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Abstract

Consideration of the problem of ambiguous meaning of the word 'reality'. Clarifying what is being modeled by currently mainstream physics and highlighting what is missing. The way in which sensory awareness is driven by receipt of sensory stimuli is discussed. As well as showing that sensory stimuli exist in the environment, and can be detected (as objective evidence). A reason for the constant speed of 'light' in a vacuum is given. It is proposed that disturbance of the medium filling 'empty' space can account for magnetism, effects of electric fields, electrostatic forces, electromagnetism and effect of gravity on matter. Discussion relevant to General Relativity follow. Observer independent passage of time and non simultaneity are considered. Problems in Quantum physics are identified; the relativity ('seen this way') nature of measurement, measurement changing the condition of the measured, missing object permanence, vulnerability to illusion, the model of 'light' currently used functions to account for result but is probably not correct i.e. does not correspond to observer independent reality The alternative, singular divisible environmental wave and 'solid-like' particle, is given as an explanation of curious quantum behaviour. Finally hydrodynamic analogs are mentioned.

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The meanings of 'reality'

Some definitions of the word 'reality' from Oxford languages;

"the state of things as they actually exist, as opposed to an idealistic or notional idea of them."

"a thing that exists in fact, having previously only existed in one's mind."|

"PHILOSOPHY, existence that is absolute, self-sufficient, or objective, and not subject to human decisions or conventions."

"Einstein is often quoted as having said "**Reality is merely an illusion.**" So it is, if one considers the appearance of reality to be the totality of what is real. Though is reality just the appearance of things? Einstein also said "**The justification of the constructs, which represent "reality" for us, lies alone in their quality of making intelligible what is sensorily given.**" Taken to have meant obtained via the senses. Albert Einstein "reply to Criticisms" in Albert Einstein: Philosopher-Scientist, Vol. II, 1959 3."

[1]

Einstein's utterances should be borne in mind while considering *what is meant by 'reality' in physics*. It can be seen that there is a mismatch between Einstein's meaning of 'reality', relating to perception generated from sense given awareness, and those given (as examples of different meanings from a different way of thinking). The definitions above from Oxford languages which pertain to existence rather than the image or semblance of it.

Both observer independent existence and happening (Object reality), and sense given limited, relative, awareness (Image reality), need considering for a more complete understanding.

Einstein's Relativity work is incomplete because it does not consider the other meaning of reality to his own and is dealing with sense given awareness. The space-time continuum, though, is treated as if the objective source of reality. He does not seem to give a clear distinction of the materially existing and products of the senses. "PHILOSOPHY existence that is absolute, self-sufficient, or objective, and not subject to human decisions or conventions." Oxford languages

However sense given awareness is necessarily dependent on the sensory stimuli received. *Which* sensory stimuli are received depends on the viewpoint of the observer, (The observer could be device or organism. eg. camera or human.)

Sensory stimuli

The visual stimuli uniquely received by each observer are processed into a **relative**, limited perspective, usually surface appearance only, observation product. Prone to distortion due to disturbance of the sensory stimuli prior to receipt. Though given the same name, the product is not physically the same as the source of the sensory stimuli.

That sensory stimuli exist in the environment and are distinct from the source objects can be demonstrated by their detection. Eg a light meter or photo multiplier, microphone or odour detector could be used. That material objects are sources of sensory stimuli can be demonstrated. Comparison of the sensory stimuli detectable with and without an object source present, and in different states that inhibit or promote release of stimuli could be conducted; vibration of the object producing sound waves, heating producing increased release of electromagnetic waves, or facilitating release of odours.

Reason for the constant speed of 'light' in a vacuum

The word 'light' in apostrophes is used here to denote the observer independent process within the environment. As opposed to the observation product, produced by the observer, seen light, having the same common name

Einstein, using his intuition, proposed a constant speed of light in a vacuum. He does not explain what physically is happening to make that so.

'Light'(transmitted by electromagnetism) is only an existing thing when it is formed within the environment, being in part a particular environmental disturbance. It is not 'light' without it. Similarly, the electrons of a magnet are not themselves the magnetic field, Solid-like particles emitted and associated with 'light' are not themselves alone 'light'. They initiate the 'light' process, and enable detection of 'light' rather than being 'light' themselves. The 'light' exists until it is absorbed by a receiving material or object, when it ceases to be existing. The motion of the source prior to formation of the 'light' does not determine the speed of 'light' when it is in the environment. Likewise the speed of the receiver plays no part in the speed of the 'light' after receipt as the 'light' no longer exists. Only the travel in the environment between source and sink corresponds to existing 'light'. The composition, constituents and concentration, of the environment determines the speed when not in a vacuum. When in a vacuum the speed is constant. A material objects, such as a ball, exists before it is released, and after catching. Taking on the speed of the carrying objects, which will be added or subtracted (depending on same or opposite direction of motion, from the speed of the ball would have if the carriers were stationary relative to the observer.

Thought about the theory of General Relativity

Curvature of space-time can not be causal because material objects do not exist in space-time.

Minkowski space, a mathematical model designed to work with Einstein's theory of Special relativity uses 3D space and 1D time to give a 4 dimensional construct, with which a singular observer's present can be mapped.

The space time continuum is supposed to encompass relative perspectives of different observers, including different perception of the passage of time. Sensory experience of the present (observation products) seems to be conflated with material existence in general comprehension of the space-time continuum. However, existing material objects exist independently of observer's relative, limited perspectives (Object permanence is a clue). Existing objects are also independent of the 'time dimension'(relevant to observation products), due to light transmission delay, which is not relevant to them.

Foundational time

Observer independent passage of time, foundational time, concerning the material and fermion components of existence, is due to change in their pattern or configuration. The current pattern supersedes and subsumes the former. So there is only ever one pattern, which is neither divided between times nor spread out over different times. This is what uni-temporal means. It applies to the entire pattern of existence. Existing things are within the uni-temporal environment. Everything existing is in relation to the pattern of all existing at one time, one configuration of the entirety of existing material things and particles. Existing is not relative perception.

Rate of change within the pattern of existing things varies. Some change happens very quickly and some slowly, some intermediate. So there is no one relevant speed of time.

Rate of change within the pattern of existing things varies. Some change happens very quickly and some slowly, some intermediate. So there is no one relevant speed of time. Regular Time intervals such as light years, eons, years, hours, minutes, seconds, milliseconds and smaller, are useful for characterizing different scales of change.

Non simultaneity

It is not necessary that the material source, of sensory stimuli, is spread over persistent time or exists at different times or persists unchanged in time as well as in the present, for non simultaneity of same events, seen by different observers, to occur. Movement of one observer relative to another can alter the respective transmission time of each, for sensory stimuli received from the same event. This does not alter light speed. This is negligible when the speed is slow compared to light speed.

Non simultaneity of same events seen by different observers is due to different receipt of sensory data from same material source event. Processed into unique experienced or experience-able products/outcomes. The time dimension of space time observation products is due to the non instantaneous transmission of sensory stimuli used to generate observations, that is incorporated into the products. That time dimension is not a part of observer independent or measurement independent existence.

(Which, stepping outside of the SR and GR models and using what is known about vision instead, can be accounted for by differences in the time taken for relevant sensory stimuli to be transmitted to the observer from the material source, due to distance, and processing of them. Rather than being existing material time slices that can be experienced by observers taking different world lines I.e, travelling differently through the continuum.)

The unreality of the space time continuum

The continuum imagined constitutes all relative observer viewpoints, the outcomes or products. As such it is many maps, that show non simultaneity of the same events according to different observers. The maps are actually imaginary (possible futures, presents and pasts), having no physical existence, not material realms that can be visited. Avoiding the possibility of the grandfather paradox. Whether an event is considered to be past present or future depends on when (corresponding to what *near* clock time, the material clock being part of the configuration of the pattern of existing things) the sensory stimuli were, are, or will be received by the observer.

The continuum can be imagined, but is not actual. Instead non simultaneity of the same event according to different observers is due to differently received sensory stimuli generated by the event. The space-time continuum is not the territory in which objects and particles, exist and physics happens. The materially existing, unseen (no viewpoint), has absolute relation to everything else-existing in the local environment. Indirectly it may effect and be affected by other bodies, due to their influence on and by the shared environment.

Different disturbances of the environment

Local disturbance of the environment by a singular photon particle is the unit amount of change responsible for electromagnetic wave properties; including wave like behaviour at the double slit experiment apparatus, and the reason for what happens at half silvered mirrors leading to interference patterns when split beams are recombined. i.e. The wave disturbance but not the 'solid'-particle is divided allowing interference at recombination.

Response by the surrounding environment to charged particles is cause of electrostatic effects. Specific types of synchronized movement of electrons, produce electric and magnetic fields within the environment due to its disturbance. Flowing in the case of electricity associated with it's electric field. The electrons generating the magnetic field contained within a magnetic object or material. The disturbance of the environment allows objects in proximity to be effected.

Existence and Absolute movement of massive bodies through the environment causes an environmental response that is able to exert influence on other bodies. The environmental effect is very small, undetectable if present for sub atomic particles, increasing with mass. The other mentioned forces and the nuclear forces are stronger, which may mask a tiny gravitational force.

The connection between electromagnetism, electrostatic effects, electric and magnetic fields and gravity is that they all involve disturbance of the surrounding filled absolute, uni-temporal space.

Newton's thought on the issue

“That Gravity should be innate, inherent and essential to Matter so that one Body may act upon another at a Distance thro' a Vacuum, without the Mediation of any thing else, by and through which their Action and Force may be conveyed, from one to another, is to me so great an Absurdity, that I believe that no Man who has in philosophical Matters a competent Faculty of thinking, can ever fall into it. Gravity must be caused by an Agent acting constantly according to certain Laws; but whether this agent be material or immaterial is a question I have left to the consideration of my readers.”

(Newton,1693) Original letter from Isaac Newton to Richard Bentley[2]

Quantum physics and illusion

Quantum physics seems to imply that measured or observed states are ‘the’ reality coming to be, from a quasi real condition I.e. no prior singular actualized existence of individual particles presumed. It is taking what is obtained via the senses to be reality not accounting for effects due to prior objective existence independent of the senses. Therefore it is prey to illusion like an audience at a magic show; rabbits from seemingly empty hats, disappearing assistants and fire transformed to live, flying doves. All achieved by keeping the audience unaware of what exists unseen. With no sensory stimuli from such things reaching the audience observers, by concealment or use of a carefully placed mirror, or mirrors, the unknown but existing does not allow formation of observation products, providing knowledge of them. Appearance/detection is not the coming into existence of an object from non or quasi existence but production, via the senses of a new observation product.

Not accounting for the effect on outcomes of the absolute orientation, (of the existing singular particles forming a pair, resulting from the pair creation) leads to the need to explain correlation * of pairs given same or opposite Stern Gerlach apparatus or polarizer orientation tests. Given that measurement outcomes ought to be random, with no reason to agree on which random outcome to take on. The idea of entanglement has been used to explain that. Entanglement may be an attempted explanation of an illusion due to lack of information. (*or anticorrelation, depending on how the particle pairs are produced).

Object permanence

Infants develop an understanding of object permanence, that objects obscured from view continue to exist, at around 8 to 9 months, according to an experimental method developed by Jean Piaget , involving hiding a toy under a blanket and seeing if the child still seeks it (as if it knows its still existing and therefore find able) when hidden from view, showing he/she has a mental image of it. There is evidence that object permanence occurs earlier than Piaget claimed. Bower and Wishart (1972) used a lab experiment to study infants between 1 – 4 months old., using a different method , Saul Mcleod, PhD, update June 16, 2023 [a, b]

There is an absence of presumed object permanence in Quantum Mechanics. Correlated Outcomes obtained by experiments, using created particle pairs, are explicable by the unseen but likely definite absolute relation between created physical entity, particle pairs, prior to measurement, having effect i.e. existing prior to the creation of new relative, limited measurement/ observation products. Whereas in Quantum Mechanics, there being no singular outcome, no relation between particles is assumed. This makes ‘entanglement’ superfluous. Particles are not *choosing* the outcome at measurement to coordinate their results.

Relativity of measurement

Untested, there is no definite spin state as the 'seen this way, relative perspective, has not been decided and applied. The particle exists and is behaving as it does, though in absolute space, as a part of the singular pattern of existence, that does not have a singular viewpoint. So it is not true that it has a singular (relative) spin in 3d giving immediate (spooky) correlation. Instead, the same relative perspective is instantly applied to both, when choice of same measurement orientation is chosen. We need not assume that having pre existing states is the macroscopic norm. We are just accustomed to a having a relative perspective of objects or imagining a relative perspective applying to a physics scenario. We assume 3D space is where things happen but it is actually absolute space. Any possible viewpoint could be applied giving a different but equally valid state of the observed/measured or even many seemingly contradictory states-each being valid for their own context. This is not many worlds but many possible perspectives. Prior to choosing a singular perspective to apply.

Relativity applies, There really is not one correct or true state description obtainable but the state description obtained for an object or particle depends upon the viewpoint used to obtain it, the 'seen like this; proviso that affixes the outcome to the context in which it was obtained. it is a relative product that can be imagined in 3d product space or a mathematical space but that is not where the particle, an actual physical entity exists.

Consider existence of something, such as the chemical pigment of an ordinary sock, (not iridescent), that makes it appear red, 'looking at it a different way does not alter the pigment structure. The frequency of light it emits is observer independent. (Hue and shade seen may vary slightly according to position , proximity of other pigmented objects, lighting and individual differences (eg. in photo-receptors and processing of the input of different observers.) However, whether a coin is called heads or called tails, the method used to provide the noticed or recorded orientation of the coin faces relative to the observer matters.

Relevant to the outcome description. 'Flipping' a coin after it has been caught as it falls, method 2 reverses the outcome from just opening palm after catching the coin, method 1. A third method could be to just letting the coin fall to the floor or table top. Methods 1 and 2 are anti-correlated. Carrying out the reveal of method 1 followed by the reveal of method 2 (i.e. catch, reveal with open palm, flip reveal on back of hand), the outcome is opposite. Method 3 outcome is not correlated or anti correlated to method 1 or 2. Which method then outputs the correct description of the coins state (rhetorical)? The output state is a consequence of the specific interaction with it, not just the inherent nature of the coin. The 3 orientations of detector, when used can be thought of as 3 viewpoints. Each gives an outcome that describes the binary feature investigated as it (most closely) seems from that 'way of 'looking'. To just think of different polarizer or Stern Gerlach apparatus angles as different viewpoints is not enough, the term 'viewpoint' does not really capture what is going on. Its more like 'conclusion' based on received output. The apparatus isn't answering questions about the inherent characteristic of the input. It is producing an output that is different from it. The question; 'what do we get out when; looked at; this way?' is more appropriate. A macroscopic analogy is using 3 different light filters to look at white 'light 'input received by camera detectors beyond the filters. The cameras do not describe the white light input only the different colours of output light. All are correct in their conclusion according to their particular filter used.

Measurement changing the condition of the measured

Polarizers and Stern Gerlach apparatus and 'light' filters can be thought of as very simple reality interfaces. Receiving the input and changing it to a different output. So we are looking at the product

not the raw input. Measurement is not the correct term, the polarizers and the Stern Gerlach apparatus, it is obtaining a result so 'conclusion' could be considered an appropriate description, as conclusions come after results but 'modifying intervention' is closer in meaning.

Some basic assumptions about Objective reality do need to be relinquished, such as 3D space and a real dimension of time. 3D space is the relative observation or measurement product space, not where the material object (not as identified by any one singular relative perspective), exists. There is foundational passage of time because the pattern of all that is existing Now changes to a new pattern.

Other examples where existence independent of the senses can explain results obtained Unseen divisible waves, (as well as 'solid '-like particles)*, inferred by the double slit experiment. Thomas Young 1801 carried out the double slit experiment using two beams of sunlight. The banded interference pattern result indicating wave behaviour had occurred prior to the detected effect produced on the screen. This led to acceptance of the wave theory of light, that had already been proposed by dutch astronomer, mathematician and physicist Christiaan Huygens (John Herivel, Britannica) whereas Newton had proposed a particle nature of 'light'. [5]

* It is possible to use single particles for this experiment. Particles passing through a double-slit apparatus one at a time results in single 'hits' appearing on the screen. An interference pattern emerges when the 'hits' are allowed to build up over time.

Versions of the experiment having detectors at the slits show that each detected photon passes through one slit (like a classical particle), and not through both slits (like a wave). However, such experiments demonstrate that the interference pattern does not happen, if which slit the particle passes through is detected. (Wikipedia double slit experiment [6]). It is not unreasonable to presume that modification of the apparatus alters the result by creating a situation where a new interaction with constituents within the experiment is introduced, changing the behaviour of them. Eg. Using polarizers to mark which path a photon took, alters the photon trajectory so that interference can't be detected.

Results of experiments involving half silvered mirrors or beam splitters, such as use of The Mach–Zehnder interferometer apparatus are explicable with an unseen, undetectable wave component that is divisible and the divided parts able to travel independently. A single detector obstruction prevents the separated wave taking two paths and being able to interfere when reunited, as it does when allowed to do so. Information about and diagram of the Mach–Zehnder interferometer, can be found at Physicsopenlabs [7]

Even “The Elitzur–Vaidman bomb-tester thought experiment (Devised in 1993) and subsequent tests results are explicable with the hypothesis of a divisible wave and particle component. A discussion of it can be found at Physics 1, by MIT, [8]

Hydrodynamic analogs of quantum behaviour

Hydrodynamic analogs of quantum behaviour have been developed [9]. They use droplets bouncing on a bed of vibrating oil. Similarity to the quantum behaviours of "particle diffraction, quantum tunneling, quantized orbits, the Zeeman Effect, and the quantum corral"[10] have been seen. Hydrodynamic analog of entanglement has not been seen probably because entanglement it is illusory not a physical reality.

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