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Space and Time

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Space and time are two elusive concepts that are still subject to intense discussions. According to **Immanuel Kant** (1724-1804) space and time are two "***apriori***" concepts that are 'given' or exist from birth. Time and space are both physical as well as non-physical entities because we can measure space and time but we also have an internal feeling of distance and duration. People in the past did not have a wrist watch to measure time, and defined both space as well as time in terms of an action.

For example, if you ask a villager "how far is the next village?" a typical answer would be "the time it takes to smoke a cigarette". Here the abstract knowledge of space and time are reduced to a concrete human action. For villagers time is measured in terms of seasons. Hours and minutes have no meaning and are not so important in their daily life.

For citizens time is of major importance. We have to catch a train or a plane. We have to be on time because these vehicles have a given schedule and leave 'on time'. If we have an appointment we have to be 'on time' and working hours are also limited with time. Modern city life is very much time dependent.

When we talk of time we implicitly assume that there is a beginning and an end; because any duration starts at a certain time and ends at another certain time. This is how motion can be defined in classical physics. Speed is defined as $v = x/t$ distance over time, which means that in order to know how fast an object move we must measure the distance covered in a certain lapse of time. In other words; if there is no motion, either distance must be zero or time must be infinite. In fact, in order to measure distance one needs two points. For an isolated single point *distance* is zero and *motion* is meaningless, because there is no other reference point to measure and compare. For an object at rest time becomes infinite.

But can there be absolute 'rest'? Everything in the universe is in motion. Our world is rotating around itself and around the sun. The solar system is rotating around the **Milkyway** galaxy and all galaxies are also in constant motion. Thus, the concept of rest is an assumption deduced from our daily experiences.

Modern physics defines a mathematical manifold called "**space-time**" and accepts that space-time is a 4-dimentional structure containing 3 space and 1 time dimensions. But such a 4-dimensional structure cannot be visualized. It is as if space itself is in constant motion, but a motion that is iterative and self-referential. The simplest way to visualize such a manifold is to consider the Klein bottle (See: article 3. **A Different Universe**).

Such a 4-dimensional universe has no "beginning" and no "end". Equivalently it has no "inside" and no "outside". The universe becomes a unified entity which is **Self-referential**

and **Auto-correlated**. In Astrophysics, autocorrelation is used to study and characterize the spatial distribution of galaxies in the Universe.

Systems or entities that are correlated "from the beginning" continue to be correlated independent of space and time. All interactions happen at a given instant or moment of measurement. Thus, the concept of time "in reality" is always an ***instantaneous moment***. The past is gone and the future is not here yet, it is an expectation. The auto-correlated reality is what we experience as "here" and "now". For auto-correlated objects time and space do not exist. There is no information that travels at the speed of light between the correlated objects. It is only when we try to explain such a phenomenon that we need such concepts that we call "space" and "time".

If space and time are mental constructs, the concept of "**beginning**" becomes relative and elusive. Any starting point can be defined as being 'the beginning'. For example, if you have a beam of laser light and you split it into two beams, by using a semi transparent mirror, the two beams will become correlated. They will create an interference pattern when they meet again. The same happens in the double-slit experiment. For such correlated systems the beginning is not the initial point of ejection of the beam, but any point after the split happened. This is because we are unable to **observe exactly** the split that occurred in space and time.

Accepting that the universe had a beginning is the consequence of the classical Newtonian physics that accepts time as a linear fundamental variable. The universe expands and contracts without any beginning, and therefore, will not have any end.
We "think" that objects move in space and time flows from past to future, just because we are weakly correlated to the whole. All material objects that we observe are "somehow" correlated as a whole. But it is a very weak correlation. That is why we think that objects are independent from each other. In fact we are "all one" and the whole universe is "one object". Even calling it "object" is wrong. We should say "**the universe is an auto-correlated energy field**".

Such an understanding to nature and the universe can be defined as a ***Holistic Approach***. The Holistic approach claims that complex systems cannot be understood by splitting, dividing and reducing them to their fundamental constituents. Even the concept of "fundamental particle" needs to be correctly defined. This is because we keep on finding a nest of recursive and intertwined entities. Natural systems are chaotic, fractal and complex.

Ecology is the leading main proponent of holism, and tries to include in its understanding the biological, chemical, physical and economical conditions of a given geographic area. All living creatures of a certain eco system are inter-dependent and correlated. Thus, the eco system is an Auto-correlated self referential and recursive, holistic structure.

Scientific holism holds that the behavior of a system is inherently non-deterministic and cannot be predicted exactly using linear and continuous mathematical methods. Chaotic systems can produce surprisingly unexpected behavior, and a full simulation is almost impossible. This is why positive science is still unable to fully understand how the brain functions. It is now established that the brain functions as a unified whole and that brain-waves travel instantaneously, independent of time. Complexity theory (also called "science of complexity"), is a contemporary approach to nature and considers that emergent instantaneous properties are inherently complex and chaotic. We have to admit that the universe is non-deterministic and that Holistic approaches towards understanding complex systems are the opposite of ***reductive deterministic methods***.