THEORETICAL AND METHODOLOGICAL APPROACHES TO THE RESEARCH INTO SOCIAL SPACE

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THE NEW IMPERATIVES OF ECONOMIC KNOWLEDGE: ON THE WAY TO SOCIONOMICS

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The article considers the current state of economic science and the methodological contradictions accumulated in its depths. The central thesis is the paradox of science, according to which meeting all the strict criteria of scientificity does not allow the current economic knowledge to give an effective response to the challenges of modernity. In order to substantiate this paradox, four attributes of the scientific nature of economics have been considered: theoretical, observational, inductive (historical) and experimental. Seven groups of objective causes provoking the decline in the practical relevance of economics were investigated in parallel. The emergence of the paradox of science against the background of long-term failures of economic science in explaining and predicting the key events of modernity indicates that for over 30 years it has been in a global methodological deadlock, in which one can stay indefinitely, rather than in a crisis that is resolved sooner or later. Therefore, a new social science – socionomics – needs to be created. Such attempts have been repeatedly made, but failed. Consideration of the methodological features of tectology, cybernetics, general systems theory and synergetics allows us to understand the reasons for these failures: identifying systems of different nature and assuming the universality of the laws to which they obey. The article shows new attempts of interdisciplinary research in Russia aimed at revealing deep analogies between structural patterns in physics, chemistry, biology and informatics and spatio-temporal archetypes (hexagrams) in the Chinese "Book of Changes" ("I Ching"). The author has revealed the reasons why these studies do not lead to final success in spite of their obvious fruitfulness: "The Book of Changes" operates with content and form of the phenomenon, but not with its scale, which gives the illusion of accuracy, but does not allow to make practically significant calculations. The contours of a new science – socionomics – are outlined.

Socionomics, hexagram, model, system, structure.

Introduction: the demand for a new science

We are now witnessing tectonic changes in the entire world order, and the process of gigantic restructuring itself is taking on the characteristics of turbulence. Not surprisingly, in this new reality, that the predictive power of the social sciences is reduced to a ridiculous level, if at all. The active geopolitical transformation of the world system that began in 2022 with Russia's special military operation (SMO) in Ukraine has been largely unpredictable not only to the average bystander but also to specialists immersed in the intricacies of politics. No one can predict what will happen in the future.

At the same time, so-called megaprojects are becoming more and more important for national economies, with the effect called "the law of the iron triangle", which states the following: the actual values of three parameters of a megaproject: financial costs, implementation time and final results (in financial and physical terms) are always higher than planned indicators (Gusev, Yurevich, 2022). All this unequivocally suggests that the social sciences such as economics, political science, sociology and history are failing to cope with the cognitive challenges of modernity. In turn, this circumstance allows us to draw a rather bold, though controversial, conclusion about the exhaustion of traditional social sciences' potential. Further, we will proceed from this statement clarified as follows: today we are witnessing the death of the social sciences in their modern form. Disclosing this hypothesis in the course of the article, which has already received enough attention in the scientific literature (Polterovich, 1998; Polterovich, 2011), it is logical to take the following step: humanity needs a new social science, based on a different theoretical and instrumental paradigm. In this regard, the purpose of this article is to consider the contours of the new science and its main methodological provisions.

The paradox of science

Throughout the preceding period, all the social sciences have steadily drifted in the direction of becoming increasingly saturated with mathematics and becoming analogous to the natural sciences. Economics has made the most progress in this endeavour. Today it has four attributes that make it little distinguishable from physics.

Thus, the first attribute, which the *theoretical* one, is represented by a set of mathematical models which relate the various economic variables to each other in a rigorous form. The presence of models allows building economic theories on the strictest formal level, and deducing all sorts of consequences, restrictions and conditions of realization of studied effects out of them. We can add to what was said above, that several new independent directions of mathematics were created especially for needs of economic science: linear and nonlinear programming; dynamic programming; game theory; mass service theory and some more particular disciplines (mainstream theory, inventory management, etc.).

The second attribute, the *observational* one, is related to the availability of a developed empirical base in the form of statistically observable aggregates and indicators, as well as econometric tools that allow us to check the presence or absence of relationships between variables. The visualization and digitization of economic concepts and the ability to test different hypotheses about the relationships between them make economics a very realistic science, akin to physics. Again, it is worth recalling that the least squares method was developed by K. Gauss for the needs of astronomy, but it is thanks to economics that such an independent and very powerful mathematical-statistical trend as econometrics was created on this basis. Today, the presence of formal methods in economics has increased even further, e.g. the tools of neural networks and artificial intelligence are used in economics no less actively than in the natural sciences.

The third attribute, the *inductive (historical)* one, is provided by the method of stylized examples and traditional case study, which allows as if to look inside a particular phenomenon or object and to test theoretical hypotheses on an example from real life and history. Note that the method of stylizing real histori-

cal events created a kind of methodological interdisciplinary link between history, political science and economics, without which many events and phenomena remained incomprehensible. At the same time, the inductive method itself, generalization from the particular to the general, found a completely different, more evidence-based empirical embodiment.

Finally, the fourth attribute, the *experimental* one, is represented by laboratory experiments, which allow the simulation of real economic interactions, testing certain theoretical propositions and identifying new behavioral properties of markets and subjects. It is important to note that controlled economic laboratory experiments are conducted on a solid theoretical and methodological basis, allowing the testing of scientific hypotheses, establishing new properties of social systems and collectives, as well as linking many disciplines – economics, neuroscience, psychology, etc. However, apart from *laboratory* experiments, there are two other types of experiments in economic science – the *social* experiment and the *pilot* experiment. A mass social experiment is not controlled, but it does not cease to be an experiment. For example, the construction of a state on communist principles could be considered a global social experiment, providing food for thought for many years to come. A pilot experiment is a local implementation of an institutional reform (for example, on the territory of 2-3 regions of a country), after which, depending on the results obtained, the reform is either abolished or replicated in the rest of the social space.

The presence of these four attributes makes economics practically equal to the natural sciences. It can even be argued, without much reservation, that modern economics is an engineering science. The other social disciplines – sociology, political science, psychology, law and history – also possess the above attributes, but in a less pronounced form. If 100 years ago, science was characterized by "exact sciences/humanities" opposition, with "social sciences" as an intermediate element between them, over the past century, the latter have made a powerful drift towards exact knowledge and have turned into a kind of engineering sciences. The proverbial opposition persists, but with a clear preponderance of natural sciences.

The paradox of the described situation is that at the moment when economic science became "real", satisfying the strictest criteria, it suddenly turned out to be incompetent and unclaimed. Let us ask ourselves why this happened.

There are many reasons for this state of affairs, but we shall touch upon only the most important ones.

First, modern economic science is the science of economic growth. Without growth, economics loses its meaning and significance as a science. At the same time, the modern world has arrived at the exhaustion of growth, when the former regime must change into a permanent qualitative restructuring of social systems in the context of economic depression. Researchers are now increasingly aware of at least three insurmountable obstacles to further economic growth: depletion of key natural resources (oil, metals, heavy elements, etc.); environmental degradation (ocean pollution, urban air pollution, climate change, etc.); over-accumulation of public and private debt (inability to pay back accumulated debts of all kinds and forms; they cannot be repaid without a fundamental restructuring of the entire global social system); and the growing inequality of the world economy. It turns out that our world is finite, and the question of stopping economic growth is only a matter of time, the regime of economic growth is only a brief episode in human history, and the subject of economic science is exhausted or, equivalently, has disappeared (Balatsky, Ekimova, 2021). Hence, a different kind of science is needed.

Second, at the current stage of civilizations' confrontation, the importance of the concept of economic efficiency, which underlies all economic science (Balatsky, 2012), has decreased dramatically. Today, such properties as responsiveness, reliability, functionality and adaptability of social systems are coming to the fore (Balatsky, 2021); they begin to determine the winning of competition in the phase of global turbulence. For example, the US outperforms China many times over in terms

of labor productivity, but this does not imply that the latter is uncompetitive. Rather, on the contrary, the US is continually and hopelessly losing the economic battle to China. The world's transition from a relatively stationary regime of economic growth to a turbulent state has automatically temporarily eliminated the former driver and criterion of development – economic efficiency of business operations. Thus, the theoretical and methodological framework of economic science has to be revised, hence, again, a new science is needed.

Third, the transition to a stop-growth regime has led to a reconsideration of the value of the various components of the world economic system. Whereas until recently the primary measure was production technology and economic efficiency of resource use, it has now become clear that the availability of critical natural resources is the primary value. For example, the lack of a domestic base of rare non-ferrous metals, heavy elements, etc., leads to the shutdown of nuclear power plants and microelectronics production in the developed world. Whereas technology used to generate the effect of interchangeability of natural resources, resource scarcity now requires the substitution of one technology or another. Consequently, the dependence of the more developed countries on deposits in the less developed states becomes greater than the dependence of the latter on the technologies of the former. Even a very rough military parity of countries based on the unacceptability of global nuclear war automatically partially blocks the remaining technological advantages of the advanced states. Such a reversal of forces in the geopolitical system requires a different scientific basis and, presumably, a different science.

Fourth, it is now understood that an adequate social theory should be based on *structural methodology,* as opposed to the traditional *causal paradigm* (Polterovich, 2016; Polterovich, 2018; Balatsky, 2021). This means that the usual causal chains are replaced by a kind of "multifactorial cauldron" in which all the variables in question are "boiled down" simultaneously. This description is characteristic of all complex and ultra-complex systems, in which, according to N. Taleb, "even concepts such as "cause" take on a different meaning, especially in light of the concepts of circular causality and interdependence" (Taleb, 2012, p. 101). In complex systems, or causal "cauldrons", there are three types of strong interdependence between elements: temporal (a variable depends on its past transformations), horizontal (variables depend on each other) and diagonal (variable A depends on the past of variable B as well as expectations about variable C) (Taleb, 2012, p. 100). These kinds of systems generate "atypical" causal events. For example, an event may cause a war, but its magnitude cannot be predicted: it may involve the deaths of three people or a billion. That is, even in situations where we are able to identify cause and effect, we cannot know the outcome in advance (Taleb, 2012, p. 101). Following Y.V. Mamleev, we can add that even the concept of fact has lost its former simplicity nowadays (Mamleev, 2019). It is difficult to say what is a fact in a world of fakes, disinformation and distortion of the truth beyond recognition. As a consequence of this state of affairs, A. Toynbee's principle is being activated, according to which one cannot adequately understand the history of one country or people without understanding the entire world history, in the context of which the respective country and people were embedded (Toynbee, 2011, p. 17). Thus, the space and time of a social object extends to the space and time of the entire observable world on a planetary scale, and this is already a different science and a different description of events. Not surprisingly, traditional mathematical models no longer work in such science. For example, many natural (e.g. tornado movement on the ground), medical (disease diagnosis) and social (e.g. inflation expectations) tasks use neural networks and artificial intelligence with an information base in the form of Big Data arrays. In these models there is a "simple" calibration of a primitive linear network based on a gigantic number of possible empirical combinations. According to A. Deaton, "if you have Big Data, you may not have economic theory" (Balatsky, Yurevich,

2018, p. 824). And this is the end of economic science itself.

Fifth, it is now definitively clear that any social system is a *man-created* one, hence it cannot be objectively observed and described. At the same time, social progress has led to a more manageable economy, an increase in the scale and sophistication of public administration, and public power itself has acquired unprecedented power and a certain sacredness. While previously the thesis of Lenin, stated in 1922, "politics is the concentrated expression of economics" (Lenin, 1970, p. 278), was true, which referred to the primacy of economics[1], by the end of the 20th century there was a definitive inversion of this formula: economy is the concentrated expression of politics. From then on, economics became a secondary, man-created phenomenon, with a corresponding principle: "Whatever the politics, whatever the economics". And even more so: "The kind of economics we make, the kind of economics we will have". And as long as the social system is determined by the will and desires of the people governing social processes, all of them must be included in the process of observation and description, but this is beyond the scope of modern sciences. For example, no one today would dream of constructing a model of an individual's life, as the endeavor doomed in advance to failure. For the same reason, there is still no mathematical model of Ch. Darwin's biological evolution, although its basic elements are well known. Thus, even the most thorough description of the social system loses its meaning, because any minor failure in its design completely disavows its further use. Considering an open system with its external environment and a huge number of degrees of freedom completely devalues any formal descriptions of it. In active systems, which include social systems, it is not the description that matters, but the action of their elements and the final result of their actions. However, this is precisely the task that modern science fails to address. Instead of producing useful advice for decision-makers about what to do, economics provides them with a complex mathematical description of processes that does not reduce uncertainty. Instead of a guide to constructing and projecting social reality, economic science offers a set of "objective" models, theorems, figures and facts which cannot be translated into the language of politicians and managers. Consequently, such science needs to be fundamentally changed, i.e. a new science needs to be created.

Sixth, during the global geopolitical turbulence in which the world finds itself in 2022, the concept of legal law has finally collapsed. As early as 2020, the communication channels of incumbent US President D. Trump were blocked, the World Health Organization (WHO) imposed lockdowns on different countries because of the coronavirus without adequate proof of their necessity, forced vaccination of citizens in many states, etc.[2] In 2022, Russia was subjected to large-scale international sanctions because of the SMO in Ukraine, which nullified the entire system of international law: the arrest of Russian accounts and gold and currency reserves, seizure of accounts and property of Russian citizens and companies abroad, prohibition of visits to Russian ports by Russian vessels, dissemination of false information in the media, etc. There is no longer any question of justice, hence the very notion of law is annulled and in its place there is only one unquestionable law – the Law of Force. Politics has traditionally denied the notion of law. Under these conditions, the logic of traditional economic interactions breaks down, and with it, the foundations of economic science.

Seventh, the situation of fusion of subjects and methods of all social sciences is already

[1] We should only note that with such a statement, Lenin still considered politics to be primary. However, these contradictions in the politician's views are irrelevant to the question under discussion.

[2] In some cases, the logic of the concept of legality is completely destroyed in the modern world. For example, according to WHO, the number of genders is not limited to the binary approach and assumes gender diversity (see: https://www.who.int/news/item/06-07-2022-who-updates-widely-used-gender-mainstreaming-manual). This leads to amazing legal paradoxes: a Norwegian feminist defending women's rights faces 3 years in prison because of her denial of other genders than men and women. Her claim that a trans woman is originally a man falls under a criminal article for discriminatory statements about transgender and bisexual people (see: https://spzh.news/ru/news/75798-novyj-zakon-v-norvegii-do-treh-let-tyurymy-za-kritiku-transgenderov).

absolutely clear today. As mentioned above, a common object of study, a common empirical base and a single analytical apparatus of law, sociology, political science and economics create conditions for their integration into a kind of synthetic science (Polterovich, 2011). The name of the new science could be disputed: for example, V.M. Polterovich suggests the name "general social analysis" (Polterovich 2011). In our view, this is a very unfortunate name – the main trend of development is in the direction of synthesis, not analysis; in addition, this name is too verbose and long. We will discuss this issue separately below, but the very need for a new science can be considered proven.

Thus, the conjunction, of a phase of economic maturity on the one hand, and of new challenges to it on the other hand, gives rise to a situation which can be characterised as a *paradox of science*: meeting all the strict criteria of scientism prevents current economic knowledge from providing an effective response to contemporary challenges. Consequently, the old methodological paradigm of economic science has become obsolete and a new social science is needed. In fact, we are witnessing a situation well expressed by N. Taleb in the following metaphor: "Economic science is like an extinguished star: you think that it still gives off light, but you know that it is dead" (Taleb, 2012, p. 216).

Attempts to create a new science: classic milestones

We should admit that the logic in the emergence of the present social sciences is quite faultless. Thus, until the end of the nineteenth century, the study of social phenomena took place within the framework of the political economy established for this purpose. However, at the beginning of the 20th century it became clear that it was necessary to move to a deeper comprehension of reality, for which purpose economics, political science, sociology and psychology branched off from the "mother" political economy. Today, the phase of development of these particular social sciences is coming to an end, and they must come together again into something coherent: the era of *total analysis* is being replaced by an era of *global synthesis*. However, this need began to be realised almost immediately after the emergence of private social sciences. Four classic attempts of this kind can be distinguished *(Tab. 1)*.

However, let us say right away that all the attempts under consideration have failed and have not yielded the expected result. Therefore, it is necessary to understand why this was the case. For example, the work of Russian physician Alexander Malinovsky (pseudonym Bogdanov), published in the 1920s, proposed *tectology*, a universal organizational science (Bogdanov, 2019). In 1947, the English historian Arnold Toynbee proposed his concept of the development of world civilization and a very beautiful and quite adequate name for a possible new science – *social seismology* (Toynbee, 2011, p. 28). In 1948 the American mathematician Norbert Wiener published a landmark work in which he introduced *cybernetics*, the science of control and communication in the machine, animal world and society (Wiener 1983). Next, in 1955, the English psychiatrist William Ross Ashby consolidated the position of cybernetics and formulated the law named after him (Ashby, 2021). In 1968, the Austrian biologist Ludwig von Bertalanffy published a treatise on *general systems theory* in which he contrasted the holistic characteristics of systems of different natures with the traditional doctrine of cause

Table 1. Milestones in the creation of a unified science of system design

Name of science	Pioneer of the science	Year of foundation
Tectology	Alexander Malinovsky-Bogdanov	1925
Cybernetics	Norbert Wiener	1948
General System Theory	Ludwig von Bertalanffy	1968
Synergetics	Hermann Haken	1977
Source: own compilation.		

and effect (Bertalanffy, 1968). Finally, in 1977, the German physicist Hermann Haken launched *synergetics* – the science of transitions of chaos (disorder) into order and vice versa: of order into chaos (disorganization) (Haken, 1980).

All the above works were to some extent based on structural methodology and implied a pronounced inter- or, more precisely, multidisciplinarity inherent in it. Although these works have not gone unnoticed, they have not given rise to a new science; until very recently, social science has continued to adhere to long-standing orthodoxies, trying to reduce the diversity of phenomena to a simple monocausal analytical construct. Why have all these fruitful attempts failed to produce the expected scientific breakthrough?

First of all, one cannot fail to notice that there is not a single economist among all the listed innovators (except perhaps Bogdanov, who was actively and quite professionally engaged in political economy). This largely explains the "defeat" of the listed sciences over a long time interval. Thus, while the "rubbing out" of tectology can be put down to an ideological conflict between A.A. Bogdanov and V.I. Lenin (Bogdanov, 2019), the other attempts did not fall under such subjective restraint. Moreover, the presentation of tectology is purely humanitarian, exclusively verbal, which also makes it less popular, whereas later sciences were based on more advanced analytical tools. What then are the shortcomings of cybernetics, systems theory and synergetics?

We will try to give an answer to this question.

First, these new sciences do not distinguish in principle between systems of different nature, and, on the contrary, emphasize the universality of all systems as such, their properties and qualities. Second, since there are no fundamental differences between systems of different natures, the laws to which they obey are also universal.

Both of these postulates are erroneous. For example, for social systems, the concepts of *part* and *whole*, *individual* and *collective* are fundamentally incomparable with those in physical and mechanical systems, since individuals in a social system are thinking entities who are aware of their own and the group's interests. In this connection, the activity of the elements in social systems is immeasurably higher than in physical, chemical or biological systems, and the consequence of this fact is a much greater variety of possible actions of individuals in society and their unpredictability. Moreover, in social systems the *contradiction* between individual and group interests, the part and the whole acts as a dialectical source of development of all dynamic changes of the systems themselves. Self-organization of social systems also occurs not only and not so much under the influence of external forces, but rather by taking into account the individual interests of actors and their internal goals. Not surprisingly, the laws in social systems are also quite different, their precision and formal rigor are much less. This is primarily due to the fact that all critical (threshold) values of the modes of functioning of social systems are not known in advance and, moreover, they are not constant in time and space. This makes it clear that any attempt to adapt the laws of physical systems to social systems is doomed to failure. This is the case in synergetics, where Edward Norton Lorenz's turbulence model, which is typical of lasers and hydrodynamics, is extended to biological processes, which have no analogous model constants, making it impossible to explain the ability of biosystems to avoid chaos (Haken, 1980, p. 378).

In general we can say that at the root of the failures of cybernetics, synergetics and systems theory are the endless attempts to apply (one might say, to superimpose) the well-known effects and analytical tools of physics and engineering to social processes. In such a situation, it is better to go the opposite way, to start from the peculiarity of social systems and to adapt the available methods of exact sciences to describe them[3]. In other words, it is necessary to abandon the thesis of the universality of all systems and build a new science in relation to strictly social phenomena.

[3] This is partly done within the framework of a scientific field known as economic physics, or econophysics. However, there are still no breakthrough results here.

Table 2. Milestones in the creation of a unified science of system design

Scientific direction	Pioneer	Year of foundation
Laws of Changes in Physics, Chemistry and Economics	Vladimir Maslennikov	2000
Laws of Changes in Genetics	Sergey Petoukhov	2001
Laws of Changes in Genetic Computer Science	Peter Garyaev	2009
Source: own compilation.		

To make this clear, we give the following textbook example. As early as 1920, Lenin formulated the canonical rule of the revolutionary situation: only when the "lower classes" do not want to live the old way and the "upper classes" cannot rule the old way, only in this case the revolution can win (Lenin 2022). Everything seems clear and there is no objection, but we cannot identify this notorious revolutionary situation. For an example, how can we measure the desire/unwillingness of the "lower classes" to live in the old ways? And how do you evaluate the ability/inability of the "upper classes" to govern the old way? And how do we distinguish between the "lower classes" and the "upper classes"? Finally, even if we settle these questions, what is the value of the very boundary of "boiling point" beyond which the predicted movement of the masses begins?

When it comes to water, which boils and turns into gaseous state at over 100 °C, and freezes and turns into solid state below 0 °C, there are no such problems – there is a temperature scale for it, which allows diagnosing of the current situation. Although even in this case, complications are possible: for example, on Everest water will boil at a temperature well below 100 °C, and in the Mariana Trench – well above this mark. But for physics, such complications are easily overcome; for economics, they are still insurmountable.

Attempts to create a new science: unconventional approaches

It is impossible not to dwell separately on some new approaches to the search for universal knowledge. One such approach is the interdisciplinary study of the Chinese Book of Changes (I Ching) in relation to various natural and social phenomena. Strange as it may seem, Russian researchers have been particularly successful in this endeavor, so let us consider some of their most representative representatives.

Below we will limit ourselves to three manifestations of interdisciplinary studies with reference to the Book of Changes (hereinafter referred to as BC studies), which are ambiguously intertwined in time and complement each other in many ways *(Tab. 2)*.

Thus, Vladimir Maslennikov, an engineer, was one of the first[4] to point out that philosophers of ancient China "knew how to construct chains of situations (stages) of natural human development" (Maslennikov, 2000, p. 9). By means of these rules and chains systematized in the Book of Changes one can "get into right relation to the laws of our essence and destiny, penetrate into all causes of manifest and hidden, exhaust all reality of objects and events to the end, and thereby point the way to discoveries and accomplishments" (Maslennikov, 2000, p. 11). Having formalized in the framework of the binary notation system the main positions of the Book of Changes, the author managed to complete D.I. Mendeleev's periodical system of elements (MPSE), which, as he rightly pointed out, had a beginning but was not completed (Maslennikov, 2000, p. 51). An indication of MPSE's incompleteness is the fact that the number of known isotopes is more than 20 times greater than the number of elements themselves, and the isotopes have not yet been systematized (Maslennikov, 2000, p. 51). The constructed cycles of evolution of the isotope elements based on dialectical models, as well

[4] V.G. Maslennikov's first book on BC studies appeared in 1989.

as the proton-hydrogen periodical system of elements allow us to speak about the success of V.G. Maslennikov's undertaking. Approaching social processes on the basis of his approach, V.G. Maslennikov argued that the longevity of the Book of Changes demonstrates to us the historical invariability of human nature. Then, in his opinion, "it is not possible to abolish the laws of natural development and human nature, but only to make necessary corrections in advance in order to prevent dangerous limiting states of society" (Maslennikov, 2000, p. 207). These theses allowed him to reconstruct the cycles of the most significant events of Russian history. However, the past quarter of a century after such impressive analytical passages, Maslennikov's BC studies have never given a worthy continuation in the academic science.

The next step to construct the biperiodic table of genetic code was taken by biologist and engineer Sergey Petukhov (Petukhov, 2001). The author constructed a double periodicity octet table of the genetic code which draws attention to the previously unknown structural features of the 64 codon system and the related system of 20 amino acids and terminator marks of protein synthesis. While a number of results, including the biperiodic table itself for the 64 triplets, has close relations to the ancient Chinese Book of Changes and its table of 64 hexagrams (Petukhov, 2001, p. 15). According to C.G. Jung, the system of trigrams and hexagrams of the Book of Changes fixes a universal set of archetypes (Petukhov, 2001, p. 53). In this respect, Petukhov's success allows us to connect the Book of Changes archetypes with the genetic code, which, in turn, is used as the basis of classification systems in linguistics, music, psychology and other fields of knowledge (Petukhov, 2001, p. 11). In other words, this allows us to approach "ancient symbols used by the most different peoples for thousands of years not only as a fruit of an ancient artist's fantasy randomly spread around the world, but also as the information about deep properties of the self-organization of natural systems, especially biological ones" (Petukhov, 2001, p. 53). Despite the mutual correspondence between the ancient semantic symbols of the Book of Changes, the archetypes of the human thinking, and the genetic codons identified by S.V. Petukhov, these BC studies have not yet received the required development.

Another BC study is presented in the works of biologist Peter Garyaev, who treated genome as a linguistic (speech) formation[5] (Garyaev, 2009). Like V.G. Maslennikov with respect to MPSE, P.P. Garyaev with respect to Francis Crick's model of the genetic code is concerned about its incompleteness. According to P.P. Garyaev, it does not consider the provisions postulated by the author himself. To eliminate the mentioned drawback P.P. Garyaev introduces two vectors of degeneracy of the triplet code: synonymy (code uniqueness of the set of differing codons), which has long been known, and homonymy (code uniqueness of the first two identical nucleotides in codons) (Garyaev, 2009, p. 7). Such a division is of fundamental importance for biological evolution, because synonymy (redundancy of information) of the code is a good thing, while homonymy (uncertainty, ambiguity of information) is a potential evil (Garyaev, 2009, p. 23). Thus, all codons having analogy with hexagrams of the Book of Changes are divided into two subsets. This step allows not only a better understanding of the semantic nature of the genetic code, but also the biological basis of speech and the mental sphere. It is believed that P.P. Garyaev's work laid the foundation for linguistic genetics and genomic quantum computing (Garyaev, 2009, p. 5). However, this BC study is also not widely supported in academic circles.

In view of the lack of discussion of the reviewed works in academic discourse, let us elaborate on their weaknesses and strengths, and try to answer the question of why BC studies remain a marginal area of social heterodoxy.

First, it is difficult to overestimate the significance of BC studies, as they allow us to operate with a finite number (albeit fairly large) of meaningful symbols of essence, which reproduce archetypal situations in the

[5] The first monographs by P.P. Garyaev and his co-authors on this subject appeared as early as 1994, but were completed in 2009.

organization of natural and social systems and in the development of processes of various nature. We can say that hexagrams reflect spatial and temporal types of organization and evolution of any systems. In particular, it follows directly from the fact that any hexagram consists of the bottom *trigram of space* (length, width, height) and the top *trigram of time* (past, present, future) (Petukhov, 2001, p. 193). Given the obtained results of BC studies, it is a great help in studying social systems and their dynamics.

Second, the mathematical apparatus of BC studies is surprisingly simple, which offers great opportunities for its replication across all problems. As a rule, all BC research models and schemes are expressed in logical binary form and have a clear geometric interpretation. This in itself enables not only the involvement of large groups of researchers in analytical activities, but also the extensive use of computer modelling tools and Big Data techniques (Big Data).

Third, BC studies set a completely atypical course of action – from passive description of reality or willful brute pressure on this reality to effective adaptation to it by the participants of the process under study. Thus, the semantic content of BC research implies the development and adjustment of controlling influences on both the control object (economic system) and its subject (decision-makers). We can say that in this case the *principle of dual management* is implemented, which marks a new management paradigm.

What prevents the results of BC research from being widely applied in modern social sciences?

The answer to this question can be given as follows.

First, the "Book of Change" operates with the *content* and *form* of a phenomenon, but not with its *scale*. This means that it can be used to understand the abstract configuration and typology of phenomena and events, but not to determine their initial or current conditions, which makes it impossible to use the available knowledge in practice[6]. And while this problem is solved for physical, chemical and biological systems, it is not solved for social systems. Here we can draw an analogy of BC studies with the theory of differential equations: knowing the general solution of a differential equation, we have an infinite number of trajectories, which have no practical value; having set initial conditions, we can choose from the mentioned set the only particular solution, which is necessary for a certain problem. As an economic example, according to Giovanni Arrighi's concept of accumulation cycles, the centre of world capital changes its geographical location over time (Arrighi 2006), but from this knowledge we cannot determine which country will become the new centre and when this will happen.

Second, BC studies produce an *illusion of accuracy*. This property is a direct consequence of the first one and consists in the fact that an intelligible form becomes a highly extensible entity without knowledge of scale depending on the context of the study. Continuing with the previous example, it can be argued that knowledge of Arrighi's four cycles of accumulation does not allow us to determine the geographical point and date of the final formation of the next world capital center. For example, three accumulation cycles tended to compress their duration by a factor of 1.3 on average, but it does not mean that the next cycle will not break this rule. Similarly, knowing about the spatial drift of the center of capital, we cannot determine the exact direction of its drift and where it stops. For example, today we know for sure that a new center will emerge in Eurasia, but it is not yet clear whether it will be China, United Europe or Russia.

It is this illusion of accuracy that generates the mistakes made in BC studies. For example, V.G. Maslennikov, based on his developments, proceeded from the approximate equality of the lengths of various social cycles in huge historical intervals (Maslennikov, 2000, pp. 239–240), which is deliberately erroneous. It

[6] The everyday practice of using the "Book of Changes" is throwing coins or similar procedures to identify the current situation. However, this approach has no basis and cannot be discussed as acceptable from a scientific point of view. This practice should not be confused with throwing runes, which should be done in a state of deep concentration and meditation; as a rule, such actions require person's special abilities and long-term training in the appropriate practice.

is precisely this kind of errors that restrain the widespread replication of BC studies; this is why they are not yet capable of producing a fundamentally new social science.

We conclude this section with another very simple example that sheds additional light on the illusion of accuracy. For example, we are well aware of all the phases of the human life cycle: birth, infancy, childhood, adolescence, youth, maturity, old age, decrepitude, death. But is it possible to predict when senility and death will come for a particular young person? They come at different times for different people – some are given more time, some less. Moreover, some phases may not come at all, for example, a person is in a bad car accident when they are young and will not live to see old age. It is even more difficult to operate with these phases for whole countries and nations. Taking into consideration the man-made character of all social events, many of them can be shifted in time and space in any direction so greatly, that it already exceeds the limits of reasonable scientific prognoses and any analytical schemes. Thus a peculiar *cognitive paradox* arises: even knowing the spatio-temporal *patterns* of the "Book of Change" we do not know their spatio-temporal *limits*, and therefore the research in this direction does not give the desired result.

To summarize, BC studies can and should be an important *addition* to the new social science, enabling the ordering of various behavioral patterns according to circumstances, but they alone cannot constitute the *core* of the new knowledge.

Socionomics: the contours of a new science

At present, humanity has accumulated enough knowledge to create a new synthetic social science. Let us try to outline at least its most general contours.

Thus, it may be stated that the new science must be a science of self-organization of social groups into large systemic units and, conversely, of disorganization of social systems. In this case, the *organizational* origin of *social* systems comes first. Systems of other natures – natural, technical and biological – can be studied and used to gain a deeper understanding of social communities, but it is not appropriate to transfer their laws to sociality, so the proposed new science must be exclusively social in nature. However, social objects and systems themselves should be viewed from a synergetic perspective – their ability to increase the structural order of both themselves and their environment.

In order to separate the new science from the existing ones that have failed, discredited or become obsolete, it should be given an appropriate new name which should be short, precise and as succinct as possible. This might be *socionomics* or *socionomy*. It is easy to see that this name is a mixture of economics and sociology, political economy and typology. The etymology of the word is simple: Latin "socius" or "societas" (society) and Greek "nomos" (λόγος) (law, principle, rule). In this interpretation, *socionomics is the science of principles and rules for constructing social systems*. A person engaged in socionomics can be called a socionomist. Here it is important to distinguish socionomics from sociology, which, by its tasks and research methods in practice, has turned out to be much narrower than its successful name suggests.

As we noted above, all social systems are man-made, and are created by the participants themselves. In this sense, socionomics is aimed at constructing social systems of various types and kinds, and therefore is a kind of social engineering, with direct access to the sphere of governance, hence an organic link to A. Bogdanov's tectology and N. Wiener's cybernetics. The study, within the framework of socionomics, of the principles of social systems' assembly, of the regularities of their existence, evolution and disintegration establishes connections with A. Toynbee's social seismology, L. von Bertalanffy's theory of systems and H. Haken's synergetics. And socionomists' understanding of the ways and models of social systems' interface with the external environment makes it possible to benefit from the positive results of BC studies. Thus, socionomics should incorporate all the earlier developments in related sciences.

The question of the methodological and instrumental framework of socionomics

deserves special discussion. It has been shown above that economics today is an engineering science. In this sense, socionomics should not just be an engineering science, but even more so than today's economics. This means that it should still be based on modelling, using quantitative methods and formalizing all processes. However, all this should be carried out on different principles, which need to be explained.

The fact is that even within the framework of economic science, its most authoritative representatives have long called for a rejection of the absolutization of mathematics. For example, Maurice Allais believed that models in economics can act not even as an image of reality, but as a *frame of reference* to help understand the extent to which society is under-utilizing its potential (Allais, 1995, pp. 18–19). In this way, even the most abstract theoretical constructs contribute to the *correct orientation* in understanding practical problems. Another landmark call for the correct use of models is Paul Krugman's thesis: "The equations and diagrams of formalized economic theory usually act as a kind of scaffolding needed to erect an intellectual edifice; once it has been built to a certain level, the scaffolding is removed and the description of the essence of the construction is set out in the simplest and most accessible language" (Krugman, 2009, pp. 19–20).

Proceeding from the above imperatives, it is possible to formulate two tasks of socionomics models – to *illustrate* and *define the scale* of the phenomena under study. The first task involves building models which, at a qualitative level, reveal the essence of a phenomenon or process (e.g., the emergence of threshold effects in overcoming institutional traps) very clearly. The second task is to build models which can be used to determine the order of magnitude of the quantitative effect (e.g. units, tens or hundreds of percent of profitability). In both the first and second cases, simplicity of model construction is assumed; otherwise, the set tasks will not be solved.

However, socionomics itself should first of all have the principles and rules of organization and functioning of social systems in its analytical arsenal. These are already available, but they are scattered in various sources, articles and monographs from different scientific fields. Hence, the task of building a new science comes down to collecting all the essential principles, rules, effects, models and facts into a single logically ordered "archive" in a maximally structured form of concepts, schemes, tables, diagrams, figures, facts.

The outcome of socionomics developments and recommendations should be institutional plans and management decisions, designing the future instead of forecasting it (Balatsky, Ekimova, 2021).

Discussion issues

The need for a new science, socionomics, is not unconditional, and not all researchers will accept abandoning the former social sciences in favor of something not yet understood. It is therefore legitimate to ask: can get along with expanding the subject of economic science or creating a new approach (direction) within the framework of the existing arsenal?

Of course, such options are possible, but this will most likely lead not to an improvement, but to a deterioration of the situation. The fact is that the subject matter of economics today is already so broad that it covers all the issues that can arise in social knowledge; there is nowhere to expand the subject matter. As for a new approach or direction, there are already so many of them that one more approach or direction would simply get lost among them and would not give the expected results. For example, at one time cybernetics dissolved into the private sciences, giving rise to technical, economic, biological, medical cybernetics and other similar fields. As a result, today all economic science has become cybernetic, and cybernetics itself has disappeared. At present, the process of "dissolving" new knowledge and new science into old sciences must be prevented; otherwise, there will be no qualitative breakthrough. Consequently, it makes more sense to create a new science, socionomics, and separate it from the "noise" of other social sciences.

As for how to create a new science, this is

a question that deserves a separate and most serious consideration, but in the most general terms the following can be pointed out.

The algorithm for socionomics creation can be understood from the evolution of social knowledge over the last 200 years. Thus, political economy gave rise to a wide range of private social sciences, which evolved from purely social knowledge to natural science and engineering *(Figure)*. Almost every social science today already has a *core of knowledge* (indicated by shading in the figure), which is technological in nature (political technology in political science, management in all its aspects in economics, marketing technology in sociology, lie detectors in psychology, etc.). This core of knowledge, with its accompanying theoretical arsenal, is to be transferred to a new science today, to socionomics. Freed from the "background" of the private social sciences, it is possible to limit the scope of the new science and begin to synthesise it with the development of model applications. The result should be a science in which theory and practice are most directly coupled.

This work should be organized by enthusiastic researchers in different research centers of the country, followed by discussion and synthesis of the findings. Over time, this volunteer movement may lead to the creation of appropriate informal creative teams, later – to the opening of laboratories and departments, the writing of monographs and textbooks, and even later – to the creation of new training courses and programs. The last stage should see the final institutionalization of the new scientific

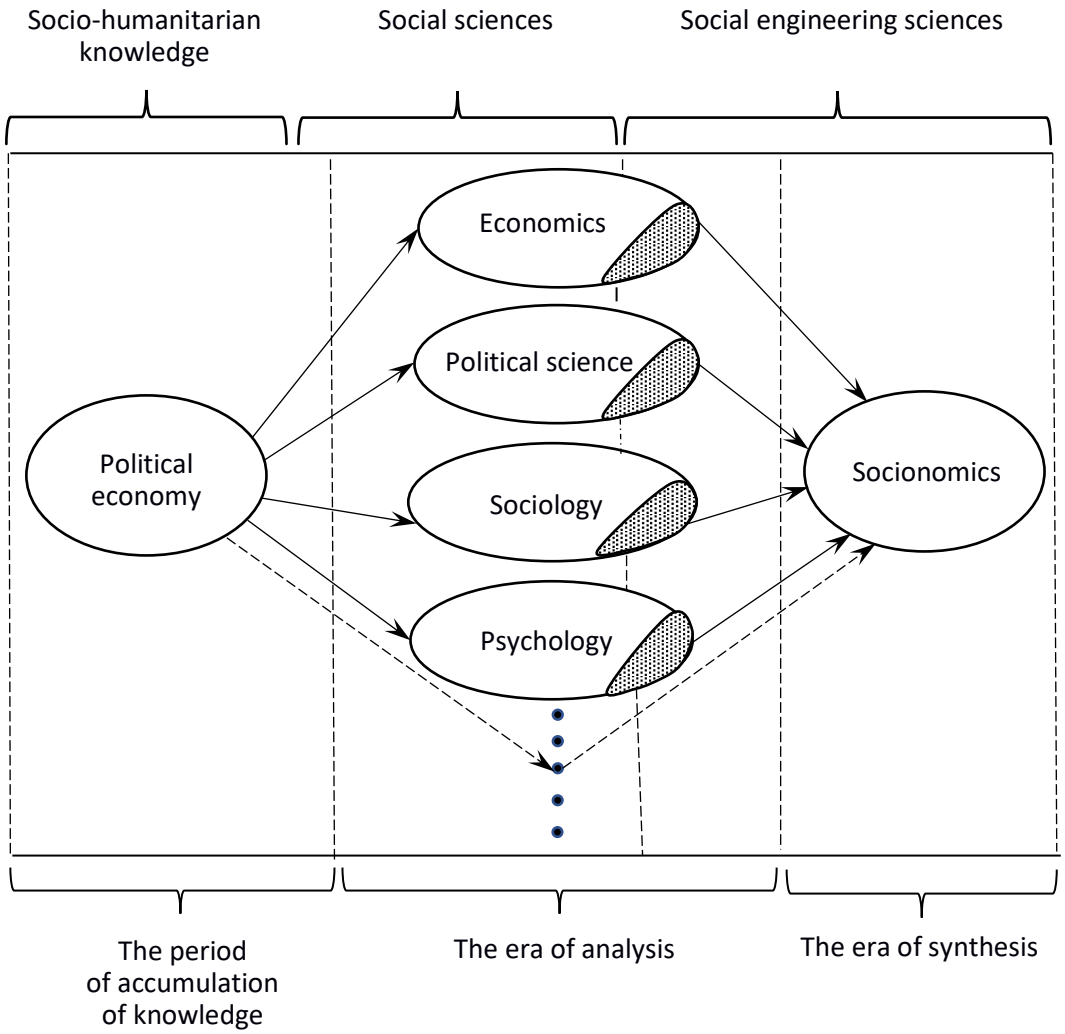

Fig. The social knowledge transformation cycle

Source: own compilation.

field through its official inclusion in the list of social sciences and the creation of relevant dissertation councils and specialized journals.

Conclusion: overcoming the crisis or breaking the deadlock?

The state of economic science discussed in the article leads to the conclusion that the emerging internal difficulties must be classified not as another crisis of a promising scientific discipline, but as a deadlock of the "old" science. What makes it possible to say that?

In the 1990s, when the Soviet Union collapsed, economic science was incapable of predicting even the most obvious consequences of this event, everything did not go as expected. However, in the 31 years since, the world has once again found itself in a state of global rearrangement. In 2022, Russia's SMO in Ukraine began, the very emergence of which is an egregious example of the wrong predictions of modern economic science: US administration analysts systematically violated Russian national security principles and assumed that it would continue indefinitely. From the outset, the SMO was perceived by the West as aggression by Russia, for which Russia was punished with unprecedented economic sanctions in the hope of bringing it to its knees and hastening its defeat in a military conflict. Six months later, it turns out that these actions have resulted in truly serious economic damage to Europe and, in part, to the US itself, while Russia continues to conduct the SMO, and its economic difficulties are invisible to much of the population. Meanwhile, by provoking the conflict in Ukraine, the US has dealt a heavy blow to itself, triggering a de-globalization of the world system and accelerating a geopolitical transformation with the inevitable loss of its international hegemony.

Without going into a discussion of the conflict of 2022, one thing can be safely stated: economic science has once again demonstrated widespread mistakes and miscalculations, as well as an even greater chasm between economic theory and real life, which has grown in the last 30 years. This chasm takes the form of a contradiction between the enormous *instrumental complexity* and *sophistication* of theoretical constructions of economics and the *astonishing primitiveness* and sometimes outright absurdity of its practical recommendations. In 1998, V.M. Polterovich proposed "dropping the claim of economic theory to discover universal laws" as a step contributing to the normalization of the cognitive climate of the community of economists (Polterovich, 1998, p. 64). Today, however, even such a step would no longer change anything. This suggests that for more than 30 years the economy has not been in crisis, which sooner or later is resolved, but in a methodological deadlock that can last indefinitely. And, as you know, the way out of deadlock is to go back in search of a completely different path.

The above attempt was made to outline the direction of efforts, which can allow overcoming the current destructive state of economic science. However, it appears that few people want to go in that direction today. The fact is that the creation of a new science is associated with an enormous work of concrete people to collect all the best and most valuable that has been accumulated by world science (and not only economics), to systematize the collected material and its subsequent application to the practical needs of society. Sooner or later, someone must do it. The only thing left is to find those who will lead and support this movement.

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