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CINEMA, CIBERNÉTICA E UMA NOVA CINEMA, CYBERNETICS AND A NEW
RELAÇÃO DE OBSERVAÇÃO OBSERVATION RELATIONSHIP

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Abstract

The act of developing means of contributing to the expansion and integration of the most different fields of knowledge permeates not only the discussion about the observer's role on the process he observes. More than that, it requires us to revise their driving logic, bearing in mind that these two elements operate on a mutually intrinsic relationship in which the epistemological making transforms both. From this perspective, the present article aims to analyze the construction of knowledge and, therefore, information through cinematic making. From cybernetics concepts, it develops the idea of a filmic production scientifically transdisciplinary that encompasses the individual and society. To this end, Visual Anthropology is used as a compelling example of this thinking and, furthermore, as a discipline permeated by cyber notions that are established by the dialogue between different fields of knowledge. This work is part of the master's research "The circularity of documentary: urban readings, collaboration and audiovisual", developed within the scope of Nomads.usp, and has concepts widely studied by the group.

Keywords: Cinema, Cybernetics, Visual Anthropology, Feedback, Circularity

1   Introduction

The application of methodologies to human and social science fields have always been a very discussed and problematized subject among researchers. If, on the one hand, the so-called "hard sciences" take advantage

of substantially pragmatic methods to find answers and solutions to their questions, disciplines such as sociology, psychology and anthropology, on the other hand, usually do not have the same condition. A hypothesis lays on the fact that these fields deal with nonlinear systems, "whose properties in isolation add little, if anything, to the understanding of the workings of these systems when each is taken as a whole" (Von Foerster, [1971] 2003, p.192).

The question of solving social and human problems without losing sight of the complexity of the observed systems has pervaded the thoughts of Heinz von Foerster (1911-2002), who saw in the very competences of the "hard sciences" a possibility. Using cybernetics, the Austro-American scientist returned to its origins to justify his appointments:

> Those of us who witnessed the early development of cybernetics may well remember that before Norbert Wiener created that name for our science it was referred to as the study of "Circular-Causal and Feedback Mechanisms in Biological and Social Systems", a description it carried even years after he wrote his famous book. Of course, in his definition of Cybernetics as the science of "communication and control in the animal and the machine" Norbert Wiener went one step further in the generalization of these concepts, and today "Cybernetics" has ultimately come to stand for the science of regulation in the most general sense (Von Foerster, [1971] 2003, p.192).

The application of cybernetics, in this case, would differ from the one envisioned for the "hard sciences." Instead of ordering the problems according to the number of objects involved, Von Foerster ([1971] 2003) proposed the investigation according to the number of brains: one (neuroscience); two (education); many (society); and all (humanity). Given its permeation through the most different knowledge areas, Von Foerster has evidenced its complex character, impossible to be understood as a single and isolated object. Consequently, the author invites us to reflect on new ways of thinking and making science, taking into consideration the idea that knowledge is built on plurality and on the integration between the multiple elements that encompass by human understanding.

From Von Foerster's categorization, this article aims to discuss knowledge production based on cybernetics ideas. Using it simultaneously as a science and a scientific medium, it investigates its origins from the perspective of cinema and, more specifically, its association with Visual Anthropology, to understand its contributions and limitations to the field. According to this logic, it discusses the construction of information, seeking ways to expand the epistemological know-how, having as a premise the association between scientific thinking and making and society itself. This work is part of the master's research "The circularity of documentary: urban readings, collaboration and audiovisual", developed within Nomads.usp, and it uses concepts that are widely studied by the group.

2   Second-order cybernetics and feedback

Cybernetics is a science initially conceived in the mid-1940s that has as one of its leading creators Norbert Wiener (1984-1964). During World War II, along with Arturo Rosenblueth (1900-1970), Wiener devoted himself to design a machine that could regulate itself according to environmental conditions in an analogous way to the logic of social-human adaptation (Umpleby and Dent, 1999). Thus, the scientists worked under a teleological bias, characterized by processes "caused not by events in the immediate past, but rather by events in the future" (Umpleby and Dent, 1999, p.92).

With the end of the war in 1945, Wiener turned to Theory of Messages. His intention was not, however, to address the constitution of new technologies closed in themselves, but to understand their relationship and interaction with the environment and with society itself. He worked upon communication not only as the study of language "but the study of messages as a means of controlling machinery and society, the development of computing machines and other such automata, certain reflections upon psychology and the nervous system, and a tentative new theory of scientific method" (Wiener, [1950] 1989, p.15).

This approach was fundamentally important for Wiener's idea of cybernetics. He does not use the term by chance: the word comes from the Greek Kubernetes which, in short, means "helmsman". According to Anja Pratschke and Daniel Paschoalin (2011, p.5),

> The helmsman controls the ship in a volatile environment and interacts with the objects that may arise. The control in this case is the navigation of his boat in an unfamiliar environment, capable of variation, of unexpected events, changes, etc. The helmsman should, be attentive and at the same time open to its environment

and protect his boat to finally define his actions in the form of responses and of a much needed reorganization.

Wiener clarifies the understanding of its application in the book *Cybernetics or Communication Control in Animal and Machine*, first published in 1950. Justifying the work's title, the author discusses:

> In giving the definition of Cybernetics in the original book, I classed communication and control together. Why did I do this? When I communicate with another person, I impart a message to him, and when he communicates back with me he returns a related message which contains information primarily accessible to him and not to me. When I control the actions of another person, I communicate a message to him, and although this message is in the imperative mood, the technique of communication does not differ from that of a message of fact. Furthermore, if my control is to be effective I must take cognizance of any messages from him which may indicate that the order is understood and has been obeyed (Wiener, [1950] 1989, p.16)

Wiener was an intellectual who understood the worldwide expansion of communication in the context of new technological developments. Therefore, he led important analysis, not only about human processes of communication but also about machines that had increasingly refined characteristics. One of his findings throughout this in-depth analysis was a feedback process between person/machine and environment. Its constitution is broadly based on "the property of being able to adjust future conduct by past performance" (Wiener, [1950] 1989, p.33). According to the author, this operation was characterized by two distinct but complementary logics: the first by the observation exercise of the system itself and the second by a higher order

> in which past experience is used not only to regulate specific movements, but also whole policies of behavior. Such a policy-feedback may, and often does, appear to be what we know under one aspect as a conditioned reflex, and under another as learning (Wiener, [1950] 1989, p.33).

To this end, the author stated that the human capacity of performing actions based on feedback is possible due to its central decision-making organs. Wiener attested that the machine has a similar function by storing relayed information analogously to the memory of a living being. By this logic, the human nervous system and the automatic machine would look similar concerning to decision-making held in the past:

> In both the machine and the nerve, there is a specific apparatus for making future decisions depend on past decisions, and in the nervous system a large part of this task is done at those extremely complicated points called 'synapses' where a number of incoming nerve fibers connect with a single outgoing nerve fiber (Wiener, [1950] 1989, p.34).

Wiener developed his thoughts to explain "that the physical functioning of the living individual and the operation of some of the newer communication machines are precisely parallel in the analogous attempts to control entropy through feedback" (Wiener, [1950] 1989, p.26). In this organization, the messages that are external to the recipient would not be received in their pure or raw form, but by the very interpretation and transformation capacity of man or machine. Consequently,

> The information is then turned into a new form available for the further stages of performance. In both the animal and the machine this performance is made to be effective on the outer world. In both of them, their performed action on the outer world, and not merely their intended action, is reported back to the central regulatory apparatus (Wiener, [1950] 1989, p.26-27).

Just as such a behavioural complex can be carried from individual physical responses, it can also be held for investigations to the field of human and social sciences. For Wiener, on the other hand, this possibility of field enlargement would be "ignored by the average man, and in particular does not play the role that it should in our habitual analysis of society" (Wiener, [1950] 1965, p.26). This statement reveals his interest to contribute to the social development and, therefore, places his expectations on the decision-making capacity of living beings as well as machines, understanding it as a device that resists to the increasing entropy of a world prone to deterioration.

Heinz Von Foerster, like Norbert Wiener, had also considered the importance of reflecting on human and social sciences from a cybernetic perspective. His admiration for this idea can be found in his article Ethics and

Second-Order Cybernetics, a paper that describes its different possibilities of application, based especially on the notion of circularity:

> When, perhaps a half century ago, the fecundity of this concept was seen, it was sheer euphoria to philosophize, epistemologize, and theorize about its unifying power and its consequences and ramification on various fields. While this was going on, something strange evolved among the philosophers, the epistemologists and the theoreticians. They began to see themselves more and more as being included in a larger circularity; maybe within the circularity of their family; or that of their society and culture; or even being included in a circularity of cosmic proportions! (Von Foerster, [1991] 2003, p.288).

Building up his argument, Von Foerster elucidated a practice that had previously been disregarded: the inclusion of the observer in the observed system. Until now, such an action was considered wrong while the basic principle of its current scientific discourse was the separation of these two elements corroborated by a discourse of objectivity. In opposition to this idea, the author advocated the inclusion of the observer within the process he observes, since "if the properties of the observer (namely to observe and describe) are eliminated, there is nothing left; no observation, no description" (Von Foerster, [1991] 2003, p.289). In this sense, he claims:

> I would like to invite you now to join me in a land where it is not forbidden; rather, where one is encouraged to speak about oneself. What else can one do anyway? This turn from looking at things "out there" to looking at "looking itself," arose I think, from significant advances in neurophysiology and neuropsychiatry. It appeared that one could now dare to ask the question of how the brain works. One could dare to write a theory of the brain (Von Foerster, [1991] 2003, p.289).

Von Foerster's epistemological turning-point – in which the observer is an active agent of the observed system and his activities are part of the process – characterizes the cybernetics of cybernetics or, in other words, second-order cybernetics. For him, this new scenario would represent the transformation of scientific thinking and making, echoing in the most different fields. From "teaching, learning, the therapeutic process, organizational management, and so on and so forth; and I would say, of how we perceive relationships in our daily life" (Von Foerster, [1991] 2003, p.289).

Thus, as Stuart Umpleby and Eric Dent (1999) pointed out, second-order cybernetics is based on a constructivist philosophy in which the observer builds his world impressions from his own experiences. As a consequence,

> An implication of this point of view implies that doubt is inherent in human existence. We can never be certain that our views are an accurate description of the world. Our descriptions simply 'fit' our experience. And it is reasonable to assume that others will construct descriptions of their experiences, which will necessarily be different in some respects (Umpleby and Dent, 1999, p.95).

Given the circular feature of cybernetics, we can question the traditional means of scientific production within the human and social sciences. As Von Foerster ([1971] 2003, p.197) affirmed, "without communication there is no regulation; without regulation there is no goal; and without a goal the concept of 'society' or 'system' becomes void". This is a central question to the article. It seeks to broaden this discussion having the cinema as an object of study and its possible contributions to the epistemological field.

3 Cybernetics, communication and cinema

Norbert Wiener ([1950] 1989), throughout his work The human use of human beings: cybernetics and society, emphasized the need for preserving communication channels for the welfare of society. On the other hand, the author had already indicated the existence of threats and problems intrinsic to his moment:

> Thus we are in an age where the enormous per capita bulk of communication is met by an ever-thinning stream of total bulk of communication. More and more we must accept a standardized inoffensive and insignificant product which, like the white bread of the bakeries, is made rather for its keeping and selling properties than for its food value (Wiener, [1950] 1965, p.132).

The scientist's concerns about the consequences of what was called mass communication, however, were not unknown. It was an issue already addressed by other intellectuals from different knowledge fields, including the philosopher Walter Benjamin. The classic essay The Work of Art in the Age of Its Technological

Reproducibility, written in 1936, had already indicated the impact of new reproduction techniques not only upon the art field but also on social relations in the context of increasingly advanced technological development.

One of the objects analyzed by Benjamin in this context was the cinema, a medium of communication and representation that, like photography firstly, was a subject of intense discussions. The author, however, pointed out the misconception of image theorists in focusing the debate on the question of characterizing these two fields as being or not being art, ignoring the conversation regarding their respective possibilities as means of social transformation, as indicated by his idea that "the technological reproducibility of the artwork changes the relation of the masses to art" (Benjamin, [1936] 2008, p.36). Complementarily, Benjamin noticed that

> *The painter's is a total image, whereas that of the cinematographer is piecemeal, its manifold parts being assembled according to a new law. Hence, the presentation of reality in film is incomparably the more significant for people of today, since it provides the equipment-free aspect of reality they are entitled to demand from a work of art, and does so precisely on the basis of the most intensive interpenetration of reality with equipment.* [...] *The most important social function of film is to establish equilibrium between human beings and the apparatus. Film achieves this goal not only in terms of man's presentation of himself to the camera but also in terms of his representation of his environment by means of this apparatus.* (Benjamin, [1936] 2008, p.35-36).

If, on the one hand, Benjamin saw in cinema a possible contribution simultaneously to the fields of art and science, on the other, he believed that

> a compelling urge toward new social opportunities is being clandestinely exploited in the interests of a property-owning minority. For this reason alone, the expropriation of film capital is an urgent demand for the proletariat (Benjamin, [1936] 2008, p.34).

Walter Benjamin's thoughts reveal a participatory crisis, an idea developed by Heinz von Foerster ([1971] 2003) based on the understanding of the individual's exclusion within the social construction that outcomes from the absence of inputs for their interaction with society: "The so-called "communication channels", the "mass media" are only one-way: they talk, but nobody can talk back" (Von Foerster, [1971] 2003, p.196). In counterargument, von Foerster pointed out that cybernetics is a science that could provide a basis for a genuinely accessible social input device. In this scenario, the author opened the prospect of developing ideas and practices in association with the most different disciplines.

How could the cinema, in this sense, contribute to social analysis and, in this, consolidate itself as a medium of communication and representation truly accessible and opened to these masses from a cybernetic logic?

Cybernetic processes in the field of cinema encompass a complex discussion that goes from the human psiqué and reaches the very core of society. This relationship is based on the nature of cinema "as a laboratory for the feelings and sensations provoked by technology, which form the basis of all histories of the screen". Consequently, it "also means understanding cinema as an illustrative system that expresses and alters perception and the corresponding nerve-psychological relations in bodies as it transmits its impulses" (Holl, 2000, p.23). This would be a relationship between human interiority and external devices in which film and editing techniques condition the individual's feelings and adjust the reactions of the spectator's own body.

In this sense, "by means of various optical tricks and their combination, through focal lengths, depths of field, apertures, camera angles, camera speeds, and camera movements" (Holl, 2000, p.26), the product we have is not simply assembled by images that describe and handle the motion, but it is also constituted of records that deal with the time and space refurbishment. The image processing by an individual is, therefore, a subjective perspective and, concomitantly, the cinema would be a way of transmitting this sight to the one who watches. More than just constituting itself as a means of diffusing a perspective, this would be a means of exchanging experiences between individuals.

When Holl (2000) analyzed the relationship between filming techniques and the nervous system throughout history and notice feedback loops in this process, he reaffirmed the relevance of examining cybernetic processes within the cinema field. Feedback is also pointed out by the author when he understands that the filmmaker's work through techniques of time and space manipulation consists in the reapplication of a recorded series of events to reach the viewer's imagination. Thus, he concludes: "The spectator's trance attests to loops of self-adaptation where the perception in the cinema is located" (HOLL, 2000, p.33). For that

matter, the different techniques of the filmographic process, ranging from scripting to projection, reveal several possibilities to put its viewers face to new relationships that go from the individual level and reaches the collectivities.

4   Visual Anthropology: a cybernetic possibility?

The technical progress experienced during the first decade of the twentieth century brought significant changes to the cinema and its production process. The passage from silent to the spoken cinema, for example, represented not only a revolution in the way people understood audiovisual. It also symbolised the metamorphosis of the cinematographic art into an industry. As Jean Rouch ([1974] 1995, p.84) indicates: "To make a film then was to head a group of a dozen technicians, to use several tons of sound and filming equipment, to be accountable for hundreds of thousands of dollars". He pointed out that this was a time when only a small group of people, including ethnographers, ventured to record and document scenes independently, exploiting resources that had not existed until recently.

On the other hand, technological development has provided a renewal of this realm. The creation of the 16mm camera, along with the audio recorder, enabled an easier equipment manipulation by amateur filmmakers if compared to the gadgets available until then. Although initially underestimated, these artefacts transformed the way to make movies and allowed anthropologists to take the whole process, simultaneously becoming producers, cameramen, sound engineers, editors, and directors. Only during the 1960s, parallel to the growing television industry, there was the consolidation and improvement of these new devices and, subsequently, the emergence of ethnography professionals from a discipline called visual anthropology (Rouch, [1974] 1995).

Such transformations, however, were not sufficient for a revolution in the way people elaborated and created ethnographic films, as Jean Rouch ([1974] 1995, p.86) affirmed:

> However, ethnographic film, in spite of its marginal and yet quite specific aspects, has not yet found its proper path. After having resolved all the technical problems, we must seemingly re-invent, like Flaherty or Vertov in the 1920s, the rules of a new language which might allow us to cross the boundaries between all civilizations.

Observing frictions within the discipline, Rouch ([1974] 1995) simultaneously sought to point out possibilities. For him, the ethnographer is, by himself, the professional who has ability to understand the filming process – the when, where and how. To do so, he must engage the group and observe it having as purpose the mutual understanding between observer and observed. In this sense, he believed that this individual's initiation into audiovisual capture techniques would be essential to the discipline: "Even if their films are technically quite inferior to the work of professionals, they will have the irreplaceable quality of real contact between the person filming and those being filmed" (Rouch, [1974] 1995, p.88).

To this end, Rouch mentioned the application of some audiovisual techniques that he considered pertinent to this process, especially about filming and editing. For him, the 16mm cameras facilitated the cameraman's movement and, subsequently, contributed to the recording of urban scenes as it allowed him to adapt to the environment and the moment actions. In other words, "to generate reality rather than leave it simply to unfold before the viewer" (Rouch, [1974] 1995, p.89). Using Dziga Vertov's "cinema-eye" ideas and Robert Flaherty's "participant camera" ideas, Rouch asserted that "then, instead of using the zoom, the cameraman-filmmaker can really get into his subject, can precede or follow a dancer, a priest or a craftsman. He is no longer a 'mechanical eye' accompanied by an 'electronic ear'" (Rouch, [1974] 1995, p.90). Besides, Rouch indicated that narrative construction occurs mainly during the survey, in which the ethnographer must synthesize his scenes at the moment of its recording.

With the editing, the author quotes Dziga Vertov, who stated: "Association [addition, subtraction, multiplication, division and bracketing together] of film strips of the same sort. Incessant permutation of these pieces of film until they are placed in a rhythmic order in which all cues to meaning coincide with all of the visual cues"(Vertov, 1923 cited in Rouch, [1974] 1995, p.91). And he adds: "But there is another step not foreseen by Vertov that seems indispensable to me. This is the presentation of the first rushes ('from beginning to end' in order) to the people who were filmed and whose participation is essential" (Rouch, [1974] 1995, p.91).

The strategies employed by Rouch meet the ideas of Ute Holl when the second says that

> Viewed from this perspective, the various faculties of cinematic technology – recording, editing, and projection – can also be seen in a different and unfamiliar

light: as opportunities to place spectators, the subjects of perception, into new relations, in which they only consciously find themselves after they have already given themselves over to the transformation caused by this cinematically constructed perceptual relation (Holl, 2000, p.23)

In addition to providing more accessible and comprehensive recording tools to Anthropology scholars, the intense development post-WWII according to Emilie De Brigard ([1975] 1995, p.14) "has facilitated development of ethnographic film of the fragmentary and idiosyncratic to the systematic and thorough". Moreover, the author pointed out that "the most exciting possibility of ethnographic films is to enable many would not otherwise do so – amongst them, those whose specialized knowledge directs men's affairs – to see, newly and richly, the range of patterns in the behaviour of man" (De Brigard, 1995, p.15). The record thought the ethnographic film, as already stated, is more than possibilities of readings: it is an exercise of observation, reflection and transformation from new perspectives.

The exercise of thinking about cinema as a means of providing possibilities for human and social studies from a cybernetic perspective requires us to reflect on ways of engaging and developing processes that involve collaboration between observers and observed. This debate corroborates the anthropological discussion proposed by Margaret Mead in the article Visual Anthropology in a Discipline of Words. The author stated that the process of making an ethnographic film constitutes "the articulate, imaginative inclusion in the whole process of the people who are being filmed – inclusion in the planning and programming, in the filming itself, and in the editing of the film" (Mead, 1995, p.8).

To the relevance of the observed participation in film production, it is important to emphasize the interaction between the observer and the observed systems. From this logic, all those who would like to record their perceptions must be willing to exchange information with their surroundings, contributing to a reciprocal construction. Approaching Jean Rouch's view ([1974]1995, p.96), for example,

This extraordinary technique of "feedback" (which I translate as "audiovisual counter-gift") has certainly not yet revealed all of its possibilities, but we can see already that, thanks to feedback, the anthropologist is no longer an entomologist observing his subject as if it were an insect (putting it down) but rather as if it were a stimulant for mutual understand (hence dignity).

The possibility of experimenting with new ways of recording what one wants to reveal, in this sense, permeates its whole course, from the planning to the exhibition. This complex scenario represents the possibility of apprehending and understanding emergencies arising from interrelationships within the observed system. Visual Anthropology, through this bias, opens itself to the creation and refinement of views about the space. It also promotes the development of a dynamic field based on the correlation between creation and criticism. The creation of a space that enhances the exploration and consolidation of these means for socio-urban readings based on subjectivities and collectivities.

5   Final Considerations

The development of cybernetics has brought a new epistemological logic based on transdisciplinarity and the active participation of its observers. This is a fact connected to the concepts of feedback and second-order cybernetics; ideas that, if applied, allow us to perceive science as a multiple and extremely dynamic field. Within the human and social sciences, cybernetics has the potential to contribute to a structural and, subsequently, communicational transformation. A field that has hitherto been constituted upon the fragmentation of each one of its disciplines and its untying to other knowledge fields.

In the sphere of mass communication, and of cinema, in this case, such issue becomes even more complex whereas this is a medium regulated by forces that subtract its potential of thinking and developing genuinely concerned and interested practices for the multitudes. Thus, the action of rethinking cinematic methods is also to rethink its production form, from script to exhibition, proposing and questioning the use of techniques to perceive its inherently artistic and scientific shape.

Understanding that knowledge and, consequently, information is built upon a multidirectional relationship and communication between the observer and observed objects – both in the sense of the one who shoots and is filmed, as well as the one who watches – studies developed within Visual Anthropology present themselves as pertinent discussions to this work. The Ideas of Jean Rouch, Margaret Mead and Emilie de Brigard, for example, point to a renewal of the ethnographic field, in which the observer acquires a new position, and at the same time the observed takes another shape, becoming an active agent within the process of narrative construction – strategies that are intrinsically related to ideas developed by Norbert Wiener and Heinz Von Foerster. In short, the possibility created by filmmakers, ethnographers and cyberneticists reveal, in an

exciting way, the power of filming to the human and social understanding. The cinema as an effective means of transformation and construction of information.

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