

# ПІДСЕКЦІЯ ЗДОРОВ'Я ЛЮДИНИ ТА ФІЗИЧНЕ ВИХОВАННЯ

## CONCERNING CAUSAL "BRIDGE" BETWEEN PHYSICAL ENVIRONMENT AND THE SOCIALITY

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*About reasons of sociality.* There is certain perspective from social psychology and sociology which could be potentially important for the further studies of different forms of determinism in any kinds of informational networks (first of all, neuronal networks of the human brain and electrical networks of computer). This perspective is able to make wider social contexts for neurology and general systems theory. It is strong idea of self-determinism took place in the sociological structural functionalism, later continued in systems theory of Niklas Luhmann, particularly in his concepts of *autopoiesis* (self-creation or self-production) and *self-reference systems*. Luhmann explains autopoiesis through the phenomenon of communication and its main function of selection of information from outside the system — so-called “reduction of complexity”. However, after Luhmann and similar theories definite changes have made a shift toward existential approach to this problem.

Existential sociology [1,3] turned focus of study from highly abstract level to concrete subjective experience of individuals in their ordinary, everyday life situations. To describe this paradigmatic shift [3] has proposed the terms *ontologisation* and *authentication*, and offered to use them as a methods for the study of social ontology, i.e. for the study of different abstract social phenomena (society, social status, social institute, social connection, etc.) in their existing, embodied, and situational parameters. Existential sociology includes several methodological principles that postulate freedom of individuals to act, to construct the reality and to “define the situation” (W.I. Thomas). Individuals make their existential (self-deterministic) choices based on the subjective hierarchies of values that can be compared with the hierarchies of neuronal networks of individual’s brain. The existence of individual exceeds hierarchies of values and is factor of integration, self-authenticity, and self-identification.

The factor of social subjectivity functioning in a human brain provides information processes which “allow” for the social past (if it appears biologically or socially useful) to determine the future of social behavior of a human subject. In this case all elements of an organism are subordinated to "useful social experience of the past of live system", become purposeful, integrated by means of this useful social experience accumulated during life-span. But we already have an assumption that the mental phenomena realized by neural networks of a human brain are that factor which forms socially significant information necessary for realization of the persons social behavior [5].

So, we have a need to investigate causality in neuronal networks which generate mental processes.

***Causality in neuronal networks, which generated by mental processes for social structuration of environment.*** Human mentality represents functional epicenter of information processing in the brain, where all information is processed subjectively. Such structures of the human brain as the limbic system and its satellites carry out the function of subjectivity, i.e. qualitative assessment (in terms of ‘good or bad’, ‘pleasure or displeasure’) of information fixed in networks of the brain specialized in restoring information for future. This subjective assessment of information in the brain gives rise to the specific informational processes that we treat here as mental phenomena. These mental phenomena are characterized by subjectivity that provides the vector and the purpose of further information processing. The phenomenon of subjectivity gives human perception, human thinking, human memory a goal-directed quality: only probabilistically relevant information is perceived, fixed, and processed in the brain in order to form an adequate response for the given problem posed by the novel environment. For example, when a human mind is engaged in solving a problem posed by the social realm, it is guided by human desires, inclinations, motives, and values, which guide not only our thoughts, but also our objective behaviors determined by these thoughts.

In order to explain how the remote past determines future objective behavior of a person, it is necessary to assume that an important quality of this subjective system of causality in the human brain is its self-determination. At any given moment two types of neuronal networks can be functionally distinguished in the brain — on the one hand hierarchically higher controlling networks and on the other hand lower subordinate networks [5]. Furthermore, operating neuronal networks execute their control over operated neuronal networks via mental phenomena, which enable operation networks purposeful integration of information fixated in subordinate networks and thus ensure purposeful behavior. Such hierarchic functional connections between ‘more informed’ neural networks and the networks subordinated to them we call here self-determination. The activity of the subordinate neuronal networks of the

brain enables the controlling networks to develop the most appropriate integration of experience fixed in memory (operated networks) to answer to environmental novelty. Such response is a result of integration of experiences fixed in memory, which can only be integrated via mental processes/phenomena. We can call such form of activity of hierarchies of neuronal networks by self-determination, for on the basis of the information fixed in all the subordinate subnetworks of the brain the controlling subnetwork comes up with one, most adequate solution. Thus, neuronal networks which at this moment carry out operating function start controlling the subordinate networks by the same solution resulted from the integration of the experience fixed in the brain. Such information mutual influences in neural hierarchies can proceed only by mental processes owing to existence in these networks of the classical physical causal gap postulated above. The essential principle of this neural networks' activity comes to light – "more competent" neural systems operate "less competent". Such functional including of mental processes in mutual information influence of neural networks at each other concretizes realization mechanisms of what B.J. Baars called *global access* (Baars 2002). Indeed, controlling neuronal networks in our explanation scheme 'need' to have global access to information fixed in brain memory networks for forming new information in response to environmental novelty.

Such explanatory scheme of the informational activity of neuronal networks of the brain means that between networks storing fragments of memory divorced on the continuum of the time there are physical causal gaps. And such physical causal gaps are the physical (classical) condition of impossibility to integrate memory divorced on the continuum of the time. Such physical causal gaps have to be overcome by mental processes realized within the hierarchical operating-operated relations in neural networks of the brain generating the phenomenon of self-determination.

Mechanism of self-determination can be described with G. Haken's concept of *order parameter*. Haken's synergetic theory (Haken and Portugali) explains self-determination as the phenomenon of the formation of the so called *order parameter*, i.e. synergistic and coordinated activity of a large number of primarily chaotically acting elements. This *order parameter* secondarily determines the activity of the individual elements of a system. So, *the order parameter* appears as a factor that enables a system to control its individual elements. In the sphere of human mentality, *the order parameter* corresponds to the phenomenon of subjectivity (qualitative evaluation of information, fixed in operated networks), which integrate the activity of neuronal networks that give rise to these mental phenomena. And any human goal formulated by human subjectivity. So, subjectivity appears as a goal-oriented factor, giving direction and trajectory to the informational processes taking place in the human brain.

Any informational process in the human brain is guided by goals formulated in terms of human subjectivity which may be explained as one of the forms of phenomenon of *the order parameter*. Turning the focus on how mental phenomena are formed and take on their causal function in the human brain we should first validate hypothetical assertion that in the human brain the classical physical chain of causation is interrupted resulting in a ‘causative gap’ and mental phenomena appear to bridge this ‘gap’. Thus, we should point out how mental phenomena realized by the human brain are formed and acquire their causative function. For this purpose we need to examine if there is any sense in our hypothetical assertion that in the human brain the classical physical chain of causation ‘is torn’. And such a way forms a ‘causative gap’, which is the condition of appearing of mental processes specifically processing information.

If a living system is ‘pressured’ by the novel environmental factors that are not fixed in its genetic memory or neuronal structure, it needs to respond to new stimuli by motor response which is adequate to this novelty (to this deficit of information). In this situation the living system does not have any created neuronal networks which could easily conduct impulses from the sensory structures to the corresponding motor neurons. But in order to survive and be self-organized in such an ever changing environment, a living system is forced to accumulate and integrate experience (information) for adequate respond to novelty. And it is this process of information accumulation, storage and response that is carried out by means of mental phenomena in the human brain. As Damasio wrote: “Good actions need good images” [2, p.24].

We have already mentioned that the subjectivity factor (our motivations, emotions, feelings, value system) is forming by the mutually coordinated activity of the structures of the limbic complex (Houser 2006; Moll et al. 2005) and sets a directional vector and a course for the informational processes in the whole human brain, i.e. subjectivity determine biologically adequate purposefulness in the human brain. We suggest that the subjectivity factor (how it is formed in the brain is still no clear) realizes not only the fixation of information in the brain but also its integration, and, finally, determines the objective human motor actions on the basis of this integrated information. For example, we mainly memorize information that is emotionally (subjectively) significant for us. Also we recall (extract from our memory) information that we require to solve a certain practical problems, i.e. we recall information because in most cases we evaluate it as necessary, relevant, and subjectively significant. Besides, in the mental sphere the information about various past events can become integrated to form new information adequate to a given novel situation only because of acting of factor of subjectivity in the brain. For example, a physicist devising a new law uses a multitude of observations and facts obtained from the books, lectures, and experiments over the years. It is clear that in the

context of objectively active processes such integration of memory contents is impossible. It can be explained to that objective classical physical causality 'does not allow' any interruption in its functional continuity by any other factors, including informational ones. And mental phenomena is that factor by which information about the past fixed in the brain may appear in the present for 'breaking' classical physical causal chains in neuronal networks by mental models of the future formed on the basis of integration, summation of information about the past. Using Damasio's terminology, information fixed in mental images acts as "the pathbreaking novelty" [2].

Large numbers of neuronal elements of the brain which store information about various past facts and transmit bioelectrical impulses, transform this information into another form common to all these elements, i.e. into the mental form. This occurs by means of the phenomenon of subjectivity, which allows integration of all this information about the past into new informational complexes (into information about new mathematical formulas, new dancing moves, new design solutions etc.). This is possible only in the sphere of mental phenomena, a sphere of specific informational processes in the human brain. And we see that the probabilistic models of the future generating a specific purpose for objective activity of human organism cannot exist within objective processes of the present activity of neuronal networks. They can only exist in the context of information fixed in the brain neuronal networks and appears only in the form of mental phenomena.

Only by mental images the human subject has opportunity "to see" information about his past fixed in his brain to include it in regulation of the behavior as a causal factor. Thus only by means of mental images human subject is capable to extract from ranks of similar in something past events, regularities which can be used later for formation of adequate mental models of future behavior. But factor of subjectivity just also is operator aspect of processing of information in mental sphere (workspace (Baars 2002)) solving which events of the past and "fixed in them" regularities are biologically or socially significant for the subject in the future.

### **Referense**

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