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Different Perspectives of Time

Asit Chakrabarti

Just think, how much worried we are always regarding time! About its wastage, proper uses, doing routine works at proper times, what is the time now, at what time did that occur, etc, etc. But have we thought ever, actually what time itself is? Whenever we think of time, the pictures of ticking of the hands of a clock or the digital display on a watch appear before us. If we think closely, it becomes clear that those are not times, but measurements of something we call time. Time is some sort of experience we feel between two successive events. This experience is measured by similar type of an experience between two periodic natural events which is divided into years, hours, etc down to atto-seconds (10^{-18} sec). The natural event may be some type of extremely regular motions, oscillations, or excitations. Thousands of years ago this regular incident was earth's rotation round the sun or around its own axis. Subsequently it was modified to radiation emitted due to electron transition between orbits of caesium atom yielding measurement accuracy to 10^{-10} sec. Now we can measure a time of few atto-seconds only. 2023 Nobel prize in Physics was awarded for attaining this accuracy practically. This minute amount of time is so small that depending on this scale we can measure time dilation, according to Einstein's general relativity, arising between two points at a separation distance of only 2 cm above earth's surface. But all these discuss only quantitative values of time, not any ideal definition of time. Philosophers, psychiatrists, physical researchers and neuro-scientists are continually studying to know the real self of time from the dawn of modern human civilization according to their different schools of thoughts.

As in many other instances, the great Greek philosopher Aristotle (384–322 BC) was possibly the first one to try to resolve this about two and a half thousand years ago. Indeed he understood the difficulty. He defined time as a 'number of motion with respect to the before and after'. He was also sceptical about its existence at all. He wrote, 'Since one part of time has been and is not, while the other is going to be and is not yet, One would naturally suppose that what is made up of things which do not exist could have no share in reality'. Also he wrote, 'Whether if soul did not exist time would exist or not ... for if there cannot be someone to count ... evidently there cannot

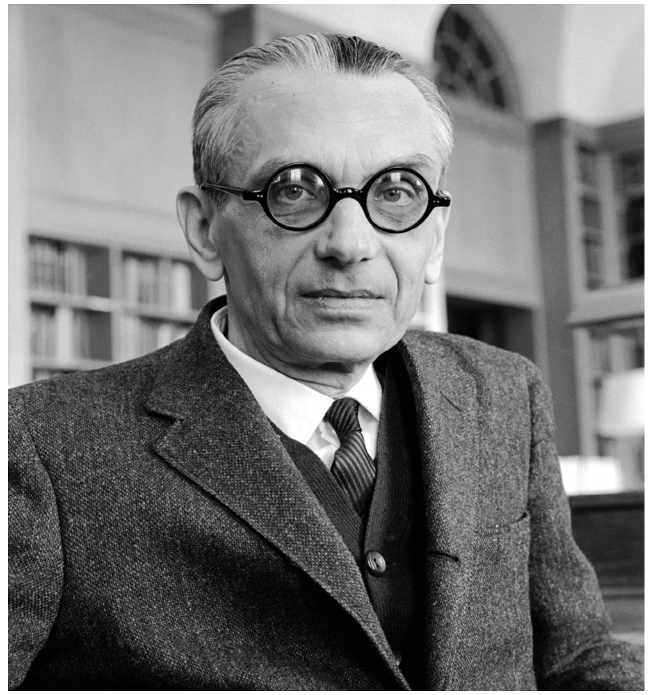
Aristotle

Immanuel Kant

be number ...'. Christian theologian and philosopher St Augustine (354-430) made it more complicated, 'What then is time? If no one asks me, I know what it is. If I wish to explain it to him who asks, I do not know'. His statement also echoed Aristotle, 'If no incident occurred (meanwhile) there is no past; if nothing new occurs there is no future; and if no incident occurs now there is no present'. Thus time is simply happening of some incident or its change. Otherwise, time is nothing. According to German philosopher Immanuel Kant (1724-1804), not only time, space also has no objective reality. Both of them are creations of mind and not features of the external world (which is) independent of us. Even the modern psychiatrist Robert Lanza (1956-) opines, 'Without consciousness, space and time are nothing. .... We can't touch them. They are not objects, ... They go forever ... tools of animal sense perception...'. However, neuro-scientists explain it differently. According to them, we perceive past from the memories already collected by our brain and the future is formed by the calculations and anticipations of our brain about what to happen next. Thus time is an illusion created by mind. On the other hand, some demand that the length of a day appears different to a child relative to an aged person. Thus at least psychologically time is not absolute. Some scholars are of the opinion that our heart beats create our sensation of time.

Now let us come to the context of time concept according to modern physical sciences. This science was first strongly built up on calculus by men like Newton. Newton's time was absolute and is independent of observer, object and space in universe, at least for the universe known at his time. It is moving with same velocity along straight line with respect to everything. Neither it has beginning, nor end. It is universally true. It needs no definition. Like space and inertia it is known to all. But at the beginning of twentieth century, Einstein's theory of special relativity put a brake on this concept. Earlier simultaneity of two events was universal for all observers whatever be their states of motion. Special relativity theory proves that this depends on the velocity of the observer's reference frame. Suppose 'A' moves on a spacecraft with a velocity equal to 80% of light velocity while 'B' is sitting idle on earth. Both have clocks on their hands which are perfectly synchronised at the start. 'B' returns to earth after, say, 10 years according to his clock. But when comparing the times between his own clock with other's clock, both will agree that there is time difference. Moreover, the time difference will be same for them. This means that a clock in a moving frame appears to move differently seen from rest. So time is not at all absolute, but relative. Space and time are inter-linked. An imaginary man riding a photon will see his clock not ticking at all. Ten years


Einstein


Kurt Godel

after proposing special relativity, Einstein put forward general relativity theory according to which gravitation is not a force at all. The grand space time geometry under the influence of a heavy body gets too distorted to make the body move in the manner we generally know as the result gravitational force. Any mechanical incident in the universe is just the motion of an object in space-time geometry. At least theoretically, it is possible to go from the present to the past (time travel). After one of his close friend's demise, Einstein wrote to his wife, '... distinction between past, present and future is only a stubbornly persistent illusion. .... The only reason for time is so that everything does not occur at once'. Famous theoretical physicist Brian Greene (1963–) writes, If you fiddle with the wormhole openings, you can make it not only a shortcut from a point in space to another point in space, but a shortcut from one moment in time to another moment in time. Wormhole is a shortcut passages in space-time geometry. Still now it is a theoretical and hypothetical term, first coined by John Wheeler (1911–2008).

Stephen Hawking

Question arises, if one can go back from present to past he can do a heinous work like, say, killing his own grandfather, though in that case his present existence becomes invalid. This is known as grandfather paradox. Then why is not practically such action possible? There are different reasons for this.

- # In thermodynamics it is proved that all natural processes are irreversible, i.e. the forward and reverse processes don't yield identical results. As a result, entropy, or disorderness in simple form, of the universe always increases through all natural processes. If we try to go to past from the present then entropy must decrease for it was less earlier. But any process to do that will increase it. Thus, it is not possible in physical world.
- # According to British physicist Julian Barbour (1937–), we live in a particular universe in a particular state. There may exist another universe on other side of

Michio Kaku

Brian Greene

big bang event where time is moving backward. Even if time travel is possible in other universe, that has no consequence on our universe.

According to quantum mechanics, all bodies have both wave and particle aspects, though it is prominent for subatomic bodies. But practically it may not be the whole picture. The dual aspect is only a mathematical model with which many incidents in subatomic world can be explained successfully. Or let us consider the space-time geometry. Infinite points are there. But that doesn't mean that infinite number of events are possible. Many points have no objective reality. Einstein himself wrote, 'Time and space are modes by which we think and conditions in which we live'. All these suggest that mathematical techniques or models are just the guiding factors to assess and predict the physical world.

On the other hand, Michio Kaku (1947–), a frontline researcher of string theory and a science communicator, opines that if time is like a moving stream of water and that stream can bent like a knot then definitely it is possible to reverse our journey from the present to past. It is a challenge to technology and may take long time to achieve. Though the famous mathematician Kurt Godel (1906–78) never supported this view and concluded that it is impossible to define time scientifically.

Recently many a scientists like Stephen Hawking (1942–2018), Paul Davies (1946–), Brian Greene (1963–) have elaborately discussed about the history and nature of time. But they have, probably consciously, avoided the very definition of time.

In conclusion, we conclude, according to French philosopher and psychologist Paul Ricoueur (1913–2005), 'We are not capable of producing a concept of time that is at once cosmological, biological, historical and individual'. According to English cleric, writer and collector Charles Cotton (1780–1832), 'Time is the most undefinable yet paradoxical of things; the past is gone, the future is not come, and the present becomes the past, even when we attempt to define it'. Then he joked, 'Relative to other time the present has one advantage that at least it is our own'. ◆

References

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Dr. Asit Chakrabarti, *a prolific science writer and retired associate professor. He can be contacted at asitchakrabarti044@gmail.com.*