

Measuring Personal and Collective History

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Abstract: This study introduces a new definition of the generalized time and uses original methods to construct bridges between quantitative approaches and poetical visions, between "time" as it is seen in physics and "time" as it appears in aging, in chronology, in astronomy and in personal and collective narratives.

Key-Words: time, definition of time, time measurement, celestial twins, the clock of the Phoenix, Theta-factor, Time-codons

1. Introduction

This article is in three parts. The first part mentions different aspects of time and introduces a generalized concept of time [1], common for both "ordinary" physical and "complex" sociological and cultural systems. This concept of generalized time makes possible to comprehend physical and creative processes within one framework and provides a common ground for discussion of the temporal algorithms governing our bodies and our minds, our material world and our lives.

The second part of this article describes the Effect of Celestial Twins (ECT), which shows that from the moment of birth, our personal potentials are constrained by the cultural, historical and geopolitical limits of our times (*Zeitgeist*), and those limits are shared and altered by all those (so-called "celestial twins") who share the same generalized time of birth (the so-called Theta-factor) [2].

Being related to Prigogine's internal time, the Theta-factor is an important measurable factor, which, in addition to heredity and environment, describes patterns of human development. When linked together with the natural celestial clocks, it depicts individual and collective oscillations and may serve as a compass showing historical changes of the generational potentials.

The article's third part is a synoptic view of *The Clock of the Phoenix* [3]. Based on the extensive historical data over the last 3000 years, it shows that at the end of every long-term Neptune-Pluto cycle (with periodicity of about 493 years) the cultural world comes to its critical junction of disruption, the so-called "Hour of the Phoenix." The generations of passionate individuals born during these radical periods of transition (ranging in our epoch from 15 to 30 years) are responsible for setting time-tables for the developing social and cultural "scripts" during the following 493 years.

2. Time Definitions and Measurements

Today time is meaningful only at the level of physical bodies, and not at the level of desires, thinking or feelings. Although time in physics remains a fundamental concept [4], it is widely accepted that we have learned how to measure it. Consequently, time became tightly associated with duration and it was even suggested that "time is what is measured by a clock" [5].

Yet is it indeed true that we can accurately measure something without defining it first? Can we differentiate between "duration" and "aging"? Can we measure the periods of time between events without either knowing what the instant of time is or without having a clear concept of events and processes?

To answer these questions let us first consider why the notion of time in daily life remains different from the notion of time in physics. Elsewhere I have described multiple differences between the uniform time in physics and the multiple times as they are understood in the life sciences [1]. Here I shall briefly mention just three of them.

Unlike the abstract physical concept of the Eddington's arrow of time, in the life sciences various phenomena have recorded various cycles, such as diurnal, lunar, annual, etc. [5, 6]. These cycles are related to the astronomical times, which are neither uniform nor linear [7]. The modern timekeepers, responsible for the atomic clocks, confirm the fact that we have moved into an era of multiple time scales. On one hand, we have fast atomic clocks, which provide a standard of frequency, but cannot determine the interval elapsed since any initial epoch in the past. On the other hand, our calibration of mundane clocks remains dependent on astronomical observations. From time to time we have to introduce the leap seconds, days or months, depending on different kinds of celestial motions and rotations in our solar system [8].

Unlike the uniform physical time, multiple biological rhythms describe different kinds of events, taking place on several temporal scales. To explore them, J.B.S. Haldane has introduced five different timescales with different corresponding ranges of time intervals, namely, the molecular (10^{-5} s to 1s), the physiological (10^{-2} s to 1h), the ontogenetic (up to a lifetime), the historical (covering many generations) and the evolutionary (may be longer than 10,000 years) [9]. Later David Bohm suggested the existence of a multiple perplexed and relatively autonomous levels of biological times, such as neurophysiological, psychological, conscious and unconscious times "going on, perhaps on levels of which we have at present no notion at all" [10]. He compared this new system of time with "a radio wave carrying a television program: "The very fast radio wave contains enfolded within it the much slower times that are depicted in the program" [10]. Such

interplay between multiple biological rhythms is so complex that contemporary biophysics has recognized its failure to define a single concept of time. A.P. Levich summed this up by stating that "clocks may be quite different in their nature, they are based on totally different physical principles and they are not necessarily reducible to each other" [11].

Today physics recognizes only one time. On the contrary, in life sciences, Ilya Prigogine has introduced the idea of two basically different (though related) kinds of time known as "age time" and "watch time" [10]. "Age time" (or internal time of the studied system) belongs to the ontogenetic timescale; it begins at zero-point of an individual's birth and reflects one's aging until one's death. "Watch time", known also as ordinary or planetary time of the environment, belongs either to the historical or to the evolutionary timescale; it has no definite beginning or end and there are no absolute watch-dating methods that work throughout long historical periods.

While the question of the interplay between age time and watch time remains unexplored in physics, it requires especial attention in all life sciences. Physics suggests that repeating the same experiment over and over again will produce the same results. In life sciences those born at different epochs, years or seasons will find different initial conditions and will be synchronized with different biological rhythms. For example, in medicine, already in the 16th century Gerolamo Cardano noticed that life expectancy of a human being is dependent on the historical time of his birth. Today we witness an increase of life span and rapid developments in methodologies of rejuvenation. Consequently, age time, as counted by the number of annual cycles since the moment of birth, does not reflect the real biological age of a person and does not show whether that person is close to the end of his or her life span. Furthermore, in biology it was reported that not only the year, but even the month of birth is of crucial importance: "Human populations show robust annual rhythms in health and well-being, and the birth month can have lasting effects that persist throughout life" [6].

In cultural studies the existence of periodical waves in the intensity of artistic life was detected both on the personal level (due to the personal development or aging) and on the social level (due to the cultural evolution of the society as a whole). There were reports of monthly or seasonal variations in human creative potential [12, 13], as well as the large-term variations in the eventfulness of the cultural life in different centuries [14]. In historical studies, such researchers as Oswald Spengler, Lev Gumilev and Karl Jaspers have suggested periodicity in birth and decline of civilizations. All these studies confirm the assumption of the complex non-homogenous nature of both age and watch times and lead to the conclusion that further studies are needed. The goal of this study is to deepen our understanding in these issues, and for this purpose we need first to clarify how we measure age time and watch time.

The starting point of age time is marked as a zero point. Afterwards it is measured by the number of diurnal, lunar and annual cycles counted since the moment of birth. Since the introduction of the Gregorian calendar in the 16th century, many countries gradually adopted the procedure of reckoning the starting point of age time as the calendar date of the moment of birth (i.e. the corresponding watch time).

Watch time is evaluated using calendars in which time is expressed in dates. Any date (such as September 7, 2016) is not a real number, but a string of alphanumeric characters, which is reckoned by a nexus of non-conjoined and not-commeasurable quasi-cyclical processes that combines years (as measured by ephemerides), months (as measured by lunar phases) and days (as measured by Earth rotation about its axis) together with the number of cycles counted since specific arbitrarily chosen zero-points. Dates are based on a whimsical combination of decimal, duodecimal, and sexagesimal systems, and their units do not bear constant relation to one another. Summing up, the date of an event is a whole set of data, which is partly cyclic (related to different celestial motions), partly linear (due to counting of cycles) and partly

arbitrary (due to historical changes in zero-points and the introduction of various leap intervals). Consequently, no calendar has been or ever will be either continuous or linear if it tries to fit together all these motley pieces of data.

The main assumption of the present work is that due to the multifaceted nature of time each process and each of its levels is governed by temporal laws of its own. Integrating all of them into a single fabric by a single real number is impossible. Therefore, both age time and watch time should be treated in their complexity. For this purpose several definitions are introduced.

Generalized time is defined as a manner of marking the events or processes and a way of arranging, ordering or coordinating them.

To provide a one-to-one correspondence between historical events and their marking, contemporary dates are substituted by a multidimensional hierarchic reckoning of time (so-called Time-codons) [1]. Depending on the particular problem, Time-codons might be based on 3 to 10 diverse quasi-cyclic celestial motions with different periodicities.

In order to study cultural developments, each event is marked by the birth of the person responsible for its initiation.

Watch-time of the environment synchronized with the zero-point age time of the enclosed subsystem is called its Theta-factor. For human beings, the Theta-Factor labels their moment of birth either by solar-lunar calendars or by relative positions of the 10 celestial bodies.

People sharing the same Theta-factor are called "celestial twins."

In historical processes "slower times" were called by Bohm after the ancient Greek notion "aeons" [10]. Aeons provide the information about the cultural and political atmosphere, in which our personal and much faster times unfold. In modern calendars, aeons are limited by diurnal and annual cycles. From the year up and from the day down they do not provide any temporal information. Time-codon reckoning, using 10 quasi-cyclic clocks with various periods, allows one to widen these limits and to

evaluate both – the faster personal times and the slower cultural aeons.

Modern counting of aging is arbitrary. It is reminiscent of T.S. Eliot's line "I have measured out my life with coffee spoons" [15]. It was shown that a more meaningful evaluation of life path might be obtained when age time is also treated in terms of Time-codons [1]. The main difference between watch time and age time becomes the starting point, in relation to which the planetary positions should be regarded. In the case of age time, they should be measured in relation to the zero point of a personal lifespan. Then age time will be reckoned as the complex matrix. (In case of ten standard planetary motions this will be a ten-by-ten matrix).

Given such sets of definitions we shall show that under certain conditions the Theta-factor becomes a temporal code prescribing and reflecting development of highly-organized living systems.

3. Effect of Celestial Twins

In his *Autobiography*, Goethe has observed that "any person born ten years earlier or later would have been quite a different being, both as regards his own culture and his influence on others" [16]. It means that the *Zeitgeist* would be felt differently by those who were born in different historical periods. In other words, the Theta-factor of a human being who is able to express a new idea, is important: it signals a potential change in history and may reveal a significant development in the culture. If so, the reverse should be also true: those who are born simultaneously with one another might be exposed to more similarities in environmental atmosphere and they might influence their environment in more similar ways.

Indeed, the systematic studies of well-known celestial twins, which lasted more than 20 years, led to the discovery of a new phenomenon – the Effect of Celestial Twins. In one sentence, this effect demonstrates that though each human being is unique, there is a fairly exact (or more precisely, isomorphic) matching between the biographical narratives of celestial twins. The preliminary stage of this

research was to collect and to crosscheck the biographical data of about 15,000 historic personalities in order to get the most accurate list of celestial twins. Hundreds of pairs of celestial twins or even threesomes were detected, but in many cases their precise birthdays could not be confirmed. Unfortunately, up to the 19th century the historical dates were frequently recorded only partially. Considering the current state of chronology, for the purpose of the preliminary studies "celestial twins" were redefined as the people born within the interval of time shorter than 48 hours. From the Time-codon point of view they have almost identical positions for all the slower cycles, but may have slightly different positions for the faster lunar cycle. (The Moon is moving quickly, traveling approximately 13° daily). After rigorous rechecks of birthdates, more than a hundred pairs of celestial twins were confirmed. Their comparative life paths demonstrated impressive parallels between celestial twins alongside profound differences between the pairs with different Theta-factors.

The next step was to write comparative biographies of the well-known historical celestial twins, those whose biographic material allowed detailed comparison of their lives from birth to death. Most of them, such as C.G. Jung or Ernest Hemingway, King George VI or Oscar Wilde were believed to have an unprecedented life path. And yet.... Each of them had at least one celestial twin who had the same unique life task, used the same methods to complete it and achieved the same results. Furthermore, in many cases it appears as if when one individual makes a discovery, his/her celestial twin consciously or unconsciously helps to spread and amplify it. To mention but four examples:

In science. In 1913 two pioneer works concerning isotopes were reported simultaneously: one was written by Frederick Soddy, another by Francis Aston. Nobody seems to recognize what an incredible coincidence it was that these Atomic Age pioneers and Nobel Prize winners were celestial twins.

In medicine. Though separated from birth by geography, religion and genes, Nobel Prize

winners Emil Behring and Paul Ehrlich were honored as "the children's saviors." Their joint work has saved millions of children from diphtheria.

In music. Pablo Casals is considered the greatest cellist of the 20th century. His celestial twin, Lionel Tertis is recognized as the greatest viola-player of all time. Both lived more than 97 years and enjoyed playing chamber music together.

In feminism. In 1919, Nancy Astor became the first woman to sit in the House of Commons, replacing in this position her husband, Waldorf Astor, who was also her celestial twin.

To sum up, the effect of celestial twins challenges many long-held beliefs. It shows that the roles of genes, race, gender and cultural background are not as strong as is believed and that the Theta-factor is not less important for shaping identity than the genes or the early environment.

The fact that the celestial twins reared apart had a similar pre-birth family history, as well as a similar early environment, and a similar physique combined with similar major modes of expression, strongly suggests that Theta-factor denotes more than the qualities of a single personality. It was suggested that the Theta-factor denotes a phenomenon resembling Whitehead's "natural unit of historic fact" and might be used for constructing a cultural historical calendar.

4. The Hour of the Phoenix

The name of this model is taken from ancient mythology. As an immortal creature, the Phoenix was associated with time, symbolizing an endless flow of ever-changing life and the cycling nature of its changes.

The first step in constructing the Clock of the Phoenix is to mark major historical or cultural events as the dates of birth of the personalities, responsive for these developments. Afterwards, the numerous historical facts are reassigned to the Theta-factors of their initiators. The final step is to reconstitute history according to the rearranged

chronology in terms of the long-term Neptune-Pluto cycles and their phases.

For example, from 1885 to 1899, Neptune and Pluto seemingly converged in the skies, a rare planetary conjunction, which takes place once every 493 years. A generation born during this Hour of the Phoenix witnessed the emergence of something unpredictably new and took part in a revolutionary transformation and becoming. One of the prominent poets of this generation, Anna Akhmatova, wrote that "no other generation in history experienced such a fate, and perhaps, there was no other generation like it" [17]. Quantitative measurements confirm that the number of great poets born during this period was significantly greater than in all the previous and following periods. For example Table 1 reproduces a characteristic fragment from one of the tables obtained in this study [3].

Table 1, Russian Poets in Wikipedia

Birth Year	Number of poets
1930-1944	32
1915-1929	44
1900-1914	51
1885-1899	100
1870-1884	42
1855-1869	22
1840-1854	10

It was found that since the beginning of the written history such enormous spikes of creativity were observed cross culturally during each and every Hour of the Phoenix [3, 18].

Furthermore, each Hour of the Phoenix is a moment of a cosmic change, when the world completes its previous cycle and subsequently steps into a new epoch. It resembles both a full stop in time and a seminal point, establishing a time frame for an exploration of new paradigms.

The proposed model of the Clock of the Phoenix has been successfully applied to the chronological analysis of Judea and Greece, Rome and Portugal, to the survey of the European Renaissance and the Age of Discoveries, to the history of the national poetries and to the history of film and aviation.

The cross-cultural findings seem to reflect the intrinsic characteristics of the generalized

time rather than to be based on more culturally-relative concepts.

5. Conclusions

Life in its totality might be treated as a juxtaposition of various processes, described by their specific temporal increments. I hope that this study will contribute to the unification of science, life and creativity by introducing the new concept of generalized time and building the interface between mind and matter.

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Измерение истории личности и общества

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Резюме – В этой работе вводится новое определение обобщенного времени и используются оригинальные методы для наведения мостов между количественными оценками и поэтическими видениями, между понятием "времени" в физике и тем, как оно проявляется в астрономии, в хронологии, в исторических процессах и в личных биографиях.

Ключевые слова: время, определение времени, измерение времени, селестиальные близнецы, часы Феникса, Тета-фактор, кодоны времени.