

THE CONCEPT " SYSTEM OF INFORMATION "

AND SOME OF ITS OPPORTUNITIES

Tanyu J. Kolev PhD NGO "Sub Specie Aeternitatis-2011"

Summary: A semi-forgotten methodological concept of information is considered, which is based on a systematic approach to the information itself and allows the introduction of a new system object - a system of information. The logical grounds for the concept and capabilities of today's application are introduced. The most interesting applications are the possibility of original interpretation of consciousness and self-consciousness, as well as its relation to Mind uploading. The concept also allows for an original interpretation of the phenomenon of singularity in human development and its exploration. The author strives to draw the attention of the transhumanist community to this approach.

The activity of our association has been directed, since its inception, towards studies that aim not only to prolong the life of man but to achieve personal immortality (For the purpose of the association and its history I reported at the **CONFERENCE** in 2015.)

During all these years of research and studies, we have become convinced that we have a wonderful and rich conceptual term that can be dubbed in three words - SYSTEM OF INFORMATION. This concept works effectively both for the principle of putting the idea of personal immortality and for orientation and the correct formulation of the problems of the transfer of the mind and the consciousness. Moreover, the concept is appropriate and works effectively to conduct theoretical studies of the problem of singularity in human development, and even to be scaled up to the creation of a model of the universe that takes into account singularity¹.

Now for historical reference of these ideas: The author of the concept is V.K. Kremyanski (Russian biologist, philosopher). In the 1970s Kremyanski published a series of works, the most significant of which are: **Структурные уровни живой материи, М., 1969г. „Системы информации как объект исследования“, сб. „Кибернетика“ ... 1976.**

¹ Таню Колев , „Личното безсмъртие без мистика и религия“, Чирпан, 2012г.

Методологические проблемы системного подхода к информации, М., 1977г.
(**Methodological Problems Systemic Approach to Information, M., 1977**) In the last monograph, we can find the fullest and most justifiable statement of these views.

In short, the basis of the idea is as follows:

"Information is not only in the form of purely additive sets of units considered by classical theory; in the natural world and in society the information passes its specific stages of development, undergoing a significant evolution. In genotypes, in instincts and habits and other forms of animal psychology, scientific knowledge, technical knowledge and projects, plans, and generally all reflections of the systems of information show that information does not simply thicken in the centers of contact, management, research, information becomes more "integrated". It goes into special states of its own specific organization and external organizational activity. Its genesis, history and function acquire relative autonomy ... "(V.K. Kremyanski1977)

By reviewing the perceptions of the systematic nature of information in various instances (living systems, living systems with psyche, social systems, etc.) V.K.Kremyanski concludes:

"Considering these tendencies in their whole, we see that they are moving and adapting, and in a sense "constructing" a substantially new system object! This is the information that is used to manage and acquire states of its own specific organization and activity ... This corresponds to the general concept of systems of information that perform the function of organizers ... "²

To understand this concept it is of paramount importance to understand the two main terms: "system" and "hyperstructure".

"SYSTEM"

We should, in this case, accept the notion of "system" in the sense of P.K. Anohin (As Kremianski accepts this definition as well). It is as follows:

² Кремянский В.И., Методологические проблемы системного подхода к информации, изд.Наука, 1977г.,стр.33.

" A system could be called such a complex of selected components between which the cooperation and the interrelation are becoming mutual CO-operation between the components for the obtaining of focused beneficial result" ³ (P.K. Anohin 1973)

Working with this definition it is in the foreground where we see that the condition for a system are very strict – the mutually beneficial interaction, cannot be just a relationship or interaction, but is a certain kind of attitude. P.K. Anohin examines in advance and in detail the matter: Can the interaction between elements taken in its own general form create a system or be the basis of some systemic process?

The answer is firmly: no, it can not!

Interaction, in its most general form, can not form a system, there are certain factors that guide and limit the interaction in the system; interaction is a necessary, but insufficient condition for the emergence of a system. Thus, the question of the system-forming factor is highlighted. The factors that guides, limits, organizes interaction, unites the plurality of elements and turns it into a system.

The result of the system activity is its system-forming factor, isomorphic for different classes of systems. We should answer the following questions in search of the definition of “system”:

1. What result should be obtained?
2. When should the result be obtained?
3. With what mechanisms should the result be obtained?
4. How is the system convinced of the sufficiency of the result obtained?

The answer to these four questions define the critical prepositions for a system. They express everything which is a requirement for a system to form, and it is subordinated to obtain a certain result. Insufficiency of the result is something that can completely reorganize the system, and the need for it to form a new, more sophisticated system, achieving a sufficient result.

Is there an isomorphic system-forming factor for systems of a random variety?

³ Анохин П.К., Принципиальные вопросы общей теории функциональных систем, в сб. Принципы системной организации функций, М.,1973г.стр.28;

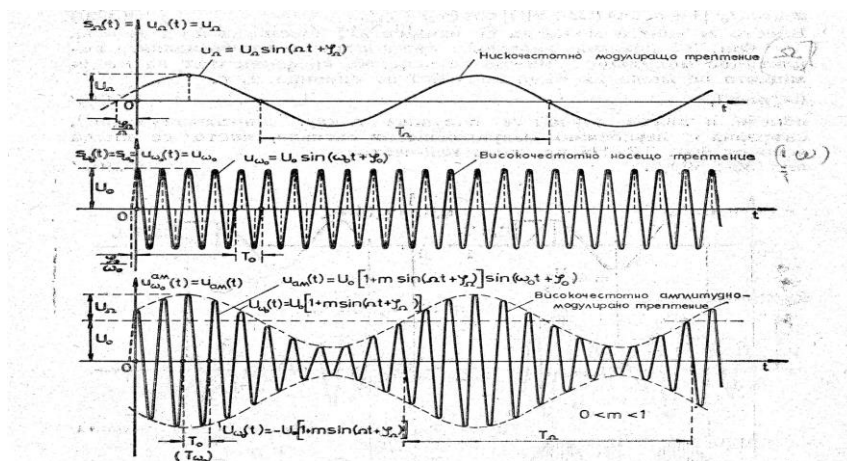
Under the effect of such general law as the second principle of thermodynamics self-preservation cannot remain unnoted as a common isomorphic system-forming factor for all systems. This is the factor that guides, limits, organizes interaction, brings together the set of elements and turns it into a system.

Resilience and self-preservation, however, are not just one of the many properties of systems, but the most important and determining feature, because without it the system simply ceases to exist.⁴

INFORMATION AS HYPERSTRUCTURE

In fact, this is the classic understanding of the term "information", which is borrowed from the signal theory, however an extension has been made to it that reveals unexpected opportunities.

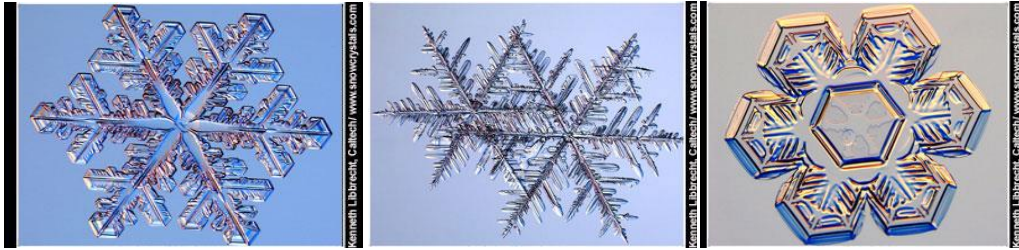
Here's the starting point:



The simplest example - low-frequency oscillation modulated amplitude high-frequency carrier signal. The low frequency fluctuation is a hyperstructure relative to the carrier high-frequency wave (ie, an internal structure built on the basis of non-dedicated degrees of freedom).

The term "hyperstructure", however, reveals its possibilities where these non-dedicated degrees of freedom are enormous, and that they can be dynamic formations in further interaction with each other. Here are some examples:

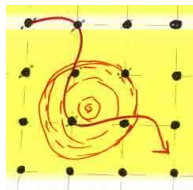
⁴ Колев Т., Понятието система: от теория на функционалните системи към обща теория на системите, сп. Философска мисъл, кн.2, 1984г.;



-snowflakes, each of which does not resemble the others, carrying a huge variety that reflect the conditions of origin;



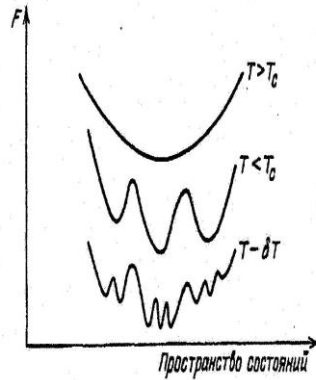
- glazed feathers on a glass surface, which are analogous to snowflakes;



- quasi-particles in a crystal (dynamic hyperstructure) that may undergo phase transitions and in which "drops of quasi-particles" are known to occur;

- and the most interesting case: **HYPERSTRUCTURE IN SPIN-GLASS!**⁵

⁵ По-подробно в Т.Колев „Личното безсмъртие без мистика и религия”,2012, стр.197-207.



Поведение структуры рельефа свободной энергии
(по В.С.Довенко Физика сини-стекляного состояния УФН)

WHEN HYPERSTRUCTURE TURNS INTO INFORMATION ?!

The hyperstructure has a special status with respect to the regular physicochemical structures;

These primitive, yet little organized fragments of information structures in the respective system arise not separately from its physical, chemical structures, in fact they appear in them, as modifications and anomalies, however not as a result of the interaction between the elements of the system, like ordinary structures, but in interaction with the environment and the metasystem. ;

When hyperstructure starts to play a role in preserving or self-preserving the system, it becomes information.

How are these examples indicative ?

Each system has a hyperstructure, but the hyperstructure becomes important and becomes a new system object - a system of information under certain conditions:

I-condition:

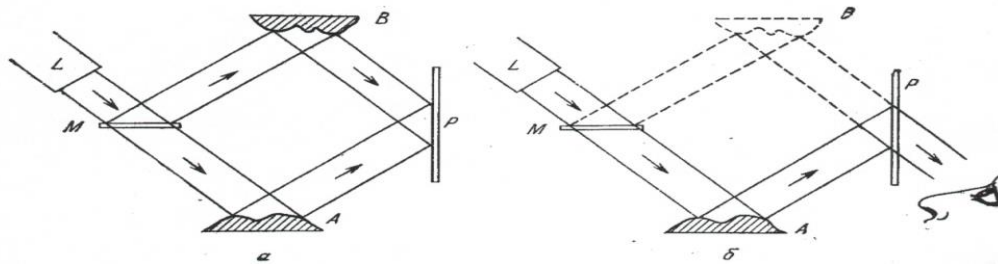
The degrees of freedom that form the hyperstructure and respectively the volume of diverse possible states, so that they can be the basis for sufficient memory, playing a significant role in the self-preservation of the system;

Second condition:

In the hyperstructure there are processes of **phase transitions** that lead to a change in the order of the elements and the content of the reflected diversity, which can be interpreted as

information processing and interaction of units of information on a new level - different from the physico-chemical interaction.

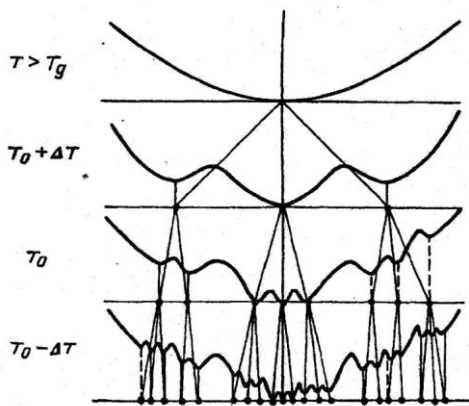
□ Example of explanation: HOLOGRAPHY AND ASSOCIATIVE HOLOGRAPHIC MEMORY! The laser beam can be seen as a condensate of optical phases! Hence the far-off order and coherence. The interaction between two coherent laser beams modulated by different objects leads to an associated relationship between the wave edges of the two beams, i. E. interaction at the hyper-structural (information) level.



by T. Kohonen, Associative Memory, 1978

Example of an explanation: SPIN-GLASS!

Continuous phase transition at any temperature change $T_0 + - dt!$



Иерархическое дерево состояний спинового стекла
(по В.С.Дюбенко Физика спин-стеклового состояния УФН)

It is no coincidence that this model describes not only the taxonomy of animal species but also the general principle of the operation of neural networks. For the first time, Hopfield

(1982)⁶ draws attention to the analogy between the processes of memorizing and processing information in spin-glass and neural network and offers a simple model of a neural network.

Memory, training, image recognition from a neural network described in the spin-glass model **is a spontaneous collective process of the system in its entirety, and a complex algorithm for processing information is not needed.** Memory is realized as a number of system conditioners and any new information is saved by expanding the set of conditioners and complicating its structure. The processing of information as a collective calculation, differs significantly from the processing of information in a computer. While in modern computers the "calculation path" is determined by instructions in steps determined by the software, i. the computational program, in neural networks, strongly linked elements form a specific environment that "focuses the calculation into a single continuous process." The process proceeds as a relaxation of the system to a state closest to the previously introduced image - spontaneously, as a process of self-organization of the information.

Interaction with previously stored information becomes contextual and not "by address". This is the important property of associativity.

Associative memory is not a one-time act, but rather a cyclical process or a "vortex" that engages a particular set of images in a temporal sequence. It turns out that the neural network model, which is the object of attention, has properties to describe and explain a number of attributes of associative memory.

It is time to recall that interaction is a necessary but insufficient condition for forming a system! All systems arise as a result of the action of a generalized natural selection, surviving and self-preserving! On this occasion, G. Claus wrote: "... there is a universal struggle between the systems. In this struggle, unsustainable systems are destroyed, and only sustainable ones remain, and they give the world its appearance. "⁷

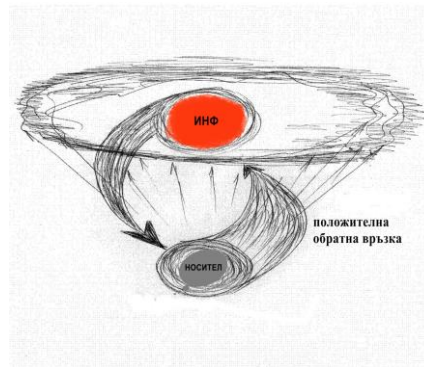
Here we can imagine the following survival scenario: a physicochemical system with hyperstructure (sufficiently voluminous, dynamic and compressed) that can help self-preservation. Thus, survival becomes more successful and efficient by going through symbiosis with a hyperstructure, which becomes a system of information. The information system reflects the system and the metasystem. As a result of the management, optimization

⁶ J.J. Hopfield, "Neural Networks and Physical Systems with Emergent Collective Computational Abilities" *Proc. Natl. Acad. Sci. USA* 79 (1982) 2554 - 2558

⁷ Клаус Г., Кибернетика и философия., 1963г., стр.151

of behavior, change and optimization in the structure, change in the adequacy of the reflection, etc., are triggered by the obvious positive feedback between an information system (Inf) of a carrier that rises higher and higher improving the ability to self-preserve.

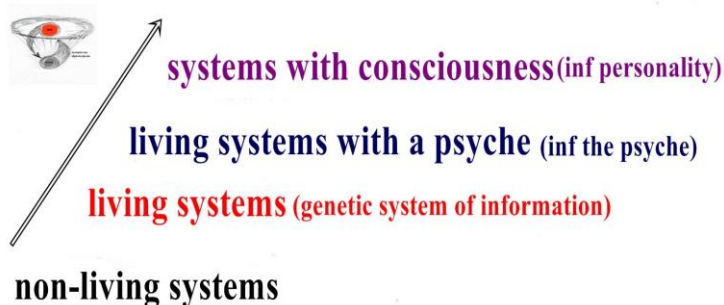
Furthermore, taking into account the qualities of the hyperstructure, the weight of self-preservation moves from the carrier system to the system of information.



- Infs can only exist in tangible carriers.
- Without departing from them, the infs evolve into a relatively greater autonomy, which is expressed in truly separate channels of information continuity.
- Information has acquired its own specific laws of amendment and preservation - it has become a new type of system: a system of information.

Insects should be considered as triple in their essence formations. They exist in not in any other way, but in a "trinity" with their own material carriers, as well as with their meta-system. At the same time, they develop as "memory" centers and organization according to their own, mostly metasystemic laws, becoming increasingly self-sufficient both in their own carrier and in the meta-system.

EVOLUTION DEVELOPMENT:

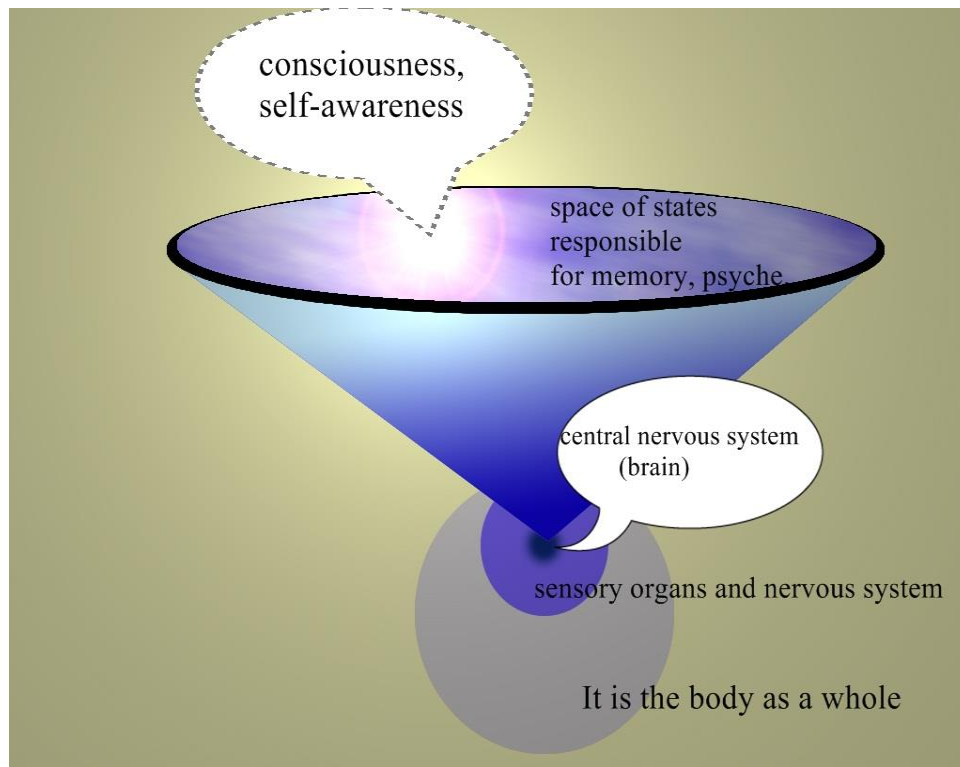


Each of these jumps is related to the emergence of new inf from non - living to living systems (inf of genetic information); the transition to psychic systems - the inf of psychic information, the transition to the systems of consciousness and society, the emergence of many new systems of information, first of which is the inf of the psyche experiences a jump in its development with the emergence of self-awareness and consciousness⁸, through the mechanisms of social inheritance - language, philosophy, science, art ... and so on.

Mind uploading (psyche and consciousness transfer)

The most interesting application for us in the concept of information systems is to raise and try to answer the question relating to Mind uploading!

This graphic shows how a human individual looks like as an organism, psyche, consciousness and self-awareness, from seen from the lense of the topic:

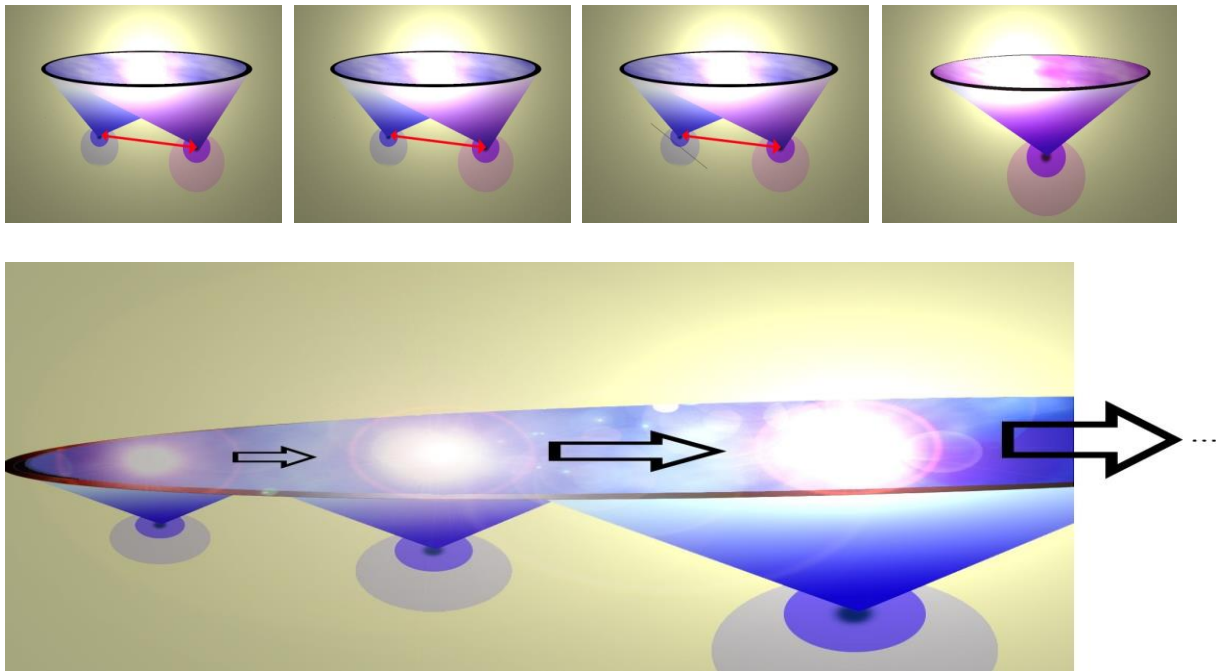


The process of memory, mind, consciousness and self-awareness itself can not be conceived as a copying of the brain. As much as the neural links between the neurons are copied, it can not recreate the system of information that exists in another space and has authenticity. It is

⁸ <http://bg.subspecieaeternitatis.org/>

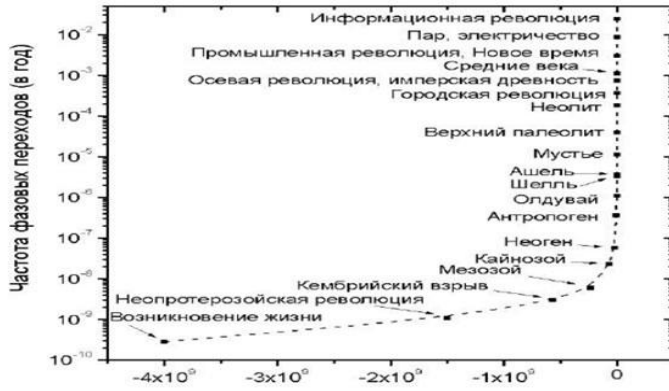
another level of reality. Perhaps neuroscientists should boldly explore the ideas of theoretical physics and take into account the specificities of structure and hyperstructure.

The process: Mind uploading would be more akin to a migration of a unique human psyche into a new medium - natural or artificial, rather than copying or reproduction (which is probably impossible due to the extraordinary complexity of connections between mental images).



The most important thing in this scheme is to create an appropriate link between the donor brain and the host brain, through which the system of information we call human psyche, consciousness, self-awareness migrate into the host brain. The principle of this, along with some technical details, is thoroughly discussed in the Monograph "Personal Immortality without Mysticism and Religion" 2012.

A brief comparison between the inf of genetic information and the inf of the psyche, consciousness and self-awareness in humans makes it obvious that the transfer of psyche and consciousness from one medium to another is not only possible but also necessary! The Snox-Panov curve is a phenomenology and is well known:



But its theoretical understanding goes through the positive feedback between the inf and the carrier, and the provision of sustainable exponential growth is impossible without the transfer of psyche, consciousness and self-awareness into new carriers with non-biological substrate.