COMPUTER CODE AND CREATIVE EXPRESSION

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1. Introduction

When I was little I was taught a lot of things about history and art and culture. The epicenter of everything was the classic Greece and its ramifications through european history until the present, more or less. Art, Literature and authorship were determined by a strong tradition of appropriation and inheritance of content where I believed there was a place for me. When I first read about the destruction of the father from the pages of the Golden Bough, G. Frazer's theories made perfect sense to me; the history of authorship was an eternal cycle of challenging, establishing and losing domination, and by playing this game any artist would earn their rightful place in the history of culture. I was very young back then, and it didn't take me long to start having trouble reconciling this naive vision of culture with what was happening around me. Most media consumption models are supported by models of competition that don't depart much from Frazer's ideas, they just seem to happen faster. The tv trends of today will be displaced by the trends of tomorrow, and because that was supposed to be trash culture, none of them would ever earn any rightful place anywhere in culture, except for cartoons, of course. Experiencing media somehow reinforced my competitive model of culture where the goal was to turn authorship into either a monument (by art) or a celebrity (by mass media), and wait until the next one in line would displace it. It took me many years to dissipate that cloud of thought and find a different perspective, and I would have probably never done it if the emergence of digital technologies did not exaggerate to the point of redundancy what was already happening since long ago, offering me a different point of view. Although I don't think it started happening within the arts or even media or communications.

In 1948 Norbert Weiner published a book that would become a classic called Cybernetics. He tried to articulate a set of principles that would describe his eccentric approach to science. My purpose is to link the ideas explored by Cybernetics with what I have already mentioned about my early perception of art and culture, and use this contrast to roughly localize how the ideas collected in Weiner's work migrated from science and engineering to other instances of culture, challenging the perception of authorship and art from hierarchy to system, from monument to experience, and from contemplation to interaction.

Because of Weiner's relationship with MIT, I think it is important to explore the environment surrounding MIT around the time when digital technologies were invented, the conditions related to their applications in the military and communication industries, and try to measure how crucial was MIT to shape the way things came to be when digital technologies became the major human social interface. My limited knowledge in the subjects of Cybernetics, MIT and digital technologies will be derived mostly from the reading of Weiner's work and an interview I performed to G. J. Sussman on the subjects of art and computation. Sussman was born almost the year when Cybernetics was published, and is a key figure in the establishment of the Computer Science and Artificial Intelligence laboratory at MIT. It is important to note that Artificial Intelligence can be considered a subfield of Cybernetics.

I won't touch many interesting things related to this theme, and I will not try to fill the massive gaps of knowledge I have to talk about these topics. My main interest

is to think about a moment of disruption within a particular history of art (ours), and try to throw links between the present and the past as an effort of conservation that would like to work more as an effort of adaptation or incorporation. One thing I will miss touching for personal reasons is the intimate relation between Weiner and the Mexican Arturo Rosenblueth, a medical doctor of the brain that shared authorship with Weiner on the key ideas behind Cybernetics, and from whom Weiner got most inspiration. The exploration of the relationship between Weiner and Rosenblueth might be a very good excuse to touch on cross-cultural issues that deal with science, technology, development, policy and colonization.

2. Cybernetics

Cybernetics or control and communication in the animal and the machine is the full title of Norbert Weiner's book. When asking G.J. Sussman about feedback systems, he told me about two early examples in history of self-regulating mechanisms. The first artificial automatic regulatory system, a water clock, was invented by the greek inventor Ktesibios in Alexandria. In his water clocks, water flowed from a holding tank into a reservoir, and from the reservoir to the mechanisms of the clock. The device used a cone shaped float to monitor the level of water in the reservoir, adjusting the flow accordingly to maintain the level of water constant, so that it neither overflowed nor it could run dry. It required no outside intervention between the feedback and the controls of the mechanism. Although he did not refer to this concept by the name of Cybernetics, Ktesibios is considered to be the first to study cybernetic principles.

The Golden Bough principle can be applied to a certain extent to the perception of science in history, but it is more often that competition takes the form of cumulative collaboration in science, and only when a given theory would be proven to fail the cycle of substitution would occur. It is ironic how when I try to explain a departure from the Greek centric model of culture, I find the root of my source of inspiration in a Greek thinker.

The second mecanism that Sussman mentioned of a machine with corrective feedback dates from late 1700s when James Watt's steam engine was equipped with a governor, a centripetal feedback valve that controlled the speed of the engine. Alfred Russel Wallace identified this as the principle of evolution in his famous 1858 paper. In 1868 James Clerk Maxwell published a theoretical article on governors, one of the first to discuss and refine the principles of self-regulating devices. Sussman made a drawing to explain the device while mentioning Russel and Maxwell and jumping ahead in time to the invention of telephone networks. Electricity, his true passion along with computer languages, took over the conversation.

But Weiner was not talking about specific mechanisms or machines. He envisioned principles behind them that defined a philosophy of science, or an approach to scientific thinking that was substantially different than the preceding one. By focusing on behaviors rather than things, the question of "what is" was replaced

by the "what does it do". Weiner talks about this different way of thinking about systems and process as a revolution in science the size of Copernicus' description of the solar system, but he fails to deliver a precise description of some scientific truth that would fail to be true when examined with the lens of Cybernetics. More than a revolution, Cybernetics seems to be an evolution. The displacement of causality from explanation to prediction (what does it do instead of what is) was a well known procedure in science since the late seventeenth century with the emergence of probability and statistical science, and Weiner's notes on Nonlinear Problems in Random Theory show that he was very aware of this body of scientific knowledge, already mature when he graduated as a mathematician. However, he describes in detail a variety of problems that are still the concern of many popular branches of science, like artificial intelligence, neuroscience, decision theory, game theory, biology and psychology.

In page seven of Cybernetics Weiner talks about picking up a pencil. To do so, quoting from his words, I have to move a few muscles, but I would hardly know what muscles I am moving, and even if I knew, I am not performing the action by consciously willing those muscles to move. What I do is just to pick the pencil up. I don't know why, but I can do the task. Sixty years later, when I turn my computer on and pick up my digital pencil to start brushing light on a picture with Photoshop (something almost everyone can do if the tool is given to them), it is impossible for me to know the constitutive elements of code that are running the task performed by the machine. And I don't need to know. Digital computers have been meant to follow the black box design metaphor described by Weiner in Cybernetics, like all other media products that swarm our daily life. What does this all mean?

3. Code

To contrast the mysterious black box approach suggested by Weiner, Sussman likes to go back to the idea of understanding things, and solving problems as an approach to learning something from them. When trying to draw it doesn't make sense to spend a lot of energy trying to study the muscle motion of the wrist, and it would potentially result in a poor drawing, but when wanting to use the computer as a medium, if there is no understanding of how to open the black box and rewire it in a different way, the possibilities for innovation will remain constrained by what the designer of the given program intended for it to do. Code is a literacy that lets you talk with computers, and because they are universal machines, they can do whatever you want, says Sussman, if you figure out how to say it in terms they can understand. And he continues: Because computers are fairly dumb, you have to be very precise when instructing them on how to do something, to the point where you are forced to describe your knowledge so precisely that other trained humans could understand what you know just by reading the code. Code, he argues, has joined mathematics as the preferred language for the communication of science and engineering.

Where does that leave art? Paying reverence to authorship, Sussman quotes E. A. Poe to explain his point of how the process of making art might be not that different from the practice of science and engineering. Using a constructivist approach, he traces parallels between Poe's poem and a beautiful bicycle hanging from the ceiling of his office, advocating for intentionality, elegance and precision as the components of artistic beauty. Computer programming, he says, is a kind of art, that talks about technical things instead of emotions or stories. A computer program, just like a machine, Poe's poem or a good novel, are beautiful if their almost impossible achievement appears effortless to their audiences (or users).

An art that can be "used" brings me closer to one important idea that has changed the nature of art and media in the past decades: interaction. An art that could be touched was kind of a novelty for traditional spaces like the museum, but an art, or any other content, that could also be changed when touched is an idea that authors and copyright owners are still finding very hard to swallow.

Sussman's appreciation for the beauty of the machine and elegance in the design inherits from the modernist tradition that flourished in places like Bauhaus, and was of influence in places like MIT, where artists like Moholy-Nagy and Kepes found a niche to experiment with their very modern ideas. A chain of events that I wont describe here led to a school of code-based computer art in the MIT Media Lab, inspired by the Cybernetic ideas of system, communication and process, and adopting the modernist appreciation of the material, in this case code, as the principal determinant of the medium and the form. An art made with a computer processing code and user input should express the process, the feedback and the code.

4. Conclusion

Contemporary art collectives, that work outside of the curator-gallery-museum establishment and look at their artwork as an evolving process that takes feedback from live interaction from the public, access the fabric of culture from a significantly different perspective than the one shared by art practitioners from the past, even if they were revolutionaries and challengers. They belong to a new tradition inspired by the likes of Weiner, valuing process and interaction rather than result and contemplation. However, I haven't found a direct trail of events that could connect the activities in places like MIT during the first half of the 20th century with the current condition of contemporary culture, but it is natural to conjecture about a relation between Cybernetics and contemporary schools of thinking, where so much emphasis is put on social process, feedback, pattern recognition and data.

On the other hand, the link between Cybernetics and a particular school of digital art is evident, because of the great influence of cybernetic principles in the art and because this particular school was originated in MIT.

After talking with Sussman and reading Cybernetics I found some of questions that remained open because I don't have a deep enough background to draw a clear picture about where the key ideas that brought computers and other interactive machines come from. Medical science, electrical engineering, biology and chemistry seemed to be big sources of inspiration for the ideas that changed the face of technology during the 20th century, but I don't have a clear understanding of evolutions in political science, urban planning, economics, or any other aspect of knowledge closer to the social sciences, that perhaps could have had a bigger impact in the ways people perceive their own needs. Even when I try to avoid thinking of individuals, I tend to think about social forces of culture (models of the world, etc) driving human activities towards change, and sometimes I wonder if it would not be change itself the one that shapes those forces.