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Imagen computacional: reseña sobre la imagen como simulación

Computational Image: review about image as simulation

TIPO DE TRABAJO: Comunicación Virtual

PALABRAS CLAVE

Arte Computacional, Imagen Numérica, Simulación.

KEYWORDS

Computational Art, Numerical Image, Simulation.

RESUMEN

Este artículo es una revisión bibliográfica sobre un problema de imagen en el entorno de creación de arte computacional. Con los avances tecnológicos, especialmente en el campo de los gráficos por computadora, las imágenes computacionales se insertan en el campo del arte para comprender y discutir cómo pueden interferir en los asuntos de signos y significados. Con la tecnología computacional, las imágenes se convirtieron en generadas por máquina y los impactos de este fenómeno aún están bajo investigación. Este trabajo se basa en las discusiones presentadas por Edmond Couchot, Oliver Grau, Cláudia Gianetti, José Luis Brea, Vilém Flusser, Suzete Venturelli y Cleomar Rocha, y nuestro objetivo es presentar la estética de las imágenes computacionales actuales.

ABSTRACT

This article is a bibliographic review about an image issue in the computational art creation environment. With the technological breakthroughs, specially in the computer graphics field, computational images insert themselves in the art field to understand and discuss how they can interfere in sign and meaning matters. With computational technology, images became machine generated and this phenomenon's impacts are still under investigation. This work is based on the discussions brought by Edmond Couchot, Oliver Grau, Cláudia Gianetti, José Luis Brea, Vilém Flusser, Suzete Venturelli and Cleomar Rocha, and we aim to present the aesthetics of the current computational images.

INTRODUCTION

The 19th century was for the technological arts a first mark since it represents the period when the technology of photography was patented, which for Flusser (2012) is the first of the "technical images". This is the visual expression with greater power of reproducibility until the present day and for that its invention begins to modify the relationship between the general public and visibility. The nature of this relationship is then maximized by the miniaturization of computers and cameras and the popularization of smartphones and the emergence of other visual expressions that fall into this category, such as cinema, animations and computer images, resulting in a large universe of images produced and reproduced in everyday life.

From the first images of this type, in the 19th century, to the simulated computational images, we also had changes in the way they could be part of the field of art, even changing the way we consider the artistic work. At first, the refined manual skill with continuous work and accompanied by masters or endorsed by a public initiated in the *métier* (and thus differentiated of the artisan work), was the landmark of the artist. The fact that photography is the result of the work of a machine brought, at the beginning, great prejudice on part of the artistic community and this fact today is evident in many discussions about the entrance of the computational image in the contemporary arts.

In order to try to describe the ontology of the simulated or artificial image, we propose for this study a bibliographic review at first, citing some of the theoreticians involved in this discussion, but mainly highlighting the efforts of researchers from the Media Lab / BR Group in trying to characterize these images and their reflexes in the field of computational art. We also try to characterize the simulated image as a subcategory of the technical images but that differs from the others by its numerical constitution.

At first, we take the division made by José Luis Brea in "Las tres eras de la imagen" (2016) that makes an ontological-historical line of the image in three categories especially related to its form of creation, namely: (1) material image, (2) Film, (3) e-image. Thus, our concern as a research would be the latter, since it represents surely the majority of the images produced today which are specifically the images born without support, or as we can affirm to be multi-support and multi-user, fruit of the networks of distribution networks involved in the very basis of the Internet.

This e-image, also entitled numerical image, by Edmond Couchot (2003), composed of interpreted codes of mathematics, a fact that we will discuss later in the article. In this sense, in the analysis of the genesis of the image, we can perceive four paths:

- A) Natural reality is observed and interpreted with the aid of instruments and the body of its observer, that represents what he perceives of his world, for example, in a painting or in a sculpture.
- B) Natural reality is observed through a computational device, which allows the digitization of an image of reality, transforming electrical impulses into lines of code, stored and visualized in devices such as monitors and printers.
- C) Natural reality is simulated, and is taken by the observer as the real thing, and may even be confused with the natural reality, for it is within the image.
- D) Simulated reality is a coding described in lines of code that exist artificially, but does not represent a specific object of the physical-sensory world, it can be a Class.

Considering the simulated reality, a subcategory of "technical images" emerges in the 1970s and, in this context, the way that the image as a concept has crossed, differs from the past until it unfolds in a computational image resulting from a numerical environment, simulated to become visible. This issue will be further discussed below.

THE ZERODIMENSIONALITY OF THE CODED IMAGE

The permanence of the image, once achieved with the cold rock of the caves throughout the world and subsequently with the texture of the fabric of the canvas of the painting, is modified with the emergence of the technologies of reproduction, which made the originals "reproduction matrices".

When Walter Benjamin wrote his anthological paper "The Art Work at the Time of Technical Reproducibility" (1987), he probably could not imagine a space whose reproduction would be done in milliseconds and without modifying any raw material, just about the click. The coded images have the ability to be there on the computer screen, as well as other devices such as cell phones, television, movies, and watches and are also stored in the protection *bunkers* of large technology companies, since they do not have a dimension. Those images in which artists are hunched over for years trying to imagine ways of exceeding two-dimensionality or three-dimensionality, at this point reach zerodimensionality.

The discovery of the pixel, as a basic component of the digital image also brought new thoughts about the relations with the image, since having no dimension, this image is basically only information, a handful of zeros and some aligned in an array that the computer interprets and exposes it on a screen (this electronic rather than tissue) so that our eyes can apprehend and perceive it. In this way the *pixel* allowed us to be able to digitize the images, that is, transform the analog in electrical impulses that would be understood by the machines as lines of codes that say in how many parts this image must be presented, what color of each part and what size of each part, which Couchot constantly refers to as numeration.

The digitization helped in the reproduction of images in general, with or without movement, however the computational images are something different, because they are not fruits of the human ingenuity in the manipulation of matter, but rather fruits of calculations elaborated by the machine with variables inserted by the human beings: "The artist no longer works with matter, nor with energy, but with symbols" (Couchot, 2003, p.157).

For example, in the case of digital photography: the camera, independent of its model or value, will work in the same way: it will have a sensor that will capture the light rays reflected by objects and sensitize the sensor, causing the computer inside the device to interpret those impulses such as digital data.

However, the resulting image, even though it is a digital image, is a representation of an existing object in the physical-sensory world. When we speak of a numerical image, we want to refer to an image that exists only as a matrix, that is, it does not necessarily have a specific physical counterpoint, it is generated directly in this context through algorithmic interpretation.

In this case Couchot states that this is a simulated image:

"From a technical point of view, it is not more about images, but about information; not of signs but of coded signals - the *bits* - treatable by the computer, in which images, sounds and texts can be converted or can be converted into images, sounds and texts" (Couchot, 2003, p.155).

Venturelli says that within the simulation we live the phenomenon and we are not before him. It warns us that : "In science, the term [simulation] approaches the sense of simulation of phenomena as opposed to experimentation, and in art we speak of simulation as opposed to simulacrum / imitation" (2017, 38) and complete : "Digital technologies allow the complete reconstruction of a phenomenon and reproduce it to revive it in its natural principles: artificial life, artificial intelligence technologies, genetic algorithms, neural networks, biotechnology and others" (Couchot, 2003, p. 155).

For us, it is important to clarify that in computer art, the process of simulating phenomena of reality, for example, differs from the simulacrum, because it does not copy the original identically, but stands out from its appearances, to finally replace it propose an altered form. The simulation in art, does not always intend to provoke the illusion. Simulation is also a method, developed by science, that consists of studying theoretically the activity, or the action of a real phenomenon, or rather, the results of an action on a real element. Art appropriates this method to establish an unprecedented relationship with the real in art. That is, this antinomy marks the perceptual complexity generated by the simulation, which involves subjects such as: nature, artifice, original, double, reproduction, imitation, illusion and simulation, which intermingle and intertwine. What we can glimpse is that the relationship between the real, more specifically, nature and artifice is striking in current production, and is entering a new phase, which has conceptual consequences in science, art and philosophy.

For example, Jean Baudrillard (1981), in his critique of the technology presented in the book *Simulacres et simulation*, evoked the virtual to observe that "the real no longer exists." For the author, by exaggeration of simulacra, accumulation of mediatization, and processes of reproduction, contemporary society would have lost its relation with the original, with the referent, that is, with the real. Jean Baudrillard, in relation to the simulation, also says that today it precedes reality, which produces and replaces it but for us today the simulation and reality are mixed.

Considering this information, and based on the following quotation from Cláudia Giannetti's "Estética Digital":

"Since the internal structure of the binary code completely dissipates the difference between a letter, a shape, a sound or a number, the data entered in the computer can generate both images, music, sounds or texts" (Giannetti, 2006, p. 103-104)

We can, from this quotation, understand the extension of possibilities created with the phenomenon of simulation, however we return to affirm that our primordial concern is the genesis of the numerical image. From the concept of "simulation", here the aspect of zero-dimensionality of this simulated image resumes as a question to be studied. As Couchot (2003, p.160) points out, the computational image presents itself in a wide variety of aspects, but they have two points in common: "they are calculated by the computer and capable of interacting (or 'dialoguing') with the creates or he who looks at them" (*op cit*). In relation to the first characteristic, for the author, the pixel acts as an *exchanger*, capable of authorizing the passage from number to image (Giannetti, 2006, p 161).

Thus, as we have already said, numerical images can be scanned from a physical-sensorial object or are algorithmic, but independently:

"Whether the computer has proceeded from real numbered objects or mathematically described objects, the image that appears on the screen no longer has, technically, no direct relation to any preexisting reality. Even when it comes to a numbered image or object, numeration breaks this connection [...] between the image and the real" (Giannetti, 2006, p. 161).

This is, for example, the work of the Galapagos by Karl Sims¹, virtual beings resemble some microscopic beings of the physical world, but their format is composed of simple three-dimensional geometric elements. In this way, even if the cinema has sought in computer animation the verisimilitude to the point of numerizing the capillary pores of digital actors, the perceptual-cognitive experience is completed by human experiences and does not need to be mimetic, which distances us again from the discourse of the simulacrum.

ALGORITHM AS LANGUAGE AND ART AS ALGORITHM

The simple existence of the numerated image has brought to the surface discussions about authorship and originality, as the authors Brea, Venturelli, Couchot and Giannetti point out. The author of the work that had disappeared for Roland Barthes, returns to the discussion when it tries to understand the difference between participation and authorship, which returns the second common characteristic observed by Couchot among the numerical images, quoted above.

Interactivity, as Couchot put it, is an essential part of the computational image, but has largely depended on the development of "the modes of exogenous interactivity conditioning man / machine dialogue" (Couchot, 2003, p. The development of these modes of interaction that are basically the *input* devices were classified by Cleomar Rocha in "Bridges, Windows and Skins"² in three parts: Physical Interfaces, Perceptual Interfaces and Cognitive Interfaces. The evolution of these interfaces, according to the professor, points to the ever smaller use of the keyboard interface and the use of sensors that will make the machine position more and more autonomous.

Couchot also points out that there is a modification also in the endogenous interactivity that is confirmed by the Rocha reading: since new ways of allowing the machine an interaction with the World, these mechanisms must be "explained" to the machine, allowing this information to be processed in useful data. However, even in the face of these implementations, the way the machine still relates to the data did not change, that is, in an in-depth analysis, the human / machine dialogue did not change in the same way as the input and output mechanisms of this communication, at least not until we consider the new research in quantum computing and artificial intelligence.

But even though there has not yet been such a modification, two paths to artistic practice have been structured here, one in which these new mechanisms of input and output have enabled a digitalization of commonly analogical artistic practices such as digital painting, digital sculpture and digital engraving, but this just puts the same practice with other tools. That is, there is the human factor in artistic creation, even if the result is an image that can only be visualized in the computational world.

The other, which the latest research has highlighted, is when the creation of the artistic object (the computational image) occurs autonomously, through a generative code or through data inserted by sensors that do not have the human being control them. This computational image that initially seems to be purely a consequence of random programming and generated is at the core of the discussion about authorship and the consequences of cognitive computing that works of art at this time only anticipate some scenarios.

Thus, the authorship of these numerical images is directly related to the authorship of the code (algorithm) that initializes the simulation. For Couchot, "the algorithm is actually a technique particularly adapted to the computer to automate certain procedures of reasoning that seem to be put into play in artistic creation" (Couchot, 2003, p.197).

Consequently, from the implementation of personal computers in the 1970s to the early years of the 21st century, we saw the exponential growth of programmers-artists and programmers in the fields of visual, sound and design arts and "develop the code" to be the primordial ocean of current numerical images.

The algorithm that was once a domain of developers (with specific and hermetic language) facilitated by the evolution of computers and programming languages was opened to a wider public. The increasingly resemble to the everyday language of the human being and less with the binary codes was enough to develop FrameWorks like *Processing*³ or TouchDesigner (<https://derivative.ca/>), to name two of the most used frameworks today, and for England to determine in 2014⁴ the teaching of programming logic as a component of the basic curriculum of its elementary school.

We must take into account that this algorithm that for Couchot is a technique used to deal with the machine, but at the same time it is established as a language of its own, it is also a descriptive result that will have a simulated image and thus become representational. In this way, Venturelli states that:

¹ See Galapagos Interactive Exhibit, available at: <http://www.karlsims.com/galapagos/>, last accessed at November 18, 2018.

² E-book Available in: <https://producao.ciar.ufg.br/ebooks/>. Access in: November 18, 2018.

³ Available at: <https://processing.org/>.

⁴ See at: <https://www.theguardian.com/technology/2014/sep/04/coding-school-computing-children-programming>.

"Computational art through computing is defined by works whose form and content are, in part or totally, the product of a process that uses the pragmatic use of abstract information systems, without *direct* relation to the real. Computational art becomes fully technical and has a special feature, found in the history of art, since it is an art of the model, in the mathematical sense of the term" (Venturelli, 2017, 73).

Thus, the algorithm that was previously the fruit of a functionalist work, becomes, in the view of art, the essence of the numerical artistic object. For us the best description we have so far is that the ontological axis of the computational work of art is shifted from the simulated work to the code. Thus, we can affirm that "computational art contains aesthetic information, because when the work is executed in a computer, it opens dialogue between the abstract world of calculation and the user" (Venturelli, 2017, 83).

And so, the algorithm that was once only a series of instructions from the author to the computer, becomes the expectation of a series of sensory reactions (depending on the expression that the artist throws), resignifying the code itself. The following statement by Venturelli is important to understand this process:

"Every work presents the objective moment of a dynamic system, particular of a certain context of relations between different variables that participate in its being, in which the form corresponds to the content of the tensions that are manifested in the evolution of the system" (Venturelli, 2017, p. 72).

In this way, we can understand that the artist developing his work mediated by the code is stressing at all times the limits of the machine's understanding of the instructions he receives. When still using the generative art, of evolutionary codes, the artist elevates the instrument machine to co-author, and brings the essence of his work to the code.

CONSIDERATIONS

Like any ongoing research, this document has obvious gaps that need to be filled at some point. This subject is basic for the researches in the area of art and technology or technoscience, and should be taken in the multiple directions that are drawn here.

Computational images will reveal new forms of human relationship with the lived world, not only in what human perception allows us to experience, but also in the macro and micro universes in situations that human life can not exist and yet we can simulate these phenomena to broaden our knowledge of the world. The role of art at this time is to rethink these spaces of creation, to demonstrate how we can strain the barriers and demonstrate the ruptures in science and philosophy, as we have done so far.

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