

Article

Social health in the aspect of fractal determinism and the changing world

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Abstract: The paper consider the problems of a changing world in the areas of natural and climatic, ecology, migration of ethnic groups, education and their impact on the health of society. Research has revealed that the idea of bifurcations and the principle of fractal determinism allows us to look at one of the most significant problems of humanity: its health and adaptive capabilities in a changing world. We still understand these changes at the level of any one science, and not holistically. Therefore, it is so important to comprehensive study health problems from the standpoint of modern synergetic methodology in a changing world.

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1. Introduction

In 2008, the book "Human Ecology in a Changing World" published, for which the team of authors received the Government Prize. The introduction states that "People's health and the quality of their life are largely determined by the state of the time-varying environment-natural, anthropogenic and social. At the same time, the reaction to its impact of various categories of the population (by gender, age, genetic characteristics, profession, place of residence, social conditions, diseases) can be purely individual and changeable over time" [6, p. 4]. One of the significant social values is not only the health of society as a whole but also the health of a particular person who performs labor activity in those natural and social conditions in which he has to carry it out.

The concept of "changing world" considered in the work of Ervin Laszlo "Age of Bifurcation. Comprehension of the changing world" [5]. The concept of "changing world" which is considered in Ervin Laszlo's work "Age of Bifurcation. Comprehension of the changing world" [5] has undoubted interest due to the fact that the society has moved to a different stage of its development in the 21st century, which can no longer explained by the principle of linear determinism.

The appearance in science of the concept of "synergetic" as an interdisciplinary area of scientific research, made it possible to take a different look at the development of society, its value orientations in the conditions of intensively developing scientific and technological progress [4]. Synergetic studies the patterns and principles underlying self-organization in systems of different nature: physical, chemical, biological, psychological, social, technical, and others. Bifurcation is a basic concept that allows the scientific community to understand current development trends, including biological and psychological knowledge about a person and his activities. In modern scientific terminology, this term is the name of a fundamental feature of the behavior of complex systems subject to strong influences and stresses, sometimes destructive forces. It considered bifurcation as a qualitative restructuring or metamorphosis of various objects with a change in the parameters on which they depend. A living system has the ability to self-organization and instability to the influence of the conditions of novelty in which it finds itself, which allows it to adapt to the changed conditions of the external or internal environment. Physiology may manifest a different reflex path that changes human behavior, reflecting in the psychology of behavioral actions as an event in one time and space.



The purpose of this work is to analyze the health of society in the aspect of fractal determinism and the changing world.

2. Methods

It considered the health of society from interdisciplinary positions in medicine, biology, psychology, philosophy and other sciences. Our research and analysis of literary sources let us address some elements of social health from the point of view of self-organization theory. The idea of bifurcations and the principle of fractal determinism used in the methodology of the non-invasive method of heart rate variability. The analysis of attractors of phase portraits, as a geometric pattern, allows us to analyze human health not only in 5-minute cardio intervals, ultradian, circadian rhythms, but also to predict diseases associated with disorders of both the cardiorespiratory system and the body as a whole.

It uses the principle of fractal determinism in sociological, psychological research, analysis of historical events, which makes it possible to model not only social development, but educational space.

The bifurcation point is one of the important concepts of the theory of self-organization. For society, this is the moment in the history of the system when it passes from one system of certainty into another. An example of such a social event is the collapse of the Soviet Union, with its transition from one system of socially significant values to a new system of values. The period of transition is the bifurcation point at which it doomed the old values to change. And society and a particular person can adapt to these changes faster, thanks to socio-psychological adaptation, due to the awareness of new values and the acceptance or non-acceptance of them. Another thing is the evolutionarily established mechanism of biological adaptations. In this case, the living system has the genetic potential of adaptive mechanisms. However, the transition from the bifurcation point to the equilibrium system takes a significant amount of time, and, in a certain period, may experience an adaptive breakdown. If there are enough resources in the system, it reaches equilibrium due to resistance. If not, then the system, at the individual level, can self-destruct, but is able to survive population due to the genetic reserve of adaptive mechanisms.

3. Results

In the theory of dynamical systems, there is the concept of “phase space” - this is the number of attractors in space and time that determine the totality of all conditions in which the system can be. The non-invasive method of heart rate variability (HRV) uses the concept of “phase portrait” in pre-nosological conditions. The system responds to these “attractors”, or forces, that determine the trajectories in the phase space. Since such attractors act on the whole system, they force it to change its dynamic properties, forming an orbit of the attractors. In physiology and psychology, they make it possible to determine the rate of stress of the body and its adaptive capabilities (Fig.).

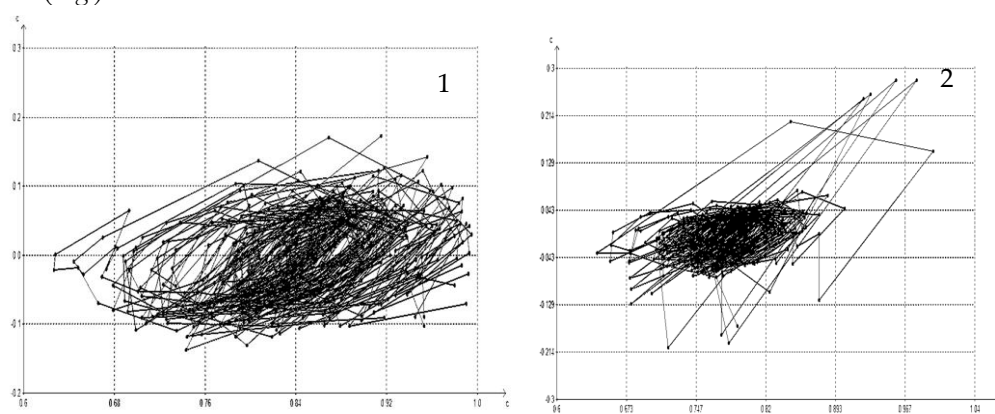


Figure. Phase portraits of the students under conditions of mental load according to attractors of cardio intervals using HRV (1 - normal; 2 - tension of regulatory systems).

If we are considering the characteristics of a person (subject / personality) in a group, then the phase space allows you to identify risk groups or a marginal group. But anyway, the system will strive for equilibrium / homeostasis.

Currently, a person has to perform labor activities in various environmental conditions, including migration, through a search for work in the current trends of world globalization. Let us designate some problems in which a person finds himself in his activity. Thus, the lack of holistic knowledge creates sufficient problems within which society cannot solve the global problems that



it has fallen into because of fragmentation of knowledge. We can see this in the example of the problems of adaptation of migrants to the new conditions of climatic and geographical latitudes.

N.A. Agadzhanian noted that the peculiarity of climate, topography, nutrition, magnetic anomalies, photoperiodism affect the structural and physiological organization of people whose ancestors from generation to generation lived in relatively little changing environmental conditions [2]. "When studying the ecological portrait of each individual, it is necessary to regard the ethnicity of a person and the biochemical characteristics of the environment" [1, p. 6]. There is information in the literature about the existence of ethnic differences as the most important physiological constants of the body in the functioning of not only individual enzymatic systems but also the response of the neuro-immune-endocrine system to the impact of inadequate exogenous and endogenous factors. It clearly manifested ethnic differences in the temporal - chronophysiological features of the reproductive function. For example, the level of tension in the regulatory systems of the body in different ethnic groups, the direction and severity of changes in the dynamics of the cardiovascular system, depends on the ethnic characteristics of adaptation to natural and climatic conditions.

In connection with the anthropogenic impact on the climate, active migration processes associated with professional activities, various ethnic groups will face the risks of failing the evolutionarily established adaptive resources and adaptive reactions of the body to specific natural and climatic conditions, if we consider systems in the aspect of linear determination. If we turn to fractal determinism, then adaptation to climate change will require a fundamental rethinking of the socio-economic development strategy and ecosystem management strategy from states that are actively included in the world community today in terms of the concept of bifurcation. It should note that, at present, in order to solve the problem of the impact of climate change on the health of an ethnic group, it is required to develop indicators that could help determine future risks and diseases. Such developments are necessary to create corrective models of health security and evolutionarily formed adaptive responses to a complex of stress factors of various nature in ethnic groups in new conditions of life and professional implementation.

Thus, the outlined issue is associated with Edward Lorenz's "butterfly effect," which was found during the simulation of global climates. He occurred to the conclusion that weather conditions are unstable, like the flapping of the wings of a danaid butterfly, as atmospheric turbulence generates a whole series of bifurcations. Today, Russia assumes the intensive development of not the Far North, but the Arctic latitudes, which can also cause a "butterfly effect" not only of weather, but of climate change and lead to a bifurcation of the evolutionarily established mechanisms of nature, including the organization of life for people in other regions, which so far is only possible predict.

The modern problem of education, aimed at preparing future labor resources, loses sight of socially significant values in professional activity - human health. Introducing the innovative educational technologies, the pedagogical community does not consider adaptive reactions to stimuli. The modern school provides knowledge that is not subjected to critical analysis. In Russia, it built a unified state exam using a testing system on their isolation from practical significance in choosing a future profession and, as a result, fragmentation and inability to use them in future professional activities. Scientists mention that educational institutes share knowledge systems based on the picture of the world, divided into physical reality and the sphere of human goals and actions, which hinders the formation of a holistic worldview [3]. Holistic knowledge of society is the moral basis of our responsibility for actions in the world around us. The implementation of global projects that do not consider the integrity of existing knowledge can lead to irreversible processes, both in the biosphere and in the viability of the human population in it.

4. Discussion

Currently, holistic education is becoming increasingly popular, focused on the practical holistic value of knowledge, including the integration of the highest achievements of modern sciences and arts. The formation of holistic knowledge is a very difficult task in holistic education. In Russian universities, there is an attempt to introduce practice-oriented learning into the system of higher education. However, the system of subject education itself, where we are considering the training of a narrow specialist, does not solve the problem of its development.

5. Conclusions

Thus, the idea of bifurcations and the principle of fractal determinism gives us the opportunity to look at one of the most significant problems of humanity: its health and adaptive capabilities in a changing world. We still understand these changes at the level of a single science, and not holistically. Therefore, complex studies of health problems from the standpoint of modern synergetic methodology in a changing world are so important.



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