to have been, as some experiments have seemed to require. The suggestion is that only a part of the whole photon phenomenon is detectable, and that part is identified as the photon. The other undetectable part of the phenomenon is responsible for the seemingly odd findings of evidence for interference.

Source; Woodward, G. (19th Aug. 2017). "Is Quantum Physics Really Strange?", viXra.org. <http://vixra.org/pdf/1708.0235v1.pdf>

An alternative explanation of the double slit experiment

The QM model applied to the double slit experiment has the electron modeled in a superposition of states in mathematical Hilbert space. In that model the electron doesn't have an either-or location in (Object reality) space while somehow it is passing through the apparatus. Therefore, which slit it has gone through can't be known because the question just doesn't apply in the way in which the scenario is modeled and described.

Rather than the particle being in a superposition of states passing through both slits, until detection provides a singular path taken, vibration of an electron is suggested as a source of waves that can pass undetected through both slits and interfere. The wave interference affecting the path of the particle beyond the slits and resulting in the build up of an interference pattern for many test particles. The waves passing through both slits occurring as well as the electron particle passing through just one slit, giving a singular slit outcome when which slit is taken by the particle is tested.

Rabbit from an 'empty' hat: Quantum decoherence or wave function collapse

It is easy to presume, from its demeanor, that a dog knows, with certainty, that the biscuit obscured from view still exists, as do most 4-year-old humans. Magic is not mere illusion if material objects only come into existence upon observation (as has been suggested by for example the participatory universe hypothesis of QM.) From the arguments presented in this work it should be clear that observation involves production of a manifestation from processing of a received signal, it does not create substantial objects. The manifestation is only produced if the signal content from which to form it, via sensory information generation, has been received.

Performance of an illusion causes a subjective Image reality to be constructed by the audience members based upon incomplete information, playing to the 'what you see is all there is' bias, the human tendency to draw strong conclusions from incomplete information. As described by Daniel Kahneman, in his book 'Thinking fast and slow' (2011). The audience's assumption of no support when a table leg is obscured from view by careful positioning of the magician's own body while performing a levitation illusion, is such a cognitive bias 'in action'. A magician uses misdirection, distraction, and skillful handling / manipulation to control the subjective realities of the audience.

The rabbit most definitely is a physical (material) phenomenon while unobserved in the magician's hat. The live rabbit object has a structure and function including its biochemistry. The biochemistry involves atoms and particles and therefore also physics. A test could be done to show that the rabbit continues to function unobserved, and therefore exists somewhere.

Observations do not create material actualization (a beable) but form manifestations that can be interpreted. The click of a Geiger counter is not the creation, i.e. coming into being, of a radioactive particle but an audible manifestation (a product of the observer's sensory system, that can be interpreted as measurement of an existing radioactive particle. All the undetected existing particles are like rabbits in hats, not part of experienced reality but still having existence (in Object rather than Image reality.)

The magician shows the audience an empty hat. It then seems that he reaches into the empty hat and pulls out a rabbit. For this illusion to be performed the magician must put a rabbit into the hat or allow a trained rabbit to enter the hat unseen. The rabbit is concealed nearby, such as in a black pocket hanging from the rear of the magician's table, making it easy for the transition into the hat to be accomplished. Careful positioning of hat and use of distraction prevents

attention being paid to the maneuver. (Extending the illusion; The rabbit may be placed into a pocket in the hat's lining. In which case a fleeting glimpse of the interior can be given, and will still appear empty to the audience. The lining being absorbing rather than reflective minimizes transmission of potential visual stimuli.)

It isn't possible to withdraw, from the hat, a rabbit that is not in the hat. Similarly, a detected state (a relation between the measured object / phenomenon and the measuring device that the variable is measured relative to) has to exist prior to the observation of the result. The conscious observer becomes aware of the result (usually) via a 'visual (EM radiation)' or 'auditory' (sound wave) signal or display. Which means that the sound wave or EM radiation encoding that signal or display must travel from apparatus to observer, then stimulating the sensory system of the observer and after a sensory signal has been sent to the Central Nervous System and processed cognition of the result of the experiment occurs. The cognition is therefore occurring after a causal sequence of earlier events necessary for its coming to be. That means that 'consciousness causes collapse' models must be incorrect. They require cognition of events that have not happened. Retroactively causing the necessary events to match the prior untrue (not matching physical reality) 'cognition'; after the unfounded 'cognition' has occurred. This is very magical thinking, akin to; 'I have just seen a rabbit and therefore a rabbit has now come into existence'. Rather than; 'I have just seen a rabbit appear and therefore my knowledge must be incomplete; Some information that would complete it (how it got into the hat) has not been acquired, for some reason or reasons'. Not to say that the measured state exists all along; It is not suggested here that it is within spacetime just awaiting an observer's acknowledgment. The measured state cannot come into being until the relation with the apparatus that enables the measurement to be taken is established.

The heads or tails measurement of a coin is not in existence until the coin's orientation relative to a chosen surface is established. The spin up or spin down result of an electron that has passed through a Stern Gerlach apparatus does not exist until the electron has been exposed to the environment of the apparatus. The relation that determines the outcome is chosen prior to, and exists at collection / receipt of the result. Establishment of the relation (that gives the measurement outcome) is where / when the singular fixed state of the variable 'comes to be', in the object-apparatus system, unobserved. That could metaphorically be likened to the rabbit entering the hat unseen.

Conscious awareness of the result is a product of information receipt, an 'internal' reality that didn't previously exist. It is not the external reality coming into being. The wave-function collapse or decoherence associated with knowledge of the result (found in consciousness causes collapse models), is not corresponding to a change in the experimental system in external reality. Instead it is mental switching from thinking about the unknown state represented by the superposition model to the known representation of reality built from received information.

Reference

Kahneman D., "Thinking Fast and Slow", Farrar, Straus and Giroux, New York, 2011

Source

Woodward, G. (19th Aug. 2017). "Is Quantum Physics Really Strange?", viXra.org. <http://vixra.org/pdf/1708.0235v1.pdf>

The frog and the swarm of bees, **different views of the universe**

In Max Tegmark's paper 'Shut up and calculate' (2007) the idea of the different frog and birds eye viewpoints of the universe is introduced. The frog has a view from within the universe whereas the bird can 'fly above' and see the 'larger picture' of the whole. The notion of different equally valid perspectives is useful. Working from that different points of view idea, it would be good to have a frogs eye view and the view of the hive mind of a swarm of super intelligent bees. (This is not about literal bees, bee communication and consensus of real bee hives. Nor is a metaphor for human beings. It is only a visualization tool to aid comprehension of the idea of of the aggregation of different perspectives of the same objects / phenomena.) The bees can then have multiple viewpoints of the same arrangement and relations within the universe, rather than a singular viewpoint. All of the bees are correct, though having different individual opinions on variable values, or states, (such as velocity, direction of rotation, and orientation). This ties in with relativity.

The hive mind view of a swarm of bees encompass a view of an external reality that is fully relative to many independent sensors (bees), providing an aggregate, (not an amalgamation), multi-state, multi-orientation, multi-value characterization of variables. So that for each variable there is a variable profile rather than individual value or state. That represents, a 'world' of many possibilities prior to selection of a singular viewpoint (or apparatus and method) giving a singular state or value. This ties together relativity with a solution to the many worlds conundrum of QM. The bee swarm visualization demonstrates the idea that singular attribute measurements are relative. That is, they come from the relation with the entity under consideration rather than being sole property of the entity independently.

Reference

Tegmark, M. (25th Sept. 2007) "Shut up and calculate", arXiv:0709.4024v1
[physics.pop-ph]

Justified true belief (JTB) and justified misinformed belief (JMB)

Information received from an experiment is used to give a particular perception of the source reality. Does it fully match the external reality? No because it is a limited viewpoint. In relation to the possible mismatch of perception and underlying reality, the possibility of natural (not man-made) illusion in relation to the double slit and half silvered mirror experiments is discussed in chapter 9 'Demystifying the quantum realm by comparison of macroscopic scenarios providing similar outcomes'. There is also alteration of what is being observed in Stern Gerlach, and polarizer experiments, the outcome of interaction.

Though there is no clear consensus it seems 'knowledge' might be explained as 'justified true belief' (JTB), with some extra condition or conditions, or instead K-reliabilism's explanation based on reliable cognitive process, or a causal connection between belief and the fact. (Ichikawa, Jonathan Jenkins and Steup, Matthias, Fall 2017)

A lot of the debate on what it (knowledge) is and isn't could be eliminated by agreeing on an extra term; 'misinformed knowledge'; Referring to what seems to be knowledge of an external truth but is not what it seems to be. A belief can be justified without the subject of that belief being the truth or the whole truth. A court requires witnesses to give evidence that is the truth i.e. not false and

the whole truth, not omitting relevant facts. The more complete the true evidence the better the representation of events.

The Justified Misinformed Belief (JMB) terminology is helpful in avoiding arguments about what is and isn't knowledge when the thinker is misinformed but has a justified belief.

It is also possible to see that JTB can change to JMB when additional information is available. i.e. what was true for the known data set is not true for the expanded data set. Example: All swans are white -until the first black swan is found. The opposite process may also occur; supposed (according to available data and expert opinion) JMB can change to JTB when more facts are available later. Example: a high fat diet can be healthy.

That recognition of how the categories are not necessarily permanently fixed but change with the information that is available is useful for science. With that extra JMB term, what was knowledge is not becoming not knowledge or non-knowledge, but misinformed knowledge when superseded. That is relevant to investigation of foundational Object reality. 'Sub information' (a less than detectable quantum) is undetectable (by us, with current technology), except indirectly by its interference. It might be justified true belief but unverifiable at present and would allow the effect of an illusion in double slit and half silvered mirror experiments.

Analogy: One can have a justified true belief that a magician is concealing information, one can have that knowledge in that 'JTB' sense but not in the reliable cognitive process sense, since the information receipt is necessary for the cognitive process providing the knowledge. For full truth there needs to be not one impartial objective view but all relational views.

Basing evaluation of truth on the reliable cognitive process comes into difficulties when the cognitive process itself is selective with the truth, i.e. only limited signals and results are obtained, that can be further reducing in their processing. It also combines evidence together that did not co-exist in the Source reality and the 'evidence' can be 'tampered with', subject to distortions, interference and absorption.

Certainly, human beings can have power over the perception of reality of others by control of information. It is the art of magicians and craft of propagandists. Bending of 'light' around an object can cloak it. Animals that use mimicry rely on providing information that will mislead a predator. Animals that use camouflage decrease their chances of being detected by predators or prey.

The notion of linear cause and effect at a singular scale limits our perception of how events unfold. In a linear causal sequence, only 'significant' known knowns are included, and a great deal is left out. There are multiple influences and scales of influence acting to produce a particular outcome. This may be a chink in determinism's armour.

Reference

Ichikawa, Jonathan Jenkins and Steup, Matthias, "The Analysis of Knowledge", *The Stanford Encyclopedia of Philosophy* (Fall 2017 Edition), Edward N. Zalta (ed.)

About Variables

The word 'Variable' can refer to something that can potentially be known by measurement or calculation; a measurable. The measurement imposes a relative perspective ('relative to this'), and quantifies or qualitatively determines something about the object / phenomenon relative to something else, or object / phenomenon-observer relationship.

Variables can be placed into equations and there are such equations that represent relationships that have been identified by science. The equations obey the laws of mathematics and so variables can be expressed in terms of other variable components of them and can undergo mathematical operations. Knowledge can be about relationships, that can be represented as equations or algorithms. The variable that is measured in some way relates to (is correlated with) the measurement or observation *relationship* with the object or phenomenon under consideration, *that exists independently of the measurement made*.

It is important that there is clear differentiation between 'the material world', 'Object reality', that reality existing outside of the mind, and representations. The external reality *as it exists*, includes all the relations existing between the parts. The parts, of themselves, are be-ables (beables) rather than measurables; they are existing things in physical reality. It is necessary to have both beables and measurables in science. The beables are actual parts of physical reality, whereas the measurables are sample-able variables used to gain some cognition of the external world. Those sampled measurables allow construction of models and ideas about how that World / universe functions. Those samples, measurements are found by the relation between the object of interest and something else providing a 'relative to this' context.

'Variable' suffers from the same problem due to lack of differentiation as Object nouns. A variable can be the 'character' of a natural property, or behaviour, or relationship, that is unmeasured. 'Variable' also refers to the determined quantified measurement or determined singular qualitative state. One is an intrinsic part of external reality and the other is knowledge.

The lack of differentiation of variable category (into a part of external reality unmeasured or product of measurement), is similar to the problem of material object and the image of the object seen, (the product of processing of received electromagnetic radiation (EM signal) with a distinct profile of frequencies and intensities) both being called by the same object name.

The radiation transmitted from emitting or reflecting object to receiver is not just a uniform signal emitted from a singular object. The radiation profile that is being emitted varies with the location on the surface of the source, because of the material's chemistry, its distribution and variations in illumination. The observer will receive EM with a distinct spatial, and temporal origin profile, 'reflected' in the product that is generated.

The content of the signal transmitted from object to receiver can be regarded as information because a retina or photocell array (or other device) is able to convert the received energy frequencies and intensities into signals that can be incorporated into a product. From the 'point of view' of the emitter or any object or system incapable of turning the radiation into a product, it isn't information. However, to an object or system that can, it is potential information. Therefore, the boundary is abstract, one of 'viewpoint', even though those objects or systems don't have opinions. The EM radiation does not have a meaning *of itself*, it is just radiation.

The sensory information is nerve impulses, or electrical signals, originating from stimulation of receptors by EM signals emitted from the source. This means that signals emitted at different times can be amalgamated into a product (by human or device) that does not faithfully represent the dimensions of the material object at any one time. EM signals can also be received by photo sensitive devices and processed into products. This fact shows the argument provided is not based on human psychology or anatomy.

Cognition of time obtained from received signals is cognition of the product generated not source reality. How and when the signals are received largely determines how and when the product is generated. (There can also be effects on the product generated from *how* the processing has happened. For more on this see David Eagleman's work.⁴ For example, the apparent timing of perceived events relative to each other being modified.

Regarding differentiation of the variable category, into a part of unmeasured external reality or product of measurement: Since the saying "the map is not the territory " is well known and used, perhaps it would be good to have Terrain and Map variables, abbreviated to T-variable and M-variable. Think of the Terrain as Object reality, and a map of it observed reality.

Reference

Eagleman, D. (2011) on CHOICE (video) Retrieved from
<https://www.youtube.com/watch?v=MkANniH8XZE>
FQXi.org/conferences/talks/2011

Logic and truth values

There is a problem with applying the truth values [true or false] to relative perspectives. Different relations can produce contradictory statements that are both true from their own perspective but false from another perspective. *Examples*

Analogy: A two-sided jig saw (sandwiched between glass and each side seen by a different observer); There is a boat. A yes = true, B no = true. There is a cat. A no = true, B yes = true. There is a cat and a boat. {A, B} yes = true. |

The globe is spinning clockwise A yes = True, B no = true. The globe is spinning both clockwise and anti-clock wise {A, B} yes = True. |

From either side of a horizontal waveform: The wave is at the peak of its oscillation. A yes = true, B no (it's at its trough) = true. The waveform is at both peak and trough {A, B} yes = true. |

The aggregation of the relative perspectives can give a truth outcome for what seems an illogical statement. This is because we are used to thinking about characteristics / properties as belonging to the objects and phenomena observed / measured and not to the relations between the object and a reference (relative to this) viewpoint. The individual viewpoint that gives a true truth value is not regarded as partial but true.

However, despite seeming to be contradictory and raising suspicion of being counterfactual, that is what the amalgamation of different perspectives is; A more complete truth than the partial analysis. It only 'feels odd' because it is a different way of thinking about properties and variables.

The material Object universe, by the above reasoning, requires another kind of logic– the logic of aggregate (amalgamated but not added) viewpoints. It can be seen with that logic that even opposite, seemingly contradictory, truth statements can be aggregated into a larger truth. For full truth there needs to be not one impartial objective view but all relational (relative perspective) views. Basing evaluation of truth on the 'reliable cognitive process'¹³ comes to difficulties when the cognitive process itself is selective with the truth, i.e. only limited signals and results are obtained, that can be further reducing in their processing. It also combines evidence together that did not co-exist in the Source reality and the 'evidence' can be 'tampered with' (subject to distortions, interference and absorption).

From this reasoning, the unknowable Object (material) universe is the full truth as it is, all existent things and all relations between them, not partial. It's history, that no longer exists but is imaginable, the sequence of former configurations, *were* the full truth of all things in their time, unlike partial historical accounts and records that are derived from limited viewpoints.

With the spacetime continuum universe, 'The Creator' is redundant, since the completed job is done once at the theorized 'big bang' and subsequent 'inflation'. The Object universe is the active omnipotent, omnipresent creator, preserver and destroyer of all structures and patterns.

The Object universe is more akin to Heraclitus' river than Plato's perfect realm. It is the patterns and all the processes that are occurring, including the continual generation of potential sensory data. The continual change of the configuration of the Object universe, the universal pattern, might be likened to the flow of the Tao, (of Eastern philosophy particularly Taoism). Likening the ever changing pattern to the process of the underlying natural order, or way of existence. The framework of a continuously changing uni-temporal Object universe brings

physics closer to a number of theological ideas and overcomes many problems. The Object universe is the full (source) truth, electromagnetic radiation and the material universe itself; Truth, 'light' and world.

0 Editors of Encyclopaedia Britannica "Uncertainty principle" retrieved from <https://www.britannica.com/science/uncertainty-principle> on 22 May 2018

1 Example video Beau Lotto: "Deviate" | Talks at Google (Published on 20. 6. 2017)

URL=www.youtube.com/watch?v=hQUgGg9XzbQ&t=148s

2 Woodward, G. (19th Aug. 2017). "Is Quantum Physics Really Strange?", viXra.org.

<http://vixra.org/pdf/1708.0235v1.pdf>

3 Ichikawa, Jonathan Jenkins and Steup, Matthias, "The Analysis of Knowledge", *The Stanford Encyclopedia of Philosophy* (Fall 2017 Edition), Edward N. Zalta (ed.)

Absolute (complete) Object reality, counterfactual definiteness, the law of non-contradiction and context

As 'our' (individual human) perception, informed via our senses directly or by accessing the output of our singular devices, is definite, showing particular, singular identifiable states, we may be fooled into thinking that therefore that is what macroscopic reality itself is like. That is problematic. Prior to observation, without an observer's reference frame applied and no specification of when or where a measurement is to be made, the object is in an absolute unmeasured state. That is being all that it is, not any partial aspect: The whole truth. For to be assigned a definite state, observer viewpoint relative to the object, and/ or measurement method is needed.

Examples of absolute states without contradiction include both clockwise and anticlockwise spin; a surface that is simultaneously both concave and convex; a state of both heads and tails, simultaneously spinning up and spinning down. Any viewpoint of a source object gives a representation of a part of the topology of the 3D source object, part of the surface (usually), not the whole of the source object. Seen manifestations of objects have limited fixed states determined by measurement/ observation, and are partial representations of absolute Objects. The state observed by any singular observer is limited. As the sensory data, from which the seen reality is fabricated, is generated only from received EM signals. The received signals are a limited sub set of all of the radiation within the environment as selection is made, all of which has the potential to enable generation of sensory information pertaining to the source object.

Also, measurements condense data into a limited number of detectable outcomes. A coin's state at measurement may only be seen as heads or tails. The measurement method provides only one of those two outcomes nothing else.

A spinning object's state only as clockwise or anti-clockwise spin. The counterfactual is eliminated by the process of forming the Image reality, selecting EM potential sensory data, or making a measurement. This macroscopic Image reality is an impoverished representation of external source reality.

Consider: A concave/ convex cup is, in absolute truth, in Object reality, both simultaneously. It is when observation is made, that a particular 'viewpoint' is imposed and, it 'becomes' one or the other. It, the observed manifestation, is not the same 'it' as the material source, or the pre-selection potential sensory data, pertaining to the source, and distributed within the environment. It, the observed manifestation, is truly just one state, concave or convex, because the signal content to form the contradictory state cannot be received simultaneously. It is not and so does not form a part of the observer's emergent reality.

The emergent reality does not contain the counterfactually definite. That makes it partial truth formed from incomplete information, in contrast to the absolute truth contained within Object reality. This is a switch from thinking about the world in a way, that includes all possible outcomes, to looking at it in just one way.

A cup unseen in absolute space is both concave and convex, the potential sensory data in the environment encodes both concave and convex topology and a wave function representation of the superposition of states for the cup must allow for the two contradictory outcomes. Yet the emergent spacetime experienced reality of any singular observer, like any singular measurement, excludes the counterfactually definite.

The counterfactual possibilities are not within spacetime exterior to the observer. They are unseen within the potential sensory data distributed in space and possibly still part of the Object source of the data, both belonging to the Object reality facet of reality, the source side of the 'reality interface'.

An unobserved spinning coin in free fall does not have a recognizable state of orientation relative to the observer but can be thought of as all states, until the measurement method produces a fixed observable. The flux of a spinning coin in free fall; how, the way in which, it is moving in relation to its environmental context is inseparable from the substantial object. That is its full, true nature, how it relates to the Object universe, in contrast to any singular state assigned to it from a singular measurement or observer viewpoint and reference frame. That 'picture' of what is occurring is pertinent to the question of why systems can be probabilistic rather than fixed and certain prior to measurement.

Consider the unobserved free falling spinning coin object again. The object is in all indirectly observable states because there is no reference frame, making all frames equally valid. It is also in flux altering what would be observed from each reference frame, if applied, over foundational passage of time (sequential change of the Object universal configuration).

Although the evolution of its relations to the external environment is deterministic, if all variables are considered, without choosing and applying the observer's reference frame and selecting the potential sensory data that will give a known designated starting state, relative to the observer, the outcome of any later measurement cannot be predicted. There is no observation context for a singular determination. However, there is an alternative to choosing a starting state, as seen by a particular observer. That is considering the environmental context of the phenomenon; the relations to external surroundings that gives a context whereby all orientations and changes of orientation due to intrinsic motion are valid. That seems unusual because we are used to seeing limited fixed state manifestations with definite relative attributes and not used to considering the myriad of other ways in which the same source object might be perceived / considered via different manifestations of it. By considering all the information

not received /measurements not made, a collection of other possible states is acquired. All possible states could perhaps be thought of as similar to quantum physics eigenstates (the possible outcome states) that are reduced to the to one product measured. Information not received forms no part of the manifestation seen. This makes macroscopic physics a little less different from quantum physics.

The law of non-contradiction states: Contradictory statements cannot both be true, in the same sense, at the same time. The observer's Image reality is impoverished and *does* comply with the Law of non-contradiction. An unseen substantial object in Object reality, and a theoretical superposition in a quantum probability space, are conditions in which it can be argued that the law of classical logic called the Law of non-contradiction *does not* apply. The amalgamated or superposed 'contradictory' possible states prior to measurement are not generally described along with their own individual causal context which would allow the statements about the unmeasured to be taken as 'different senses'.

There has traditionally been the idea of a divide between the sub atomic and macroscopic scales.

This comes about as the result of the different ways in which humankind must interact with them. Primarily interacting with the macroscopic scale via our sense of sight and hence with the limited, fixed, definite state product of that sensory processing.

Object reality exists at all scales including the astronomic and sub atomic.

There is another divide which is between Object reality and Image reality. Object reality is what exists preceding all observed present representations of it. This can be said because experienced presents are fabricated from received EM signals (that have been emitted from objects) which are then processed into sensory

information and then perception and cognition. Those processes happen over foundational passage of time, (a sequence of change of the Object universe configuration). The duration of the signal transmission and processing may be extremely small when objects are in close proximity, nevertheless the speed of 'light' is finite, not infinite.

Within the Object reality is the EM radiation that has the potential to be formed into sensory data, processed to form image realities of former things and events. This is EM potential data source is spread within uni-temporal space, not spacetime. It is meaningless radiation until received and processed. The radiation and other 'potential sensory data' in the 'data pool' is not the spacetime continuum. A significant difference is its content can only be processed into Image reality products not substantial objects and events. It also does not include any potential data from events that have not yet occurred in substantial material reality.

True, absolute relations V relations within spacetime images

The question of whether there are spatial relations between objects at different times presumes that there can be Objects at different times. That is so for a spacetime model such as Block time. A uni-temporal Object universe precludes that possibility. Uni-temporal Now is only one extant time, in which objects wholly exist. That does not mean that Objects cannot be affected by the former action of other objects, and calculations made. Such as a boat rocked -Now by the wake from the earlier passing of another boat. The true, absolute relations are those between substantial things; individual objects of particulate matter, or such objects and parts of the EM medium of unknown constitution, within the same configuration of the Object universe.

The question of whether there are spatial relations between objects at different times requires differentiation of Image from Object reality because there can be apparent spatial relations between parts of an image that pertain to different times. The distances shown in the image could then be measured 'on the ground', giving a concrete measurement of an Image reality or could be estimated for astronomic images, giving the distance between corresponding source Objects; even though the EM radiation from which the different parts of the image is formed was not produced during the same configuration of the Object universe, i.e. not at the same time. The image is real but is also a distorted representation of what had existed. The measurement, even if concrete, only pertains to the Image reality in such circumstances.

Any experiment involving observation (using the sense of sight or sound or a device to be proxy for that visual or auditory system such as a camera) is using the product from 'sensory' data collection and processing. That might be emergent sound or images in the case of an organism being the observer. Or some other product in the case of a device collecting the data. There may be awareness of, or evidence of, *apparent* interactions of those images of objects, (which is not the same phenomenon as interaction of material objects).

On the accuracy of maps, related to physics modelling

As Relativity is generally understood, what is seen [the product from received EM radiation], is taken to be the external reality of objects in spacetime. This has happened because of a category error.

Measurements of seen images are muddled with measurements of material objects. The necessarily 'sense-able / detectable information' derived spacetime universe is taken to be THE reality, the universe. As spacetime *must be* the generated location of the seen product, **because of the way in which vision works** using received EM radiation, the foundational source of the seen 'image' is

not in spacetime along with the product. The train measured from a distance is not a material train.

Nothing in spacetime is a material object. (Analogies; the computer console is not inside the game being played: The book being read is not inside the story.) This category error confusing Map and Territory is also the cause of the paradoxes associated with Relativity. QM produces very good predictions. However it is not sufficient to consider the 'picture of quantum reality' produced from descriptions of what is being done mathematically, to be complete reality. That mistake would be a bit like taking the Harry Beck London underground maps to be complete reality, for accurately predicting the order of stations and line exchanges only occurring at marked junctions. The maps are designed for ease of use of the network, although the spatial journey of a passenger on the material train does not correspond to the spatial changes shown on the Harry Beck's 'Tube' map ⁵. The map represents some aspects of reality accurately; ordering of stations, and correctly indicated line junctions where passengers can switch lines.

The Harry Beck's maps are part of the collection of the London Transport Museum. The 1933 Harry Beck map, (pocket map) and the 1959 version are © TfL from the London Transport Museum collection. Referenced 1999/321 and 1984/51/608

The spatial distribution of the network, that is its correspondence to spatial geography, has been forfeited. It is spatially / geographically highly *inaccurate* in order to give simplicity of function, that is ease of use. It can be used for easy navigation of the network but not for planning a journey outside of it, meaning the locations of the stations in relation to each other on the map do not correspond to the geographical distribution of the stations in material reality or on ordinance survey maps.

The layout of the London Underground 'tube' maps has no doubt caused some traveller's confusion about actual distances travelled between marked stations. Research on this is published in a paper called 'Mind the Map': "Results show that the elasticity of the map distance is twice that of the travel time, which suggests that passengers often trust the tube map more than their own travel experience on deciding the "best" travel path. This is true even for the most experienced passengers using the system" Zhan Guo, (2011).

The map is constructed from information about the network and conveys that information accurately, but it does not fully correspond to the reality that is the underlying reason for it (i.e. the material 'tube train' rail network with a particular spatial distribution in material reality.) The relevance to physics is that this provides a refutation of the argument that a model with impressive predictive power must be accurately modelling reality because of that high predictive power. The map analogy shows that high predictive power can only be taken as an indication of some correspondence to reality not entire correspondence. It has been argued here, that it is possible for something to be highly accurate in some regards but also inaccurate in other regards, by example of the Harry Beck London Tube map. That demonstration was given as an analogy for quantum physics wave-function superposition models, that allow accurate prediction of outcome probabilities but probably do not accurately model what is occurring in Object reality.

References and sources

Guo, Z. (2011). Mind the map! The impact of transit maps on path choice in public transit. *Transportation Research Part A: Policy and Practice*. Vol. 45, (7), pp. 625-639.

Woodward, G. (19th Aug. 2017). "Is Quantum Physics Really Strange?", viXra.org. <http://vixra.org/pdf/1708.0235v1.pdf>

Harry Beck's Tube map. Transport for London. <https://tfl.gov.uk/corporate/about-tfl/cultureand-heritage/art-anddesign/harry-becks-tube-map>

Emergence

Biology can be looked at in a reductionist way as chemistry and the chemistry can be reduced to physics. The biology, chemistry and physics are dealing with different scales of the same phenomena. Reductionism, expecting answers from breaking systems down into their components, overlooks emergence from complexity and emergence from scale. What an organism or other complex system does isn't ultimately explicable by sub atomic particle interactions alone.

Though the energy for biochemical processes comes from the breaking of energy rich bonds (in ATP), which were formed during another (respiratory) biochemical process, that bond making and breaking could be considered at the sub atomic scale. Yet that does not explain life. Imagine two separate collections of the same type and quantity of ions. One group has a random arrangement, the other has a specific arrangement forming an enzyme. The enzyme group now has a catalytic function not possessed by the other group, despite them both containing the same type and quantity of ions. The catalytic functionality comes from the

shape and topology of the arrangement not merely the ions present. The function of the enzyme has not appeared from nothing, it is a consequence of the sequence of assembly of the protein molecule, that leads to it becoming packed into a particular shape due to the forces between the constituent particles. For production of the sequence the configuration of material reality, the Object universe, must change sequentially. That allows the protein assembly, with a necessary sequence of steps, to occur. (Imagine threading beads on a string.)

Organization and structure does not make sense without sequential time allowing ordered construction and ordered processes / function. When the steps in a biochemical process occur, in foundational Object reality, cannot be a matter of opinion. Each next step requires the preceding step. There is also no reason for cycles such as the Krebs citric acid cycle that provides ATP for biochemistry in a fully existent spacetime universe (as THE universe) where everything *is* without the necessity for processes to maintain existence / life. Emergence isn't just the emergence of a structure from the relations and interaction of smaller parts or behaviours of simpler entities but is something new (in its own right), that is not predictable from the individual parts alone.

Termite mound

How the temperature control properties of a termite mound have arisen, for example, cannot be ascertained from watching the behaviour of individual isolated termites; Or merely from the properties of the mud it is built from. But the complete mound and its properties are the result of behaviours of individual termites that built it and the mud and its properties, from which it is constructed.

Egg shell

The shell of a bird's egg is an emergent structure (no pun intended). The shape cannot be attributed to the calcium carbonate of the shell alone, from which it is constructed. Calcium carbonate from ground up oyster shell or Cuttle fish bone

may be input to a bird (organized structure) and a beautifully formed eggshell is output. (Birds eat small stones and shell which grinds up their food in their gizzard, they do not have teeth to do that.) That egg form would not occur without the complex bird organism. It is a product of the organization of the bird and sequential process of egg production, from ingestion of raw material to egg laying, not just self-assembly of atoms. Taking the egg shell on its own, ignoring bird behaviour, reproduction and anatomy, its form cannot be satisfactorily explained. There isn't a good reductionist explanation.

Enzyme catalysis

When an enzyme protein sequence is folded a shape results, that did not previously exist; and that enzyme shape has a function that the unfolded protein does not have. The physics that happens isn't following a set prescription of what must be done step by step, that is the same every time. The parts of the protein that must come together are the same but what happens in the environment is not fully controlled by the protein. The protein's folding isn't mere mechanical folding but involves not just the protein itself but interaction with the environment; in which it is buffeted until parts that will bind together come into proximity. So each folding event of a particular protein could play out somewhat differently but result in the same folded configuration. There will also be variation in the time taken to fold. There is some seeming randomness or complexity involved in the interaction with the environment which means it isn't just rote playing out of an instruction that is the same every time.

While the sequence of the unfolded protein's amino acids is important for folding, it isn't by itself the cause of the folding occurring. Perhaps "environment driven self assembly" is a useful descriptive phrase. As the energy for motion, which results in the finished folding, comes from interaction with molecules and ions in the environment. Most probably water molecules, as the inside of the cell is an

aqueous solution, and ions dissolved in it. As well as there being the effects of fields generated by charged particles that are part of the protein sequence. A function has been enabled that did not previously exist; An emergent function. That function changes the relationship of the protein sequence to the molecules or ions that are catalyzed by interaction with it. The topology is altered by folding and by binding with specific molecules or ions in the environment, enabling catalysis. Heat sensitivity of enzymes might be considered a new rule that applies to the complete folded enzyme, as heat can affect the shape, and thus ability to function. A process called denaturing of the enzyme.

Rules and Laws describing or mathematically representing relationships can be 'distilled' from observation of outcomes of particular circumstances. The distilled rules or Laws can then be used predictively, applied to similar circumstances. That does not mean nature has a rule book in some platonic realm (additional to material reality) from which it is able to receive instruction of what to do. The rules are a characterization of what happens not necessary instruction of what to do, so it can happen.

New rules can apply to higher levels of organization or complexity. A correctly folded enzyme has catalytic function whereas the unfolded or mis-folded or much deformed one does not. Rules pertaining to catalytic function apply to the correctly folded enzyme; such as temperature sensitivity affecting rate of catalysis, because of the effect of heat on its form. The rule does not apply the un-folded sequence because it does not work as a catalyst; Nor does it apply to the parts alone. This is very different from, for example, considering different scales within circulating air, or scales of circulating air. There is a logical reason for the difference which is difference in shape and organization not just scale. Some arrangements have shape and or topology that have functions because of that shape and or topology. Physics and chemistry that applies to the whole form does not necessarily apply to the constituents. A man made wing shape for

example has rules of physics associated with air flow that apply to it; that don't apply to the micro constituents within it. The whole can provide lift in appropriate circumstances. The new rule is not necessary for the shape to exist but is a result of what it is -and therefore often (but not exclusively) a reason for its manufacture. The wing shape could for example be a part of a static sculpture.

Some Inspiration

Ellis, G., F., R. 'Recognising Top-Down Causation' (Jul. 17. 2012), via <https://fqxi.org/community/forum/topic/1337>

Ellis, G., F., R., ' Wandering Towards a Goal: The Key Role of Biomolecules' (Feb. 17. 2017), via <https://fqxi.org/community/forum/topic/2769>

Dill, K., "The protein folding problem: a major conundrum of science": at TEDxSBU Published on Oct 22, 2013, Retrieved via <https://www.youtube.com/watch?v=zm-3kovWpNQ>

Thanks overall

Thanks to my sons, Alexander and Lawrence, for listening, for their feedback and suggestions, and for maintaining interest in this project over many years.

Thanks to Max Tegmark, most of all for his inspiring paper "Shut up and calculate" (2007).

Thanks also to FQXi.org for stimulating blog posts, articles, and competitions; as well as the means to share thoughts, develop ideas *and receive feedback on them*. I am grateful for all the kinds of help and encouragement I have received.