

*Philosophy of Science
Философия на науката*

PARADIGM SHIFT IN THE UNDERSTANDING OF THE CREATIVE ABILITIES OF CONSCIOUSNESS

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Abstract. The understanding of human consciousness as a kind of computer is insufficient and even irrelevant, taking into account the modern advances in the development of cognitive science. The author argues that a certain paradigm shift in the understanding of human consciousness and its creative abilities takes place. Consciousness is rather dynamic and autopoietic entity that is embedded into environment and intimately related with the human body. Consciousness is embodied, situated and enactive. A great contribution to this conception of human consciousness (mind) is made by Francisco Varela and his followers. Autopoiesis of consciousness means that it is able to maintain its integrity in the processes of self-organization in the permanently changing environment. An autopoietic activity of consciousness it directed to the search of elements that are missed, it longs for completing integral structures. For these reasons, it is possible to create a new, fresh view on the creative activities of consciousness, if we base our notions on the modern theories of complexity, dynamic chaos and self-organization. In the theoretical frames, chaos acquires a creative image; it is not simply a destroying force. Complex structures emerge in chaos and out of chaos. Chaos is organized and it organizes. When destroying, it builds. Chaos has many facets. Chaos is a way of renovation of complex organizations. A periodical immersion of human consciousness into chaos is a way of stimulation of its cognitive and creative activities.

Keywords: autopoiesis; chaos; complex systems; consciousness; creative thinking; self-organization.

Introduction. Creativity is a Requirement of the Modern Age. We live in such a period of time when everyone wants to be creative. Creativity is a desirable quality of a person and a characteristic of a product or service that is highly valued in the modern society. Creativity is in demand everywhere. This is:

- the creative problem solving,
- creativity and innovation in economic markets,

- creative leadership, when a leader acts as a catalyst for progress and changes that are already matured in a group (an organization), and works optimally, having a positive vision of the future,
- creative learning, which is, in fact, learning by awakening of a pupil,
- the creative organizational climate in a particular social group or enterprise,
- creative communities, where the mechanisms of synergy, mutual adhesion and mutual stimulation of individuals, are available,
- everyday creativity (gifted people are creative in everything, in any area of their daily activities).

The literature on creativity is colossal (see, for example: Ambrose, 2016; Charyton, 2015; Glăveanu, 2016). However, largely the literature concerns the psychology of creativity. Psychologists, as a rule, consider the stages of creative activity, the connection between creativity and emotions, as well as creativity and intelligence, the development of creativity in children and throughout a person's life. In the article, creativity is considered from the point of view of cognitive science and epistemology, when applying relevant models based on the theory of complexity.

The *Encyclopedia of Giftedness, Creativity and Talent* (Kerr, 2009: 200 – 201) states that creativity includes two aspects. First, the product of creativity is always original; it is characterized by novelty, singularity, uniqueness. Secondly, it is not only original, but also forceful, effective, able to integrate well, to find its cognitive, cultural, social, market niche. Creative products remain important. Nevertheless, creativity itself is more personal than social. It is connected with the ability to have an open mind and not follow conventions, with flexibility, mobility, originality of thoughts, as well as with the ability to deviate from the generally accepted patterns and from the standards of perception, thinking and actions

The problem of creativity is in intermediate relation with the problem of innovation and innovative complexity. Creative people create new things, such as new knowledge, new melodies, new styles in painting or architecture, new patterns of social organization. However, only a few of these creations are destined to be recognized and to spread in culture, i.e. to become innovations. We know creativity in high samples: creativity is Pyotr Tchaikovsky's musical work, Pablo Picasso's painting, Wolfgang von Goethe's poems, and Albert Einstein's theory. However, in order to understand what creativity is, it is worth viewing it through an "epistemological loop" or from the standpoint of the modern cognitive science.

The Individual Consciousness: a Self-organizing Complexity. Structures of self-organization are not hard blocks from which the observed well-ordered universe is built. They are rather metastable localized processes that are able to become permanently transformed, to enter into cooperative interactions with other processes and to form thereby larger entities or, on the contrary, to come apart

and sometimes to completely disappear in a chaotic background of the universe. The observed well-ordered world is the world where structures-processes of self-organization live their own life. If we consider a human being, his cognitive abilities and practical intentions, the construction of his personality, the hierarchical layers of his consciousness and subconsciousness, the historical strata of his memory, all these formations can be understood as *structure-processes of self-organization*. Many notions of the theory of complexity (self-organization and poising at the edge of chaos, operational closeness and self-production, autopoiesis, a multitude of possible discrete states and the existential choice in the moments of bifurcation, the slow, iterative going out to the automodel stage of development and the autocatalytic, avalanche-like growth of a new property) are in use for a better understanding of the internal complexity of individual consciousness (Knyazeva & Haken, 1999).

Poising at the Edge of Chaos. Nature is wise in constructing complex structure formations, but these structures are rather fragile. They are poised “at the edge of chaos” in such a way that even the best little step in the direction of improvement of their organization can initiate the process of their rapid spontaneous decay. Such properties of self-organizing systems are studied in the theory of self-organized criticality (Bak, 1997).

Availability of chaotic elements, a relative irregularity is often a sign of human health, both corporal and spiritual, a sign of stability of personal structure. For example, only a strong aperiodicity in heartbeat means a sickly state – arrhythmia, whereas some small chaotic fluctuations in heartbeat are quite normal; they are a result of especially internal rather than external factors. A line of demarcation between the health and an illness, between life-giving and basilisk chaos is rather polysemantic and mobile. The question is: what portion of chaos must a human carry in himself in order to be healthy?

Chaos is a natural randomizer, i.e. a random-signal generator in nature. Chaos makes our organs more flexible and more suited for a changeable environment. A complex organization emerges and maintains itself at the edge of chaos. “The edge of chaos is a dynamic, fluid transition zone exiting between two extremes: predictable order and unpredictable chaos... All of life evolves to the edge of chaos, where it remains flexibly poised in a critical state of readiness... Only between extremes, at the edge of chaos, can a psychological balance be achieved. At the edge of chaos, we are best equipped psychologically to deal with erratic and unpredictable events in life” (Marks-Tarlow, 1999: 322 – 323).

The more stereotypical a person’s behavior is, the more suspicion is there about his pathology. Whereas a psychologically healthy man conforms to the patterns of behavior depending on social roles he plays at the present moment, a man with a mental disease pursues – to a considerable or lesser degree – only one object (*idée fixe*), his behavior is – to a great extent – repeatable, iterative, liable to cyclic attrac-

tors. His behavior does not have the due flexibility and is not sensitive to environment, which is steady in change.

To be chaotic means to be creative. Chaotic cognition. The human creative activity is in need of special stages or permanently existing layers of subconscious random, chaotic movements of mind. To be productive, cognition should have periods when it plunges into chaos. Nowadays some specific methods of chaotic cognition are under development. Such methods allow thinkers to explore new possibilities and to make maximum use of moments of intensive inspired work when the increase of new knowledge occurs. Creative thinking is divergent thinking. The pathway of creativity consists in giving oneself over to chaos in order to take possession of it. That is to resign oneself to control of chaos when at the same time seizing the opportunity to create a refined structure.

Every human has a shady side, which lies not only in his psychological weaknesses and in shortcomings but also harbors a demonic dynamics. The monstrous, explosive, non-organized energy that cuts its way through layers of subconsciousness is similar to avalanche-like natural processes, the so-called blow-up regimes, studied in the theory of complexity, in which new, so far unobserved structures of self-organization arise. A “wandering look” of mind – this is an image that might rather precisely express the basis of human creativity. The mind should be decentralized, defocused; it should move freely between vectors of directional activity. The “wandering over the field of possible pathways of development”, the chaotic movement of creative mind leads every now and then to coming out to one of structure-attractors. Thereby, a vector of creative activity, leading to a breakthrough into a new, is determined. A field of possibilities is being tested. As a result, one of latent structures is realized; the crystallization of new knowledge occurs.

Thus, chaos is necessary in order to allow a cognitive system to go out to a structure-attractor, its own trend of development and to initiate the process of its self-organization. In fact, it has been known since long time and has been expressed in allegorical, poetical forms, such as, for example, in one of aphorisms of Friedrich Nietzsche: “A man has to carry chaos in him in order to be able to get birth to a dancing star” (Nietzsche, 1955: 284).

According to the synergetic model developed by H. Haken (order parameters, slaving principle, circular causality) (Haken, 1988), as a result of creative activity or creative teaching, new order parameters of behavior of a human as a complex nonlinear system spring up. The system “swings” over all accessible degrees of freedom, and after that, new macroscopic structures of knowledge or of experience appear. Creativity is a factor of success, because it implicitly relies on chaos as a way of self-renewal. To undertake something means to change permanently and to find vectors of further development.

Individual landscapes of personality. Every personality is autonomous and self-sufficient. If we apply a term from the theory of autopoiesis elaborated by H.

Maturana and F. Varela, we may say that a personality is operationally closed, i.e. a man derives his strength and intentions of his activity from himself, makes his own plans, actualizes himself, and devotes himself to the world. The Russian scientist, Nobel Prize laureate in Physics (1978) Pyotr L. Kapitza once noted that “the main sign of talent consists in the fact that a man knows what he wants”. At the same time, consciousness is a multi-layer and many-dimensional formation, which is dissolved in situations, actualized in different social and family roles, distributed in a topological way. Individual consciousness has his own space of life which borders are fragile and mobile. An individual landscape of personality is built into a landscape of his family as well as of the corresponding social group, nation, noospheric reason.

These notions are strikingly close to the ideas of Kurt Lewin (1890-1947) who was a disciple of the Berlin school of gestalt psychology but developed later on his original research trend called by different names: “dynamical theory”, “topological psychology”, “vectorial psychology”, and “field theory”. Lewin introduced a notion of “space of life” (“Lebensraum”). This is a personality taken together with his psychological environment in such a form how it exists for the personality. As a rule, the space of life is taken into consideration, if personal needs, motivation, mood, purposes, doubts and fears, ideals are analyzed.

What is structure of the personal space of life? The concept of purpose as an ordering of forces in a dynamical field of personality plays here the central role. The space of life contains “the psychological past”, “the psychological present” and “the psychological future”, they are different dimensions of the available space of life (Lewin, 1982: 68). Lewin introduced the principle of simultaneity (synchronism) and of simultaneous influence of the past and the future: any act of behavior and any possible change of the psychological field depend purely on the state of the field at the present moment. The psychological past, present and future are parts of the psychological field in a certain point of time. Both the past (accumulated experience) and the future (expectations, desires, apprehensions and hopes) exert influence on forces regulating the today’s behavior of an individual.

The space of life of personality is a certain field on which different forces, determinative tendencies, aspirations come into collision with each other. Thereby, the purpose is understood as a force field of psychological activities structured in a certain way; it is a disposition of forces in space. As a matter of fact, this is a certain dispersed purpose. The notion of vector finds a quite constructive use in the topological psychology. Firstly, forces that are available in the psychological field can differ in magnitude. Secondly, one can perceive various directions of forces (of aspirations) within the psychological field. The very notion of direction makes sense only if one can distinguish different directions, as we might say from the synergetic point of view, different structure-attractors of psychological activities.

The individual landscapes of personality are configurations of the inner (own) space and of environment of an acting and cognitive subject. These configurations

are determined by a dispersed purpose, by a spectrum of structure-attractors of cognitive and creative activities.

The cognitive activities are partly pre-determined by latent and overt attitudes and plans. The cognitive subject is permanently in a multi-stable state and takes a random walk about the field of possibilities. There is a zigzag path that every time actualizes only one possibility from an available spectrum of theirs. The individual landscape a whole series of purposes and paths that lead to them. One can form a picture of a certain space where all possible forms of trains of thought are already available in a concealed, latent way. When a new knowledge arises, a fan of possibilities rolls up into one possibility from a set of discrete states.

Another specific feature of the individual landscape of personality is synchronism. The landscape involves possible pathways of future development as well as some traces of the past activities. Applying a term of Kurt Lewin, one may say that the landscape has a certain temporal depth. The synchronism of configurations of the human soul was a subject of investigation in the works of Karl Jung as well: "The soul is all that a human has already done and that he still has to do in the future". The memory of the past is always at present, but it can exert influence on the course of life only before points of "bifurcation", i.e. at the moment of decisive choice of one of possible courses of life. If the point of "bifurcation" is already passed, the choice is made, the human activities are determined by the future rather than by the past. In such a case, the activities are built from the future, in accordance with one of structure-attractors of development.

Instabilities. Cascades of Crystallization of Personality. The structure of landscape of the individual consciousness is not rigid. Change in the intrinsic characteristics of a personality leads to reconstructing the field of pathways of his movement into the future. The stages of child's education as well as the further self-education condition periodic qualitative transformations of a spectrum of purposes of life (plans, expectations and hopes) and a spectrum of possibilities. The personality passes through periods of instabilities and crises; as a result, crystallizations of personality (his knowledge, his talent, etc.) can take place. The long process of self-education and of permanent creative activity are connected with a whole series of "bifurcation", cascades of crystallization of personality, several events of qualitative reconstruction of structure-attractors, non-linear phase transitions. The individual landscape is repeatedly re-built in a qualitative way. A person becomes times and again another one. A creator is created. As Paul Valéry once noted in his diaries, the attained exerts a backward influence on the creator. The work alters an author.

Fractal Geometry of Human Behavior. The fractal pictures of human behavior are determined, in the first place, by some stable, reiterative, reproducible structures (patterns) of behavior and, in the second place, by self-similarity of these structures on different levels and on different scales of human activities. The fractal dynamics signifies either

the structure of a strange, chaotic attractor that underlie the human behavior or self-organization of a complex structure near a critical point, “at the edge of chaos”.

The landscape of individual consciousness has a certain fractal depth. In other words, configurations of situations of life demonstrate a property of scale invariance. A creative man is creative in all kinds of activities, both in the large and in the small. He is creative on all levels of the scientific and practical activities, down to the everyday life. For example, he can develop his original methods of cooking – of the preparation of house-made veal cutlets. It is paradoxical that the creative, non-linear writing is connected with the creative, non-linear cooking. On all levels and in all fragments of the chain of his actions, one can discover his “handwriting”, his original style of creative activity.

Consciousness: Embodiment and Enaction. The approach based on the theory of complexity to understanding the human consciousness and behavior coincides with the modern dynamical approach in cognitive science (F. Varela, R. Brooks, T. van Gelder, R.D. Beer, A. Clark and others) which is based on the applying the models of nonlinear mathematics and of the theory of complex adaptive systems. The dynamical approach is defined by three key words: embodied, situated and enactive cognition. What is a meaning of these new concepts?

Cognitive activity of consciousness is embodied: the perceptual and mental processes are bound up with the “architecture” of human body. F. Varela with his co-authors explains the term as follows: “By using the term embodied we mean to highlight two points: first, that cognition depends upon the kinds of experience that come from having a body with various sensor motor capacities, and second, that these individual sensor motor capacities are themselves embedded in a more encompassing biological, psychological, and cultural context” (Varela et al., 1991: 172 – 173). The processes of perception and motor activity are closely connected in the real processes of cognition. The mental processes are bound up not only with the emotionality of an individual but also with peculiarities of his corporal organization. Therefore, it is in a certain sense true that a human thinks using his body not only his brain. It is said for a long time that there is a language of body that constitutes a basis of nonverbal communication. If there is the language of body, may be the thinking is not concentrated in the head but is poured over the whole body.

Cognitive and creative activity of consciousness is situated: a cognitive act expands into a situation that possesses certain topological properties. The relations of a cognitive subject with his environment are essential. From the standpoint, memory is not considered as something accumulated in a symbolic form in the head; it is rather spread over environment. The cognitive psychology becomes an ecological psychology. In this respect, the individual emergence signifies co-emergence of the individual consciousness and the environment.

The third neologism is enactive cognition. It is introduced to lay emphasis on the active side of perception and thinking, of the human cognition in general. We learn,

remember, and get to know something when we act. Cognition is an epistemic action: cognition occurs in action and through action. A human conceives the world but at the same time the very process of cognition forms and changes him, imparts configurations to his cognitive activity. A going man paves the way, but at the same time, the way makes the going man; when the path is traversed, he becomes another man. And what is more, the cognizing subject not only cognizes the world but also constructs it, because if the world of pigeon is colored in five colors, the bats perceive the world in ultra-violet rays and the world of humans is polychromatic, it is senseless to question what is real color of the world. Thus, as Varela says, the world can be characterized not by attributes but only by potencies that can be brought into live (i.e. enactivated) in the cognitive and creative activities. In such an enactive process of cognition, new emergent structures arise and develop, sometimes fall into decay or, on the contrary, become complicated and are completed. The human life (and human consciousness) is dynamic process demonstrating an autopoietic activity because it is always directed to the search of elements that are still missed and it strives for completing integral structures.

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