Article

New Understanding of Time Measurement

Amrit S. Sorli*

Abstract

Recent physical research on time measuring suggests time measured with clocks is merely a numerical sequence of changes that takes place in quantum vacuum. Observer perceives this mathematical sequence of change with his senses, then it is processed within the framework of linear psychological time "past-present-future", and finally it is experienced. In quantum vacuum the past, present, and future exist only as a mathematical numerical sequence of change.

Key words: time measuring, observer, change, numerical sequence, psychological time.

1. Introduction

Changes in the universe have its numerical sequence. Change n is followed by change n+1; change n+1 is followed by change n+2 and so on. Time that we measure with clocks is a numerical sequence of changes: n, n+1, n+2 and so on. The smallest unit of time is a Planck time, the largest is one year.

In the Special Theory of Relativity time t which we measure with clocks is a component of the forth coordinate of space-time $X_4 = ict$; in this formalism, time t represents the numerical sequence (order) of photon motion in space. Let us take a look at a photon moving from the point A to the point B on the distance d. The distance d is composed of a given number n of Planck distances d_p, namely $d = \sum_1^n d_p$. The photon moves from Planck distance d_1 to Planck distance d_2 and so on. Eah Planck distance d_n corresponds exactly to the Planck time t_p. In this perspective, Planck times $t_1, t_2, ...t_n$ are numerical mathematical sequences of photon motion on distance d. A photon does not move in time, it moves in quantum vacuum only, while time is a numerical sequence (order) of its motion. We use clocks to measure this numerical order.

Clocks do not run in time, they run in quantum vacuum only and time is a numerical sequence of their run. Clocks are reference systems for measuring all other changes in the universe. Changes in the universe do not take place in time, time is merely a numerical sequence of changes.

* Correspondence: Amrit S. Sorli, Space Life Institute, Slovenia E-mail: sorli@spacelife.si

Space-time, where time is a 4th coordinate of space, exists only as a mathematical model and it is not a fundamental arena of the universe. The fundamental arena of the universe is the three-dimensional quantum vacuum constituted out of fundamental entities of Planck volume l_p^3 where time measured with clocks is a numerical order of change which take place in quantum vacuum [1,2].

In this perspective human experience occurs in time as a fundamental psychological "past-present-future" frame through which we experience the flow of physical time which is numerical sequence (order) of changes in quantum vacuum [3].

2. Common understanding of time measuring

Common understanding in science today is that time runs in the universe as a physical reality which observer first perceives in senses and than experiences and measures it [4,5]. For this common understanding there is no experimental evidence; experimental data confirm time we measure with clocks is a numerical sequence of change in quantum vacuum.

3. New understanding of time measuring

Recent neurological research has shown that linear "past-present-future" psychological time has its physical basis in the neuronal activity of the brain. The experience of changes taking place "one after another in linear time" is the result of neuronal activity of the brain [6].

Observer perceives numerical sequence of changes in the world with his/her senses, followed by processing within the framework of psychological time, and finally measuring takes place. Experiencing and measuring within the framework of psychological time, observer experiences changes that take place in quantum vacuum as "changes taking place in time". Numerical sequence – sensual perception – processing in psychological time – measuring time.

Distinguishing physical time, i.e. the numerical sequence of change, from linear psychological time brings new insights into the real nature of time measuring which is only a numerical sequence of change of the universe. The universe does not take place in time, on the contrary, time is the numerical sequence of universal change. Universal past and future exist only in the sense of numerical order. There is no physical past or future. Time travels into past or future are not possible. One can travel in quantum vacuum only and time is the numerical order of one's motion. One can travel in time only in a psychological sense, because linear time is exclusively a

psychological reality.

4. Conclusions

In today physics time measurement is experienced in the frame of psychological time, so we experience change run in time, although there is not a single experiment in physics that would confirm that changes take place in time as a physical reality; By becoming aware of psychological time observer becomes conscious that the time which he/she measures with clocks is exclusively numerical sequence of changes taking place in quantum vacuum, hence time is a mathematical quantity.

References

1. Amrit Sorli, David Fiscaletti, Dusan Klinar, Time is a measuring system derived from light speed, Phys. Essays **23**, 330 (2010)

2. Amrit Sorli, Dusan Klinar, David Fiscaletti, New insights into the special theory of relativity, Phys. Essays **24**, 313 (2011)

3. Amrit Sorli, Dusan Klinar, David Fiscaletti, Replacing time with numerical order of material change resolves Zeno problems of motion, Phys. Essays **24**, 11 (2011)

4. David M. Eagleman, Peter U. Tse, Dean Buonomano, Peter Janssen, Anna Christina Nobre, Alex O. Holcombe, Time and the Brain: How Subjective Time Relates to Neural Time, The Journal of Neuroscience, November 9, 2005, 25(45):10369-10371;

5. Deborah L. Harrington, Kathleen Y. Haaland, Robert T. Knight, The Journal of Neuroscience, Cortical Networks Underlying Mechanisms of

6. Catalin V. Buhusi, Warren H. Meck, What makes us thick? (2005), Functional and Neural Mechanisms of Interval Timing, Nature reviews, Volume 6, October 2005