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## Media art: aesthetic and social system

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### Abstract

This article is a scan of ways in which the Media art production is constituted as aesthetic and social system, based on concepts from german cyberneticist sociologist Niklas Luhmann. Opening the discussion pointing the relations between the Media Art and Cybernetics, the article provides examples to illustrate how the creative and receptive processes in this area are based on communication processes, described by Luhmann as necessarily autopoietic processes and whose effectiveness is made highly unlikely. This discussion is the basis of our argument about the understanding of Media Art production, and from that we bring up critical points and work out suggestions for how to conduct such a complex activity at both the micro (individual goals) as the

macro level (overall goals). Our conclusions point to the importance of Second Order Cybernetics in the understanding of Media Art as a social and aesthetic system and to the utopian nature of our propositions.

**Keywords:** Media Art, Second Order Cybernetics, Niklas Luhmann, Aesthetic system, Social system, Communication.

## 1. Introduction

This article is a reference to the book "Art as Social System"(2000), from the german cibernetician sociologist Niklas Luhmann. Based on the systemic theory's (criticizing the points of view of classical authors like Max Weber and Talcott Parson) paradigm shift and on Second Order Cybernetic principles, Luhmann reviews the ideas of subject, action, communication and interaction, beyond the traditional and nostalgic sociologist schools (LUHMANN, 1995).

According to Luhmann, social systems are shaped not by people but by actions. He states that a theory based in actions provides an overture to a shared starting point between system theory and subjectivity-based theories. Forward, we bring his concept of actions, that presupposes subjects participation and the recursive movement among the systems' parts.

Actions are artifacts of processes of attribution, the results of observing observers (or Eigenvalues, in Heinz von Foerster's sense), which emerge when a system operates recursively on the level of second-order observation. (LUHMANN, 1995, p.xliv)

In the picture below, Luhmann explains the way he conceives the relationships among the different sub-systems of his social theory.

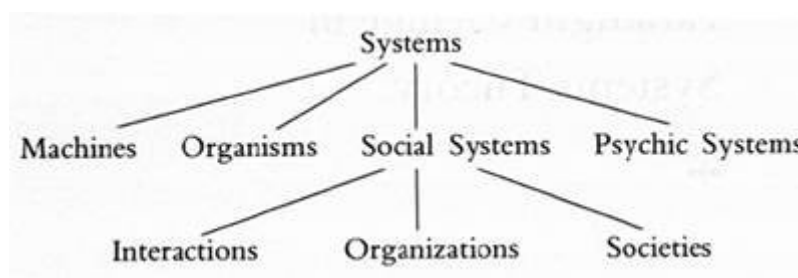


Figure 1: Luhmann's schema pointing the main elements of his social systems theory. Source: Luhmann (1995, p. 02).

Even if the schema does not represent the always mentioned recursivity, among the systems' parts, it helps us to clarify the manner the author visualizes the very frequently contradictory and paradoxal concepts he deals with.

After these observations, we continue our argument pointing the relations between Media Art and Cybernetics.

## 1.1. Cybernetics: first and second-order observations

### First-order Cybernetics

Study of control and communication in animals and machines (WIENER, 1948).

Cybernetics is the science that studies the abstract principles of organization in complex systems. It is concerned not so much with what systems consist of, but how they function. Cybernetics focuses on how systems use information, models, and control actions to steer towards and maintain their goals, while counteracting various disturbances" (HEYLIGHEN, JOSLYN, 2001, p.2).

### Second-order Cybernetics

Second order Cybernetics (...) was developed between 1968 and 1975 in recognition of the power and consequences of Cybernetic examination of circularity. It is Cibernetics, when Cybernetics is subjected to the critique and the understandings of Cibernetics. It is the Cibernetics in which the role of the observer is appreciated and acknowledged rather than disguised as had become traditional in western science: and is thus the Cybernetics that considers observing, rather than observed systems (GLANVILLE, 2001, p.03).

Cybernetics has emerged in the mid-1940s from interdisciplinary meetings between scientists and humanists from various areas of knowledge of the postwar period, such as Norbert Wiener, John von Neumann, Warren McCulloch, Claude Shannon, Heinz von Foester, W. Ross Ashby, Gregory Bateson and Margaret Mead. These meetings, known as "Macy Conferences on Cybernetics and whose focus of interest was in machines and animals, studies cyber widened to a large range of issues and ideas, between the mind and social systems (HEYLIGHEN, JOSLYN, 2001).

Since the 1960s, continuing the exploration of studies of complex, adaptive systems, Cybernetics has undergone a conceptual expansion and comes to life through its application in different areas of expertise: Social Sciences, Economics, Politics, Mathematics and Computer Science, Psychology, Design, among others.

Regarding the incorporation of Cybernetics in our work, we are interested in the principles of Second Order Cybernetics, that besides considering the observer during the action of observing systems, examines the circularity, interdependence and autonomy of the relationship between observer and observed.

Considering the observer as the protagonist in the observation system (in line with the fundamental principles of Endophysics), Second Order Cybernetics can also points toward an Endoesthetics. Propositions from this field assume that a given simulated world, "we become both internal and external observers" (GIANNETTI, 2006, p.191). The approach of Endoesthetics becomes a good

example to show how, even conceptually, the close and transdisciplinary links between Arts and Science constitute themselves as the creative core of Media Art.

## **1.2. *Media Art and Cybernetics***

With close and inevitable links, Media Art and Science come together on stage when process and experience are valued, overlapping the closed object of artistic creation, and establishing rich exchanges between themselves. As contemporary examples of these relations, we can mention recurring contamination of artists and scientists, for instance the work of Christa Sommerer and Laurent Mignonneau, Eduardo Kac, Otto Rössler, Peter Weibel, among many others.

These internationally prominent artists who often work as scientists at research institutes, are engaged in the development of the new interfaces, models for interaction, and innovative codes: they set the technical limits themselves according to their own aesthetic goals and criteria (GRAU, p.5, 2007).

Media Art production takes place in a context that highlights the experimental qualities of art and aspects of reception, through the creation of an aesthetic continuum between analog and digital. This approach involves the discussion of Media Art as inserted both in contemporary Art and Science fields (BROECKMANN, 2007, p.194). In this context, always critical and provocative man, Zielinski poses the question:

"Don't we need more scientists with eyes as sharp as lynxes and hearing as acute as locusts, and more artists who are prepared to run risks instead of merely moderating social progress by using aesthetic devices?" (ZIELINSKI, 2006, p.11).

Attentive to the relationship between Art and Science, we proposed to observe the production of Media Art from the Cybernetics viewpoint. A fundamental premise for understanding the scope of Cybernetics is to consider that it marks the passage from the concept of energy to the concept of information as a basic parameter to understand communication. Unlike newtonian physics, a model based on information theory considers the systems as open (GIANNETTI, 2006, p.26).

The current ubiquity applied to the idea of "information" in our daily life is the result of paradigmatic changes that we have faced in the history of civilizations, and is intensified considerably after the emergence of electronic media. The transformation process we face contributes to the emergence of theoretical currents directly influenced by Cybernetics and Information Theory. These are theoretical perspectives that conceive the parameter "information" as a key to the understanding of aesthetic processes, and also seek an alternative to the idealistic, transcendental or epistemological tendencies of the aesthetic theories derived from the Kantian-Hegelian tradition (GIANNETTI, 2006, p. 16).

These theoretical perspectives, despite having common backgrounds, differ in the way of judging the parameter "information". For example, while Max Bense (1957) worked with quantifiable methods; Helmar Franks and Herbert Franke proposed the principle of successive models, in other words, "practical and functional models for the artwork to allow a progressive and by parts approach – from simple to complex – to its structure" (Giannetti, 2006, p.57). Moreover, in opposition to the prospect of Bense, Frank and Franke, closer to the principles of Second Order Cybernetics, consider the influence of subjective values on aesthetic processes.

Significant examples of Cybernetics developments together artistic production can be found in the works of english cyberneticist Gordon Pask and his disciple, also english, Roy Ascott.

Pask (1970) states that to build an aesthetically powerful environment some key qualities are required. They are: (1) the environment needs to offer enough variety to promote the "potential controllable novelty" by the subject, (2) it must contain forms that the subject may interpret, or learn to play at various levels of abstraction, (3) he need to provide clues or instructions implicitly declared to guide the learning and abstractive processes, and (4) it can additionally respond to the subject, involving him in a conversation and adapt its characteristics to the dominant mode of discourse (Pask, 1970, p. 76). Such placements are linked to Pask's Conversation Theory. Complementary to Pask's theory and stating that although we play with objects, we are guided by processes, Roy Ascott was meant to create what he named Cybernetic Art Matrix (CAM), something that in both social and intimate scale of the artifacts created by him, would constitute itself as triggering processes (ASCOTT, 1968, p. 105).

## ***2. Media art as communication system***

### **2.1. Communication: machine-machine, man-machine, man-man interactions**

Within the production context of machinic aesthetics of Media Art (BROECKMANN, 2007), we can highlight three main types of communication: those machine-machine interactions, the man-machine interactions, and those of human-human interactions - mediated (or not) by the machines, which may include the first two ways mentioned. If analysed these typological variations of communication in Media Art propositions, one can realize communication aspects in both, the constitutive level of production (aesthetic system), as well in the creative and enjoyment activities (social system).

To illustrate the complexity of possible relationships that emerge from the cybernetic and systemic perspective on Media Art production, we will use the example of "Perfect Human", the performative artwork conceived and produced by the artists Mika Satomi and Hannah Perner-Wilson.

The performer wears a suit equipped with electronic devices such as bend sensors strategically placed in the joints of her body. To each joint is assigned different fragments of a text about the perfect body, inspired by the homonymous short film by Joergen Leth (1967), and the film by Lars von Trier's "The Five Obstructions" (2003). According to the artists, the intent was to create the sixth obstruction, through the introduction of control over performance and the non-linear narration. The fragmented narration is shaped through the movement of the performer, who plays simultaneously with the body and the text. To have the mobility necessary for public space conditions, the artists worked with wireless and radio technologies. Through portable radios, the public had access to the station where it was possible to hear the text manipulated by the performer in real time.

[Vídeo 1: Performer and public during one of the presentations of "Perfect Human" at Ars Electronica 2008 \(Linz, Áustria\). Source: Wilson; Satomi \(2008, website\).](#)

The interactive approach of "Perfect Human" was suggested by an empty square marked on the floor, located in front of the performer. If an interactor took place in the square he/she had their gestures and movements repeated by the performer, who yielded his body to mediate the manipulation of the text by the public.

Through the analysis of this example, we will try to make more evident the systems and sub-systems involved in the machine-machine, human-machine and human-human interactions. MM, HM and HH, which can be identified in any media art artwork.

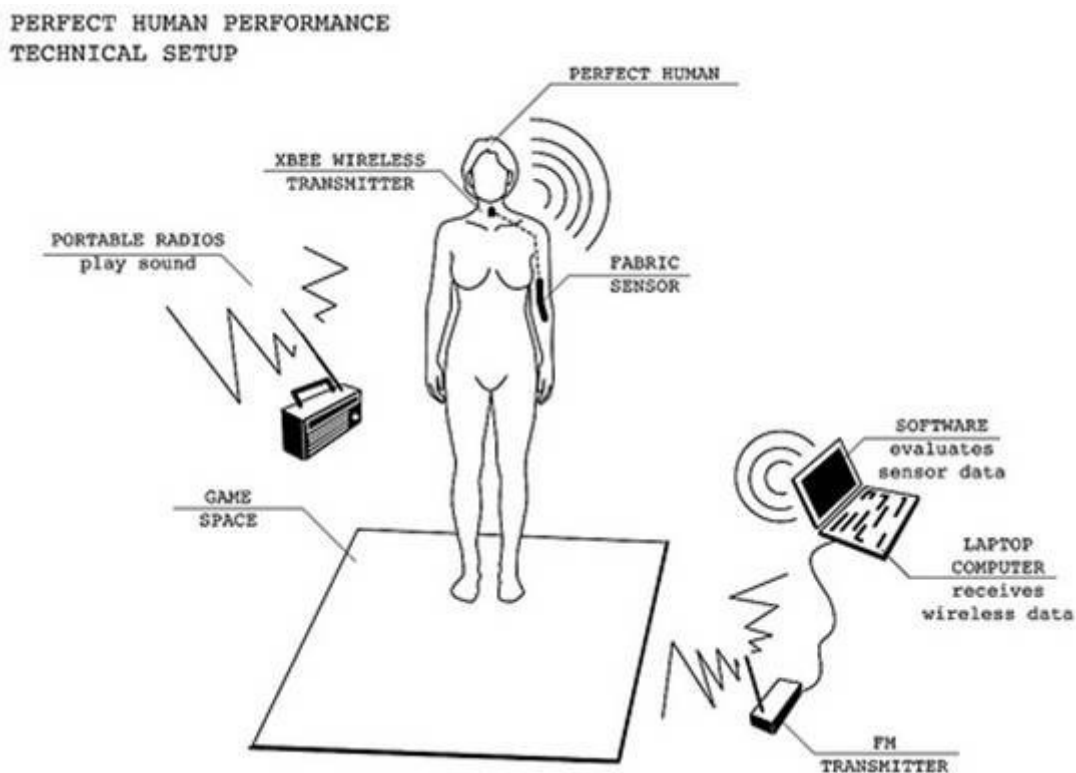


Figure 2: Sketch of how "Perfect Human" works. Fonte: Satomi; Wilson (2008, website).

There is a general system composed of the following elements arbitrarily chosen by us in the analysis: artist-performer-machine-interactors-observers-moment-place. Within this system we can identify other sub-systems, which arise from innumerable combinatorial possibilities: the technical devices system(sensors, computers and radios), the artists system, the performer system, the artist-devices system, the devices-performer; the interactor-performer system, the artist-interactors system, the interactors-devices system, and so on.

Communication between the various systems in interaction is based on traffic and translation of analog and digital data across different systems. And we can not deny that aesthetic experiences offered by Media Art artworks are intertwined and interconnected by webs of machinery and apparatuses, which become the exoskeletons of our perceptions and expressions. However, despite showing a strong technical and machinic aspect, Media Art is primarily produced from people to people, and can be constituted as a practice to enrich both individual and collective experiences.

According to German philosopher and historian of culture Martin Burckhardt, who understands machines such as "cultural dispositions that articulate and disarticulate human agency, constructing relationships and cutting ties with multiple natures and multiple cultures" (BURKHARDT, 1999 apud BROECKMANN, 2007 apud GRAU, 2007, p.194), can we envision a transforming and liberating power of the "machinic aesthetics" of Media Art?

## **2.2. Autopoietic systems**

The autopoietic model, developed in the Second Order Cybernetics principles by the Chilean neuroscientists Humberto Maturana and Francisco Varela, between 1974 and 1981, can be explained as a class of mechanistic system in which each member of the class is a dynamic system defined as a unity by relations that constitute it as a network of processes of production of components which: (a) recursively participate through their interactions in the generation and realization of the network of processes of production of components which produce them; and (b) constitute this network of processes of production of components as a unit in the space in which they (the components) exist by realizing its boundaries" (GLANVILLE, 2001, p.15).

Belonging to the Second Order Cybernetics, terms like "self-reference", "recursion" and "autopoiesis" highlight the paradigm shift introduced by cybernetic observation and study of complex systems. Such concepts become inevitable in the cybernetic theory when the circularity and presence of the subject is considered in the observation of a such system.

The circularity posed by the definition of autopoiesis is not exclusive of Cybernetics and under different circumstances is unprecedented in the history of civilization, like we can observe in Greek mythology the story of Sisyphus, or in Western philosophy, the "eternal return" introduced by the

german philosopher Friedrich Nietzsche (FLUSSER, 2008). However, it is worth remembering that, as the english cyberneticist architect Ranulph Glanville points out, "the basic consequence of the autopoietic organization is that everything that takes place in an autopoietic system is subordinated to the realization of its autopoiesis, otherwise it disintegrates" (GLANVILLE, 2001, p.15). Moreover, adds Glanville, "autopoietic system is stable through its (dynamic) ability to keep on making itself anew" (GLANVILLE, 2001, p.15).

In the case of interactive media art propositions, by the fact that they only completed through the contribution of the interactor, we believe that these are potentially autopoietic systems. Between inputs and outputs of both the proposition's operating system as the interactor's psychic system, circular relationships of communication are established, and tends to achieve autonomy. Beyond autopoiesis be present in the structure level of an interactive system, it can also be evidenced in the context of relationships that weave among the participants in the creative process.

An emblematic example to address the recursion in Media Art History is the artwork "Present Continuous Past(s)" (1974), from the north-american artist Dan Graham[1]. In this proposal, the artist explored the idea of spatio-temporal continuity. The mirrors reflect the present time, the video camera records what immediately appears in front of it and the complete reflection mirrored on the opposite wall. The image seen by the camera (reflecting everything in the room) appears eight seconds later in a video monitor (via tape delay placed between two video recorders, one that is writing, and another that is playing the previous recording). A person watching the monitor, sees both the image of her/himself in the mirror eight seconds before the present moment and picture yourself in the monitor reflected in the mirror, which corresponds to 16 seconds before the present moment. If the body of the observer is not in front of the camera lens behind the mirror, it records the reflection of the room and the images reflected on the monitor (which shows the 8s previously recorded and reflected by the mirror). This creates an infinite regression of time continuums within time continuums (always separated by intervals of 8 seconds (HALL, FIFFI, 1990, p. 186).

The mirror located at right angles to the wall of the monitor and the other wall mirror gives the view of the present time of installation, as an objective and external point of view; contrasting with the subjective experience of the observer and with the installation's operation mechanism that produces the perceptual effect of spatio-temporal continuity.



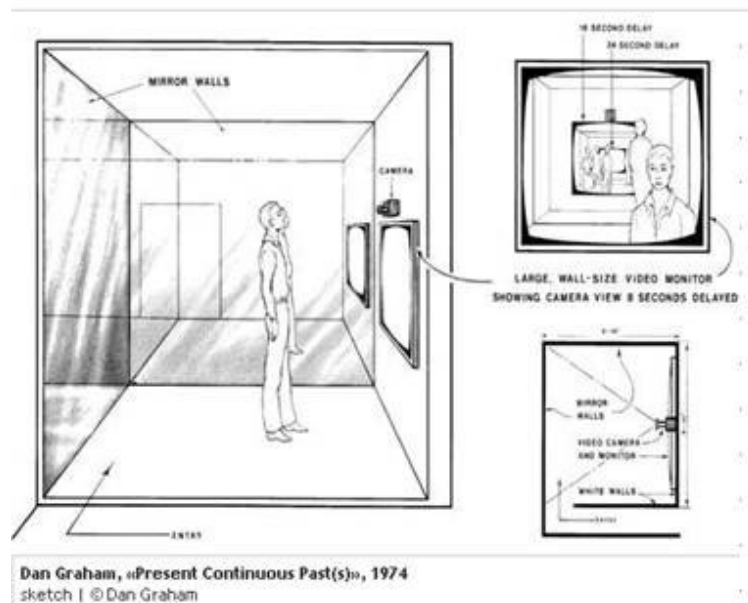


Figure 3: Schema of Dan Graham's "Present Continuous Past(s)" video installation. Source: Medien Kuns Netz (1974, website).

The effect technologically mediate self-awareness through a camera is particularly powerful in situations that spatially include the observer. In dialogic proposal to Graham, the american artist Bruce Nauman created in "Live-Taped Video Corridor (1969-1970) annoyance and discomfort to the spatial-time experience caused by the feeling of physical presence or absence. In his work Nauman specifically emphasized the dependence of physical impressions in the perception of time. In contrast, Graham addresses the time as a dimension that can be experienced in space. With the installation "Present Continuous Past(s)" he treats the relationship between spatial experience and temporal experience. Perception generally takes place in present time and Graham disquiets the "observer" by building a space that constantly offers remakes of continuous presence phenomenon, available to try through the visualization of temporal distance in space.

### **2.3. Media Art and Communication: creation and fruition as conversation processes**

Much of Gordon Pask's production was dedicated to develop his Conversational Theory, whose main idea is that learning becomes effective through conversations on a topic, making explicit a such knowledge. Based on this theory, we see that the collaborative practice of Media Art can also be observed by a communication processes perspective, in which the people involved come out naturally from their experiences with something learned. Our emphasis in the discussion of communication within the Media Art field relates to the criticism of what Glanville called "terminological inflation" of interactivity. According to the author, the term interactivity has become a buzzword used to refer to technologies that provide some form of "reaction" to a "user input." Nevertheless, these manifestations perform tricks, and do not give us anything that is remote and

truly interactive, nor there is any meaningful participation, they are merely responses to certain stimuli (GLYNN, 2008).

To Glanville, "interaction" means "mutual responsiveness that may lead to novelty, in which no participant has formal control over the proceedings. Interaction occurs between participants, not because of any of them" (GLANVILLE, 2001, p. 3). In contrast, "conversation" is the "interaction in progress" and is described by the author as

A circular form of communication in which each participant constructs his own understanding. Checks on understandings between participants occur through re-presentation of individual understandings in a feedback loop. Conversation Occurs between participants and is essentially interactive" (q.v.) (GLANVILLE, 2001, p.2)

Thus, besides autopoietic, we consider the conversational processes as applicable to all types of speeches, verbal and nonverbal. According to writer and editor of relevant journals in the Contemporary Art field Monika Szewczyk (2009)[2], in an essay published in the E-flux, the simplest definition of a simpler type of conversation is based on dialogue fragmented discourses. When two people talk, they do not talk together, but each one in turn. Someone says one thing then stops, and the other person says something, then stops. The coherent discourse that they lead is composed of sequences that are interrupted when the conversation moves from one collaborator to another, even if adjustments are made so that they correspond to one another. The fact that the discourse needs to move from one party to another in order to be confirmed, contradicted, or developed shows the need of the range.

For Blanchot (1969), speech and silence, as two forms of interruption, can serve as a dialectical understanding or can produce something of a more complex nature. It all depends on how we conceive interlocutors in the conversation. If we see our interlocutor as an opposite, either as object of our subjective discourse, or as a subject that is endlessly different, but like us, we enter into a dialectical synthesis and unity: understanding. On the other hand, if we assume our partner not as an opposite but as a neutral - an otherness that holds on behalf of the neutral - the conversation goes beyond the binary relation that structures the dialectic (BLANCHOT, 1969).

Conceiving of dialogue beyond dialectics (which holds out unity and synthesis as an end), we can approach the infinity that proliferates via its deployment of the neutral. This is to say that a kind of geometry of thought is at stake that might allow for thought itself to move differently altogether (SZEWCZYK, 2009, p.2-3).

Based on these statements, we can conclude that the conversation is by definition circular, it is not message transmitted, encoded; it is what the participant can make. The conversation may also be reflective when it has itself as theme. Criticizing the contemporary situation, Flusser asserts that the dialogues are not telematic conversations, conversations are chatters. For him,

everybody immediately receive vast amounts of information, but all receive the same type of information, no matter where they are. In such a situation all dialogue becomes redundant. Since everyone will have identical information, there is nothing to be authentically dialogued (FLUSSER, 2008, p. 87).

And to illustrate the placement, Flusser cites the exhibition *Electric* of 1984 in Paris, setting the atmosphere of the event as "generalized nonsense". He said the show did not seek to intelligent dialogues, only the presentation of new gadgets that replace the film, book, phone and mail (FLUSSER, 2008, p. 86).

In the social sphere in general, time passed and many people have not realized that the power is not in the devices brought by the revolution of the digital age, but especially in the dialogues that weave between people in different cultural situations, in which we face a metamorphosis perception (Santos, 2003). Based on communication that is woven among the collaborators in a such artwork is that for example Roy Ascott substantiate the proposal of "Cybernetic Art Matrix" (CAM), or even Flusser proposes the metaphor of the post-historical as a nest composed of creative ants (FLUSSER, 2008).

Pragmatically analyze how are woven the communication lines within the social and aesthetic system that is art, specifically the sub-system Media Art, is a humanly impossible task, nor is it our interest in this article. Also, remembering the autopoiesis of a such system, this program serves a larger operation, where information senders are like onion skins: there are layers and layers of programs, which when peeled, you arrive to nothing (FLUSSER, 2008). The autonomy of such an aesthetic and social system does not happen without our constant efforts to feed this system. As rightly put Bill Nichols, we are inserted into

a system ready to restore, alter, modify or transform any given moment to us any time. Cybernetic Interactions can become intensely demanding, more so than we might imagine from our experience with texts, even powerfully engaging ones (NICHOLS, 1988, p.631).

In this direction, from the cybernetic point of view, we can conclude that we build a way of making art totally different from the previous cultural and digital electronic technologies.

Only after having captured the fascination we can understand why our grandchildren assume themselves as both 'creative artists' and 'employees scheduled', 'dominated' and 'domineering', 'government' and 'governed' (FLUSSER, 2008, p. 129).

This placement of Flusser points to the emergence of human relations in which it assimilates the overcoming of the distinction between active and passive, typical construction of the historical society. According to the author, this paradigm shift also contributes to the indeterminacy of the

distinction between public and private, a phenomenon also observed and discussed by the production of contemporary media art.

### **3. *Media art as social and aesthetic system***

#### **3.1. The digital era and the social paradigma reinvention**

The changes brought by digital and telecommunications technologies has contributed to the growing influence of media and their "realities" on society to the detriment of subjective views (GIANNETTI, 2006). This condition opens up the Luhmann's proposition on the role of communication in society: "society is not formed by people but by communication" (GIANNETTI, 2006, p.63).

According to Luhmann, by abandoning the organic view in which prevailed the prominence of the subject in part-whole relationship, communication is understood as a recursive and self-regulatory system among other systems, whose operation depends on each part's operation. This mutual dependence of the parties makes the communication effectiveness very unlikely (GIANNETTI, 2006, p.63). For Luhmann

is unlikely that anyone understands what the other wants to say, given the isolation and individualization of consciousness. The meaning can only be understood in different contexts and for each context is basically what your memory will provide (LUHMANN, 1992, apud GIANNETTI, 2006, p.63)

Within this perspective, Luhmann (2000) considers art as an aesthetic and social system acting between the psychic and communication systems, two distinct systems that relate to each other round.

Communication can no longer be understood as a 'transmission' of information from an (operatively closed) living being or conscious system to any other such system. Communication is an independent type of formation in the medium of meaning (sinn), an emergent reality that presupposes living beings capable of consciousness but irreducible to any one of these beings, not even to all of them taken together. Compared to consciousness, communication executes an extremely slow, time-consuming sequence of sign transformations (which means, among other things, that the participating consciousness gains time for its own perceptions, imaginations, and trains of thought). Communication recursively recalls and anticipates further communications, and solely within the network of self-created communication can it produce communications as the operative elements of its own system. In so doing, communication generates a distinct autopoietic system in the strict (not just 'metaphorical') sense of the term. And, given the form in which it organizes its own autopoiesis, communication cannot receive or produce perceptions. But it can certainly communicate about perceptions" (LUHMANN, 2000, p.9-10).

Looking at the art as aesthetic and social system, also based on the theory of Luhmann, the austrian researcher Katharina Gsöllpointner summarized in the following diagram the relationships between artist, work and public:

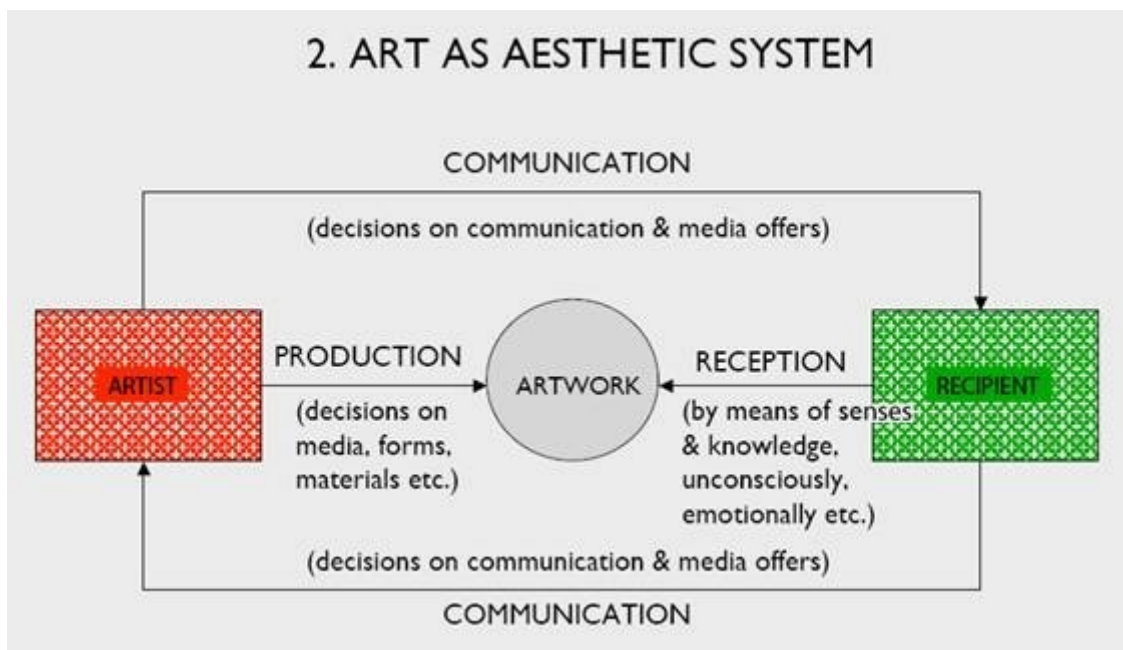


Figure 4: Diagram presented by the austrian researcher Katharina Gsollpointner during her lecture at Interface Culture Department in the Kunstuniversität Linz on May, 27th, 2008. Source: Gsöllpointner (2008)

Assuming the elements as dynamical systems, it is noted that communication is the structuring element that links the different systems in interaction.

Despite the controversy of Luhmann's propositions, our interest in his systemic sociological approach to about Art is based on the dialogue he kept with other cyberneticists authors - Heinz von Foester on "Understanding Understanding" responds to Luhmann with an article titled: "How recursive is Communication" - and in fact that it point us out another perspective to better understand the complex relationships between artist, public and artwork in our current cultural situation and in the development of projects in the Media Art field.

In this context, we wonder if, being Art a social system that anticipates aspects of historical unfoldings and processes, is the practice of Media Art one of the possible trajectories for the implementation of innovative forms of communication, developing horizontal structures and non-hierarchical production and exchange of knowledge? It would appear so if it was not our natural tendency toward entropy, massification and uniformity.

With increasing entropy, the universe, and all closed systems of the universe, tend naturally to deteriorate and lose their sharpness, to move from one state to another minimum of maximum likelihood; a state of

organization and differentiation, in which there are forms and distinctions, to a state of chaos and sameness. (...) While the universe as a whole, if indeed there is a universe whole, tends to deteriorate, there are local enclaves whose direction seems to be the opposite of the universe in general and in which there is a limited and temporary tendency to increment of organization (WIENER, 1954, p.14).

Based on the theory of entropic principles of thermodynamics and Cybernetics, Flusser puts that communication is an intersubjective process, anti-natural and negatively entropic. A process that goes against the general movement of nature toward entropy and chaos. Think of the creative processes of Media Art as social and communication processes is a way of viewing it as an anti-redundancy and misinformation agent (GIANNETTI, 2006).

Luhmann's model of Art as aesthetic and social system active in the spheres of psychic and communication systems can also be analyzed from the perspective of local (micro) and global (macro) events, which handle respectively the opposing and simultaneous movement of organization and chaos.

This concept brings to the discussion the nature of creativity in the era of digital culture: a collective creativity, grounded in the emergence of innovation through the interplay of forces between the micro and macro levels.

### **3.2. Coordination: action between micro and macro levels**

As the practice of Media Art is guided by creative design process of interfaces and humanmachine interactions (Glynn, 2008), we also searched for references in the design field to understand the complexity of the transdisciplinary production.

Discuss this production scenario requires an approach to the notion of coordination. Coordination problems emerge because decisions and complex processes demands the organization of different people, knowledge and other elements that are interconnected in various ways, which makes coordination a kind of management of interdependencies between activities to achieve a goal (ALEXIOU; ZAMENOPOULOS, 2007, p.587).

It is possible to identify some key challenges faced during the coordination of design processes. For researchers in the field of design and complexity of english universities like Zamenopoulos and Alexiou, among these challenges are: the need to establish a relationship of translation between different forms of representation; synchronize information exchange, establish roles and delegate structures in organizations. The challenges listed by the authors somehow show a concept of coordination that encompasses the notions of conflict and cooperation. Moreover, they say that coordination can not be regarded only as a mere management, but also an activity related to

exploitation and generation of alternative, new and creative solutions (ALEXIOU; ZAMENOPOULOS, 2007, p.588).

From the perspective of Cybernetics, the coordination of the collaborative media art production does not require the centralization of creative activities. Working with professionals from different specialties, as the roles and responsibilities are delegated, the decisions are made from individual goals at the local level, with no centralized source of control, forming a distributed process control, which emerges the design solutions. Collaborative design tasks require that knowledge is distributed among the local staff, and coordination involves the synthesis and construction of knowledge necessary for the collective task. In this sense, learning is seen as an important tool not only to enhance the ability of individual agents and thus derive design solutions, but also for creating shared knowledge on design tasks and their limitations (ALEXIOU; ZAMENOPOULOS, 2007, p.589). In this conception, exploration, generation and parallel recasting of problems and solutions become a collective responsibility, in line with the notion of "collective intelligence" of the French philosopher Pierre Lévy:

a distributed intelligence everywhere, constantly enhanced, coordinated in real time, which results in an effective mobilization of skills. Let us add to our definition this essential addition: the foundation and goal of collective intelligence is the recognition and mutual enrichment of people, not the cult of fetishized or hypostatized communities (LÉVY, 1998, p. 28-29).

To better understand the coordination model described by Alexiou and Zamenopoulos is important to develop the structural links between the micro world of individual agents and the macro universe in which the whole is coordinated and is made consistent. Regarded as central to understanding the social aspect of design, different authors discuss the link between micro and macro, quoting the British sociologist Anthony Giddens and the Italian director of the Istituto di Scienze and Tecnologie della Cognizione Cristiano Castelfranchi.

Based on theoretical analysis of the two mentioned authors, Alexiou and Zamenopoulos say that the way the agents interact, join or differentiate themselves (in terms of goals and beliefs), is reflected in the spatial organization at the macro level. Individual actions, guided by goals and beliefs, is the basis for creating the macro level. Micro and macro does not exactly correspond to the space problem and solution, but its expression in individual and global scales, respectively (ALEXIOU; ZAMENOPOULOS, 2007, p.594).

The perceived distance (or error) between the intended and unintended effects not only motivates action, but is also used as a metric of the limitations and constraints over that action. In reality, agents are bounded in two ways: one is related to the limitations of available resources, laws and other external constraints, and the other is related to the ability of an agent to learn, interpret or internalise the external world and therefore form

expectations and predictions about it (ALEXIOU; ZAMENOPOULOS, 2007, p.593).

Besides considerations about the limitations on both levels, is also relevant to place the coordination model that looks at intentional and unintentional effects functionally contributes in creating and managing the dynamics of relationships between micro and macro. This perspective sees the world as a field where recursive actions are manifested simultaneously convergent and conflicting, whose agents interact based on their knowledge of the world to guide their future actions (ALEXIOU; ZAMENOPOULOS, 2007, p. 593).

#### **4. Conclusions**

To look at Media Art production from the viewpoint of Second-order Cybernetics contribute to the understanding of it as an aesthetic and social system, potentially based in the paradigm shift that digital technologies may come to realize. We assume that there is a strong utopian character in Cybernetics approach, as Claus Pias points out the limits of its application. In the context of radical overhaul in the way of thinking technology, Cybernetics has created a new order to things, dreaming of various modes of reconciliation, forming a kind of "experimental epistemology" (PIAS, 2005, p.544). The experiment lies in the reorganization of knowledge in a way that psychological and sociological, political and economic, aesthetic and biological phenomena and agents can be seen as rooted in the communication and recursion.

Under the collective and transdisciplinary nature of Media Art production, outline connections between the micro (agent) and macro (structure) means the one hand, the need to explain the (un)stability of social structures despite the actions of the individual; another, the drive for variability, creativity and innovation. Media Art is an experimental field for excellence and can serve as social experiment purpose in different ways

No âmbito da natureza coletiva e transdisciplinar da produção de *Media Art*, esboçar ligações entre o micro(agente) e macro(estrutura) significa por um lado, a necessidade de se explicar a (des)estabilidade das estruturas sociais apesar das ações do indivíduo; de outro, a pulsão para variabilidade, a criatividade e a inovação. A *Media Art* é um campo experimental por excelência e pode servir ao propósito de uma experimentação social em diferentes aspectos.

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## Notes

[1] Born in 1942 in Urbana, Illinois (USA), Dan Graham was a pioneer in performance and video art in the 1970s. Later focused his attention to architectural projects designed for social interaction in public spaces. The writing was also one of the strongest aspects of his work. His texts cover several subjects ranging from pieces of conceptual art inserted in magazines of mass culture, writings to close friends artists and analysis of popular culture. He currently lives and works in New York (Medien Kunst Netz).

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