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Digital feedback as another state of matter. Automated creation processes as a new clay.

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I remember I'm going to forget what I just remembered.

Sampling one reality

There is an essential difference between the analogue universe and its digital transposition. An analogue model is carried by a continuous signal while its digital alter ego codes the information in a symbolic way using a numerical system.

The computer then processes the data as messages made up of a succession of binary digits. This quantity of information contained in the elementary choice of two states of a probable reality is the “bit”¹, sole and unique switch confined in its own world, far away from any “multiversal” theories.

Digital technology allows signal processing by controlling the circulation of these messages. It makes the combination and recombination of any objects and material possible within the virtual frame of the machine, and as a consequence, a massive development of abstract models.

Following this path, the access to unlikely natural waveforms and data dumps is possible and perceptible to us. Here again, we transform the objects, we change nature while maintaining the form and vice-versa. Information leaves and returns by the means of transformations, making it abstract, like a new state of matter only found so far in mental emulations.

On top of that, the act of coding information adds another level of abstraction. The clock, mother nature of virtual existences, imprisons the meaning of the original model in its rhythm, a complex yet minimal structure of dancing zeroes and ones.

The binary language is not limited though. This versatile and modular sequencing system is able to provide rich expressions which explains why it became today's preferred support of information. Like a demiurgic intervention², this abstraction does not have a fixed form but always appears as an intermediary entity between the conceptual model and its multiple realities.

1 Binary Digit, binary number. It is the measuring unit of the quantity of digital information. This concept results directly from the work of Claude Shannon who in 1948 published "a Mathematical Theory of the Communication" in which he posed the first stones of the concepts of digitalisation.

2 A demiurge is the god-like entity that shaped the world from a perfect model to an imperfect reality either because it was made using flawed matter (platonian interpretation) or because the demiurge was imitating the supreme act of god creation (gnostic interpretation), hence downgrading the original model.

During the 19th Century, millennia after the clepsydra and the first reality shift³, the virtual addition to our environment and digitalisation of real-life pseudo models was reaching a key point. It would define our future relationship and interactions with data-processed matter.

Probably one of the first use of binary code by a machine, is the control system for the weaving of patterns in fabric inside Joseph-Marie Jacquard's mechanical loom⁴. This machine produced in 1801 was the first entirely automatic mechanical loom. The unit was controlled by a perforated card, also known as a punch-card. The presence or the absence of holes on the cardboard would directly lead the position of wires and then control the weaving according to the programmed pattern.

The transposition of a model towards another referential space is not accomplished using arbitrary rules. On the contrary, a strict set of correspondences needs to be elaborated to provide a working mapping of reality.

By changing the reference frame, one could think at first we would lose the sensitivity of the original model. But the direct results of such a transformation are the apparitions of a whole collection of anamorphic ghosts resulting from the constraints implied by the data mapping⁵. As a result our attention needs to be focused on a set of revealed characteristics of the studied model. During such a passage, one loses nuance, definition and resolution but because of the specific choice of representation, it is then possible to observe particular aspects of the analysed object.

Such a process does not reject the nature of the model but makes it possible by an effort of abstraction to release the essential forms, and to reach the heart of things.

Putting things together

An algorithm defines a set of rules that lead to the resolution of a problem. These rules can be represented by a succession of elementary symbolic operations that follow a logical sequence. A programming language is a set of syntactic and semantic rules which allow the description of the considered algorithm/problem into a human-readable context. This high-level human-friendly dialect is most of the time translated by a compiler into a lower-level language, such

3 The clepsydra is a water clock. It has been the first device used to measure time by letting water regularly flow out of a container. Invented around 3000 BC it represents the first shift of Humanity into an abstract environment that would rule human existence based on virtual information and not on natural references.

4 Thanks to Bouchon-Falcon early experiments with semi automatic loom systems.

5 Starting to appear in the 15th century paintings, an anamorphosis is an image that has been deformed by changing the perspective referential. Using the term anamorphic ghosts, we refer to the collection of entities copied from the original model and deformed by the change of referential occurring in the data-mapping.

as assembly language or machine code, which is more suitable to a machine that can carry out only a small number of instructions.

From the algorithm itself and the higher level abstractions, down to the machine code, there is a whole scale of creative opportunities which all offer their own definition of freedom. There is absolutely no steady state in these creative worlds, even though you are working with a limited set of rules, the artwork can be forever expanded by recombining its elements.

Digital, hard/software art are often seen as impersonal because of the analogy made with the technique involved and the very confusing relationship between the tool and the artwork. There is however a real sensitivity and emotion in this form of art. It requires to call upon a level of sensitivity which is different from the one that may be needed for the appreciation of a figurative creation.

Creating a data-processing work is a very personal act. It lives and evolves somewhere within the special relationship between the computer and the programmer. As a matter of fact it is much more than classes and instructions which are transmitted, it is also a part of the author, his thoughts, his algorithmic vision, his sensitivity to solve and eventually create new problems.

The resulting piece is yet another transposition of the authors conceptual model into a down sampled digital pattern.

In a traditional format, the creator moves and seeds his work, whereas in the digital world he/she is static and emits his/her creation. This work spreads like digital germs, and represents many pieces of its author. With those data-processed objects, an artist becomes a significant source of data proliferation. These assembled packets become languages of their own and agents of the emitting author. They are human extensions of the body in a virtual shift which takes place in the reality dissolution.

A data-processing artwork has a much larger aura than it seems. It delivers to the spectator the contamination seeds through its author's agents. It lives inside your private digital environment, infects your memory, cohabits with your personal data and definitively influences your audio-visual field. This attempt to develop independent autonomous creative processes and to abandon once and for all the interactive pseudo deterministic systems, is obviously something which is related to the contamination act, to the virus. This new process is the next step in the evolution of digital arts.

With the implementation of artificial neural networks, cellular automata, genetic algorithms and alike, the artist appears as a digital alchemist seeking the ultimate quine⁶ that will live as an independent data entity in a micro/macro/meta sea of living information.

⁶ Named after philosopher Willard Van Orman Quine, a quine is a program that can produce its source code when executed.

In that regard, Abraham Moles⁷ proposes three key points in order to establish the core of an autonomous artistic process:

- Anonymity, the creator becomes anonymous. Creation then loses the characteristics of its individualistic form to become a collective symbol.
- Redundancy, acting as its own feedback, the creation, even if it can generate different results, must remain confined in a non innovative process while creating constant revival of the permutations.
- Balance between the original algorithmic form and the injection of artistic emotions. Here we are reaching the limits of a machine that can only evaluate the structure of an object without being able to attribute a qualitative value to it, other than a simple statistical report⁸.

Although the redundancy question can be arguable or at least needs to be revised to take into account evolution options to escape from the original frame in which the autonomous creative process has been defined, the most delicate dilemma undoubtedly remains the balance.

While the artwork is built based on a conceptual design, the need to develop technical systems will rise throughout the process leading to a key stage. However, the insertion of such systems has a dramatic influence on the main creative process. The survival of the process depends then on the ability of the system to correctly dose the previous diagram influence at each stage of its regeneration.

Consequently, not only the artwork needs to act like an autopoietic⁹ machine, but its roots need to be fed by a substrate providing a complex enough environment¹⁰. In such a situation the artist is not replaced by the machine but moved to a position where he initiates and develops a digital chemistry where artistic processes can evolve on their own.

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7 Abraham Moles "Art and Computer" 1971.

8 For example, a working system is a system that works, disregarding the fact it is working well or not.

9 "An autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components that produces the components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in the space in which they (the components) exist by specifying the topological domain of its realization as such a network." Humberto Maturana and Francisco Varela, *Autopoiesis and Cognition*, 1972

10 With complex environment, we mean a Langton balance operating between periodic and chaotic behaviours, as defined in cellular automata systems.