

Proto-Computational Arts and Photography

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Abstract

How Geraldo de Barros obtained abstract photographs using disposed punched cards makes evident that the origins of the interaction between algorithmic devices and the arts are deep and there is a clear need to describe the visual artifacts, and the historical and technological contexts as well to better understand his work. José Oiticica Filho and de Barros expanded the use of photography beyond the camera operation focusing on experiments in the darkroom. I have proposed that Geraldo de Barros must be recognized as a pioneer of computational arts “because he developed a method for using punched cards instead of the negative Film in the darkroom, exposing the photographic paper several times while changing the distance of the enlarger lens to the photographic paper in order to magnify or minimize the size of the rectangles through which the light would pass creating complex abstract compositions in the photographic paper”.

Keywords

Proto-computational Arts, Algorithmic Devices, Early Computers, Geraldo de Barros, Jose Oiticica Filho.

Konrad Zuse

The opening phase of my research about early computation and the arts was the examination of the work of engineer Konrad Zuse (1910-1995), the responsible of developing the Z1 and Z3 computers, the Z3 made in 1941 is arguably the first fully programmable computer. In several of his pioneer computer devices, Zuse used punched film stock as a storage medium (to store data and instructions). Fragments of celluloid with frames showing cinematographic scenes punched with digital code remain as a mysterious trace of intersection “between cinematographic image and computational code” (Rojas, 2002). After writing about the meaning and significance of Zuse’s method I had the impression that the relationship between binary code and the cinematographic and/or the photographic image was a unique feature of that isolated example (Burbano, García, 2016). The findings of the work of

Geraldo de Barros showed the relationship mentioned above could be explored in depth in other scenarios. More importantly, there is a need to find possibilities to elaborate a discourse capable of articulating these two phenomena.

Introduction

This research must be contextualized within a larger scope project that is systematizing early interactions between computation and the arts. This project identifies several layers in time, starting with proto- computational initiatives in which the notes written by Ada Lovelace about the Analytical Engine (1839) and its potential capacity to compose music occupy a unique place. Nevertheless, there are several other examples in the modern history of computation where it is possible to trace early encounters between the computers and the arts. For instance, the interactions between computation, the visual arts and cinema in the case of Konrad Zuse in Germany in the decade of the forties (Burbano, 2013), the interactions between literature and electronic writing in the case of Christopher Strachey in the UK in decade of the fifties (Link, 2006), the case of Electronic Music production in the CSIRAC in Australia in early fifties too (Doornbusch, 2005). The experiments made by Geraldo de Barros in Brazil with punched cards storing binary code translated into photographic experiments are a rare case in which a Latin American artist anticipates the deep relation that computation and photography will have several decades after (Burbano, 2013).

Barros and the Darkroom Experiments

Between 1949 and 1951 Geraldo Barros produced seven photographic works made with punched cards, these experiments are notorious nowadays and some of them are part of important collections worldwide like the photography collection at MOMA in New York. Today is clear that Barros “played” with the punched cards in

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the darkroom controlling the light exposition and the sensitive photographic paper. A new material analysis shows that he was using other additional materials in the process like cellophane paper. In the absence of a photographic negative, there are no physical sources from which make copies of these seven works. These pieces have no particular title and are part of the “Fotoformas” series, an influential photo collection of more than fifty works (Girardin, 1999).

Photographic Context

Originally when conducting research about Barros, there was not much information about the context to explain his experiments at the photographic level, in the last two years I have had the opportunity to re-collect information about that aspect. We can start with a glimpse of the history of photography in Brazil. In the transition between the forties and the fifties, there are exquisite examples of experimental photography there; these works have been linked to

the Concrete or Constructivist art movements (Espada, 2014). Amongst the practitioners is José Oiticica Filho, father of influential artist Helio Oiticica. Oiticica Filho who made abstract photographic works like “Forma D-10 A” was part of the artistic scene in Rio de Janeiro while Barros was part of the one in Sao Paulo, both can be seen as key figures of the photographic modernity in Brazil in a period where Biennale de Sao Paulo was founded, and several important transformations in the local art scene took place (Herkenhoff, 1983). Both of them started to work with photography more or less at the same time and contrary to other contemporary creators using the same medium they focused on the dark room and the materiality of the photographic process as key elements of their creative practices. These two artists also have in common their heterodox careers, as far as Oiticica Filho was originally trained as an entomologist and Barros was working for the Banco do Brasil part time, this double action opened several doors to unknown fields for both of them.

Thinking about the historical context to explain the apparition of experimental photographers like Barros and Oiticica Filho I would like to refer to the work of another important Brazilian pioneer in the field of photography. In 1901 Valério Vieira (1862-1941) made the influential photographic composition “The thirty Valerios” a rich photography with significant elaboration in the dark room, an image that can be seen

as an anticipation of the manipulation of layers in the computational photography and that can be clearly seen as a premonition of what Photoshop, and other software to process photography based on the layers principle, does to contemporary photography. However, at the conceptual level we can observe that the promise of computer imaging that Vieira examines in his picture is based on the figurative front of photography, while in the case of Barros his investigation occupies the abstract side of it.

Technical and Technological Context

Of course, Barros made his experiments before any computer was actually able to produce computer graphics or digital images. At that time the calculators or tabulating machines were unable to produce any visual output, no computer screen was even implemented therefore computer graphics were not in the plans of the most audacious computer makers at that time. The first commercially available computer, the UNIVersal Automatic Computer I, was available the same year that Barros was working in his experiments with tabulating machines, an IMB machine at the Banco do Brasil, it is clear now it was not a computer as such, as far as the first computer, a Univac-120, was imported to Brazil in 1957.

The typology of the punched cards used at that time is relatively easier to track. Because of the shape of the rectangles seen on the photographic experiments by Barros is possible to identify that the cards used were the IBM “80-column punched cards” introduced in 1928. Those cards were a global standard for several decades. When Barros made his experiments IBM had bases in several Latin American countries (Medina, 2008). At the time I came across the work done by Barros, “I found myself confronted to a constellation of phenomena that emerged at that moment in history more or less pointing in the same direction: unusual, unseen, often misunderstood creative phenomena made with binary code punched cards or punched film stock, two examples that can be regarded as instantiations of the same phenomenon: the early interaction of the digital code and the photochemical image” (Burbano, 2013).

Proto-Computational Photography

The originality of the photographic experiments made by Barros and Oiticica Filho are based on their creative use of the photographic equipment in the darkroom. They were building upon the basic idea that not only

the photographic negative but, in fact, any transparent object or surface with holes can be used to interfere with the transit of light, the photons, from the enlarger light bulb to the sensitized paper. This can be seen, of course, as the manifestation of a deep understanding of the photographic equipment functionalities. Nevertheless, a characteristic that remains distinctive of the work done by Barros is his use of cards with binary code punched, this process shows an additional sophisticated level of creative relationship with the machines, in this case, the IBM tabulating machines used at Banco do Brasil. His approach shows an imaginative view of the material elements and the technical processes, how a piece of equipment used here could be used there, how a material disposed from one process could be used in another one. This particular method is no doubt one of the patterns of technological innovation nowadays (Johnson, 2010).

The survey about other artists or technicians working in a similar path to Barros has been fruitful in some ways. First of all, the investigations exposed that in the experimental level there is indeed a good close example in the manipulation of photographic material in the dark room. The quality of the work of José Oiticica Filho shows how advanced was the scene in Brazil and reflects well the inspirational changes in the artistic world at that time (Oiticica Filho, 1983). Nevertheless, I was not able to identify other photographers doing experiments with punched cards; this remains a distinctive path of Barros creative endeavors. Finding another experiment in that specific way is hard if no impossible.

However, there is a novel way of exploration that has started. This short text began with the mention of pioneer Zuse's work, which has an important signification for the computer history but also for the media art history. After doing a general review of Brazilian computer history in order to find possible examples of computational creativity related to the work done by Barros I found a new interesting track that can connect this story in Brazil and the one of Zuse in Germany. Zuse had a partner in the development of the Z1 and Z3 computers (Rojas, 2002), who actually helped him to use telephone relays and who later on suggested to use vacuum tubes to make computations.

Zuse's friend is Helmut Schreyer who was a computer pioneer and partially responsible for the achievements of the construction of first computers made with Zuse. Schreyer after the World War II immigrated to Brazil, to Rio de Janeiro specifically, where developed an academic career joining the *Instituto Militar de*

Engenharia (Rojas, 2010) and he also used to work at the *Departamento de Correios e Telégrafos*. Therefore there is a new branch to explore on the intersection between computation and Brazilian art history.

Acknowledgements

I would like to thank Fabiana de Barros for her precious help and advice with the research about his father Geraldo de Barros.

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Author Biography

“Burbano, originally from Colombia, explores the interactions of science, art and technology in various capacities: as a researcher, as an individual artist and in collaborations with other artists and designers. Burbano’s work ranges from documentary video (in both science and art), sound and telecommunication art to the exploration of algorithmic cinematic narratives. The broad spectrum of his work illustrates the importance- indeed, the prevalence- of interdisciplinary collaborative work in the field of digital art.”

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