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Avant-Garde as Mimesis of Nature

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Introduction

The art world is in crisis: “Most concept art I see now is pretentious, self-indulgent, craftless tat that I wouldn't accept even as a gift” remarked former chairman of the Institute of Contemporary Art in London.¹ Another critic, philosopher Arthur Danto, announced “the end of art”: “To say that history is over is to say that there is no longer a pale of history for works of art to fall outside of. Everything is possible. Anything can be art.”² This paper sets out to examine the claims that notions such as ‘work of art’, ‘progress’ and ‘history’ cannot be maintained in postmodern times by analysing a particular strand of conceptually oriented contemporary art, sometimes referred to as *Information Arts*, in the context of the emergence of the historical Avant-Garde at the turn of the twentieth century. I will argue that the current sense of impasse in contemporary visual arts is an effect of, among other factors, the relative stability of the prevalent *Weltanschauung* of contemporary science since the early twentieth century, and information arts could be seen as an attempt to overcome the sense of lack of progress in art by intervening directly in the process of scientific discovery by engaging in *science-like* research.

In the following pages, first, *information arts* is defined and an axiological framework for the evaluation of works of information art is introduced. Next, Peter Bürger's account of the development of historical avant-garde is discussed, and an alternative view of the development of the historical avant-garde in the context of developments in science, in particular systems theory and cybernetics, is presented. In contrast to Bürger's views in his *Theory of the Avant-Garde*, it is suggested that avant-gardiste art presents a more accurate image of the universe, which is consistent with the current systemic/organismic *Weltanschauung* in science.³ It is argued that, in this sense, avant-gardiste art is closer to actualising an organic image of the universe. In the remaining parts of the paper the emergence of information arts within the last decades of the twentieth century is discussed in the context of the relative stagnancy (maturation) of the systemic/organismic world picture.

Information Arts

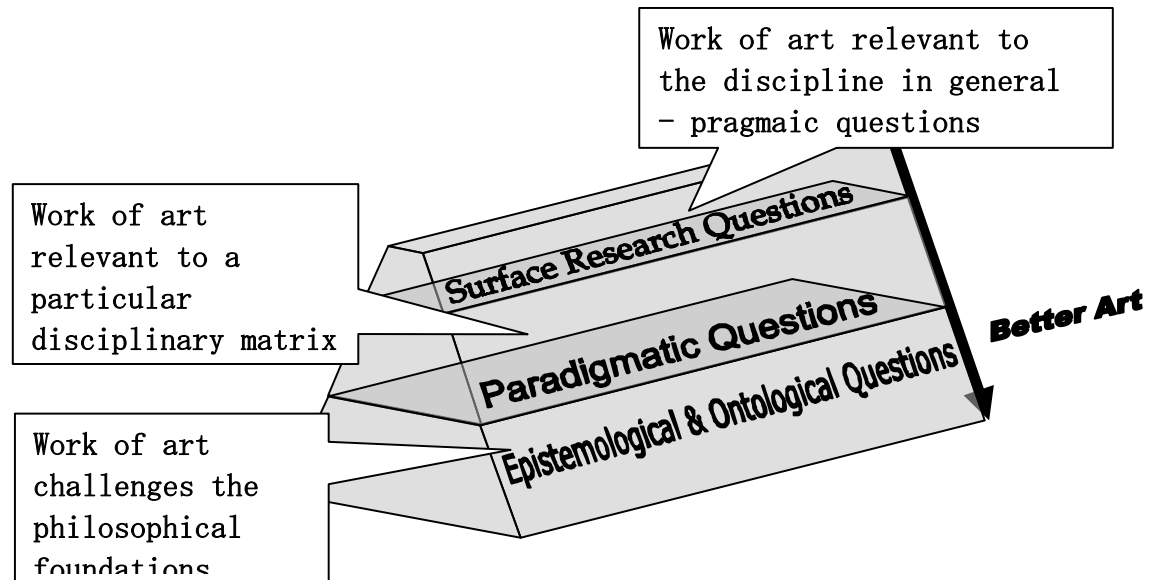
Information art is a relatively new term applied to a particular kind of conceptual art that combines art with science and technology. Although the term has been in use for some time, it has gained currency recently with the publication of Stephen Wilson's compendium entitled *Information Arts: Intersections of Art, Science, and Technology* in 2002.⁴ The volume is a survey of works created mainly in the last decade that integrate art with science and technology. Wilson's book charts the changing role of the art and artist in an era dominated by technological and scientific research.

In a general sense, conceptual art is any work of art, which gives primacy to the "ideational content" or the idea behind the work over its formal aspects. In a more special sense, it refers to the work of a group of artists in the 60s and 70s who challenged the fundamental assumptions behind what constitutes art, and attempted to free art from its realisation in a particular object form. Early conceptual art and related art-and-technology experiments of 60s and 70s challenged the limits and problematised the nature of art and the function of the artist. Although, few artists would call themselves conceptualist today, the influence of the ideas of the early conceptual artists is pervasive in almost all strands of contemporary art. The experimental art of the 60s and 70s was influenced by the techno-scientific discourse dominant in that period (i.e., cybernetics and related discourses of systems science, and information technology). However, this has recently changed dramatically as demonstrated in Stephen Wilson's book *Information Arts*. In the new generation of science and technology oriented art diverse range of scientific disciplines are referenced and directly contribute to creation of artworks. Wilson argues that the meaning and character of science and technology oriented art have been changing since the beginning of the 90s in response to increasingly dominant role technology and scientific research assume in social and cultural life. The artists that experiment with science and technology in the recent years do not see art as a practice of creating merely aesthetic objects or social commentary. Instead, they have become a new kind of *researcher*.

Examples of new conceptual art found in Wilson's *Information Arts* and elsewhere suggest that certain varieties of conceptually oriented art have transformed in the last two decades into a sophisticated form of research-based work that takes part in knowledge production directly or indirectly.⁵ In this transformation, a shift from work of art as representation of ideas or opinions of its creator(s) to work of art as representation of fully worked-out research problems can be observed. In some cases, the work of art required invention of new tools or devices that could potentially be useful for scientific research. In other cases, the work of art embodied ideas that could inspire scientists to think differently about fundamental principles/methods in their fields, and directly or indirectly enhance scientific thinking and research. Karamuftuoglu argued that this transformation marks a shift from "art as concept" or concept art to "art as fully developed research document" or information art. Work of art has become in this period *document* that communicates technological and scientific information.⁶

There are many documented examples of works of art that engage in research and contribute to knowledge production. An example from *bioarts* is used below to illustrate this point. In his 1990 work *Microvenus* (Gibbs, 2001; Wilson, 2004), Davis digitized and translated into a string of 28 DNA nucleotides a figure based on Germanic rune representing the female Earth.⁷ The genetically engineered DNA sequences that carry the graphical message were then inserted into the genomes of living *E. coli* bacteria. This

work suggests that art could contribute to radical new ways of thinking in science. Although the artistic motivation behind it is most certainly different, the importance of this work is that it has the *potential* to inform or inspire those with relevant background and preparedness to think radically about fundamentals of computer science. Fifteen years ago Davis' idea of using DNA to encode extra-biological information was novel and did not have many precedents. Today, computer scientists are working on DNA



computing techniques and biological computers that could revolutionise computer science in the not too distant future. It is plausible to imagine that any scientist with relevant background and preparedness could have been inspired by this work if she had been exposed to it.

Figure 1: The Axiological Framework for Information Arts

Based on the above arguments Karamuftuoglu suggested that “[t]he purpose or function of a work of information art is to facilitate communication of pertinent scientific and technological information”, and “[i]nformation art helps generate or answer significant questions and/or answers regarding fundamental epistemological and ontological assumptions relevant to the scientific discipline(s) from which the work derives its methods, concepts or tools.”⁸ In the same paper Karamuftuoglu proposed an axiological framework for evaluation of research-based art: “[v]alue of a work of information art is related to its potential to inform or address pertinent research questions/problems.” This idea is illustrated by Figure 1, where aesthetic value of a work of art is judged on the basis of the contribution it makes to fundamental philosophical assumptions that underlie the disciplines from which the work derives its methods, concepts or tools. It should be noted that it is not claimed that a work of art could be judged solely on this basis, or mapped exclusively to one of the levels of the axiological framework illustrated by Figure 1. It is more realistic to think in terms of degrees in which a work of art may be relevant to one or more of the three categories of Figure 1.⁹ The remaining part of the paper attempts to elucidate the dynamics that underlie the current changes in the conceptions of art.

Bürger's Theory: Avant-Garde as the Destruction of the Institution of Art

In his influential *Theory of the Avant-Garde* Peter Bürger discusses the emergence of avant-garde art movements at the beginning of the twentieth century.¹⁰ Bürger's main contribution to the debate is the elaboration of the distinction between *modernist* and *avant-garde* art. The two are usually equated and used interchangeably.¹¹ Bürger offers a clear distinction between them. Whereas, modernist art movements (such as Symbolism, Fauvism, Impressionism, and to an extent Cubism) are characterised by *aestheticism*, that is, separation of art from the praxis of life and the consequent autonomy of art, avant-garde art (e.g., Dadaism, Surrealism, Futurism) should be understood as attempts to undo the autonomy of art and reintegration of art and everyday life, according to Bürger: "... with the historical avant-garde movements the social subsystem that is art enters the stage of self-criticism. Dadaism, the most radical movement within the European avant-garde, no longer merely criticises schools that preceded it, but criticise art as an institution, and the course its development took in bourgeois society".¹²

Bürger, therefore, argues that whereas modernist movements can be understood in terms of stylistic changes that break with the tradition, avant-garde art can best be understood in terms of a protest against and a radical break with the social institution that is art. A corollary of this, according to the Bürger, is the dissolution of the unity and coherence of the work of art, marked by the emergence of the *nonorganic* work of art. Although, in modernism artwork has already become nonorganic to an extent, Bürger notes that it is only in the avant-gardiste art that the unity between part and whole, thus the category of "work", has been abolished. In the *organic* work of art, whole is determined in terms of its constituent parts, and parts make sense only in the context of the whole. Bürger suggests that the historical avant-garde's intention of the destruction of art as an institution is realised symbolically in the destruction of the organic work of art, although it failed ultimately to abolish the autonomy of the "institution of art" itself. In my opinion, neither Bürger's account of the difference between nonorganic work of art in modernism and avant-garde, nor his attempt to distinguish modernism from avant-garde in terms of the assault of the latter on the institution of art, are adequate to fully comprehend the phenomenon of the avant-garde. This is due to, in my view, his negligence of the epistemological basis of the historical avant-garde.

In the following section, I will attempt to develop an epistemological analysis of the avant-garde, which will clarify some of the points regarding nonorganic character of the avant-gardiste work of art, and Bürger's assertion regarding intentions of the historical avant-garde movements.

Criticism of Bürger's Theory of the Avant-Garde

One of the claims of Bürger in *Theory of the Avant-Garde* is that:

The avant-gardiste work is defined as nonorganic. Whereas in the organic work of art, the structural principle governs the parts and joins them in a unified whole, in the avant-gardiste work, the parts have significantly larger autonomy vis-à-vis the whole. They become less important as constituent elements of a totality of meaning and simultaneously more important as relatively autonomous signs.¹³

I will attempt present an analysis of the avant-gardiste work of art in terms of systems- and cybernetics- derived concepts below. This will illustrate that the historical avant-garde shares a common epistemological base with systems- and cybernetics- oriented

theories of the universe. The classical paradigm, which is also known alternately as the Cartesian- or Newtonian- worldview, emerged in the sixteenth and seventeenth centuries in the West. The Cartesian/Newtonian paradigm posits a mechanistic view of the universe. The main characteristics of this universe could be summed up by the following statement: the world is a deterministic machine that could be understood completely by analysing it in terms of its constituent parts. A corollary of this view is that the world is equal to the sum of its parts, and parts/objects occupy a precise location in time and space. Events in this universe are analysed in terms of linear cause and effect chains, and the observed phenomena are assumed to be isolated completely from the observers of the phenomena. In this universe of linear causality there is no place for uncertainty, chance, or creativity.

One of the archetypal manifestations of the classical mechanistic view of the world is the invention of the linear perspective in Renaissance painting, which is perfected by Leonardo da Vinci. Although, Renaissance paintings were not realistic in content, they were certainly in form. The realism is achieved chiefly by means of linear perspective, which creates the semblance of "nature" by ensuring "correct" spatial relations between the parts that constitute the whole based on the knowledge of geometric/ray optics. Bürger in reference to Lukàcs' theory of realist art, states: "What Lukàcs calls 'covering' ... is nothing other than the creation of the appearance (*Schein*) of nature".¹⁴ It is known that re-invention of the *camera obscura* in Renaissance helped the widespread adoption of perspective in painting. An important characteristic of linear perspective needs to be mentioned here. It is a *limited* window that opens onto the world: "it [perspective] is similar to a viewer looking through a window and painting what is seen directly onto the windowpane".¹⁵ The spatial extent of reality that can be captured by perspective is thus bound by the size of the window, and therefore, limited.

Furthermore, we know today that perception is never a matter of passively registering physical data on the mind of the observer, which is reified as an inactive screen. Our cognitive processes, in particular those related to memory, play an active part in perception. Perception, hence, is a process of interpretation. Gestalt psychology, founded around 1912 with the publication of Max Wertheimer's *Experimental Studies on the Seeing of Motion*, was one of the first scientific theories that acknowledged this fact.¹⁶ In contrast to the accepted view, perspective is, hence, perception of the nature by a mechanical, rather than organic, eye. Perspective painting is a limited presentation of the nature not only because it is bound by the size of the window it opens up onto the reality, but also as it is a passive reflection of the reality that does not incorporate the cognitive processes that are so important in perception. Contrary to popular view perspective, thus, presents only a low fidelity image of the reality. This conclusion weakens Bürger's assertion regarding the destruction of the organic work of art by the historical avant-garde, as it problematizes the conception of classical painting as "organic". We will now turn our attention to the avant-gardiste work of art, and try to establish whether it can be construed as nonorganic as Bürger states.

Montage and Systemic Epistemology

One of the main techniques used in nonorganic avant-gardiste work is *montage*:

The organic work of art seeks to make unrecognizable the fact that it has been made. The opposite holds true for the avant-gardiste work: it proclaims itself as an artificial construct, an artifact. To this extent montage may be considered the fundamental principle of avant-gardiste art. ... it breaks through the appearance (*Schein*) of totality.¹⁷

It is, therefore, necessary to look at in some detail the use of montage (collage) in visual art. One prominent use of it can be found in Dadaist works. Note that, Dadaism is an archetypal avant-garde movement according to Bürger. Bürger states that:

A theory of the avant-garde must begin with the concept of montage that is suggested by the early cubist collages. What distinguishes them from the techniques of composition developed since the Renaissance is the insertion of reality fragments into the painting, i.e., the insertion of material that has been left unchanged by the artist. But this means the destruction of the painting as a whole, all of whose parts are fashioned by the subjectivity of its creator.¹⁸

I will argue below that far from being an attempt at the destruction of the wholeness of the artwork, Dadaism in general, and montage in particular, presents a holistic view of the nature that correlates well with the new view of the universe offered by the developments in science, especially, systems theory and cybernetics. Systems theory and cybernetics have been developed from 1940s onwards by an interdisciplinary team of scientists. However, their intellectual roots are in the developments in physics, biology, and psychology at the beginning of the twentieth century, in particular, quantum physics, organismic biology, and gestalt psychology (Capra, 1997).¹⁹

One of the revolutions in the scientific outlook brought about by quantum physics is the discovery of the inherent duality in nature. Quantum physics has shown the inadequacy of the classical conception of subatomic entities as particles. In a series of well-known experiments at the turn of the last century, physicists discovered that the so-called quantum "objects" exhibit properties of both waves and particles. The discovery of wave-particle duality of nature makes it impossible to talk about building blocks of the universe.²⁰ In fact, quantum physics suggests that at the atomic level it makes better sense to talk about network of relations among wave-particles that extend in space-time, rather than locally-determined particles. This is sometimes referred to as quantum non-locality. Quantum *entanglement* could be viewed as a manifestation of this quality of nature, where two "particles" non-located, nonetheless, are correlated such that a change in the quantum state of one particle appears to instantaneously affect the quantum state of the other particle.

Organismic Biology at the turn of the twentieth century presented, similarly, a holistic view of nature where the interconnectedness of the organisms and their environments is seen more fundamental than the individual organism. Organismic biologists viewed the nature as an integrated whole, whose properties emerge from the relationships between its parts. The organismic school developed a new way of thinking, which aimed at "understanding of a phenomenon within the context of a larger whole".²¹ This was the beginning of "systems thinking", which culminated in the work of Ludwig van Bertalanffy who published a series of work on systems theory.²²

Another source, which influenced the development of systems thinking was Gestalt psychology, discussed briefly earlier. The German word Gestalt means "organic form", and used to denote an irreducible perceptual pattern, a whole, which is more than the sum of its constituent parts.²³ Some of the principles of Gestalt perception are particularly

relevant for the analysis of montage in visual arts. The principle of *emergence* states that a whole is perceived at once in its entirety without first recognising its individual parts. This principle posits, in a way similar to the organismic school in biology, that a whole can only be understood contextually in relation to its environment, which constitutes a larger whole. Another principle of Gestalt psychology, *multistability*, states the existence of ambiguous perceptual interpretations, which result in oscillation between two or more alternative perceptions. A case in point is the certain type of images (e.g., the Rubin's vase), where foreground (or figure) and background (or ground) oscillate back and forth, resulting in two different interpretations of the same image.²⁴

Dada montage is composed of signs that are fragments of reality (pieces of photos, newspaper cuttings, text snippets, etc.), which seem not to form a coherent whole. The Dadaist montage thus appears to be, as Bürger argues, a nonorganic work of art made up of autonomous signs that are not subdued under the reign of the whole.²⁵ The signs that make up of the Dadaist montage seem to jump back and forth, creating a multistable system that could only be comprehended in reference to and in the context of a larger whole (reality). Dadaist work, therefore, comprises a dynamic system, which is in a state of continuous interaction with its environment, and from which a sense of a new conceptual unity emerges. Dillon compares Dadaist montage to Web sitemaps:

The hypertext page has words and images linking to other words and images; Dada photomontage is made up of bits of photos and other images along with words and phrases from the media, not "things" but signifiers. These signifiers are recomposed into a new whole but point always to another "page" from which they were snipped. So the Dada photomontage is like a sitemap – an image of one way all the fragments go together.²⁶

The Dadaist work, hence, constitutes of an emergent whole, where dynamic exchange between parts and environment results in a nonlocal sense of causality (unity) at a higher level of interpretation. It is, therefore, arguable that Dadaist works, and more generally avant-gardiste art, present a new conceptual image of the universe which could be called as organismic. This image of the world is consistent with the systemic epistemology that has become dominant in the second half of the twentieth century. As we are going to see in the next section, the influence of the systemic epistemology is felt not only in art, but also science, philosophy, and political economy. We could conclude, therefore, that the Dadaist work, and more generally the avant-gardiste art, actualises a more accurate image of the universe, which is consistent with the current scientific *Weltanschauung* or world picture. I would suggest that, in this sense, contrary to Bürger's view, the avant-gardiste work of art is closer to presenting an organic image of the nature.

Information Arts Reaction to Avant-Garde's Mimesis of Nature

The paradigmatic shift in the scientific *Weltanschauung*, which has started in the first decades of the twentieth century, culminated in the systemic view of the universe. The systemic worldview is still the dominant paradigm today. Table 1 compares the old Cartesian/Newtonian view to the contemporary systemic view of the universe. The new systemic view presents a dynamic, evolving, relational universe, where each *holon* is a part of larger whole, which is a holon itself, and acts as the environment of the lower level holon and itself is part of a higher level holon, *ad infinitum*.²⁷ Holons form complex loops of matter, energy and information exchange with other holons and their environments. In this universe of continuous creation and destruction, interacting entities that form dynamic loops of production are defined in relation to each other. This view of

the universe is similar to that of postmodern philosophers who also think in terms of relations and differences rather than positive essences.

Mechanical Universe	Systemic Universe
Static, deterministic	Dynamic, evolving
Inert objects with simple locations in space and time	Delocalized organisms with mutually entangled space-times
Linear, homogeneous space and time	Nonlinear, heterogeneous, multi-dimensional space-times
Local causation	Non-local causation
Given, nonparticipatory and hence, impotent observer	Creative, participatory; entanglement of observer and observed
Wholes made up of parts	Networks of holons, which are simultaneously part and whole
Product	Process

Table 1: Mechanical versus Systemic Universe (adapted from Ho, 1997).²⁸

Gilles Deleuze, who has been a significant influence on the development of postmodern philosophy, is a case in point. Deleuze's universe is an endless process of creation and production of multiplicity of intensities. The intricate systems of concepts developed according to the logic of difference and ceaseless process of becoming in the philosophy of Deleuze and his collaborator Felix Guattari unite the physico-chemical, organic and antropomorphic levels of the cosmos, connecting the mechanical and the organic in a single sphere of interaction.²⁹ This is why Deleuze can be considered an ideologist of late capitalism, which also functions by the production of variety (difference) and multiplicity of intensities of affects and desires according to Žižek.³⁰

It is, therefore, plausible to suggest that since the middle of the twentieth century, the socio-economic system of capitalism, postmodern philosophy and scientific worldview appear to have converged on a similar view of the universe/nature. This worldview, which I call systemic, seems to provide the most accurate description of the universe so far in human history. Furthermore, as mentioned earlier, it seems that this worldview has not been seriously challenged by philosophers, scientists, theologians or artists since roughly the middle of the last century. In other words, the dominant view of the nature and universe seems to have become stagnant; there seems to be no major intellectual movement that challenges the supremacy or accuracy of the model of the universe/nature presented by the systemic theories and philosophies. It is arguable that, progress in art depends ultimately on the change in the models of the universe and nature. For instance, as argued in this paper, the historical avant-garde should be seen not so much as a break with the art as a social institution as Bürger argues, but with the old worldview, which is known as the Newtonian mechanical universe. Without progress and change in the models of the universe/nature, it seems that there is no room for major artistic innovation.³¹ Arguably, this has been the case for about half a century in the art world. I

suggest that information arts, briefly discussed at the beginning of the paper, could be seen as an attempt by artists to intervene directly in the process of scientific discovery and creation of future models of the universe by engaging in *science-like* research in order to overcome the relative stagnancy in the dominant worldview, which constitutes one of the bases of the cultural condition known generally as postmodernism. This is not to deny that there may be many other motivations for artists to engage science-like research. To reflect on and criticise the dominant philosophical bases of scientific disciplines in order to create new forms and languages of art is obviously only one of them.

From the perspective of science, the cross-fertilisation between art and science offers benefits as well. It may be argued that many scientific disciplines (e.g., biology, genetics) are rooted in the nineteenth century worldviews. However, the current pace of scientific-technological innovations presses serious social-ethical-cultural questions that cannot be addressed within the old paradigms. A particularly interesting development that is relevant to experiments in bioarts is the accelerated rate of production of hybrids (entities that mix nature, science, technology, and politics) that dissolve the age-old dichotomies such as object-subject, culture-nature, etc.³² Old paradigms are ill equipped to reflect on the new social conditions brought about by the accelerated cycle of technological innovation, where science has become an immediate/direct force of material production.³³ From this perspective, it could be argued that best art is the one that help orient old scientific paradigms towards the new reality expressed by the systemic worldview.

If the above analysis is valid, i.e., if progress in art depends on the progress in scientific knowledge, it is plausible to suggest that the resolution of the feeling of lack of progress and significance of contemporary art may depend on the success of artists who engage in research-based work.

¹ Gibbons, F. "Concept art is pretentious tat, says ICA chief." *The Guardian* 17 January 2002. Retrieved August 5, 2006, from http://www.guardian.co.uk/uk_news/story/0,3604,634797,00.html

² Danto, A. *After the end of art. Contemporary art and the pale history*. Princeton, New Jersey: Princeton University Press, 1997.

³ Bürger, P. *Theory of the Avant-Garde*. Minneapolis: University of Minnesota Press, 1974/2002.

⁴ Wilson, S. *Information arts: Intersection of, art, science, and technology*. Cambridge, Massachusetts: The MIT Press, 2002.

⁵ See for example Arends B. & Thackara D. *Experiment: Conversations in art and science*. London: The Wellcome Trust, 2003. Ede S. *Art & science*. London: I.B. Tauris, 2005.

⁶ Karamuftuoglu, M. "Information arts and information science: time to unite?" *Journal of the American Society for Information Science and Technology* 57 (2006): 1780-1793.

⁷ See for example: Gibbs W.W. "Art as form of life." *Scientific American* April 2001. Retrieved October 1, 2006,

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<http://userwww.sfsu.edu/%7Einfoarts/links/bioarts.montreal.present/bioartist.research.present8.html>

⁸ Karamuftuoglu M. 2006.

⁹ For a detailed discussion of the axiological model see Karamuftuoglu, M. 2006.

¹⁰ Bürger, P. 1974/2002.

¹¹ See for example, Poggioli R. *The theory of the avant-garde*. Cambridge, Mass.: Belknap Pr., 1968.

¹² Bürger P. 1974/2002. 22.

¹³ Bürger P. 1974/2002. 83-84.

¹⁴ Bürger P. 1974/2002. 72.

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- ¹⁵ "Perspective (graphical)." *Wikipedia, The Free Encyclopedia*. Retrieved April 22, 2007 from http://en.wikipedia.org/w/index.php?title=Perspective_%28graphical%29&oldid=122258628
- ¹⁶ Wertheimer M. "Experimental studies on the seeing of motion." In T. Shipley, *Classics in psychology*, 1912/1961: 1032–1089. New York: Philosophical Library.
- ¹⁷ Bürger, P. 1974/2002. 72.
- ¹⁸ Bürger, P. 1974/2002. 77.
- ¹⁹ Capra, F. *The web of life*. New York: Anchor Books 1997.
- ²⁰ Capra, F. 1997. 30-31.
- ²¹ Capra, F. 1997. 27.
- ²² His best known work in this area probably is: Bertalanffy, Ludwig von. *General Systems Theory*. New York: Braziller, 1968.
- ²³ Capra, 1997, 31.
- ²⁴ "Gestalt psychology." *Wikipedia, The Free Encyclopedia*. Retrieved April 22 2007, from http://en.wikipedia.org/w/index.php?title=Gestalt_psychology&oldid=124753069
- ²⁵ Bürger, P. 1974/2002. 55-59.
- ²⁶ Dillon, G. L., 2000 – "Dada Photomontage and net.art Sitemaps". *Postmodern Culture* 10 (2000): 63-90.
- ²⁷ A holon is simultaneously part and whole. See: Koestler A. *The Ghost In The Machine*. London: Hutchinson, 1967.
- ²⁸ HO, M.W. "The New Age of the Organism." *Architectural Design Profile No. 129*, New Science New Architecture (C. Jencks, ed.), 1997. 44-51. Royal Academy of Art.
Available at: <http://www.i-sis.org.uk/hoarchi.phpa>
- ²⁹ Karamuftuoglu, M. "A Deleuzoguattarian Framework for Understanding Information Systems: the Case of Document Retrieval Systems". In J.N.D. Gupta (Ed.), *Proceedings of the Americas Conference on Information Systems*, Indianapolis, Indiana, 1997. 882-884. Association For Information Systems.
- ³⁰ Žižek, S. *Organs without bodies: on Deleuze and consequences*. London: Routledge, 2004. 183-184.
- ³¹ For a discussion of epistemological basis of art, and how art reflects the Weltanschauung of a specific period see: Tunalı, İ. *Estetik* (6. basım). İstanbul: Remzi Kitabevi, 1978/2001.
Tunalı, İ. *Felsefenin Işığında modern resim* (6. basım). İstanbul: rh+sanat.Tunalı, 1981/2003. Tunalı presents a detailed epistemological analysis of Impressionism and Abstract art.
- ³² See for instance: Latour, Bruno. *We have never been modern*. Cambridge, Mass: Harvard University Press, 1993.
- ³³ See: Richta, R. *Civilization at the Crossroads: Social and Human Implications of the Scientific and Technological Revolution*. White Plains: International Arts and Science Press, 1969. It is, therefore, not surprising to see a similar trend in art, where scientific knowledge is directly applied to artistic and, more generally, cultural production.