

# THE PROBLEM OF ESTIMATION OF EVOLUTIONARY RISK OF HIGH TECH IN THE CONCEPT OF STABLE ADAPTIVE STRATEGY OF HOMO SAPIENS

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## Резюме.

### **Проблема исчисления эволюционных рисков high tech технологий и концепция стабильной эволюционной стратегии Homo sapiens**

С позиций концепции эволюционной стратегии Homo sapiens (SAS<sub>H</sub>) рассматривается проблема определения и оценки эволюционного риска так называемых High Hume (NBIC) технологий. Генезис эволюционного риска детерминируется возможностью деструкции коэволюционных отношений внутри SAS<sub>H</sub> в результате технологических трансформаций генетического, когнитивного и социокультурного кодов.

One of the acutest problems of the modern theory of anthropogenesis is the origin and organization of stable adaptive (evolutionary) strategy of Hominidae (SAS<sub>H</sub>). The solution of this problem is especially important as now we are approaching the point of the next global macroevolutionary bifurcation: the transition to the phase of managed evolution, the cause of which is the global evolutionary and ecological consequences of the SAS implementation. Modern technological schemes (managed evolution, High Hume) make unavoidable turning of natural sciences to the study of human. Before this sphere considered to be the prerogative exclusively of the Humanities. The conception of “managed evolution” of Nikolai Vavilov [1, p.169], “noosphere” of Vladimir Vernadskii and “transhumanism” of Julian Huxley make up the triad of ideology and world outlook of the modern stage of the development of technogeneous civilization [5, p.237]. The suggested essay is dedicated to some transdisciplinary (naturalistic, ethical, humanistic and sociological) aspects of this idea. The recent achievements of biotechnology gave it a new paradigmatic interpretation, they revealed not only positive and constructive sides, but potentially dangerous aspects that can cause serious risks.

### **The conceptual model of stable adaptive strategy of Homo sapiens**

The initial methodological postulates of the explanatory model that underlie the basis of the hypothesis developed below, at different times were offered by N. Vavilov, V Vernadsky, J. Huxley. The holistic «ideology» (the system of initial theoretical postulates), that is a theoretical core of this concept, is known as the Model of the Triple Helix.

As a result of superposition of three separate objects in a single bundle, where each part of it is associated with any of the other by the cycle of forward and backward linkages, a different dynamic structure is generated. In this case, in the phase space of parameters of SYSTEM COMPLEXITY-ADAPTABILITY, the evolutionary curve («triple helix») arises, this evolutionary curve in application to the society bears the name of scientific and technological, social and humanitarian progress (in spite of the ideological loading of this term). Accordingly, there is either a generation of organized complexity of each element of the triple system and this triple system itself as some integrity, or their degradation (the increase of the total entropy) [8, p. 109]. As a result it turns out to be an element of hierarchically structured evolutionary fractal, each level of

which is the system able to generate adaptive complexity: each level is acting as an add-on to the previous one and provides the genesis of the most dynamic element of the overlying triad.

Desynchronization of evolutionary rates of the autonomous subsystems that take part in it inevitably means the violation of the environmental or social homeostasis based on mutual adaptations; it serves as a forerunner of profound revolutionary disintegration and the metamorphosis of the structural-functional organization that was organized before. The consequence of it is the process of permanent and progressive autonomization of the most rapidly changing system. This regularity can be considered as a general law of the conjugately evolving synergetic systems. The main regularities of co-evolution of interdependent open, nonequilibrium self-reproducing objects can be summarized in the form of two postulates:

1. The indispensable condition of isolation of the new autonomous system with its inherent specific form of evolution is the emergence of an independent way of coding, reproduction and transformation of the information which is needed to maintain their structure and reproduction;
2. Of the two the conjugately evolving autonomous systems the active role usually belongs to the one that has the potential for more rapid adaptive evolution.

In general, these two postulates are quite applicable to the bundle of objects (processes) - person (biogenesis) - society (sociogenesis) - technology (technogenesis). As it can be assumed the emergence of this system occurred at the very stage of our evolutionary history.

The whole process of constituting of a new adaptive strategy was completed 25 thousand years ago. From that moment the further evolution of SAS<sub>H</sub> has become a self-sustaining process of *co-evolution* of the genome, culture and technology, accompanied by continuous and spontaneous increase of the system complexity. From the existence of several (at least the two ones - genetic and social and cultural) autonomous systems of generation, replication and implementation of adaptive information, follows another, extremely important premise of the disciplinary matrix of modern genetics and evolutionary theory. Along with natural selection of individual genetic determinants (genes) and organisms significant role in the evolutionary process is played by selection of social groups. The selection itself, in this case, has a multi-level hierarchical organization.

The existence of socio-cultural inheritance creates the possibility of differentiation of functions of individuals within a social group. The possibility of a considerable intensification of the formation of superindividual adaptations and the competition between individual groups opens. A necessary condition for that is the system of information communications between the members of the group [7, p. 123]. By virtue of this integral adaptability is derived from multiple, potentially conflicting acts of selection - its genetic, organismic and a group forms. As a consequence, the frequency of the individuals within the social group or cells within the body that provide the adaptability of the higher level, is able to grow much faster than the equation of Hamilton allows. So, selection of cultural types changes the parameters of the evolutionary process at the expense of increasing the potential of inter-group selection and decrease of the potential of selection within the social group, as compared with what could be expected if the mechanisms of evolution acted on the basis of the actual genetic regularities [11, p. 34-35; 12, p. 327]. In their joint article, The hypothesis give the famous rule of ethics that is present as one of the key and fundamental postulates in any culture and, in one form or another, in any of widespread religions.

In the basis of new systems of generation and replication of adaptive information there is the competition between not just social groups but between different social communities, societies, ethnic groups, cultural types, etc. The biological diversity of humanity serves as the source substrate for it. It is significant that, the most obvious result of genetic and cultural co-evolution is a high level of stability and integrity of the individual to the social communities in the process of socio-cultural evolution.

In the course of sapientation the multitude of phenotypes was shifted in the evolutionary landscape towards maximum values of adaptation. The accumulation of the average values of the complexity and the lability of nervous and mental organization near the maximum possible level of adaptivity, resulted in separation of genotypic variants beyond the adaptive norm. These limits are the adaptive balance between creativity and resistance to psychophysiological stress.

Stable evolutionary strategy of *Homo sapiens* is dualistic, and at least two levels, and/or in two aspects: (1) substantially-somatic level - biological adaptation versus techno-cultural adaptation; (2) reflexive and cognitive level – emotional and intuitive (coherent) versus logical-rationalist (causal) way of ideal description-evaluation-prediction of objective reality. The possibilities of the effective progressive genetic adaptation have been exhausted and the role of the leader passed to the socio-cultural component of adaptive strategy of *Homo sapiens*. At the same time, the socio-cultural types, that have been formed on the basis of extreme variants of the genotype and phenotype near the borders of adaptation and disadaptation, mentioned above, become the material of the new phase of the evolutionary process. This way the mechanism of the change of functions, in the course of which psychophysiological disadaptation/pathology transformed into socio-cultural adaptation, increasing the chances of survival of social groups appears.

The following bifurcational point – “change in the dominant goal” of socio-cultural adaptation from transformation of the behavior of individuals and group in the changing environment to change of the environment in accordance with the existing system of behavioral stereotypes (generated and reproduced genetically and socially). As with the previous transformation, the transition of the role of the leader of the adaptation genesis of hominid from genetic (biological) to the socio-cultural heredity demanded achieving of a certain threshold values of the specific weight of the corresponding components of adaptation in its integral meaning.

### **Evolutional risk of the technologies of managed evolution**

The socio-cultural component of the evolutionary process proceeds with much higher speed compared with the biological component. As a result - to a certain extent such elements of culture that do not match the increase in the frequency of genes that provide the highest possible biological fitness can be spread. The above argument is also valid for the other binary connectives – culture-technology. With substantial reserves of resources that could be used as means of survival, the dominance of technological adaptation provides better survival of appropriate types of society. However, technological innovations result in a mismatch between behavioural stereotypes, formed in this type of culture, and the conditions of technolized environment. This imbalance potentially becomes stronger and transfers further to the peculiarities of biological constitution, clusters of genome that supervising them, etc. The features of this imbalance were analyzed rather long time ago by the well-known Russian-Ukrainian-French biologist Ilya Mechnikov.

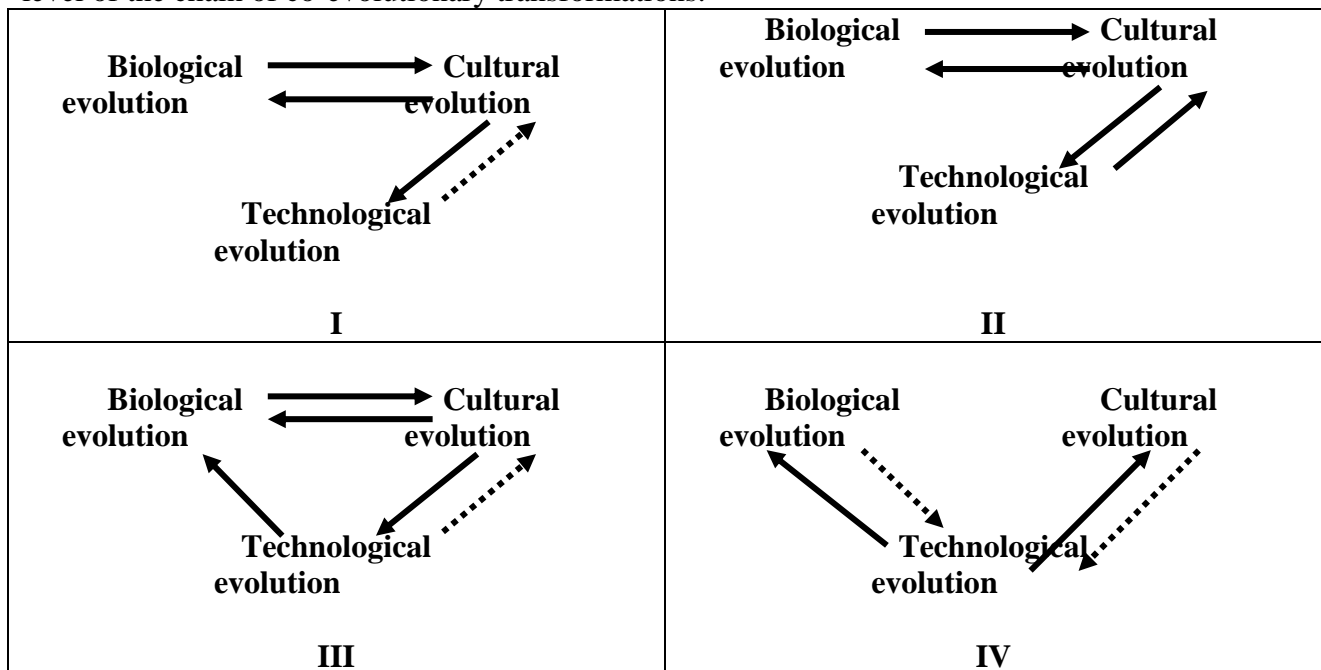
Generalized mechanism of co-evolutionary interactions, built-in in the SAS<sub>H</sub> organization - gene-cultural co-evolution (E.Wilson, R.Dawkins) and technocultural balance (A. Nazaretyan) saves it from disintegration. The genesis of the phenomenon of co-evolution is connected with the formation of interdependent evolving systems, the direct exchange of information between them is impossible or at least difficult and rare. In this case, a mechanism for mutual adaptation of such systems and their integration into a new holistic formation arises.

Recently, some researchers prefer to clarify the theory of gene-cultural co-evolution, to emphasize the leading role of the evolution of culture in a binary bundle «biological adaptation»-«social-cultural adaptation» [10, p.8886]. According to the paleo-genetic data the changes of genetic frequencies induced by a culture became noticeable in the period of the so-called neolithic revolution – transition to agriculture and cattle breeding. N. Moiseev [3, p.12] put forward the hypothesis that in the course of the neolithic revolution the direction of the genetic component of anthropogenesis has split. Pastoral tribes required constant movement, seeking for new pastures, the conquest of new territories. The unlimited expansion were the adaptive strategy of these tribes.

Thus, socio-cultural transformations are reflected in the frequency of the corresponding genes, and the numerical dominance of certain genetic determinants is an additional condition for stability or instability of the general direction of historical development (See [2, p. 129et al.] for example). Changes in the structure of the genome contributed to the reduction of conflict within the group, which occurred about 40 million years ago, were both a prerequisite and an element of adaptation of the ancestors of modern man to the socialization [6, p. 529].

The basic laws of the co-evolution of interdependent open, non-equilibrium self-replicating objects can be summarized in the form of two postulates: (1) indispensable condition for isolation of a new autonomous system with its inherent specific form of evolution is the emergence of an independent method of encoding, reproduction and transformation of information necessary for maintaining of their structure and reproduction; (2) among two conjugate evolving autonomous systems usually active role belongs to that which has the potential ability to more rapid adaptive evolution. Conjugation of processes and sociocultural and technogenesis occurs under the conditions of partial overlapping of mechanisms of generation and fixation of a new information, as well as the coding systems. In other words, along with co-evolution of cultural and technological innovation we can a priori observe a direct exchange of information between them: the higher generating capacity of the technologies, the more effective sociocultural regulators of their use [4, p.3].

In systems theory and informatics of structure for indicating of SAS<sub>H</sub> models, similar to described above, it is used the term "system of system" - SoS [9, p.62]. So, we can determine the *evolutionary risk* as the probability of development of time trend, leading to a sudden marked decrease of adaptability of the SoS. If the set forth diagram of the cycle of SAS<sub>H</sub> evolutionary transformations is true, then the cycle of rotation of the triple helix, started by biogenesis and ended by technogenesis, is approaching to the completion of the first spiral and an bringing up to the new level of the chain of co-evolutionary transformations.



At the first stage of the development the biological adaptation played the leading role, that initiated the emergence of behavioral and technological components of the SAS, that was reflected in the genesis and in the results of socio-environmental crises - the evolutionary bifurcations in the course of anthropogenesis. So, it was formed a relatively stable (in terms of evolution) configuration of a stable adaptive strategy of hominid (stage II). From that moment and until the emergence of technology-driven evolution the culture performed the functions of balancer-controller that integrates biological and technological components into an integral system. This factor is finally determined the boundaries of the ecological niche of the genus Homo as the being which does not adapt to the environment, but adapt the reality for himself and himself for some ideal image.

It is the evolution of culture defined a vector of technological development and its scope, matching the content and scope of technological innovations with the possibilities of the substrate material, i.e. - in the end - the genetic program that is encoded in the genome of Homo sapiens.

Human nature and its substrate can no longer be accepted as a universal constant, which can be «taken out of the context» of equations of the future evolution of civilization. This transition

through the point of evolutionary bifurcation will mean a radical transformation of the economic organization of technogenic civilization. The latter, in accordance with our concept is based on homeostatic interaction of the two sub-civilizations - industrial and agrarian, each of which builds on the alternative evolutionary-economic mechanisms of attracting and production resources.

Premise of this civilizational dichotomy is the technological dichotomy: the economic specificity of functioning of the subjects of the economic activity in the agricultural and industrial sectors of the economy.. Hence, the two fundamental characteristics of the agrarian type of civilization caused by dependence on solar energy and by the nature of usage of «bioreactors» (vegetable organisms): spatial constraints imposed on the efficiency of agricultural production in this technological context and cyclicity of the production cycle. The described dichotomy is also subject to a radical and irreversible erosion and deconstruction as a result of the biotechnology revolution.

Defense reaction to the prospects of transhumanistic transition consists in concepts formed by the culture, incarnated in the system of normative standards-stereotypes, canalising the topos of possible vectors of technological innovation in relation to human nature and ecological-cultural environment. The evident or indirect intervention of the public, state authorities and political movements into the subject and the progress of scientific researches has become the norm of life of the Western - and not only to the Western -civilization. These are the realities of modern society - the risk society. Moreover, precisely bioethics on the theoretical-reflexive level and diopolitics - on the projectable-praxiological level of the human being become a «transmission belt» of the global evolutionary process.

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