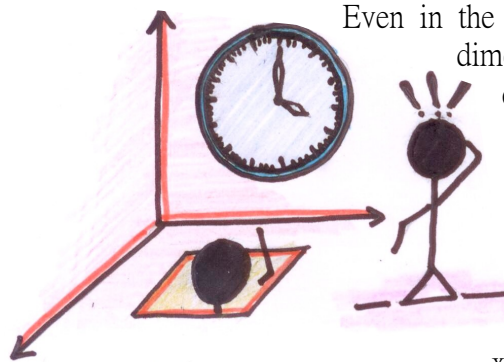


Why Should Time Be

The FOURTH Dimension?

We are all somewhat familiar to the concept of time being the fourth dimension, although completely mastering this concept is still far away to a common man. A mathematical definition of dimension can be "the least number of co-ordinates needed to specify every point within a system under consideration e.g. a reference frame". We are familiar with and have understood the concept of one, two and three dimensional space which respectively needs one, two and three coordinates to specify a point.



Even in the Newtonian period and later, our real world was considered to be three dimensional. Time was considered to be absolute and different from the spatial dimensions. It was Albert Einstein, in his famous paper about the special theory of relativity, who proposed the idea of time being interconnected with spatial dimensions. Time factors come in places we never believed it would. The Galilean transformations were replaced by the Lorentz transformation. It was Minkowski who formalized the idea of space-time forming four dimensions and formulated the algebraic relationships.

Einstein adopted it. The normal length in a space was replaced by $(-c^2t^2 + x^2 + y^2 + z^2)$. It clearly shows time as a dimension. Having said all this we can just go back and explore the mind of the common man during Minkowski's time, when he was suggesting the idea of time being the fourth dimension.

"Time.....a fourth dimension!!!!!"

"Never...I can't accept it. One saying the world is relative another saying time is also a dimension, this is absurd."

This is a fairly common comment any one could have made at that point of time. Do you think the above person really has no point at all, apart from the new view being different from reality? My job here is just to provoke a thought in you that the person who disagreed is not mad (according to the contemporary view of space-time). Before going into details, we'll just try to look into the properties of spatial dimensions and then try to argue why one should think time is, or is not different from other spatial dimensions.

Properties of spatial dimensions:

It will be good to note that these properties are not taken from any source. These are just my own creations. All of you are invited to completely disagree if you find it hard to agree with.

First: we can place a physical object anywhere in the three dimensional space. There is no kind of restriction. Is it the same with the time axis?



Second: assume any operation or transformation that a body undergoes from one spatial point to another. The object can be oriented in any arbitrary position by such an operation including the previously occupied position. Is this true in the case of time? Can we move to any previously occupied point in time?

Third: the change in spatial coordinates can be at any rate or acceleration (you all may know this is not actually true as the velocity of any object or signal is restricted by special theory of relativity). But time on the other hand cannot have an arbitrary rate. It goes forward as if it doesn't concern anything else!

If one seriously thinks about this we can have no other solution but interconnection of space-time as established by Einstein to believe that time should be considered as the fourth dimension. In my opinion time need not be considered so. It can be just another dimension like space. Who knows, in the future higher dimensions of time may be found out! So, when we have more dimensions of time what name will we give for them? Thus, it is better to expand the higher dimensions of space (along with the first three) as the 4th dimension, 5th dimension etc., and time (separated only by nomenclature) as the 1st dimension and so on.

-Gopi kri shnan M.