

# Electronic Art and Second Order Cybernetics: from Art in Process to Process in Art

Graziele Lautenschlaeger and Anja Pratschke

**Abstract**—This paper draws on current research aiming to analyze connections between the design process in electronic art and architecture, related to the creation of cross-breaded spatialities. Based on Grounded Theory methodology, a method of qualitative research which aims to understand “reality” from the meanings attributed by people to their experiences, the research started by collecting data through bibliographical references, realizing interviews with media artists, theoreticians and curators of electronic art and by carrying out visits to media laboratories. By crossing data collected from the interviews and visits, the cybernetic social system theory proposed by Niklas Luhmann and the discussion of an example of the creative process of an interactive installation, this paper analyses how creative processes in the digital era depend on different collaborative interdisciplinary approaches. The aim of this paper is to discuss the relevance of the use of cybernetics in the digital era, where concepts like participation, interaction and communication are some of the key terms, towards a “collective and distributed authorship”, and their reflections on the contemporary spatiality.

**Key Words**— Second order Cybernetic, Electronic art, Design process, Niklas Luhmann.

## I. INTRODUCTION

This paper aims to discuss partial results of a Masters Degree program, funded since 2007 by The State of São Paulo Research Foundation (FAPESP), and based at Nomads.usp (Center for Interactive Living Studies – www.eesc.usp.br/nomads). Making part of the research area Design Process, the present study aims to get an overview of the changes that are happening in the creative process in the electronic age as well as in the artistic and the architectural practices and receptivity by their users.

What we are accustomed to refer to today as electronic art, media art, digital art, net art among others, is a result of a long and complex process. Since ancient times, there have been relations between technical innovation and artistic practices, but it is only after the Industrial Revolution that this direct influence of the technology in art became a daily subject under discussion in the art field.

The advent of movements like the *Art Nouveau*, the Arts and Crafts and schools like Bauhaus and The Chicago Institute of Technology, founded by Moholy-Nagy, were a drive to the development of a nascent technologic art. Later, movements like Dadaism, Futurism and Constructivism came to represent an even deeper interest in machines, technical aspects and in the movement itself. That was also the same period when many artistic movements emerged and initiated inter dialogues as in the case of Russian Constructivism, Eisenstein and Vertov’s cinema.

During the iconic 1960’s, this complex of transformations are further empowered by the effervescent artistic movements. At that time, new techniques, new materials, new processes and new languages composed a huge and diversified production scenario, leading further to object declination, the participation of the audience, the appeal to all human senses, and the conquest of the public and architectural space by the artist. In 1975 the art and technology historiographer Frank Popper wrote that all these transformations would steer us to the construction of a more democratic art[1].

In this context, artists all over the world, like Joseph Beuys, George Maciunas (Grupo Fluxus), Allan Kaprow, Lygia Clark, Yaacov Agam, Roy Ascott, John Cage, Nam June Paik, and

others, through publishing, events and performances reinforced issues like the ephemeral aspects of things, the blending of art and daily life, the destruction of conventions, the non-materiality of the image, the construction of non-physical systems and the appreciation of collective creation. This way, they highlighted in Art, the new relations between subject, object, time and space that were gaining more space in society at that time.

At the core of these changing times, also present was the Cybernetics Theory, especially the Second-order Cybernetics that can contribute to symbiotic dialogues between Science, Art and Architecture, as well as help in the understanding of the creative process in the electronic age, considering indeed, the changes in the creative human faculties.

Heylighen and Joslyn wrote a paper that summarizes Cybernetics as *“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. (...) Second-order cybernetic in particular studies the role of the (human) observer in the construction of models of systems and other observers.”* [2]

For Ranulph Glanville, Second-order Cybernetics *“may be seen as an agenda, an unfinished revolution (as Karl Mueller calls it), a different way of seeing. It gives presence and often precedence to observing, and hence to the agent of that observing, the observer (rather than trying to cancel and/or rule the observer out). It assumes that, as each of us is different, each observer is different, and therefore each observation, depending as it does on the observer (and the occasion), will be different.”* [3]

Instigated by this context of changes, the research was interested in investigating the emerging Art practices, where one can observe the emergence of multi-skilled artists, who are always looking for links, dialogues and references in other fields of knowledge in order to concretize their ideas. Additionally, performative and recombinant aspects are present in the form of collective authorship (or at least, ideas that intend to be so).

Special interest in the comparison of artistic methods and cybernetics is to understand how information and communication are dealt with using a process to promote active exchange of knowledge and competences, and to improve interaction and conversation in a context of producing interactive artifacts.

Roy Ascott, one of the pioneers in writing about the connections between Art and Cybernetic, and about aesthetic and technological procedure, asserted in 1964, in his text *“Construction to Change”*[4] that the artist in his symbolic role in society should be able to understand the changes suffered by society, caused mainly by the influence of science and technology in the environment. For that, he argues, the artist should familiarize him/herself with the scientific thought,

especially with Cybernetics, and use it as a tool of reference.

For Heylighen and Joslyn *“cybernetic reasoning can be applied to understand, model and design systems of any kind: physical, technological, biological, ecological, psychological, social, or any combination of those.”* [5]

An example of how the relations between Art and Science take shape in our society nowadays, while getting rid of their traditional hermetic characteristics, we can identify and name artists who have always worked with references in scientific production, like Eduardo Kac, Harold Cohen, etc; and scientists who walked through the path of Art and technology, like Otto Rössler, Peter Weibel e Siegfried Zielinski among many others.

Due to its constant questioning of viability, adaptability and recursion, Cybernetics should enable the artistic team to constantly revise the proposal and to change the conditions during the process of its implementation and later its autonomy.

Another theoretical basis that helps us understand the transformations caused by the electronic age is the German sociologist Niklas Luhmann's cybernetic social system theory. For this author Art is as a special kind of communication, which uses perceptions instead of language and acts between the incommensurable psychic and social systems, provoking consciousness and communication at the same time. More than observing the Art field taking into consideration the complexity of relations, Luhmann's writings represent a shift of paradigm: from a phenomenon-centered to an operative way of perception, and from a representational to a constructivist epistemology. According to Luhmann *“the functional concepts of imitation and representation, now obsolete, would have to be rejected a second time – not because they indulge unduly restrict the freedom of art but because they indulge in, rather than unmask, the illusionism of the world”.* [6]

Luhmann's polemic theory is many times considered dangerous and difficult by sociologists. The main critique is that usually his arguments are logically very well conducted in order to convince the reader that the systemic concept of society is “simple” and logic. We would like however, to make it clear that our interest in his theory is not in its application to a given situation, but rather to take note of this shift of paradigm introduced by him in the sociological field.

## II. MATERIALS AND METHODS

### A. Grounded Theory

The methodology of the current research is based on Grounded Theory (GT), a systematic qualitative research methodology used in social sciences which creates a theory based on data collected and that emerges along the research process. According to Fell [7], this is a theory to discover other theories. It allows researchers to develop theoretical judgments about the generic characteristics of a topic, taking as a background empirical data and considerations.

For Dick [8], the Grounded Theory starts in a “research situation”. Inside that situation, the task of the researcher is to

understand what is going on in the scenario, and how people play their roles. Usually this is done through observation, conversation and interview. After each set of data collection the researcher writes down the key topics. Constant comparison is at the heart of the process. Later, the researcher compares an interview, conversation or observation with another set of those and gradually, theory begins to emerge. Following from there, the task then is to compare data with theory.

Given that this paper presents only partial results, we decided to first compare data collected through interviews, focusing on a specific issue: the concept of “knowledge space”, a term encountered in the bibliographical review and recurrent in some of the interviews realized in this study. This concept in a second moment will be related to the description of the experience of development of a digital interactive installation, an example of a collaborative creative process.

### B. Interviews and visits

Visits and interviews were carried out as part of the primary data collection. Most of the interviews and visits were held in Europe while the author was on an exchange student program in the Interface Culture Department in *Kunstuniversität Linz*, from March to September of 2008.

The interviewees were media artists, curators, theoreticians, researchers and students of media art. As we had completely different profiles, we elaborated broad questions and according to the rhythm and contents that emerged in the conversation we focused on one or another aspect.

The questions elaborated and applied were:

- What is your background and what have you been working on lately?
- Which relations do you see between your work and other fields of knowledge?
- Who and what are your main references (aesthetics, philosophic, artistic, etc.?) and what are the main concepts around your work?
- In your opinion, what are the most significant changes in the creative process following the digital era?
- How do you conceive the relations between the current production of electronic Art and the available technologies?
- What do you have to say about centers of research, production and exhibition of electronic Art? Considering organizational aspects all the way to sponsorship?
- How do you see the interactor's role in the history of electronic and interactive Art?
- Do you see relations between the artwork process structure and the social system you we live in? Which are they?
- Do you perceive relations between space and narrative in the actual production of electronic Art? If yes, how do they take shape?
- How do you see the training and academic preparation in your field? And if you plan to create a

course today what would you prioritize?

Whenever possible, we carried out the interviews in the workplace where we had the possibility to be in touch with spaces where electronic Art is being researched, produced and exhibited. Examples of such locations are: Ars Electronica Center and Festival (Linz, Austria), iMal (Brussels, Belgium) and the European Media Art Festival (Osnabrück, Germany).

## III. RESULTS AND DISCUSSION

### A. Creating Knowledge spaces

In the 5<sup>th</sup> chapter of Oliver Graus's book “Virtual Art: from illusion to immersion”, titled “Knowledge Spaces”, the author describes different artworks concerned with the creation of a space for actions, ideas and thought, where divergent concepts could enter in conflict.

The same concept emerged in some of the interviews and we opted to discuss it in this paper. Among 24 interviews, we could observe that this concept was recurrent at least three times. Different profiles were interested in how to spread experience and perceive such contents in that space.

We held an interview with the artist and researcher Dietmar Offenhuber, who has a background in architecture, virtual spaces and knowledge spaces compared to physical structures, as well as some experience at Ars Electronica Future Lab with interactive exhibitions. Recently, the focus of his research has been visualization of information and knowledge. Referring to knowledge spaces he stated that within the whole field of visualization you have disciplines.

According to him, when people for example refer to scientific visualization they usually mean the representation of concrete data, like medical images. On the other hand, Information visualization could be related to more abstract data, like the data generated by the financial field. The idea of knowledge visualization deals with semantic structures, with semantic spaces. This means that in this sense, they deal with ontologies, thinking about how people could describe knowledge in a diagrammatic way. For Offenhuber a diagram attempts to explain something through spatial relations; the interviewee is also interested in topics like visual rhetorics or spatial rhetorics and in how we could use spatial relationships in order to get across a certain message. This is one of the possibilities of the relationship between space and language, space and speech, yet if we include rhetorics that relation would even be narrower, because this term suggests the effort to convince someone of something. So, his interest is in the question: “how does this mechanism work in relation to space and diagram?”

For Monika Fleischmann and Wolfgang Strauss, the couple from the German media artists and researchers (he with a background in architecture, design and visual communication; she with the background in visual Arts, fashion design and drama) the definition of the concept knowledge space is not an

easy task, and it could also have multiple significances. On the one hand, the information space could be digital archives (databases), which is an abstract thing but nevertheless already familiar to people. On the other hand, knowledge space is *“the space in your head. It is also the memory space. Thinking is like a house.”*[9]

The conversations carried out during the research additionally relate the concept at the social level: the knowledge that people who live together in a city or in a given environment share this knowledge in order to communicate. In another example Fleischmann and Strauss pointed out the e-learning context and the knowledge management in big companies that attempt to harness the expressive knowledge: their aim is to share knowledge by extracting the impressive knowledge of individual workers.

Making connections with their artworks, they utilized *“The home of the brain”* and *“Energy Passages”* as examples that discuss public space. The interviewees pointed out that the concept of knowledge space is a notion for them to develop their theory and work on the topics discussed at a certain time, in an interdisciplinary manner.

To conclude this idea, they advanced the idea that since we lost part of the information and the knowledge because those are locked and make part of the machine, the challenge to them is to externalize things in the head as reflected in the mechanical devices. *“How can we bring back this idea of a picture on the board that reminds you of something?”* Wolfgang said. Their basic question is how to mix realities? How to put virtual and physical spaces in a continuous surrounding? They concluded the topic with a statement concerning the creation of a knowledge space: How can we furnish the space with data?

After this overview on the concept of knowledge space, we would like to add Peter Matussek's idea of how we perceive our environment and how we perceive live situations. For this German theoretician of media aesthetics, *“Situations I mean spaces that are experienced by subjects... we do not live in spaces, we do not live even in environments, we live in situations. (...) and situations are as well made by subjects and also by subjective experiences of our senses. (...) Environment is something that gives me objects and process to detect and to perceive. Situations are also made by atmospheres. Atmospheres is a notion that we can hardly have in objective terms. Atmospheres are performative objects. Atmospheres we register when we enter in a room, for example... (...) Media are also our senses. (...) We create spaces, we create objects, we create sense experiences, oriented by mental constructive activities.”*[10]

During the interview, another term used by him and related to the idea of knowledge space is the *“Aporia”*: knowledge grows in people by the feeling of knowing nothing about anything.

One of the future aims of this research is to develop a study on the media laboratories in Europe from the point of view of the concept of knowledge spaces.

#### B. *Don't Give Up! About a history that doesn't want to be told: a cybernetic experiment.*

In addition to the interviews, a practical project was implemented in order to collect data that emerged in a creative process in the Art field. In the first semester of 2008, we developed at Interface Cultures Department of the *Kunstuniversität Linz*, under the supervision of Prof. Laurent and Christa Sommerer an interactive installation which was exposed and interacted (tested) between the 4<sup>th</sup> and the 9<sup>th</sup> of September at the *Ars Electronica 2008's Campus Exhibition*.

Considering the experiment as *“knowledge space”* and through a collaborative creative experience, aiming to get in touch with process and tools used by media artists nowadays, an interactive digital installation was developed guided by the discussion on the relations between space and time carried out by the individuals experimenting the installation. This way, the installation itself became an interactive and non-linear story presented in a 3D concrete scenario inspired by Escher's painting *“Relativity”*.

Besides discussing relations between space and narrative in a digital interactive installation, the project also explored aspects of speed apology versus daily pleasure along the consumption of the narrative. This idea was extracted from Umberto Eco's book *Sei passeggiate nei boschi narrativi (1994)*, where he says: *“Any narrative of fiction is necessary and fatally rapid because in the construction of a world that includes a multiplicity of happenings and personalities one cannot tell all about that world. Simply alludes to it and beseeches the reader to fill in a series of gaps. After all, (as I've written), every text is a slow machine urging the reader to make part of it”* [11]

On the other hand, Eco in dialogue with Italo Calvino, states: *“I do not mean to say that rapidity is a value in itself. The time of the narrative can also be slow, cyclical or stationary (...) This apologia of rapidity does not intend to negate the pleasures of the awaiting”* [12].

Eco concludes poetically that that if we go to a forest, not withstanding the danger of escaping a wolf or an ogre, a walk around that place can indeed be a great pleasure. [13]

Inspired in the Italo Calvino's classical book *Se una notte d'inverno un viaggiatore (1979)*[14], in which the reader is always frustrated by histories that are cut in plot points of the narrative, we tried to experiment the creation of a similar kind of fiction pact, followed by its dissolution. Also described by Umberto Eco in his *Sei passeggiate nei boschi narrativi (1994)*, this concept is related to the idea that *“we are compelled to exchange fiction for life – to read life as if it were fiction, to read fiction as if it were life. Some of these confusions are pleasant and innocent, some absolutely necessary, some are scary.”* [15]

These theoretical references take us to the question: how can immersion and critical distance be developed inside the electronic Art? One of our possible answers can be found by turning our attention in precedent Art forms, like cinema and theatre, that in order to create a critical distance, developed in their respective languages mechanisms like the use of metaphors and its consecutive break [16], as well as make the media explicit in the system while interaction/fruition is

happening. Otherwise we are certain these possibilities are not enough for the digital media, considering its specifications and potentialities.

In the installation we developed, we tried not to apply these concepts but to use them as a reference to create a non-linear narrative experience in a “non-linear”/ relativized space.

*Don't give up! About a history that doesn't want to be told* is an interactive audiovisual installation where a tension between the system and the interactors is generated: the system is programmed to take the narrative to chaos and the users are where public expectations are constructed and interrupted, as a metaphor of a history that does not want to be told.

The system contains four events: a lost man (blue), a dog (yellow), a couple (red) and a murderer (purple). They are all related and it is left to the interactor to discover what happens in that scenario.

The four events displayed in the form of animations are projected in the mockup inspired by Escher's painting made of Plexiglas. These animations are controlled by the users through four coloured ropes related to the animations colours, and they are presented as a tangible interface. *“Tangible interfaces give physical form to digital information, employing physical artefacts both as representations and computational media.”* [17]. See figure 2.

The control of these animations was programmed in the software MAX/MSP/Jitter. The inputs generated by the movement of the ropes were collected by encoders (sensors of rotations) attached to the pulleys and processed by a microcontroller, which sends the data to the software running in a computer. A representation of the technical aspects of the working installation can be seen at figure 3:

Concerning the theoretical basis mentioned, we would like to elaborate how we went about working with these concepts in the installation.

The interface itself (the four ropes), was considered as a metaphor of a timeline in the user's hands. It was imagined that it could also work to establish a bridge of identification between one of the characters and the user. The lost man, the blue one, he also has a rope in the hands looking for something

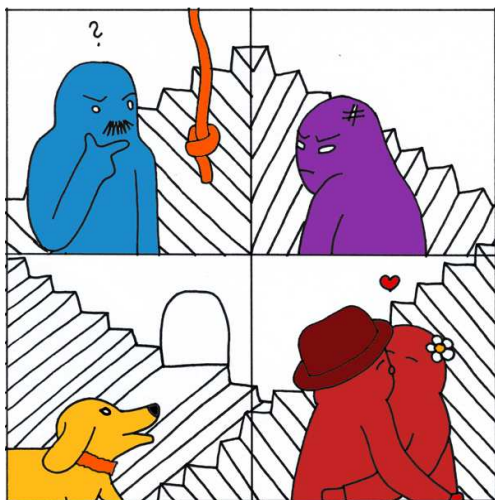


Fig. 1. Sketch of the four events of the story. Illustrations and animations by Andreea Jabelean.

in the scenario, like the user. But we also tried to break this fiction pact, breaking apart this metaphor, since we these bridges of explicit identification are not built for all the characters. The sound manipulation, another possibility to help users to understand what happened in the story, was not synchronized, and the system the way it was constructed would never permit the perfect matching of sound and image. This frustration was purposefully created as an attempt to keep



Fig. 2. Child interacting with the ropes, a metaphor of the timeline in the users' hands.

users in a critical distant point and not immerse blindly in the representation world.

The idea of the dally pleasure is constructed by inviting the users to stop in a range of frames for each animation. If they stop, for example, exploring the details of the narrative they get a hidden scene, which constitutes a hint to help them to discover the relationships between the characters as well as

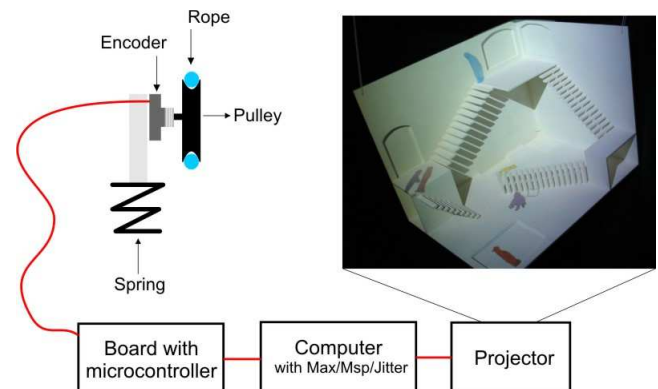


Fig. 3. Scheme of the working installation.

what happened in that scenario.

It is also important to mention here that, and in connection with second-order cybernetics, throughout all the creative and system's modeling process, the role of the interactor was considered, and designated as the main part of the system, otherwise the artwork itself would not function, or worse, it would not exist. It takes form only through the performance of

the interactor. In Eco's narrative theory, he says: "*Within any story there is always a reader and this reader is a fundamental ingredient not only of the process of telling the story but also of the story itself*" [18]

Another cybernetic approach of this process is related to the relationships between each productive part. Like in every electronic and collaborative artwork, different skills were needed and those involved had to talk amongst them to guarantee the success of the proposal. There was the animation team, the interface design part, the programming helpers, the electronic support, people that helped in the setup in the exhibition space, as well as external services, involved in the different phases and tasks executed, amounting in the end to a large team of people's work and effort.

#### IV. CONCLUSION

According to our preliminary investigations, we would suggest for people from the electronic Art field to be focus on questions such as: even if we intend a more collaborative creative process, and at the same time closer to the culture of the "do it yourself", we should ask ourselves whether we really are on the way to a democratic Art production/exhibition/research?

Thinking about the creation of knowledge spaces, in the context of the infinite attempt to attain the "new", people are concerned with novelties as consumers want the newest products/gadgets available in the shops, it is needed to combat the huge anxiety of the techno culture: "*Although technological art is regularly shown at events such as Siggraph Art Show, it is in constant danger of being treated as just another ingenious application, a technological demonstration without any intrinsic aesthetic and cultural values*" [19]. The boundaries between the dangerous or potential use of creativity with technology are thin and we should bear in mind the social, political and cultural implications of our choices in this field.

If by trying to create knowledge spaces we are trying to create utopian worlds, it is always good to remember that utopias always survive even if they never become truth.

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- [9] Excerpt extracted from interview realized with Monika Fleischmann and Wolfgang Strauss in Apr, 24th, 2008 in Osnabrück, Germany.
- [10] Excerpt extracted from interview realized with Peter Matussek in Jun, 28th, 2008 in Düsseldorf, Germany.
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- [12] *Ibdem*. Calvino apud Eco, p.55. Citation in original text: "*Não quero dizer que a rapidez é um valor em si.. O tempo narrativo também pode ser lento, cíclico ou imóvel (...). Esta apologia da rapidez não pretende negar os prazeres da demora*".
- [13] *Ibdem*, p.56. From the original citation: "*Vamos a um bosque para passear, se não somos obrigados a sair correndo para fugir do lobo ou do ogro, é uma delícia nos demorarmos ali*".
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