

Personal Immortality Without Mysticism and Religion

T.J.Kolev

Life and death are my eternal wings
spread together – so close and far away
I don't see bounds among my swing;
swift running instants
I lost painful count.

P.K.Yavorov

In my maturity I go face to face with eternity.
All optimism disappears face to face with eternity.
At night the light is on and I work, I go on
not raising a white flag-but white shirt. Face to face with eternity.

A.Germanov

Since ancient times, probably with the rise of the civilized man and the first burials of the dead(1), has occurred the idea of personal immortality. Ever since it's been popular especially among the religion, it was though not overlooked by the philosophy and natural science. In science, the existence and evolution of the idea has not been so smooth and constant, discredited and rejected numeral times, then again revised and coming back stronger and more mesmerizing than ever, it is qualified as one of the everlasting questions, resurrecting in every era of mankind evolution.

In a rational plan, the beginning of the latest revival of the idea of personal immortality was set probably by the physicist John Desmond Bernal. In one of his first monographs, published in the beginning of twentieth century (1929) called "The World, the Flesh and the Devil", Bernal concludes that the numeral limits of the human body can be overcome with the help of artificial organs-prostheses, direct products of the constructional and technological advances of humankind. Years later in his book known to many "The Origin of Life" (1967) the author concludes:

"Now we must accept death not as a mysterious fate, imposed upon us as a vengeance by a jealous god, but as a heritage leading from biological facts and processes...as a consequence of the fact that we have inherited bodies for which death is a logical ending."(2)

Even though he does not suggest anything specific regarding the matter, using his scientific intuition takes an optimistic stand and concludes:

“What I know is that the restrictions facing us now are not invariable. There can be found ways to postpone death and there will be even more ways in the future, but we are still in the situation of **Tor** among titans, who in the struggle with old troll Death can not achieve anything, but to make him kneel. We have better chances than him to succeed, because we gather greater power exceeding **Tor's**, with wisdom greater than Odin's.(3)

For the past few decades in cybernetics, among the big and acknowledged results, an idea that in great extent could justify the showed optimism by John Bernal has been developed. There is a **fundamentally new rational approach** to the problem of avoiding ageing and death of humans. Essentially the idea is much broader and covers the overcoming of a wide range of limits imposed on the individual existence and development of the man resulting from its biological origin (biological organism) and in particular- achieving **personal immortality by prosthesis the whole organism**.

Most shortly and figuratively this idea is published by the promoter of the cybernetic Viktor Pekelis, that wrote the following in the journal “**Литературная Россия**” Literaturnaya Russia:

“Is it possible to substantially extend human life? ...
In the long run, at the end of the long road of which cybernetics has just set foot, we can imagine that an artificial brain connects to the natural brain that is still healthy. They work in parallel for a while and the artificial brain learns all the skills and tastes of his “master”. Then the old, living brain switches off and the man continues to live with the artificial one that has inherited the memory, knowledge, taste and character of the original one. Artificial brain planted into a body that consists of prosthetic organs! Means that “mere” man dies, his body dies, and even his brain!? Yes. But the man continues to live as an intellect, handing down his “I” to the artificial brain. It follows that immortality is possible in theory! (4)

When I first stumbled upon the cybernetic version of personal immortality, looking for ideas in the area of immortology(5), I was not able to realize right away the magnitude of this conception. It took me years to understand the beauty and possibilities for growth and development of this direction. The whole difficulty comes from the fact that the idea was formulated metaphorically at the level of popular press, as a sensation, without the use of the rich and stern conceptual approach of science, even that science that allowed for the birth that thought-cybernetics and systemology. My initial motivation to take up this idea was mainly to check the possibilities of the idea and to complete a more common investigation, rather than an overall comprising and practical realization.. To start with, I did an attempt (6) to formulate cybernetic version for personal immortality in the system-cybernetics concepts and thus to bring the analysis and discussion out from the level of journalistic speculation, and escalate it to the level of research. The more I entered into that problematic area, I grew more convinced that my efforts are not a waste, and that every step in this direction is important and heuristic. Not long after I was fully focused on the fixed idea, and entirely

convinced that it deserves not just a careful investigation, but extreme care and complete surrender.

Each aspect of this idea excites curiosity and interest and deserves attention, and every time I write I am tempted to start a very detailed statement that include the history, philosophy, general-system aspects, private-science aspects, social importance and so on, as far as the model of the universe and its interpretations, which is based on the model of a personal immortality in its cybernetic version. Here again, however, I will focus mainly on the logic of the model for personal immortality and how it fits within the context of science.

I will begin with some preliminary ideas necessary for understanding the cybernetic model of personal immortality.

Logical starting point of the analysis is the implementation of conceptual basis, which is adequate to the idea. My understanding of adequacy is primarily linked to the understanding of the **immortality as a form of preserving**. More precisely, in its cybernetic concept the immortality is self preservation, which is so developed and improved that becomes **ultimate preservation**. All modern science is nothing more than discovering the forms of preservation in the form of natural laws and social laws and their explication and summary, but you should note that we are far from unified general theory of conservation. However, there are impressive attempts to build such a theory. The most famous attempt to build a general theory of conservation and with it the concept and general science movement is proposed in the middle of the twentieth century by L. von Bertalanffy - **General System Theory(7)**, and the rolled out stream of subsequent system studies. Unfortunately this process of theoretical analysis is not finished yet. During the years new fruitful ideas were created which most probably will lead to a quality leap and the appearance of commonly accepted practically working General system theory. The crucial relation between system and the preservation is noticed in the first researches in that direction, it is realized also today. Below are few significant citations:

- “The whole growing up from its components in complex process of internal and external interaction... Each object in it’s capacity of an element of a future structure is inexhaustible with it’s potential. This potential is being realized in a statistic way, by the means of repeated sorting out. The nature has for that unlimited time. Among the inexhaustible structural possibilities are realized only those one that are founding stable systems. It does exist, it could be said like that, principle of the natural selection of the arising systems. Only the most stable systems could “survive”. Because of that in order to see the integrity of the arising systems, it is necessary the laws to of its [stability⁹](#) to be studied in details.
- “The alteration – this is attributive status of the matter, natural background of all events. Only those structures, that acquiring internal **stability**, are in dynamic balance with the **environment**

could “survive” e.g. to stay unchanged in the stream of alterations, in constant fight with the destructive factors.”¹⁰

- “The system is combination of unspecified kind of elements, which have stable relation one to another. The concept stability has important logical weight in the terms of system definition. The unstable system cannot exist for a long time. The attribute **steadiness**, stability – this is the most common characteristic of all types of systems, because it specifies most of the rest their characteristics.”¹¹

Sometimes the too conspicuous things could be hardly seen and remain without the necessary attention, but for me exactly this aspect (the essential relation between system and preservation) was the most important and directed me to the general system theory, which because of the specific role of the concept “idea” in its foundation could be called also general theory of the preservation. On the chosen level of research it is important to be mentioned that exactly this common aspect, not missed in the classic system researches, but in the same time it becomes necessary to be purposely underlined and studied¹² by us, turns out to be the most important for the setting and researching of the idea of the personal immortality. It was necessary to be worked out original conception¹³ of the general system theory which could correspond to the investigated idea. We took as a basis of this elaboration general theory of the functional systems¹⁴ of P. K. Anohin and his definition of the concept “system”:

“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”¹⁵ (P.K.Anohin), which was criticized as not generalized enough but easily lead to the conclusion that the **mutual CO-operation** after all, directly or indirectly takes to one universal result - **self preservation**. For the most part of the studies, being misled by the striving of conclusion, great number of functions (results) is presented as spectrum, which separate lines are the same important. But the functions (results) in the nature could be put in order more successfully and more precisely in the form of a **“tree: with common root and this is the: self preservation”**¹⁶. The explanation is that is valid such a common regularity what is the second principle of the thermodynamics according to which each complex of elements separated by the environment, realizing, definite heterogeneous allocation of matter and energy, during each power transformation as if experience certain “pressure” that lead to the equalization of the heterogeneities, which after all lead to disintegration of the complex, if there is no reaction against that. But this is already a problem, posed by the character of the world, which the interacting complexes of elements (e g the systems) could solve or not, more or less successfully, in the following way: **the survival is not a fact; it is a fundamental problem** for the systems with unspecified nature. It is absolutely naturally that there is a talk of the “natural selection” outside the frames of the biology – for the physical and chemical systems, because the universal meaning of the selection for the progress¹⁷ has been realized. In this connection G. Klaus wrote: “ ...there is an universal fight between the systems. In

this fight the unstable systems are being destroyed, only the stable systems remain and they are giving to the world his face [."18](#) The nature of the preservation, as a result is that is putting it above all other results, because the unstable systems are being destroyed and disappear, only the stable remain (**self preservative**). Of course, exactly the **over preservative** (leaders in the preservation) have the main role for the determination of the world's aspect and define the nature of the Universe. It is also naturally, the generalized system selection to distinguish after some time **over preservation systems, systems that could be easily called immortal**.

Essential for the understanding of the cybernetic version of personal immortality is the system approach (in terms of general systems theory) of the human as individual, which is reflected in the theoretical form long known and repeatedly discussed separation in man: man as an organism and the human as a psyche (as personality).

Individual development of man as an organism is a set of ontogenesis with a phylogenetic program in it. Starting point of the ontogenesis is the zygote and the entire process of embryogenesis, with its two phases: the embryo and the fetus. The passing of the phylogenesis into ontogenesis is the beginning of the individual whose background can be observed in oogenesis and more generally the mechanism of heredity and the preservation of the species genetic code. The beginning of the individual is not a single moment act of its creation by the parental couple, but has deep roots in the phylogenies and heredity, transmitted from the parental couple. The formed individual undergoes several metamorphoses in the womb period of his life and therefore as a body man began his existence and development long before birth, a newborn child already has a history of development as an organism.

From the moment of its birth, human get into the human social conditions of existence and development. The fact that it has a complicated, and individually acquired neuro-psychological apparatus any psyche is not sufficient enough to claim that the newborn child is a person or that the baby talk (gu-gu), the first expression of emotions and electoral reactions to people or the environment are beginning of a personality. Man as a person comes into being later, together with the occurrence of consciousness and self-awareness and this is related to the lifestyle of the society, and also with cultural, political and legal development of a given nation.

Just like the beginning of the body, the personality is the beginning of a long, complex and multiphase process of socialization, passing most intensively in the second or third year post birth, and the development of a man as a personality requires high level of neuro-psychological development. "Any person – this is a temporary installation of materials, borrowed from the environment, but consciousness - that is an intracerebral work on extracerebral information. The "Individual" half is a regrouping of the elements of the surrounding environment."[\(19\) wrote H. Delgado](#) in an old but recently recalled book: "Physical Control of the Mind".

For identification of this new aspect of the development in humans B. Ananiev introduced the term – life line (20): this is the story of the formation and development of human personality at a particular society.

The system approach to this separation in man (man as a human body and man as a personality) goes further more, revealing the cause, mechanism and its immediate carrier.

Any organism, including the human's is composed of cells and is a complex and hierarchical system, at the bottom stands the cell, followed by tissues, organs and organ systems, up to the whole organism, all above have derived from the differentiation of cells that originate from the fertilized egg . All cells in the body carry the same genes that underlie the cell division and each cell's behavior.

From unicellular to multicellular organisms it is obvious that actually, if you need to make decomposition of the complex system of subsystems, there is a clearly defined system of genes (Control subsystem) and the specific carrier system (executive subsystem), which is comprised of cellular organelles, tissues, organs, etc.

Moreover, the system of genes and there is not realized only through the particular carrier-body, but unfolds from generation to generation, have their roots in the primary and the first living cells. This system exists, confined from the environment and been developed through each individual organism, but it is not exhausted by its carrier. As V.I.Kremyanskiy states: "information not only remains in the form of simple in nature purely additive sets of units handled by the classical theory; in living nature and society, information passes their specific levels of development have evolved considerably. In genotypes, in the instincts and habits, or other forms of psychic in animals, in scientific knowledge, technical projects and programs, plans and all the contents of all higher forms of reflection, the **information is not simply compressed in the contact points, management, research, it becomes more "integrated". It changes to specific conditions in their own specific organization and external organizational activity. Its genesis, history and performance gain relative independence ... "(21)**

Thus, V.I.Kremyanskiy asks for a new types of systems - systems of information (22)(infs) , this is the information used for management of the state acquiring its own organization, activity and self preservation. (As there should be a clear distinction between *information system* and system of information).

Systems of information can be regarded as three way entities in nature. The content is determined primarily by metasystem (the wider system), but they can not exist and self preserve otherwise than by the structure and dynamics of their systems-carriers. However, based on continuity and invariables of information against its direct media (the processes of coding and recoding), systems of information are evolving around their own laws that are irrelevant to the laws of the carrier system or the metasystem. Moreover, systems of information, even with their appearance, become more "important" than their direct media, concentrating in itself the emphasis of self preservation, becoming a new higher stage of implementation of this feature. Indeed, they are relevant

not only to its immediate carrier and themselves, but to metasystem and metasystematic preservation (evolution), and so they become a factor of self preservation on a wider scale.

More importantly is that they represent a qualitatively new type of self preservation compared to the substance-material systems of self preservation on **hyper structural** level. No matter how physically-resistant material structures are, as a result of irreversible processes in them (the second law of thermodynamics), they degrade and destroy over time. Self preservation, as information is considerably more promising, because the information is coded and reproduced in signals and vehicles with varying nature, provided they have the necessary qualities. In complex systems, which represent a unity of system of information and system-medium, the self preservation of physically-material structures is dependent in nature, although it is also implemented better, but the systems of information remain above all, on their bases the self-replicating is realized, continuity in development, matching of system and metasystem (surrounding medium), and thus the overall stability of the system.

The subsystem organism in human individual is made up of cells and apparently can be represented as: genetic information subsystem and subsystem-carrier (body), but how we can describe the subsystem psyche - personality?

What was it built from?

The concept of V.I.Kremyanskiy works here perfectly: the psyche and personality (arising on psyche's basis) is also - a system of information that emerged on a neurophysiological basis of human memory in the conditions of the social development. Its metasystemic orientation is human society that goes far beyond its biological development, rather than human species as a biological being. As a representative of the systems of information the psyche (later personality) is the next higher stage of the realization of this type of system organization, in which information acquires new forms of integration and self-organization, as well as some relative autonomy.

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Ageing and death are processes which destroy any organism, do not affect the genetic information system, but even higher rate of replacement of generation makes for the latter a more dynamic development. There are hypotheses that ageing and death are active, destructive varieties of species self-regulation mechanism (23). But even if these assumptions are incorrect, the system of genetic information via replication of genes and processes of generation slips out of the destruction that affects the organism-carrier. The system of genetic information has achieved immortality (hyper stability), which extends within the frame of the species or more generally within self preservation of life.

However, this does not apply to the psyche, and the human personality, which will cease to exist with the death of the individual human body. The point is that the psyche arises at a certain stage of evolution of life, as an additional mechanism of self preservation and regulation of the conduct of life, passing from a homogeneous environment to an environment shaped by real sources of food

and danger (24). Moreover, this mechanism is not the most important, it can not compete with the genome. Genes and genetic information system remains the center of self-preservation and continuity.

Inversion occurs only with humans and human development. In human society the fundamental value and the center of self preservation, continuity and development, is the human personality. Man is primarily valuable as personality. Moreover, the evolution of species (human as a species) is stuck and even terminated due to the direct intervention in the processes of natural selection by such factors as medicine, and this is far not the only example . However, in the same time the effects of ageing and death remain, for whatever man is as a person, he is also a biological organism and remains subordinate to these processes. The systems of information "psyche – personality" is destroyed and vanishes with the death of the body.

This is a fundamental contradiction in human development, which has its specific negative manifestations on the level of the individual to the level of the whole human society. Attempts to reconcile humanity with death, to present ageing and death as natural and necessary for man is not only false but also irresponsible, because the presence of ageing and death is a significant brake in the development of the individual and society. The arguments of the type: <<where will all the people be accomodated, when immortality is achieved?!>>, have no value if were are not committed to a specific model of immortality, which makes it reasonable to ask this question.

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The concept of cybernetic version of immortality supposes an unlimited personal existence and personal development, based on several hypotheses that can be grouped into four groups:

1st group: about the personality;

2nd group: about the artificial organism;

3rd group: about the social environment of existence and development;

4th group: about the natural environment.

To start with, I was needing a clear and distinct formulation of each concept per groups of hypotheses above so the process of rational personal immortality can be described, and also to build a working scheme to interact with other scientific fields.

1st group "Personality":

1. **Personality** (representing social phenomenon based on individual psyche, individual neurological memory, mental processes, consciousness and self-awareness as well as on sensory and effector capabilities of the organism) **is a system with such a nature, that allows unlimited and infinite existence and development, so to say this is a system that is able to assimilate the eternity in itself.** In detail this means that the personality as a system is capable of unlimited (infinite) existence in time, while preserving its history and identity and at the same time is able to develop new states to adequately reflect all the manifestations of a new variety of environments. The development of the

personality, by nature is such that it can properly fill the space the opportunities generated by the environment as well as that environment and can be expanded and can be made more dynamic.

2 The body carrier is being born, but the personality occurs much later in a complex process of interaction with the natural and social environment. **The nature of the relationship between personality and body carrier is such that allows the "migration" ("transfer", movement) from one carrier to another (from a donor organism into another organism successor), as personality can change its carrier, if appropriate conditions are provided.** Through building a direct connection between body-donor and body-receiver, to allow such type of movement. This transfer can be done unlimited number of times and in more than one host organism.

3. Immediate carrier, both of the psyche and the personality is the neurological memory, so to say memory of the neural networks of the human brain. The properties of this memory and the dynamics of its processes define the psychological processes, the "space of existence" and spiritual development, and also determine the specific integrity of the system of the personality that occurs in the presence of consciousness and self-awareness – the "I" of each man. Exactly **the consciousness and the self-awareness that are the most important characteristics of the preservation in the process of personal immortality. All other parameters can undergo significant qualitative changes.** Starting from the individual neuron and its processes, macro-and microstructure of neuronal networks and the differentiation of the brain departments, going to the architecture and specialization of the sensors and effectors, and with this and the whole organism. Moreover, changing the clock speed of neurons, as a threshold elements, which for biological neuron is approximately 1 KHz up to the clock speed of some artificial neurons, which can be as high as several GHz, the degree of connectivity of the elements; the recovery speed **refracternost**; the balance between excitation **and deprivation** in nervous tissue; the impulse transmission speed through filaments, the nature and the firing rate of synaptic connections, and not least in importance - the reliability of components, etc. **Any changes in "hardware" and "software" that would not impair, but positively impact the unity and integrity of the system manifesting as consciousness and self-awareness of the personality, are admissible. Furthermore, this implies the deployment of new higher levels of consciousness and self-awareness.**

2nd group "Artificial organism":

1. It can be created an artificial body - successor of the personality, to provide new, equal or greater opportunities for existence and development after the death of the original biological organism carrier.

2. The most easily accessible artificial organism - carrier of the personality is a new biological organism - for example, clone of the source biological organism carrier. However, it is not necessarily the artificial host organism to be built on a biological basis, **host organism based on a qualitatively different matter: crystals and (or) composite materials, high temperature plasma,**

fields, nuclear or neutron matter, etc can also be admissible., providing that the necessary performance and functional characteristics of the medium are achieved to ensure the required continuity and the space of existence and development of the personality, to provide greater opportunities. Guiding principle in the construction and technological creation of artificial host organism is: **this new medium to create viable and more comfortable conditions of existence and development the personality** with better than its predecessor opportunities for the achievement of higher levels of consciousness and self-awareness, or in other words **higher level of** integrity and preservation of the personality.

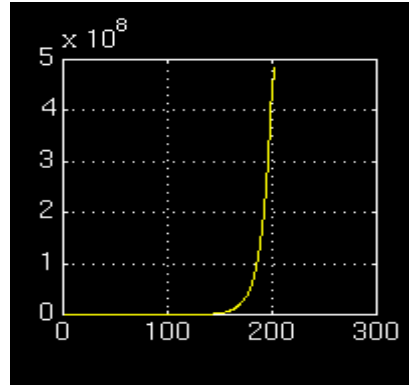
3. "Migration" of the personality from one to another organism-carrier will not be a single act but will be implemented continuously, each time to a new improved body-carrier. Thus, the preservation and the development of the personality will be done in a series of organisms-carriers with some continuity and increasing sophistication. **Criterion of excellence (of the body-carrier) will be the realization of the self preservation of the personality in the dynamics of the internal and external environment, raising consciousness and self awareness on a new higher levels.**

3rd group: "Social environment:

1. Society is about to realize that we are near up to the limit of validity of the principle **"To adapt nature to our needs! "**. In order to acquire new areas of environment - northern regions of the planet, deep in the ocean and further the space, etc... we must expend incredible efforts. This is because our biological organism can exist and operate in very limited and constant conditions - low temperature range (20 to 30 degrees Celsius); appropriate atmosphere composition and pressure, no harmful rays - ultraviolet, X-ray, gamma rays, , etc..., relatively limited mechanical forces and loads, etc. and so we are forced to create microenvironments in which we exist, function and work while there are no such conditions in the external environment. The farther from the place of our origin, the more difficult it becomes. People who work in outer space know best the meaning of "difficult", –as well as how the efforts of thousands of others are necessary in order to make possible their activities. At a certain stage of our development as though it should be possible to come up with another principle: **"To adapt ourselves to the nature!"**. However, this to be achieved not in the sense that consumed eastern philosophies as giving up the demand of high technology and comfort, but on the contrary, based on the technology process. We are talking about such interference in human nature starting with creating artificial organs, prostheses and completing as an artificial organism in the end, which would allow it to exist and function normally at any temperature, with or without atmosphere at high pressure or vacuum etc. For certain purposes and under certain very different from our originating medium conditions, the principle: "To adapt ourselves to nature!" will probably be more cost-effective or the only possibility.

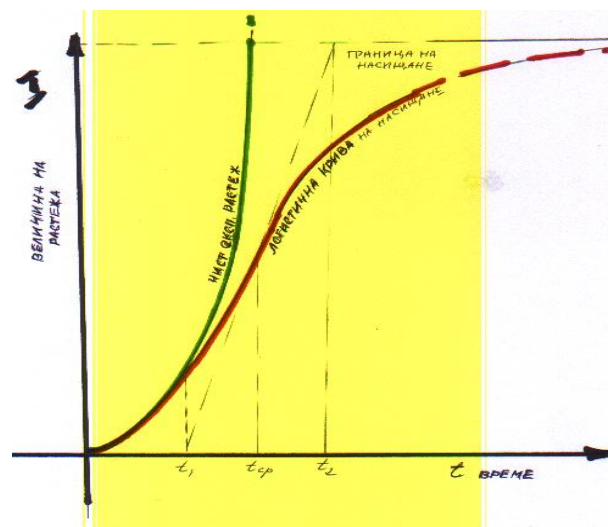
2. Recently, in one or another occasion, in many publications could be seen the curve of growth of society by chosen marker. This curve is truly

remarkable when the amount of information available to human society is plotted over time:



Exponential Growth

The curve shows that for 2000 years the rate of accumulation of the amount of information rapidly increases and becomes simply stunning. The analysis of the issue of acceleration has always evoked interest and discussion for many years (25), as in the past few years appear clear awareness that humanity is entering specific singularity (26). However, anyone who more or less is trying to make scientific and technological forecasting and dealt with the system dynamics knows well that this same exponential growth curve, quite so determined goes in so called logistical saturation (27), which can lead to a catastrophic end, especially when the parameter is the quantity of information available to human society.



Logistic saturation curve

In order to escape from entering into logistical saturation and stagnation it is necessary to remove the “brakes” (to address the bottle neck). It could be of any nature: starting from a discrepancy between “productive forces and

production relations" (Marx) and any other type of social contradictions leading to conflicts between social classes, groups, sub-classes, races and so reaching to the bottom where: **the limited possibilities of the human individual which are in drastic conflict with accumulations in society, the rate of changes and the limited resources of the planet.**

3. The human society as a system in its growth and development has potential and opportunities for development without ending with self-destruction, it is a system that does not give away the vitality and the realization of the function of "self-preservation" to purely biological systems (plant and animal species). Moreover, society is a system (for now unique), which can overcome the limitations of the environment, moving into new ranges of existence and changing and eliminating the limitations of its own structures. The human society is a system that is able to achieve infinite existence and development, if it overcomes the restrictions on the single human individual and personality, evolving from the conservative nature of the carrier organism (in our case the biologic nature of the human body). In general, the carrier structures should follow adequately the development of the personality and on bigger scale - the social processes. However, this is impossible if they are fixed and are not in the scope of society's possibility of management and control, as is the case with the genetic program in ontogenesis and biological evolution.

4th group "Environment" (or external medium):

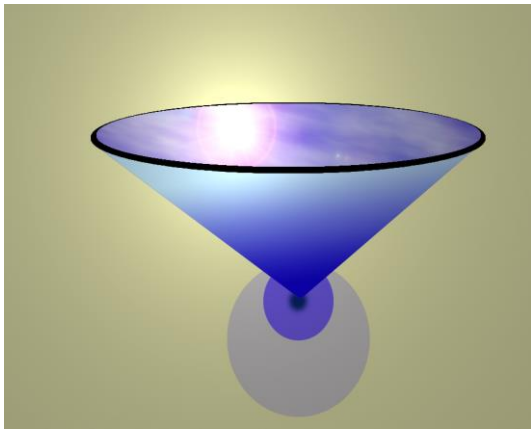
1. With the adoption of such vast formulation on the substrate structure and functions of the artificial host-organism of personality in its infinite development, it becomes evident that the concept of "living medium", "external environment" is expanded up to the concept of universe. The only imposing hypothesis in this case is that the universe holds an inexhaustible variety (potential and actual) of possibilities and activities. **The world is inexhaustible and infinitely diverse in terms of potential opportunities and activities.**

Naturally to one immortal, infinite and unlimited in its existence and development personality, and of an infinitely existing and evolving humanity, to be juxtaposed with an infinite and inexhaustible in its opportunities and activities Universe.

2. Of course, also consistent and logically compatible with the idea of personal immortality in its rational option is the adoption of **the principle of cognoscibility of the world i.e. human (?mind) consciousness is able to understand and gain knowledge of the world in its entire actual and potential manifestation.** The human mind is able to get to know as well as to create reality. On the basis of the truth of the phenomena, the mind is able to bring to the reality even less probable possibilities to cause events, that without his intervention would never have occurred.

Here I'm not going to discuss the grounds and justification of all these hypotheses this will be a subject to further analysis, which will progress consistently. The constructive attitude was the important factor why I've chosen some time ago this direction of thought. In other words, I've supposed that each of these hypotheses has its grounds, sounds reasonable and it can be justified as

well as it could successfully serve as a starting point of thought constructing. Then we come to the question: **“How the scenario of the process of personal immortality in its cybernetic variant will look like in particular? What are the grounds to apply science in each element of this scenario?”** For this purpose, I've been helped with an attempt to visualize the process in a series of schemes. (Picture. № 1 to Picture. № 6.)



Picture. № 1.

On Picture № 1. schematically is depicted the human individual. For **proper understanding of** the idea of personal immortality is essential to demonstrate the **distinction** between the human as an organism and human as a personality. However, the difference should not be brought to full separation of soul and body like this is represented by some religious or philosophical views such as dualism and idealism.

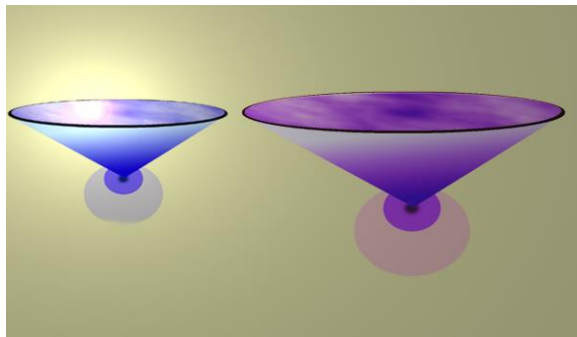
The body is represented schematically in three overlapping circles that represent respectively:

1st circle (gray): effector tissues and organs (skeletal - muscular system, endocrine system, internal organs, skin, nervous system, etc.);

2nd circle (purple blue): sensory organs and nervous system, directly responsible for the psyche;
3rd circle (dark blue): central nervous system (brain).

Naturally, the first includes the second circle and the second in turn includes the third.

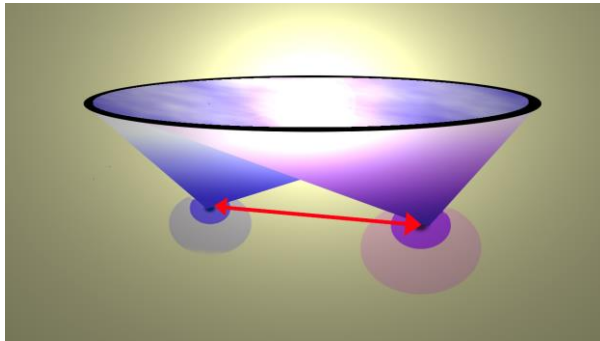
The human nervous system and in particular the brain is sufficiently complex system composed of strongly connected components (neurons and glial cells), only neurons are between 14×10^9 , and each element is connected with several thousand others. Processes of excitation and deprivation in the membranes of cells are spreading in this highly connected excitable tissue, which is determining long term changes of the biochemistry and connectivity of neurons, and in essence this is the basis of individual neurological memory. Without going to dive into details, which in this case are definitely not irrelevant, we can quite legally imagine that the brain "generates" space of states responsible for memory, psyche (mental processes) and in particular consciousness, the unconscious psychic, and self-awareness (the "I"). This **"space"** is represented schematically as an eliptoid area above the overlapping circles of the body and nervous system. This **"space"** is not identical neither with the physical space of the body nor with one of the nervous system and has its specifics, this can be a subject of further dedicated discussion. It is in this space where **after the birth** of the human individual the psyche, consciousness, self-awareness and the integral personality of man occur. This system is represented on the picture as a bright circle (like the sun) because on one hand it "illuminates the world", and on the other, it is representing that essence which will achieve an unlimited existence and development (i.e. immortality).



Picture. № 2

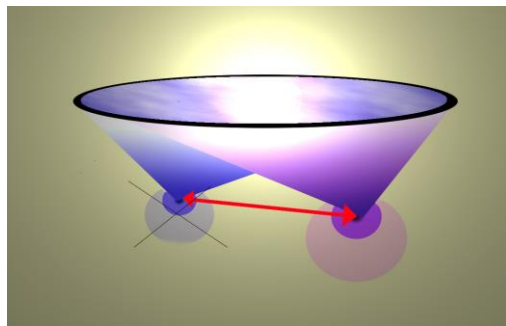
Picture. № 2. Here we see drawn to each other - a human individual, in its natural organic body, with mind and personality which are depicted as a bright sphere, who will put in to practice the process of personal immortality; and next to him an artificial body-receiver (pink –purple coloured), the same scheme, but without the bright sphere on top of it. Artificial body receiver has all the effector

and sensory systems, nervous system and brain, but does not have an individual memory, psyche, consciousness, self-awareness and personality. Artificial host body is depicted with the same scheme because it was created keeping some continuity however the color and size are now different, please mention that the generated by the brain area of existence of the psyche (personality) is much bigger here, this is done in order to underlie that the new carrier is achieving something more than perfect organic body and creates more opportunities for subsistence and development of the personality.



Picture. № 3

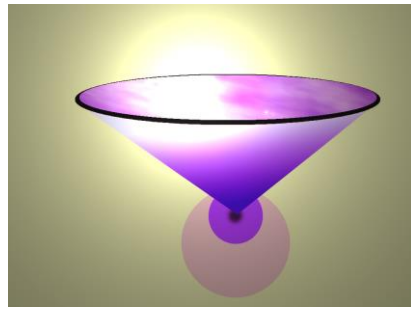
Picture. № 3. The two way red arrow is demonstrating a physical interface connection between the biological body and the artificial body receiver. This connection is of such nature that it is causing the “spaces” of existence, generated by both systems cease to be independent and fuse into one space. The bright sphere now becomes larger and more luminous because acquiring new degrees of freedom and opportunities for development. The old and the new body carriers remain connected as described above until the migrating psyche masters the new body.



Picture. № 4

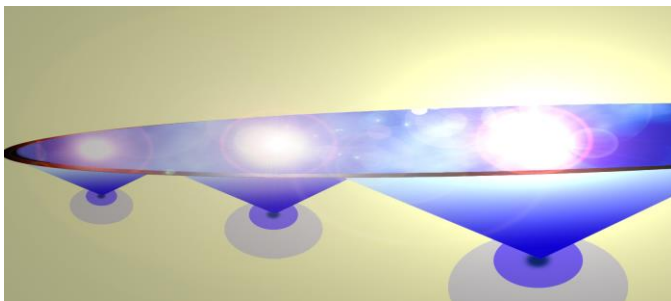
Picture. № 4 depicts the process of disconnecting and removing the old body-carrier. Braking the connection should follow the transfer of all individual memory in the “common space” and after the “mastering” of the new body. The way a person perceives himself and the world through the artificial body-receiver

alone with temporary elimination of the biological body (Picture.4) (e.g. anaesthesia) can be a good measure for this. Once certain indices are covered, the old, and already unnecessary body can be completely removed. Here it should be pointed out that breaking the link between the old and new body without removing the old body would split personality (bifurcation, or clone), and each branch will have its own consciousness. In most cases such a process would be undesirable.



Picture. № 5.

Picture. № 5 - This is the man carried a full migration to the new organism receiver mastered the new body and completed its first cycle of endless road of immortality.



Picture. № 6.

Picture. № 6. Personal immortality means unlimited repetition of the described cyclic process. The personality will be existing and will be developing itself in a series of bodies with certain continuity and increasing sophistication. The figure depicts a series of three bodies, the first of which is the natural biological organism with which nature has endowed us, the next are artificial organism-carriers resulting from the creation of man. Of course, this sequence is not limited to three cycles, but continues to infinity.

Special keen imagination is not necessary for the one who follows the sequence of pictures above to understand that they actually represent the beginning of a positive feedback, which does not have limitation. The personal immortality in its form presented here is actually a process that grows as a chain reaction, like explosion, which however the well-known explosions have unlimited charge and also grows indefinitely. Maybe Stanislav Lem is right, that "the thread

of understanding” breaks too fast because we easy to realize that only a few cycles of the described process our mind will become a super mind, from creatures we will become super creatures that will quickly tighten the whole Universe in an unified process of expansion. Such perspective can be in some aspects too close to the idea of God and the irrational, but despite this and despite the matching characteristics between irrational and rational idea of personal immortality the borderline between them is not blurring, but remains sharp and clearly laid down.

Even without making a full comparison between rational and irrational personal immortality, it is quite clear that both concepts have common elements, for example, after the death of the body there is something that remains and continues to exist and develop. In the religious beliefs this is the human soul. Respectively in the cybernetic version of rational personal immortality this is – the psyche, the personality (memory, emotions, thinking, consciousness, self-awareness (self-consciousness) (the “I”), etc.). Both assume unlimited in time and full existence and spiritual development, despite the death of the organism. An obvious, and important item is, that in both variants personal immortality is definitively associated with the term "preservation". In religion and mysticism responsible for this preservation are incognoscible superpowers: god, devil, etc. What is the nature preservation in the rational version? This question should be given a complete and differentiated response, if we really support the rational nature of the idea, and because exactly the notion-category "preservation" is the most direct route to its formulation in terms of science. The following questions should be answered clearly and precisely:

What is being preserved?

What are the "mechanisms" of preservation?

Can so defined preservation be classified? (Are there any analogues in reality?)

Of course, this questionnaire can continue to develop in more detail, but here it is important to emphasize that there is a well-paved road towards the science. It should also be mentioned that this is not just a small path, but a highway, because all the science is nothing but discovering the forms of preservation and their detailed description.

At this stage, we have the necessary conceptual tools to give very definitive answer to the question: What would be preserved in the process of cybernetic personal immortality? Obviously, this is the “inf” of personality (in more general terms – the inf of psyche). Both systems of information are closely related, as it should be borne in mind that the personality as a system of information is upgraded on and integrated into the “inf” of the psyche. Cybernetic version of personal immortality is depicted using a series of drawings (№ 1, № 2, № 3, № 4, № 5, № 6) that are nothing more than detailed representation of the **positive feedback between “inf” and carrier**. The bright sphere, which is handed over from a carrier to another new carrier, becomes bigger, and brighter in it is motion through an unlimited number of carriers – this is the system of information of the personality. When the formulation that the cybernetic version of immortality suppose an unlimited personal existence and personal development in a series of bodies-carriers with a certain continuity and increasing

sophistication is read for the first time, it might be difficult to realize at once that indeed a common process actually exists and it has been achieved without human intervention. This is the existence and development of the "inf" of genetic information in a series of organisms since the occurrence of primary life up to nowadays. This is the biological immortality or the immortality of the system of genetic information. At a certain stage of development, as an innovation and for more precise service of biological self-preservation and immortality arises the psyche. The "inf" of psyche (mind) has servicing and subordinate role and this state is maintained until the appearance of man. At a certain stage of development, with the emergence of man and human society the "inf" of the psyche acquires the qualities as "consciousness" and "self-awareness" and the biological individual becomes a man, the species - human society is "inf" of the psyche becomes an "inf" of the human person. The biological evolution and the natural selection lose their importance, as the personality factor became leading. An inversion occurs, as for the existence and development of man and both as an individual and as society it is the personality which is of paramount importance, not the set of genes. However, our bodies do not yet know almost anything about this inversion. The processes of ageing and death are in the interest of development of species and are not an obstacle to development and the immortality of the "inf" genetic information (human genome), successfully passing from generation to generation through DNA replication, and mechanisms for self-reproduction and propagation. However, those same processes of ageing and death, which can be viewed as mechanisms of internal species regulation does not threaten the "inf" genetic information at all, are detrimental and disastrous for the "inf" of the personality which dies and vanishes with the ageing and dying body.

The cybernetic version of personal immortality imposes correction of this gross contradiction and inconsistency in human development and to create purposely a "mechanism" to allow unlimited existence and development of personality, analogous to the biological immortality. From the selected point of view the axiom of unconquerability of death which is accepted without appeal in everyday life, does not appear unshakable any longer. There are systems that are virtually immortal - these are "infs" of genetic information (the genome of each species). Why not to think about or accomplish a similar process with the "inf" of mind and personality?!

A hope that this is a totally realistic program is offered by some generally popular terms:

The principle of invariability of information.

Starting point for analysis is the assertion: **the psyche and the personality are systems of information**

The information approach to the problem of the pscyche has already advanced with some serious steps (28) and has also received very serious criticism (29), but it is quite obvious that precisely the claim: **the psyche is information** is the foundation from which to go and to build further. Of course it is not just information of any kind, but a system of information and also not every system of information psyche. The psyche is a system of information of a

specified type that has not yet been studied completely (30). However, the psyche as a phenomenon belongs precisely to the class of information processes and is subject to the most general laws in this area. Moreover, precisely the system-information approach, if appropriately modified and further elaborated, underlies the case - the psyche is a system of information of a specific type, and I believe that it can provide an comprehensive description and explanation of the psyche and mental processes.

The information invariability principle is fundamental for understanding both the concept of information as well as the information processes specifics.

The meaning of this principle implies a clear distinction between the terms "signal" and "information". The signal is physical structure carrying information, however the information in its proper sense is the content of this signal. The content of the signal is not part of its general physical properties, but is more related to what caused it and for what it has been intended. Information exists only in the self-organizing systems in the process of self-organization and self preservation. Need to distinguish between the terms "signal" and "information" that is triggered by the understanding that the signal that includes physical characteristics and the information is exempted from them. Of course, the information can not exist independently apart from the signal, it is incarnated in it, but it is independent of the specific substrate and energetic characteristics of the signal. One and the same information can be stored and transmitted by different signals with largely different physical characteristics. Information is always "metasystematic" with relation to the signal there is always a "conditionality" between the structure of the carrier and the relation with "system – metasystem", and this means that self-organizing systems can use for the realization of one or another function information carriers that are far too different in their nature. "Relativity" manifests in a specific **code of information**. In any signal, in any information carrier, it exists in the form of a specific code or the signal itself is a code. The formation of a code is by essence an act of self-organization. There are codes that are basic - for example, the genetic code carried on the structure of DNA is basic to all living systems of our planet. (There is an assumption that the universality of the psychic code is not inferior to that of the genetic code.) The relation between codes expresses the specifics of the phenomenon of information and information process. The information always exists in the form of a defined code that is determinately "clear" i.e. allows direct use by the self-organizing system. A question to clarify remains: in what sense the information is independent on the physical properties of its carrier? This is the question of the existence of certain codes for a self-organizing system and the possibility of formation of new codes and conversion of old. The codes are formed historically and reflect the entire line of the self-preservation improvement through information and information processes, because there definite superstructure levels in complex systems. The genetic code is the basis of the first cell, but cells can unite to form tissues in a variety of ways, tissues are forming organs where some or other properties of the cells are essential in order to arise muscle, brain, glands etc. In the brain it the electrical modulation of the cell membrane (membrane potential) is essential, while in glands - the production of a specific

chemical. In the neural networks of the central nervous system based on electrical oscillations of the membrane and related to them processes in the entire cell the whole sensory information is coded, to ensure its interaction and the formation of mental images, the latter is the basis of psychological regulation and management of the system. The question arises: key codes for life on Earth that were formed in the process of emergence of life, the arise of the psyche, the occurrence of consciousness - are these the only possible codes, is this the only possible way to self-organization? Are the coding of the substrate DNA coding and later in the sodium-potassium membrane potential mechanism the only possible codes for the life and for the psyche?!

It seems that the development of the huge front of research related to problems of artificial intelligence (AI) (31) and neural networks (32) (natural and artificial) and obtained results in this field, with decades-long debates (33) about the boundaries of artificial reproduction of mental functions make more and more credible the hypothesis that is totally admissible to think about coding the "inf" of the psyche in a non-biological substrate: artificial neural networks structured in artificial brains equipped with artificial sensors.

And while **the principle of invariability of the information is the general framework within which such thought is admissible as a hypothesis**, the qualities of the neurophysiological memory as a basis of the "inf" of mind and personality are the next argument, which makes visible such a possibility.

Properties of the neurophysiological memory.

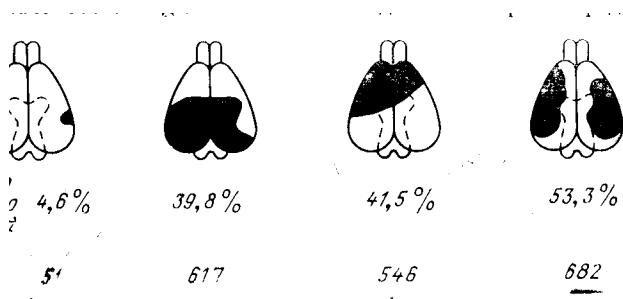
The neurophysiological memory is a property of a specialized organ - the central nervous system (CNS) in animals and humans. Specialization of cells, including nerve (neurons and glial cells) is late acquisition of the evolution, so neural memory appears much later than the genetic one. It must be outlined that in most cases on the basis of more ancient mechanisms the new ones are formed and superstructured, so neural memory is largely based on the primary form of memory in living systems - genetic. However, the volume of the genetic memory is insufficient for predetermining the neural networks and thus the brain is an organ, although with a genetically set macro structure, its micro structure is formed by the influence of environment. On the main question - how the information is stored in the central nervous system in the brain, for what the memory traces (engrams) stand for and required information is reproduced, etc., for all of the above we have not yet given a complete and satisfactory response. Even though, the scientific research in this direction from a long time ago are not in vain, there are models compelling, functional and beautiful enough, which may serve as a basis for further reflection, experimentation and practice.

Hypotheses about the neurological memory are divided into two main groups: **The first group** of hypotheses propose variety of concrete forms of the thesis that the information is coded into specific chemical substrates - nucleic acids, proteins, specific peptides, etc. The beginning of this strand of research was placed by the Hyden's hypothesis (34) for the coding for acquired habit in a sequence of nucleotides in the RNA of the neurons and subsequent synthesis of "memory" proteins.

The second group of hypotheses, which is currently supported by the larger number of researchers, is based on the claim that the traces of memory - the engrams are property of the neural networks, which are associated with changes in synaptic connections between neurons as a result of neural activity. Hebb (35) Model representations of the memory of the neural networks based on the developments of physics of disordered systems (spin-glass) proposed by Hopfield (36), together with the comparisons of the functional characteristics of memory seem to weight the benefit for the second group of hypotheses. Of great importance is the fact that only with those studies - information processes in natural and artificial neural networks, the scientific thought succeeded to cover the most important characteristics of neurophysiological memory into a coherent whole:

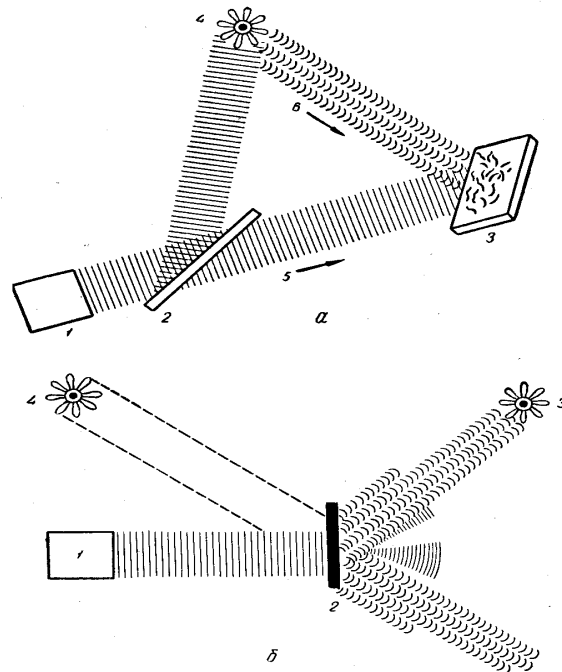
- A huge **volume**;
- **Associativeness** (instant access to content);
- **Distributiveness** (extremely reliable).

The purpose here is not to make a review (37) about the resolution progress of the neurological memory problems, but to focus the readers attention on those memory qualities that are directly related to the idea of personal immortality in its cybernetic variant. From this perspective the most interesting experimental fact concerning the neurological memory is its **distributiveness**. There are numerous experimental evidences, ranging from Lashley's research (38) the famous series of experiments on mice showing that the destruction of the brain cortex impairs the learning of the habit to find a the way through the maze and the deteriorates of its memorizing is proportional to the volume of the damaged cortex, but it is not dependent on the place of defeat, which indicate that this **memory is implemented in distributed form**, as a collective stucture in the brain. Surgically separating parts of cortex in mice (in some cases more than 50%), observed that arise Lashley observed that partial memory defects occur, which are dependent on the quantity of the removed cortex, but he succeeded to destroy a specific engram and memory changes almost do not depend on the location of the cortex removed. Although the first experimental evidences in this direction are subjected to fierce criticism, the next newer and more detailed and thorough studies (39) confirm the initial observations and concepts, and this allows us to say that the memory associated with the cerebral cortex is distributive, and not localized.



By Lashley number of errors

One of the first theoretical models of memory, which successfully gives an interpretation of the properties as distributiveness, as well as associativeness (this is the addressing on the content, image reconstruction from its parts, etc.) is the neuroholographic model (40), the next impressive steps in this direction are made by the whole new front of research triggered by the quoted Hopfield "spin-glass" model in neural networks. And as far, the relation of these ideas to the problem of cybernetic version of personal immortality could be demonstrated by rough first approximation, we will work with neuroholographic model. The holography is a well-developed method for saving information (41) and can be immediately demonstrated and visualized.



Scheme of obtaining a hologram and reproduction of a mock and real image (By "сб. Биологическая и медицинская кибернетика"):

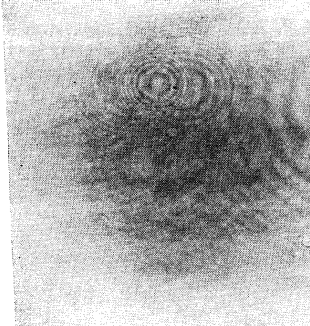
a/.1. Laser; 2. Semitransperant mirror separating the laser to supporting and objective beams. 3. Photographic plates, 4. Object; 5.Supporting beam.

The supporting beam and the wave front from the object interfere on the photographic plate. Interferencial picture stored on the plate is a hologram.

b/.1. Laser 2. Hologram; 3.Real image 4. Mock image. The hologram is a diffraction grating, the laser beam contacting with it undergoes diffraction and generates a wave front which is identical to that one by which the horogram was obtained it carries all the information about the object.

How the information in holograms is coded? With the interaction of the incoming wave front from the image object with supporting beam an interference occurs. This interference picture is fixed on some medium. At first glance, its appearance has nothing to do with the object recorded, but indeed the media has fixed on all the information about wave front coming from the object which has been "photographed" (here we can trace the etymology of the term "Holo" (whole) meaning and full fixation of the amplitude and phase of the wave) . M.

Arbib successfully used expression - "holograms are frozen waves" (42). It is enough direct a restoring supporting beam similar to the one used for the fixation to the hologram, so it will play the role of diffraction grating and will cause exactly an identical wave front, as used for the fixation. A three-dimensional image identical to the capture object appears. The information stored on the hologram is in organized distributively - each section of the hologram has the full information of the object. If the hologram is broken into pieces each of them can serve to restore the image. Image quality deteriorates if a piece from the hologram is too small, but each piece carries the whole information (which strongly reminds about the Lashley's results



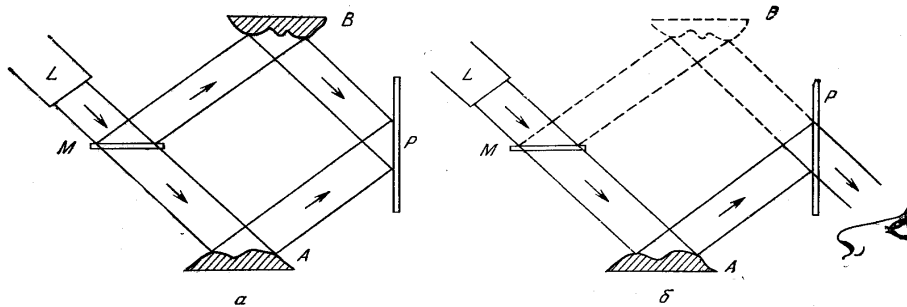
a/



b/

On the above Figure a/ is shown the appearance of a hologram and the image obtained b/ using a laser supporting beam. (pictures are from "Optical Holography ", Robert J . Collier, B Christoph .Burckhardt , Lawrence H .Lin , 1971.)

If the hologram has stored wave fronts coming from two objects, labeled A and B, and each of them has served as a supporting (reference) beam to the other, than the illumination of the hologram with a beam from object A can serve to restore the image B and vice versa, which is an equivalent to the associative memory.



memorization

associative recall

Schemes are by T. Kohonen, Associative Memory, 1978, p. 34.
The comparison between the properties of the neurological memory and properties of holograms demonstrates the following:

Optic hologram properties

Neuro-physiological memory properties

Distributiveness of the record

Lashley's law:

- a) the location of the injury of the cortex is not essential for the results;
- b) dependence on the volume of the brain tissue injured;

Invariable by size and motion pattern recognition.

Pattern recognition as a whole

Associativeness (three types)

Associativeness

Three-dimensional image (voluminosity), color and movement at image reconstitution

Stereoperception, color, and memorization over time.

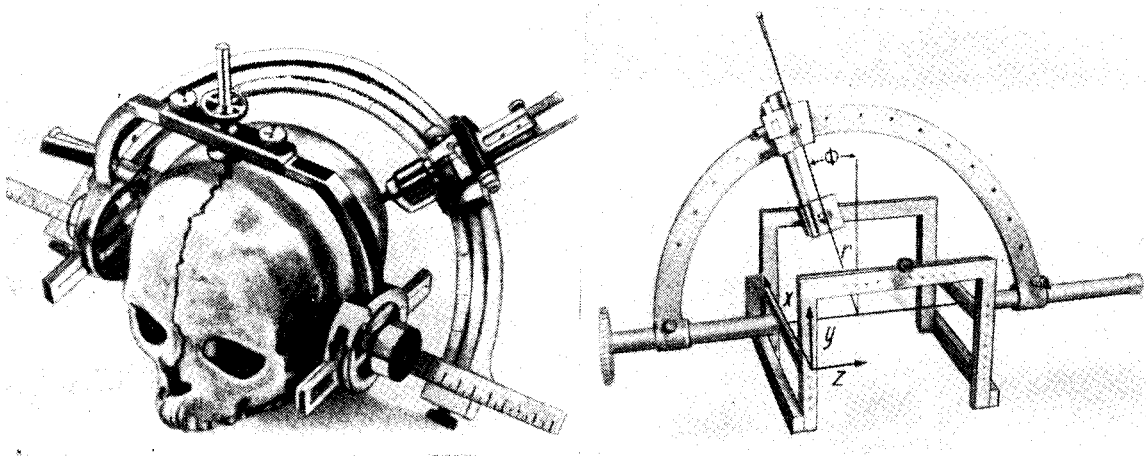
All of the above suggests that in the brain waves of neural activity are spreading out, which are saved (and can later be recovered) under the form of neuroholograms. Some authors such as M. Arbib emphasize (43) that it is just a holographic metaphor, although very helpful in the efforts to understand how our nervous system works, how the mind arises and **mental image**, but others, including: K. Pribram; F. Westlake; N. S. Braynes. and A. I. Suslov and others accept that neuroholograms actually exist, as well as of course, the mathematical properties of neuroholograms and the mechanisms of information processing i.e. the neuroholographic process is not the same as for the conventional holograms. The development of this strand of research is of exceptional interest, but even as a metaphor the holographic model is of great importance for understanding the possibility of achieving an "inf" of the personality migration from one carrier to another.

Let's relate these ideas to a cybernetic variant of personal immortality. We are starting with a source "brain" and a new "brain receiver". Imagine, that an artificial link (artificial commissura) is created between the two brains - the source (old brain) and the new brain-receiver, so that the processes of memorizing to spread on the neuronal networks of the system of jointly working two brains. So let us imagine that this process continues enough time to „walk“ across the memory material of the source brain and to create the necessary amount of common engrams (neuroholograms). And so we came up to the question - what will happen if we break the link between the two brains? Breaking the link is tantamount to tearing of the hologram of two identical pieces, but then each of them will bear all the information. This breaking the link can also be considered as a process of replication (i.e. doubling, creating a fully identical copy) of the "inf" of mind and personality. To prevent the creation of psychic and personal twin, the source system must be destroyed, but the personality will continue to exist and develop, keeping all your memory, character and other features, including consciousness and self-awareness in the new organism, into the new central nervous system and brain. The distributiveness property of neurophysiological memory and the speculation that this memory precisely is the

basis on which the "inf" of mind and personality is emerging makes the stand of the cybernetic version of personal immortality for "migration" of the personality from one carrier to another and to implement a process of unlimited development of the "inf" personality in a series of improving carriers quite admissible and logical, which we promptly directed attention (44). For the realization of such process it is necessary to construct an appropriate information bridge (an artificial commissura) between the two brains - the donor (the source) and the receiver. This task has more authority at this stage than the one for creating an artificial organism, given that the successful cloning of the human organism is a satisfactory solution for the realization of the first step in personal immortality;

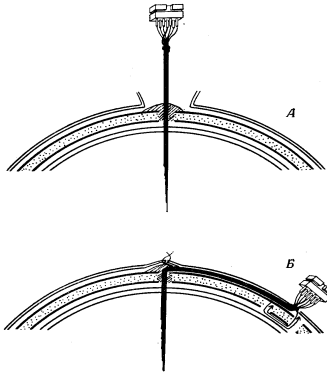
Information Bridge (artificial commissura).

At this stage of development of the experimental engineering the most direct access for investigation and influence to brain structures and impact on the brain of higher mammals and humans takes place via so-called microelectrode insertion (brain implants) (45). They are extremely thin metal filaments of isolated body and an open end that is put into brain structures and with minimal damage to the brain can serve for feeding or collecting signals. Hitting the exact location of microelectrodes in the desired brain structure is achieved by using a stereotactic equipment (46) operated by computer and controlled by CT-Scan.



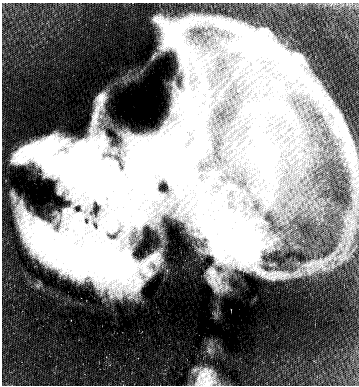
Examples of Stereotactic apparatus

Early 60's J.M.R. Delgado (47) made impressive demonstrations about remote control of animals through direct influence on cortical or sub-cortical structures through multichannel radio connection to microelectrodes inserted into the brain tissue, which allows the experimental animals to be explored in their natural environment and during a normal communication with their fellows. The method was applied successfully in humans for treatment, for example to suppress epileptic black outs. In parallel, separately from the treatment arm, studies on the relationship brain-psyche, psyche nevrodynamic codes (48) have been carried out.



Inserted microelectrodes and their fixation on the skull.

(By Jose M.R. Delgado, Physical Control of the Mind, 1969)



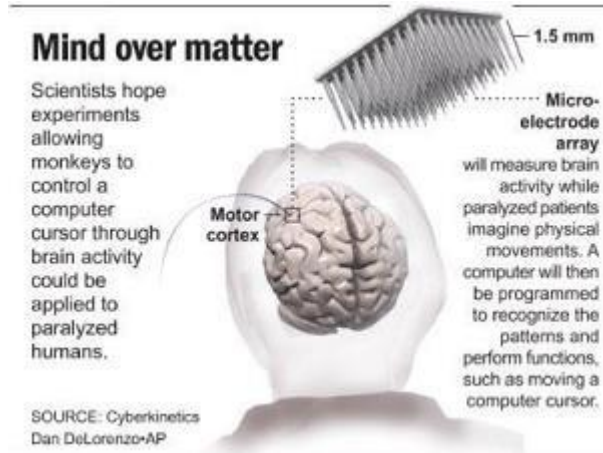
X-ray photography chimpanzee with a couple of microelectrodes inserted.

(По Jose M.R. Delgado, Physical Control of the Mind, 1969)



Chimpanzees with several hundreds of inserted microelectrodes
(By Jose MR Delgado, Physical Control of the Mind, 1969)

Over the years for the purposes of experimental research of the brain this technique demonstrated a serious advances 49, and the number of electrodes inserted per square millimeter of cortex reach tens of filaments.



(In <http://www.skewsmc.com/implants.html>)

Detailed information about solutions for direct contact with brain and implementation of direct brain-computer interface can be found on <http://www.imminst.org> (Neural interfacing Resources).

Despite its invasiveness, this method is probably one real practical opportunity for building an artificial commissura between two brains to enable the mutual work of not just two but for four cerebral hemispheres.

In this plan a great interest generate the experiments of cutting the corpus callosum (50) and other commissurae and the impact of this surgical intervention on the psyche and the findings on the role of brain asymmetry. R. Sperry, one of the founders of this field of study had believed that the results of the study of the cut corpus callosum indicate a resulting partition of consciousness of patients, which is an indirect argument for the success of the program to build artificial commissura and achieve both a collaboration of four hemispheres, as well as a "migration" of the "inf" of mind and personality from one brain to another.

Obviously, questions put herein will result in discussion, both on a global scale and in detail, but it costs us more importantly is that they are already placed at all. In a word, the idea for the cybernetic variant of personal immortality in terms terms of system approach and general system theory, is no longer "floating in the air" but it is now well grounded. Above all, this idea can be formulated so it can be understood by the specific scientific disciplines and a contact can be made with both the theory and the experiment. Here we can propose a broad research program and specific research projects vital to human existence.

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