

NATURE OF TIME

[According to 'MATTER (Re-examined)']
Edited version of article published at <http://fqxi.org/community/forum/topic/273>

Nainan K. Varghese, matterdoc@gmail.com
<http://www.matterdoc.info>

Abstract: Time is a functional entity, derived from fundamental property of basic 3D matter-particles (photons) to move at a constant linear speed with respect to surrounding universal medium. 3D matter has no ability to act or move. It is the surrounding (all-encompassing) universal medium, which moves basic 3D matter-particles at the highest possible linear speed. Unit of time is related to interval required by a photon to traverse definite extent of universal medium in space. Relating various activities about 3D matter-bodies to time helps us to rationalise in terms of cause and effect relations. Due to its lack of physical form, time can neither expand nor contract nor flow in any direction.

Keywords: Time, photon, 3D matter, quantum of matter, 2D energy-field, universal medium.

Introduction:

'MATTER (Re-examined)' describes an alternative concept, based on only one assumption on existence of matter and only one type of postulated (derived from original assumption) matter-particles – the quanta of matter. Quanta of matter are single dimensional, unstructured matter-particles, which form 2D latticework-structures, called 2D energy-fields, in all possible planes in space to create a universal medium. Universal medium fills the entire space, outside basic 3D matter-particles. 2D energy-fields, inherently under compression, tend to maintain their homogeneity and serenity. During a local breakdown that produces a gap in their latticework structures, 2D energy-fields tend to ingress towards the gap to fill it and restore serenity. If a real entity is present in the gap, actions by 2D energy-fields apply inward pressure on them. This inward action by universal medium is gravitation. Local breakdown of universal medium may release many quanta of matter from their latticework-structures, to be free in space. Gravitational actions, by surrounding universal medium, gather free quanta of matter to produce 'disturbances'. Depending on the size of a disturbance, gravitational action may compress quanta of matter in disturbance into their 3D status and create 3D matter. Due to tendency to attain serenity, 2D energy-fields expel 3D matter created in them from within their structures. Since, 2D energy-fields are

everywhere, this expulsion continues as long as the 3D matter-particle is in existence. Linear speed of the 3D matter-particle, due to expulsion from 2D energy-fields, is the highest possible linear speed that can be achieved without further damaging 2D energy-fields. Universal medium around the ejected 3D matter-particle maintain sufficient distortions in it to sustain the particle's linear speed by inertial actions. Ejected 3D matter-particle and distortions in surrounding universal medium, together, constitute a photon (corpuscle of light or similar radiations). Direct actions by universal medium on 3D matter-core of photons, in this concept, do away with illogical assumption of 'action at a distance through empty space'.

Depending on the nature of universal medium in any region of space, highest possible linear speed of a photon is constant and this makes the speed of light a critical constant. 3D matter-core of all photons are disc shaped (segmented-spherical) and of same radial sizes. 3D matter-core of each photon spins about one of its diameters at an angular speed proportional to its 3D matter-content. Attempt to reduce photon's linear speed reduces its 3D matter-content (frequency), rather than reducing its linear speed. Attempt to increase photon's linear speed increases its matter content (frequency), rather than increasing its linear speed. This keeps linear speed of a photon constant with respect to surrounding 2D energy-fields (universal medium).

Compatible photons form as binary unions to create elementary particles, which in turn, form fundamental particles, atoms and other macro bodies, found in nature. All conclusions expressed in this article are from the 'MATTER (Re-examined)' [1]. For details, kindly refer to same.

Fundamental measurements:

Matter and its (apparent) interactions dominate our world. Matter provides a sense of reality to nature and our existence. In order to understand matter-bodies and their (apparent) interactions, as rational beings, we need to relate one matter-body to others and relate a matter-body in one state to the same matter-body in a different state. This can be done only by comparison between different bodies or the same body in different states. Dimensional measurements are formulated for this reason. To define a dimensional measurement, we need to have a reference. Nearer to an absolute measurement the reference is, better is the accuracy of dimensional measurement system defined.

A matter-particle (or a matter-body) has only two types of basic dimensional measurements. One type of measurement is of its matter-content (quantity of substance). Since no references are available (to compare with), we are unable to formulate a dimensional measurement system for direct measurement of matter-content of a matter-body. Instead, we are compelled to represent matter-content of a matter-body by indirect means, related to known or derived references from other dimensional measurement systems. Thus, we do not have fundamental measurements, to directly describe matter-content of a matter-body.

Second type of dimensional measurement of matter-bodies is the relation between different matter-bodies or between different parts of the same matter-body in space, represented by distance or separation between them. In order to formulate a dimensional measurement system for this relation, we presume to have a reference. It is generally understood that displacement (linear speed) of light in space keeps (almost) a constant speed. In order to make this as a reference, useful to define distance, a functional entity – time – is introduced to represent equal intervals of changes in physical properties of certain 3D matter-bodies. We can measure distance traveled by light in a unit interval of certain physical changes (unit time). This distance, which is believed to be a constant, is used by us to define or relate our measurements of distance in space. Any other reference, which will provide similar or better convenience, may also be used to define distance. Distance is the spatial relation between locations of 3D matter-bodies (or one part of a matter-body to another) in space.

Motion:

One of the most fundamental properties of a photon is its motion at constant linear velocity with respect to surrounding universal medium. [Since spin speed (or frequency) of a photon is directly related to its 3D matter-content, it is not consider in this article]. In fact, a photon's 3D matter-core exists in stable state only because of its motion at constant linear velocity. By this inherent property, a stable

photon maintains its velocity at a critical constant value. Velocity of a photon is with respect to 2D energy-fields (universal medium) around its 3D matter-core. Inertial property of universal medium in the region, where photon is present at any instant, moves the photon at its critical constant velocity. It is an obligation of universal medium to maintain velocity of a photon at the critical level. Hence, universal medium offer required effort continuously to sustain linear velocity of photon at a constant level. Although, here, motions are directly assigned to photon, its core being a 3D matter-particle, it is incapable of any actions or movements on its own. It is the inertial actions of surrounding universal medium, which move the photon.

Interactions between a photon's 3D matter-core, in its unstable condition, and surrounding universal medium produce photon's linear motion. Once a photon has attained stability, this interaction is not present at the same scale any more. Photon's 3D matter-core is carried forward only by inertial actions of universal medium, which are limited to immediate surrounding of photon's 3D matter-core. Interactions between a stable photon and universal medium are the result of the inherent tendency of universal medium to remain homogeneous and isotropic. Universal medium causes ejection of a disturbance, out of itself. Universal medium moulds a disturbance into 3D matter-core of appropriate shape and move it at highest possible (and hence constant) linear velocity to transform it into a photon. By doing so, universal medium on a larger scale, regains its serenity.

No 3D matter-body (photon) has continuous existence in any one 2D energy-field. It is continuously ejected out of 2D energy-fields of its existence, at any instant. Since universal medium is everywhere, 3D matter-cores of photons can never escape this ejection. In nature (in our 3D world), all real matter is in the form of photons. There are no basic 3D matter-particles larger or smaller than photons. Photons vary in their 3D matter-contents, as indicated by their frequency. Radial sizes of all photons are similar. Photons, in various combinations, form all other 3D matter-particles and macro bodies, we observe in nature.

Motion of a real body is necessarily accompanied by its displacement in space. In 3D spatial system, magnitude of displacement is measured with respect to three mutually perpendicular co-ordinate planes. To comprehend displacement of a real body, it is necessary to compare its location at any instant, with an outside reference. Since the same 3D matter-body cannot exist simultaneously in two places, there should be an interval between its existence in one place and its presence in another place, after its displacement. The 3D matter-body can be in the second location, only after being at its first location. When other changes in a 3D matter body are considered, interval is between two states of the same 3D matter-body. A 3D matter-body cannot be in two identical states simultaneously. One state has to precede and another state has to follow. Likewise, all actions have their causes preceding them. Interval between two states of a 3D matter-body produces rationality of its continuous existence. Cause and effect relation of all physical phenomena necessitates sequential operations. Hence, there is an interval (however small it may be) between two states or two phenomena of 3D matter-bodies. This interval is required for cause to produce effect or for first phenomenon to produce second phenomenon, which depends on the result of first phenomenon. Unless first phenomenon produces certain result, second phenomenon cannot take place.

These phenomena are real. There is nothing else between them. Interval between the phenomena is only a functional entity. It has no real existence. Gap between the phenomena is understood by rational beings, who observe many other actions being taking place in outside world, as an interval. If the first phenomenon culminates in a particular result, second phenomenon has to follow the first. Interval between them does not affect nature of the first or second phenomena. On the contrary, it is the interval, which depends on development of second phenomenon after completion of first phenomenon. That is, unless second phenomenon has developed (however late or far it may be) we do not recognize the interval. Interval comes into existence only when second phenomenon has developed after first phenomenon. Hence, the interval has absolutely no control over either of phenomena or their results.

Interval between two phenomena depends on (or it is controlled by) relation between them. That is, if interval is larger for first phenomenon to produce a particular result to commence second

phenomenon, first phenomenon can be considered to operate for longer interval (or if second phenomenon takes place, a long time after first phenomenon, interval between them may be considered longer). Physical phenomena develop and control interval between them. Physical phenomena are the apparent interactions between 3D matter-bodies in all their related forms. Real interactions take place between each of the 3D matter-bodies and universal medium, separately. Interval between two phenomena has no control over either of the phenomena.

Time:

To represent interval between two phenomena, a functional entity called 'time' is used. Time has no real existence. Time is a functional entity that has neither objective reality nor positive existence in space and hence it has no tangible existence and no direction. It is purely a scalar measurement. It is created by rational beings to understand cause and effect relations between different states of a 3D matter-body. In order to have a reference for a 3D matter-body's motions, they are related to linear motions of a stable photon (in free space). What is being considered is the (rate of) number of 2D energy-fields traversed by a stable photon at its critical state of linear motion during equal intervals. Therefore, (unit of) time is the interval elapsed for a stable photon's displacement in universal medium from one reference point to another reference point, with definite number of latticework-squares of 2D energy-field between them.

Because of its functional property, time cannot be considered as a fundamental dimension in any spatial dimensional system. It comes into existence only when there is motion and because of the motion. It qualifies an action or a change of state. It does not describe (distance in) space or 3D matter-content. As soon as the first 3D matter-particle was created, due to its inherent nature of motion, a functional property of time (that has no tangible existence) also came into existence for rational beings like us. Scale and measurement of time is always related to motion or change of state of 3D matter-bodies. Hence, time should be considered as a character of 3D matter rather than a dimension of space. In some mathematical (analytical) solutions, time is also used with other fundamental dimensions to describe (history of) events in space. This has led to an erroneous belief that time is a fundamental dimension. Thus, time has come to be regarded by many, as fourth dimension (of space).

Whichever method we use to estimate time and its units of measurement, we are basically, comparing motion of a photon in universal medium and motion of another macro body in 3D space. Second, the unit of time, is presently defined as "*duration of (certain) number of periods of the radiation corresponding to the transition between the two hyper fine energy levels in the ground state of caesium-133 atom*". This refers to frequency of photons radiated under defined conditions. In order to produce photons of this particular frequency, constituent photons of atom have to discard quanta of matter at certain rate, into universal medium. This, in turn, depends on speed variations of constituent photons of the atom. In other words, frequency of photons, radiated by cesium-133 atom under defined conditions, depends directly on movement and variations in speed of constituent photons of the atom. Steady frequency of radiated photon indicates steady speed variations of atom's constituent photons.

Stable photons, in space, move in linear directions. However, when photons (in their unstable state) are forming elementary particles and higher forms of 3D matter-bodies, they move at constant critical linear speed in circular paths within 3D matter-particles, formed by them. Normally, larger 3D matter-particles or macro bodies (formed by unstable photons) may move as required by external efforts, without affecting independent motions of their constituent photons. It is this motion of a macro body, as a whole body, which is compared with linear motion of a stable photon in free space.

Human beings (and up to an extent, many other living beings) have ability to think and deduce rationally. To develop this rationality, they are trained throughout their life to think in terms of cause and effect. Every effect has to have a preceding cause or an action follows a cause. This sequential rationalization creates a sense of past, present and future in all our thinking. This has created an apparent direction and an arrow of time for us. Our training is so thorough, that we refuse to consider anything else, which does not exhibit this sequential relation (e.g. instincts) as reasonable or rational. In our rational thinking, the time appears to be very real that we have no hesitation to call the time, a real entity and a fundamental dimension.

Variation in the scale of time:

Time is a convenience created for us and by us to understand (apparent) interactions between 3D matter-bodies or their states, rationally. In our sense, functional dimension of time came into being when first photon was created (if there was such an action) in nature. Time will continue to be in existence as long as there are 3D matter-bodies (photons) and rational-thinking beings like us exist in nature. Time will cease to be in existence when there is a lack of any of these two. Since time depends on existence of photons and existence of rational beings, either of them can control scale of measurement of time. Variation in velocity of a photon, in relation to reference points in 3D world, or thinking of rational beings can control or regulate flow of time. Therefore, it is up to us, the rational beings, to assign meanings to 'time'. Time will fulfill functions assigned to it. Time, being only a functional entity, has no physical form. An entity without physical form cannot contract, expand, flow or deform in any other way.

We may say that a photon – radiation of matter – always maintains its linear velocity (this can be in linear or curved paths) at a constant critical value with respect to universal medium. Actually, it is the universal medium, which is coercing a photon to move at the highest possible linear velocity with respect to itself. Just because this linear velocity is the highest, universal medium can produce, it happens to be a critical constant under steady conditions. If conditions of universal medium in a region of space vary, criticality of highest linear velocity also will vary. For a different state of universal medium, in another region of space, magnitude of constant linear velocity of a photon (the light) with respect to other 3D matter-bodies may be different.

Relative time:

Units of distance-measurements, in any spatial dimensional system, are based on motion or linear speed of photons. Therefore, a change in linear speed of photon changes units of distance also, in that spatial dimensional system. In the same region of space, corresponding changes in photon's linear speed and scale of distance keep unit of time, a constant. Based on this constancy of linear velocity of light (stable photon) in a region of space, where we live, we can set our standard of time. Interval required for a photon to move through a definite quantity (space occupied by functional thickness of 2D energy-fields) of quanta of matter in 2D energy-fields is set as a standard unit of time. While doing so, we did not consider any of our aspects as observers or state of our surroundings. Instead, it is assumed that observer and his surroundings are static with respect to universal medium. Universal medium is fluid in nature. Depending on macro bodies, present in the region, its density may vary from place to place and motion of photon is related to these variable densities of universal medium. Therefore, to assess absolute velocity of a photon – radiation of matter – state of observer and his surroundings with respect to universal medium also should be taken into consideration. An estimate of linear velocity of radiation (light), without considering these factors, is only of apparent or relative value. Each observer, under different states of motion, has his own estimate of relative time. To estimate absolute time: motion of photon, motion of observer, movements of (distortions in) surrounding universal medium and state of surrounding universal medium are to be taken in to consideration.

To estimate relative time, linear motion of a stable photon is considered with respect to observer. Depending on motion of observer and state of universal medium, linear velocity of radiation appears to be faster or slower than estimated relative linear velocity, but never faster than absolute linear velocity of radiation. Since velocity is a relation between displacement and time, we can take either unit of displacement or unit of time to be a constant and let the other vary. In some cases (like transmission of light through a denser medium of a transparent macro body), we take unit of time as constant and let unit of displacement vary. Thus, we find that light travels slower in a denser medium of transparent macro body. However, in some other cases (like when comparing very large velocities or passages of light near a very large macro body), we take unit of displacement as constant and let unit of time as a variable. Thus, we see that time moves faster or slower for observers in motion or near very large macro bodies. It appears that the general rule, followed at present, is that: if observer is outside transparent medium, linear velocity of radiation is variable within the medium and unit of time is considered a constant. If observer is inside transparent medium, linear velocity of radiation is constant within the medium and

unit of time is considered variable. This is not scientific thinking.

In every day life, we consider unit (or rate of flow) of time as a constant so that light appears to be traveling slower in a denser transparent medium and faster in a rarer transparent medium. Whatever is the case, linear velocity of light with respect to universal medium never varies. If universal medium in a region can be made very dense, linear velocity of light in it may appear to be very slow to an outside observer, may be even few kilometres per second and thereby creating an illusion that the time almost stands still. For another observer, witnessing the same action from another region of universal medium of different density, time flows at a different rate.

Arrow of time:

Time is always estimated in relation to displacement of some or the other 3D matter-body or 3D matter-particle. Therefore, time itself is not a real quantity but it is only a functional quantity to indicate a relation. It describes a function or a relation between certain action with respect to an action of a reference macro body or 3D matter-particle. Hence, it is not correct to assign a direction to time. However, due to sequential actions of cause and effect, we (the rational beings) feel that time flows in one direction, from past through present to future. This gives us a false impression of direction of time and corresponding arrow of time in the direction of future. Arrow of time may be compared with arrows of other emotions. When one person loves another, arrow of love is directed from first person to second person.

Conclusion:

Time is a functional entity, conceived by us to help us to relate different phenomena. Since time does not describe space and is not tangible, it should not be included with fundamental dimensions as one of them. When, we are supposed to measure time, we are actually measuring a regular motion or some other similar physical activity of certain 3D matter-bodies and assigning specific meaning to such motions in terms of 'time'. Since time has no physical form, it cannot contract, expand or flow in any direction. Time is included with fundamental dimensions to define character or history of certain events, in some theoretical approaches, only for ease of analytical solutions of mathematical equations. This does not mean that time has become or is regarded as a fundamental dimension, as many happens to think.

Reference:

- [1] Nainan K. Varghese, *MATTER (Re-examined)*, (2013). <https://www.createspace.com/4415292> , <https://www.createspace.com/4415297>
- [2] Nainan. K. Varghese, ARTICLES, <http://www.matterdoc.info>

* * * * *