COMPUTERS AND ART: MYTHS AND REALITY

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The words "computer" and "progress" have become regarded as synonyms long ago, though the development of cybernetics in our country, as it is known, met dramatic conflicts at the beginning. But "dramas of ideas" accompany computerization of our life permanently, even after it's exclusive usefulness and inevitability have become obvious and indisputable - especially when applied to technology, natural sciences, economics, statistics, intellectual games and so on. The situation with computer application to art creative work appeared to be more problematical. Here we meet some inherent prejudices and myths that began to form since the very beginning and are present not only in common consciousness, but also in a social one. Let's consider these myths in their logical and historical order.

1st myth: **sooner or later, computers should be able to make adequate model of any form of human mental activity, including art form**. The pathos of such slogans was displayed especially brightly in our country, when after initial persecutions of cybernetics as bourgeous false science, the pendulum swang into opposite position. Even humanitarians suddenly began to sing enthusiastic hymns to expected potentialities of computer's art. This forced one prominent poet to shudder: "Any progress is reactionary, if man falls to the ground!".

Such expectation of "Art ex machina"[44] was, using the expression of French theorist in the field of cinema, A.Bazin, "most of all bourgeous". Saying so, he had in mind cinema and photo-technique. By his opinion, the advocates of this conception see the destination of new technique in allowing ones "to fabricate art works, not being the artists themselves" [1]. Let's add that the following attitudes are "bourgeous" as well: a desire for man's liberation from "pains of creation" by shifting them off onto computer; i.e., an expectation of marvelous birth of new artistic value spontaneously and practically "from nothing". The father of cybernetics N.Wiener warned about danger of such attitudes. He anticipated that there might appear new tribe of "machine worshippers" who will gladly expect that "some functions of their slaves can be passed to the machine". The logic of its operation might be unknown, but still it is regarded as "reliable" and wittingly "objective" [2]. Of course both Bazin and Wiener point out here the position utterly humiliating both artist and art itself. But "drama of ideas" is called as "drama" just because one cannot achieve harmony immediately - harmony between question mark and exclamation mark, between desire and possibility.

So, when researchers began to investigate the problem "Art and Computer", arising in aesthetics since 1950-s, they met paradoxial fact: even those machine's "creative works" (more concretely, computer graphic compositions) which were obtained without any artist's interference (in the process of solving pure mathematical/engineering tasks), often were demonstrated at special "cybernetic art" exhibitions and their beauty were widely recognized. Especially it relates to the amazing fractal geometry patterns, that were discovered not long ago (and would lead one to conclusion that God was probably the first programmer with somewhat aesthetic inclination, when He created the whole beauty of nature around us).

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[44] Originated from well-known expression "Deux ex machina", i.e. "god from machine". This is a symbol of the marvelous tool which acts beyond logics of any real events.

It is therefore reasonable to ask - why these computer's products could not be considered as an art, if they are looked so nice? But, from other side, no artist took part in the process of their creation (except the selection of the best results) - it seems they cannot be regarded as art works. Isn't it insolvable contradiction? And aesthetics practically left this question unsolved, thus showing it's own helplessness before new problems, raised by the epoch of scientific and technological revolution.

The first results of our theoretical investigations allow us to answer this long-standing question. The alternative "man or machine" has appeared to be false, and the above contradiction - far-fetched in the final analysis. In order to answer this question, let's remind those bygone disputes in our (Russian) aesthetics which were connected with seemingly scholastic reflections on similarity and differences between two basic categories of aesthetics: "aesthetical" and "artistical".

The "beauty" of computer graphic compositions obtained as by-product of solving pure mathematical problems, is beyond doubt. The beauty presents in them, as it presents in natural objects, including inorganic ones. (Everybody knows and recognizes the beauty of snowflakes, sunset, dawn, water-play, jewelry, etc.). Aesthetical contemplation, aesthetical perception of computer's compositions that were not created by artist, is therefore justified when we regard computer as an object, belonged to inorganic nature, though of artificial origin (including computer programs which reflects structure and features of this physical, inorganic world).

Some person (artist in potential) may select and combine natural objects (flowers, stones, roots etc.) and put them together to create composition of a certain aesthetical value, reflecting the beauty of the nature in concentrated form. Just in the same way, any interested person may pick up some computer's graphic compositions, obtained as by-product, out of programmer's intention, and places them "into the frame". Now they may be regarded as something similar to the art work (computer's "ikebana" of a sort).

But, strictly speaking, the function of art is not reduced to making interesting games or senseless beauty. In a true art work there is always present creative "Ego" of an active artist. You see, art is principal and essential in its functions. It is exactly and by intention the subjective (artistic, belonged to the artist) image of objective reality. By the way, the latter includes an artist himself, with all his passions, private feelings and attitudes.

In connection with this, the results of searching for algorithm of art creative process on the basis of specially devised computer programs, are disputable. The stumbling block in this case is, firstly, the impossibility of complete formalization, algorithmization of art creative process; secondly, any possible algorithm should change continuously, depending upon current social, cultural, artistic, style and personal context. As a result, an old conclusion by A.Kholmogorov (Russian famous mathematician) still remains as actual today: "It seems, that in order to build an automaton, able to write poetry at a level of prominent poets, one has model the whole development of cultural environment in which the poets are developing actually" [3]. Another researcher of this problem L.Pereversev wrote about some concrete experiments on computer's music composition, that there "only note texts are modeled, not the process of composition itself" [4]. Let's add one more argument, that would be most humiliating for computers, could they feel humiliation at all. As truly V.Ivanov noted in connection with the same experiment on computer's music, "it is an excellent example of how people must not to compose. With the computer's assistance, human mediocrity is as if imitated. We as if obtain exact mathematical model of a standard, cliche, used by the hacks" [5].

Adding to such computer programs new elements of "creativity imitation", i.e. elements of game and stochastic deviations from strict algorithm, did not change the above estimation

of computer's "creative ability". No one could ignore social nature of art, regarded as a form of social consciousness, a method of communication in a society, and, if you wish, a method of special, image-bearing modeling of a reality.

At any case, euphoria from expectations of coming "computer art" achievements decreased gradually, and, strange as it may seem, in proportion to complication of computer technique itself. Let's remind in this connections thesis of "computer revolution in art", defended by "informational aesthetics" school (A.Moles and others). According to their opinion, in the epoch of scientific and technological revolution, art should not reflect the reality any more. Instead, traditional approach is replaced by computer "programmed" permutation art, i.e. art of "machine" games, computer combinatorics. But today, after the initial euphoria has gone, we may see, that "computer art" actually exists only in pure technological sense, and does not lead to the changes of functions of art, and to corresponding total changes of artist's function. Computer is no more than a new instrument, having some new abilities (maybe, a great one). But these abilities can demonstrate their "great" potential only in the case of close collaboration between man and machine. Such unpretentious conclusion is dictated by practice. Let's add that in order the results of man-computer interactions could become facts of art, there should occur artistic and technological assimilation of this new instrument. This will allow artist to embody the same inevitably "subjective image of objective reality", although using new art language.

More then forty years of art and aesthetical computer experiments in many countries have proved this conclusion. As a result, it is clearly seen today, that any pretensions of independent "computer creative work" are withdrawn and placed to the periphery of art practice. Computers themselves are subordinated, one way or another, to the eternal purpose of further extensions of audiovisual palette. The function of computer in creative process is reduced, in the best case, to the routine, mechanical part of the work (which can be formalized). It seems, the life has set things in their order. But...

A new myth was born: **as if computer audiovisual means, being a product of new art set of instruments, have absorbed merits of all the previous ones, and then should gradually forced them out (including cinema, photo, TV, video).** But, similar to that as one cannot substitute bananas for apples, computer "palette" should take its part in the culture not "instead", but "together" with the previous ones. Of course, it has it's own specific features in the system of art communication, forming new language of art thinking. Let's take for example computer graphics, which specific character is evident even at technological level. Cinema, photo and slide technologies are mainly a process of "*reproduction*" (broadcast, copying) of something that already exists and is sending to the system input. The image then is formed by method of substraction (system substracts some information from initial pattern and lets the rest go to the "screen"). On the contrary, computer display is "tabula rasa", blank sheet, where the image is "*produced*" (in this case by method of addition, "one pixel to another").[45] It is exactly this seemingly pure "external" technological feature, that explains peculiarity of computer image: it's distilled, sterile clearness, the impression of unreality and supernatural, cosmic origin (caused by the absence of air in computer's picture, freedom from Earth's gravity etc.). Let's note also chemical virginity of color, the ideal mechanical movement - all that explains the psychedelic, hedonic character of impression produced by computer animation. It is very near to illusions caused by drags, or to dreams and hallucinations...

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[45] Oldos Haxley believed that these images are from without, from the sphere of World Reason. Naturally, it may be discussed, but it is significant here that Hacksley, who tested hallucinations agents by himself, relates exactly to Plato's prototypes. On his opinion, the bright visions, caused by chemical agents, strongly resemble them [6].

In order to understand why these "external" technological differences influence so deeply psychology of perception, aesthetics of computer graphics and animation, we should, on my opinion, turn to some fundamental philosophical conceptions or, more precisely, to historical origins of philosophy. As it is known, one of the main original philosophical trends, "objective idealism" in classic terms, considers ideal reality as primary, which exists in objective sense. Matter is understood as a mere shadow, a faint reflection of ideal reality, but it can be perceived by our sense organs. In poetical form something like this was expressed in Ancient India Holy books: material world is only a veil that covers the true reality of Divine Origin (Brahman). In Ancient European philosophy aesthetical aspect of "objective idealism" was most clearly presented by the great Plato.

According to him, ideas form their own transcendent world, where each idea is an absolute sense of corresponding thing of material, earthly world. The ideal world "above" us, high in the heaven, consists of the same things that we perceive in our own world, but they are given "above" there eternally in the form of absolutely exact prototypes, or "eidoses" (that means "form", "image", "appearance"). For Plato, the words "idea" and "eidos" are synonyms. Therefore, for example, the material kettle is a faint shadow, earthly embodiment of the eidos of "kettleness" which exists forever and outside of man's experience, outside of nature.

Computer images of kettles, bottles, tables, cars, buildings amaze us by their absolute character and by the air of irreality. Are not they kind of "visualization" of Plato's eidoses of these things? You see, they are formed on a display by means of formal algorithmic operations, which are implemented in the bowels of computer "black box". There the images are presented as multidimensional pixel matrixes, or numerical arrays i.e. in a form inaccessible to sense perception. More than that, Plato himself believed, that exactly mathematical objects serve as mediators between world of eidoses and world of perceptible, material things. It is exactly these objects that are accessible to rational cognition (isn't programming relates to this area?).

Actually, all computer images are "devised", are of "ideal" and "absolute" nature (that is the essence of programming means). It is clear why it is very difficult to get rid of these properties when trying to "animate" and make more "human" such visualization of eidoses. On the contrary, how on the spot they are in advertisement, when each toothbrush or kettle has to be presented as "ideal" object? The main purpose in this case is not "ennobling illusion" of artistic image, but illusion of other, psychological and physiological sort. Each thing is radiant with $100 smile, assuming similar reaction in potential happy consumer! The hallucinatory and meditative character of impressions produced by computer digital images, can be explained in this way. Just as in drug illusions or hallucinations (for all their fantastical, bright, hedonistic beauty) there is no object before our eyes, no input signal (in the organ of sight). This signal is appeared "by itself" somewhere in the brain's depths, which plays fancifully with desultory "eidoses" of the previous visual experience...

To what extent such properties of computer graphics may be dangerous for a man, time will show. But many people regard it as sort of "visual drug". Let's remind the famous Delgado's experiments on the rats with electrodes implanted into "delight center" of the brain. The rats were excited by electric pulses up to the loss of consciousness. Drugs, in their turn, achieve "delight center" not through direct electric contact, but via blood stream. As for computer graphics, it influences "delight center" through eye (of course, its drug effect is far weaker then that caused by electrical or chemical agent).

All above conclusions concerning nature of computer image technology, on our opinion, do not bear any evaluation moment, pointing only to its specific character, that

distinguishes it from other art technologies. This has to be clearly understood and taken into account in theoretical investigation of computer potentialities in the art.

Charmful and naive is concept of "eidos" devised in Ancient times. We use it (in the same charm form, as I hope) to explain the cultural phenomenon of XX century's end. There are no any extra pages in the history of culture, everything is interconnected and calls one another - over the ages...

And, finally, one more myth. A.Moles in his works glorifies the merits of computers, that can store, synthesize and perform the wide variety of audio and visual production - music, sounds, speech, text, abstract and concrete images, both still and animated ones. He believes that now **any artist, by simple permutation of this most various semiotic material, is able to create not only new art works, but even new kinds of art! And, which is most significant - the needs in all the previous kinds of art is therefore vanished and abolished.** Thus the art not only loses it's main function (reflection of reality), but also loses any systemic and species features, disintegrating into a lot of separate art actions, connecting neither with reality, nor with each other [7].

At one time we have made out the original system of art [8], so to speak, in the course of sequel of Lessing's "Laokoon". The heuristic character of this system is corroborated, which is significant for us, also in the period of computer revolution.

So, the main feature of our structural (schematic) representation of a system is that man of the art ("*Man*") is placed in the center, and a system itself is shown in the process of development (see Fig.1, then Fig.2).
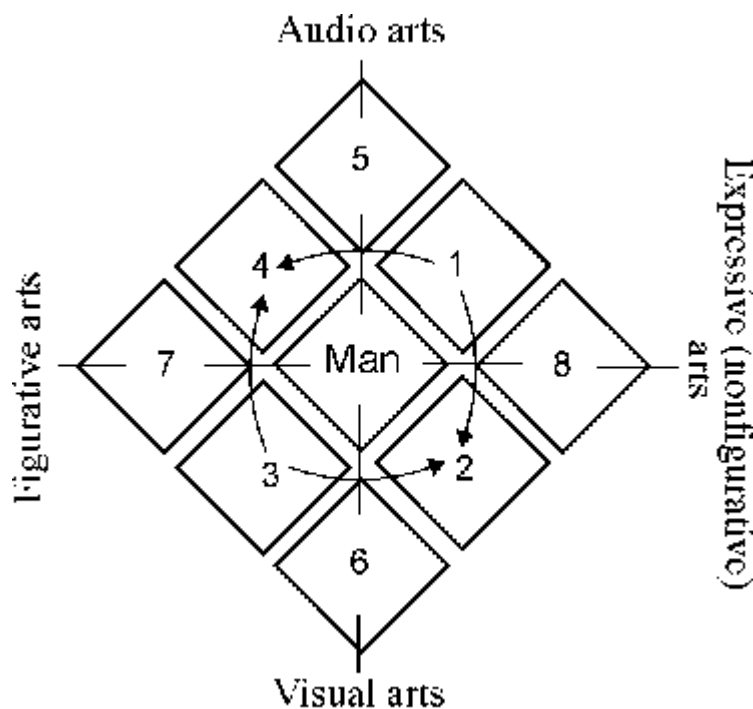
Fig.1. The system of traditional kinds of art, that use "natural" means of art communication.
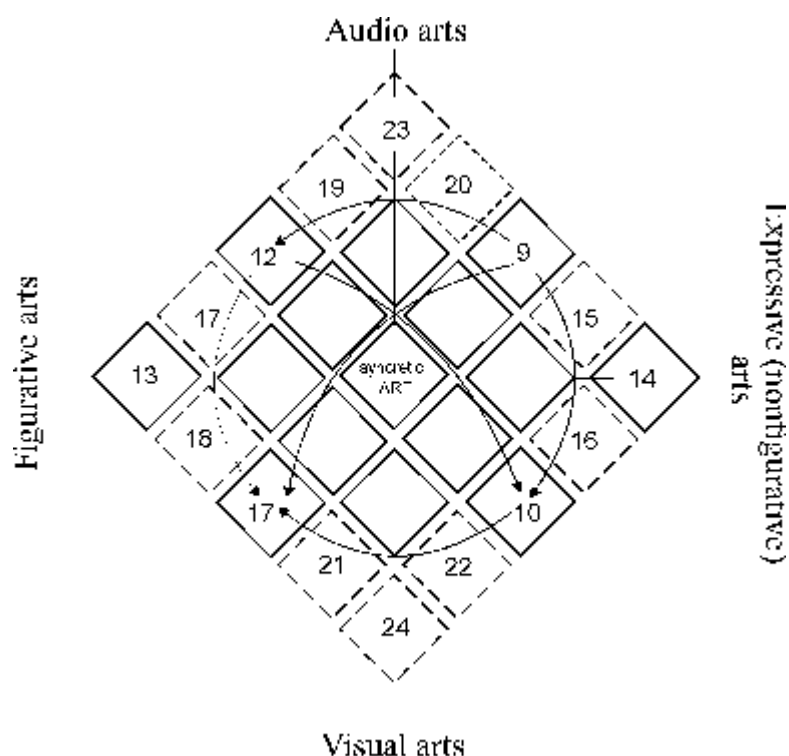
Fig.2. Expanded system of art activity kinds, using "artificial" means of audiovisual communication.

In the epoch of syncretism "*Man*" appeared in the role of subject, object, instrument and product of art at the same time. In the course of division of labor and specialization of art activity, certain essential powers of a "*Man*" undergo materialization. By that the syncretism splits into separate species, that are differentiated according the following pairs of signs (we have chosen them as most significant for the art): "audible - visual" and "figurative - expressive". These are, correspondingly: *music* (1*); architecture, ornament* (2*); painting, sculpture* (3); *art of word* (4). The striving to overcome the arisen estrangement and to restore the integrity of syncretism (that is always inherent aesthetical world view) is assisted by the following factors: - bisensory character of *theatre* (7) and *dance* (8), inherited from syncretic epoch; - bifunctional character of *a song* (5) and *applied* (6) arts; And, beside that: - the arising of a new syncretic formations (shown by the arrows):
book illustration (3+4), *monumental art* (2+3*), vocal music* (1+4), musical graphics (1+2), and, taken together - various genres of *dramatic* and *musical* theatre.

The system shown at Fig.1 has been formed nearly the middle of millennium (Renascence). It's further development consisted of exactly the complication of intrasystem links, i.e. arising of a new forms of synthesis (primarily, stage forms), and other interactions in it.

Thus it is obvious, that just dialectical unity of centrifugal and centripetal forces, revealed here, formed the structure, links and dynamics of a system, and, first of all, determined the integrity of its existence. Indeed, in reality it was accompanied sometimes with a borderline "aesthetical catastrophes", and no wonder that the nostalgia on the lost harmony of Ancient cyncretism gave birth to idea of "Gesamtkunstwerk", that should come to make an end of separate existence of different kinds of art (such was Wagner's delusion). But in the art, unlike science and technology, where diesel forced out steam engine, every artistic act at any level is unique and self-valuable: chef-d'oeuvres of Degas

and Kandinsky neither abolish nor substitute Rafaelle and Jotto, the appearance of opera and balett do not abolish instrumental music. Therefore system at Fig.1, saving unchanged its external appearance up to the end of XIX century, was growing in quantitative respect nevertheless - just owing to the arising of various stage synthesis forms! The "borderline incidents" in the past were often an indicator of growing but unrealized aesthetic requirements of society. They, in their turn, after appearance and assimilation of new instrumental tools (first of all that were based on the use of electrical power), led to the sharp extension of a system (see Fig.2). It was manifested in the emergence of the following new species of art: 9 - *electronic music*; 10 - *kinetic art;* 11 - *photography and silent films*; 12 - *radiotheatre*; 13 - *television*; 14 - *light-music*; 15, 16, 17, 18 - the *sound* and *light scenography* of musical and, correspondingly, drama theatre. (The latter includes such specific forms as 15 - "spatial music", 17 - *"Sound and Light" performances*, 18 - *"Laterna Magica"*). Applied forms are placed in the cells 19,20 - organization of visual and 22,23 - *acoustical media with artistic purposes*; 23 and 24 - *sound* and *light design*, correspondingly.

Noteworthy to say, that here, in parallel with the growing of the estrangement in the system "man - art work", the centrifugal forces are growing too (shown by the arrows). Almost all parallel cells on the left-right, top-bottom do not exist independently, but always are included into synthetical formations (cinema does not exists now without sound, electronic music inclines to the union with image, as well as interaction between TV and light-music is inevitable, etc.). Thus, it is obvious that extended system also is able to keep its unity and integrity just by means of utmost increase of art species interaction.

As regards to the so-called "screen synthesis" arts, which were at first presented as an example of complete realization of "Gesamtkunstwerk" ideals, their potentials were overestimated too. The widespread confidence existed, that they should absorb all another arts. Among the candidates to this role there were called cinema (in early Eisenstein's works) and "Mysterial All-Art" in Scriabin's declarations. The real life had refused such pretensions - neither cinema abolished theatre nor light-music abolished music. But some painful consequences of "functional asymmetry" of the system had come to the light and revealed themselves in different fates of new arts which are shown on the left and right of Fig.2. The point is that in figurative arts which use technology of "reproduction" (broadcast, copying), the functions of artist and constructor of equipment are separated. While in expressive arts which use images and sounds not referring to the reality, existing before only in artist's imagination, the processes of making equipment and art work itself are joined together. As we see, the situation is unusual for art culture, because in this case not only artwork is unique, but also the instruments, used in creative process. Here lays an explanation of paradoxial and tragical fact of both historical and social status lag of the new art forms on the right half Fig.2 (light-music, electronic music, etc.) as compared with their neighbors from the left half (cinema, radio, etc.). Although it is known that, for example, the idea of light-music itself appeared long before cinematograph.

The liquidation of such "undemocratic" situation in the system of art is assisted by the computer revolution which goes on in front of our eyes. Let's stress it once more, new digital technology is of "productive" nature. It is able to produce any images and sounds, both real and imaginary ones (i.e., figurative and non-figurative ones). Just as the revolver in America of XIX century appeared to be sort of "instrument of democracy", leveling abilities of feeble and strong men, so computers play now similar role, compensating the consequences of "functional asymmetry" in our renewed "periodical system of arts".

It is difficult now to foresee, in what way this system would change owing to further computerization of the art culture. Maybe one more upper layer will be added in our scheme of expanded Universe of arts (which is retracted more strongly at the same time

due to unifying function of computers as universal technique). But at any case it is clear that new computer technique is able to synthesize not only any sound or image, but also any combinations of them.

The total synthesis of all possible components of our extended system is embodied in modern genre of the so-called "multi-media". This synthetic genre imitates at a new, artificial level the primitive syncretism, folklore art forms. (They have many features in common: bifunctional, bisensory and game-like character of their interactive mode; anonymity of the author; usage of canonical methods; impossibility of "easel", completed and monovariant existence). Here computer appears in many roles: as instrument (sound and video at the same time); as virtual subject and as virtual object. At the end the virtual reality is formed and a real subject immerses into it. In multi-media art just as in syncretic art, the art functions are closely connected not only with the game, but also with dissolution in the environment (in this case it is virtual, i.e. artificial and "ideal" one). We may therefore formulate the result in paradoxial (dialectical) form: the system of art is expanding and at the same time retracting, returning to primitive syncretism, which is "virtual" in this case... One may think: here it is, complete and ideal embodiment of "Gesamtkunstwerk"! But, once again, similar to that as impressionism did not abolish realism, realism did not abolish high classics, and modern artist has a right to use all methods and tools that mankind has made out - so computer art in all its variety does not substitute traditional arts (including cinema and light-music also). Computer art is simply one more specific form of art creation and its being. Let's remind, once more, that we see specific character of computer images in that they are regarded as visualization of Plato's eidoses, of some sort.

Thus one can be sure that function of reality reflection, which is inherent art, will remain in computer epoch also, though it will be realized now with the assistance of artificial (synthesized) sound and image. As for elements of independed "programmed", "permutation" art which is discussed by A.Moles, they may be used, but, as it's become clear, only in special game-like forms of contact between man and computer (various exotic "interactive art", "multi-media", "virtual reality" etc., which are close to the former folklore forms).

Universe of arts is expanding, but it never will change into a multitude of homeless and isolated artistic actions, for their growing systemic set still keeps its integrity owing to interactions between them. This integrity reflects that of a man and the Universe.

The main conclusion is as follows: this quantitative growth of a system, which is ensured by computers also, is probably the only reliable indicator of progress in the art, because the contingent of those who can try and show himself in the art creative work is extended too. Now they would be able to realize their formally unclaimed creative potential by means of accustoming to any new accessible art, borned by XX century (as well as to the old ones): cinema, TV, light-music, videoart, computer and laser graphics. (Pudovkin would stayed as unknown physicist and Eisenstein - as architect in Riga, unless new art, cinematograph, would not appear at the beginning of our century). New artists speak new languages, use new instruments, which are made up in the course of development of the united culture, united human civilization, that forms dialectical unity of two processes: development of aesthetical needs, and, correspondingly, means and abilities for their realization...

Futurologists like to joke : it is hard to foresee, especially the future. Already the first day of a new millennium which is at the threshold, may bring corrections to our conclusions and prognoses. But the author is confident in reliability and heuristic character of the chosen method not only due to immanent "beauty" of systemic approach. Almost all authors'

conclusions, related to "outer cells" of scheme Fig.2, have been tested in the course of long-term works in Experimental Aesthetics Institute "Prometheus" under his guidance.

It cannot be denied that among all revolutions only one has justified itself - scientific and technological revolution (including computer revolution). And I would like to join poet A.Voznesensky, who wrote: "Long live scientific and technological revolution, developing into spiritual one!"...

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