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Creativity, Co-evolution and Co-production: The Machine as Art and as Artist

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Abstract

With the understanding that art and technology continue to experience a (rapidly escalating) historical rapprochement, but also with the understanding that our comprehension of art and technology has tended to be constrained by scientific rigour and calculative thinking by one side, or has tended to change to the extreme from the lyrical: the objective of this article is to provide a reflective look for artists, humanists, scientists, and engineers to consider these developments from the broader perspective they deserve, while maintaining a focus on what should be the emerging core of this topic; the relationship between art, technology, and science. The state of the art in mechatronics and computing today is such that we can now begin to speak comfortably of the machine as artists, and we can begin to hope, too, that an aesthetic sensibility on the part of the machine might help generate an intelligent, more friendly, and responsive machine agency overall. The principle of the inhuman emphasises that the questions of ontology are not questions of being as subject, of being as consciousness, of being as Dasein, of being as body, of being as language, of being as human, or of being as power, but of being as being. Finally, the ontological principle hypothesizes that all beings are ontologically on an equal footing or that all are to the extent that they make a difference. However, until now not much has been said about “algorithmic entities”. From the above, it is clear that there are still many unanswered questions, for example: How to raise the question of techno-diversity when intellectuals yearn for a general artificial intelligence? We must go back to history to orient ourselves in our current situation with a sense of distance. Will it be possible to find strategies to free ourselves from this apocalyptic end of technological singularity and reopen the question of the creative future in machines in relation to humans?

Keywords
Individuation, organology, art, creativity, machine

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1. Machinic Individuation

This article proposes a processual, neomaterialist, and relational vision of technical objects, understanding us as assemblages of dynamic relations that entangle the psychic, social, natural, and cultural creative process with machines. It proposes a perspective of technology beyond the culture/nature distinction and creativity beyond the expression that assumes a supposed human interiority. For this purpose, the following relevant theoretical frameworks were used: the relational techno-aesthetic perspectives of Gilbert Simondon and Bernard Stiegler.

If we delve into the history of media arts in the last 30 years, numerous artists have developed works with "algorithmic" and "reactive" components. That is to say, the display-operation of the work at any time depends on the activities of the viewers. Several of the works described in recent times cross over artificial life and genetic algorithms: they incorporate similar structures, for example *Máquina Cóndor* (2006, in process)[1] by Chilean artist Demian Schopf[2] or *Crisálida* (2002)[3] by the Bolivian multimedia artist Aruma (pseudonym of Sandra de Berduccy).[4] Several others are described in this type of work that allow visitors to influence or make judgments that shape what the next visitors will see. On the other hand, rather than being object-oriented, the interdisciplinarity of these kinds of works can be practice-oriented in the sense that where a disciplinary division of labour persists, cross-disciplinary collaboration is idealised as a value in itself, and one that outweighs any particular art project. Nowadays, commentaries on art-technology, for

1 The machine generates online text based on : a) Real-time searches in 12 newspapers for 333 keywords related to war and economy, b) Online consultation and analysis of the buying and selling values of currencies of former African colonies, of the Middle East, of the countries where Operation Condor took place, and of natural resources important for the Chilean economy, and c) intercalation of 9 words—coming from the lexicon of surgery, anatomy, and forensic medicine—in the first stanza of a "memento mori" by Luis de Góngora. The arrangement of these 9 words depends on the searches and economic analysis set out in A and B.

2 Demian Schopf is a Chilean visual artist, essayist and university professor, who in 2007 won the Altazor Award for his work *Máquina Cóndor* (2006, in process).

3 *Crisálida* (2002) is part of a research and creation project of the author inside the inter-Andean valleys of Bolivia, investigating traditional textile techniques from the Andes and experimenting with circuits, conductive threads, fibre optics, and LEDs. Crisálida is an interactive installation, made with fibre optics and jute. By placing her finger on a sensor, the visitor is surrounded by the light emitted from her own heart rate in *Crisálida*, integrating with the machine's logic from a rhythmic connection. In the rhythm of the pulsation, we are transported inside the technical object and coincide with it in time. The breathing in my chest superimposes the pulsation of *Crisálida* without homogenising; we are in a rhythm, still without a fixed image, without predetermined content, in which we make the effort to remain in continuity with a logic of organic/inorganic coordination.

4 Aruma carries out research and epistemic revitalization work, producing works that recover the modes of production of Andean textiles from practices embedded in their communities, to highlight the aesthetic and thought logic involved in the expressive modes of the weavers. Using the backstrap loom technique and weaving since the age of 12, Aruma is interested in video, programming, and performance, generating crossovers between these practices.

example, sometimes portray the microsocial collaborative endeavour between artists and machines as a crucible for creativity and as itself a focal value.

The emergence of cybernetics in the 1940s and 1950s coincided with a period of political and social upheaval in many countries, which led artists and intellectuals to explore new forms of expression and critique. For example, Latin American artists, such as Juan Downey in the 70s, Rafael Lozano-Hemmer in the 90s, and Gilberto Esparza in the 2000s, have also explored cybernetic concepts in their work, using technology and media to create new forms of expression and critique. Many of these artists have drawn on the political and social context of Latin America to create artworks that address issues such as censorship, surveillance, and authoritarianism.

In sum, cybernetic concepts have played a significant role in the development of art since the mid-20th century, inspiring artists to create new forms of expression that are aligned with the dynamic and complex nature of modern life. These artworks often incorporate technology and interactive elements, seeking to create new forms of social interaction and consciousness that are responsive to the principles of cybernetics.

These kinds of systems can have different scales, from a local network to a planetary system such as the terrestrial technosphere. Now we want to ask what might be the implications of this redefinition of (the relationship between) machine and ecology. Applying such questions in this field can contribute to the redefinition of the relationship between machine and ecology: Is the matter also the message in this exchange? How does the agency condition of graspable materialities come together with the immaterial nature of the digital or electronic signal? Are the capacities of our bodies the object or the subject of the action? With the help of our newly acquired knowledge of life processes at the technological level, from ecologies to molecular biology, we can exercise an increasing degree of control over the manipulation of living biological systems, as the technosphere ("man-made") and the biosphere ("nature") which are increasingly indistinguishable. The ability to cut and paste genes from different organisms, the prospect of engineering artificial genes, and the possibility of coercing functional living tissue (outside an organism) to grow and behave according to human-determined plans are just a few examples of this merger. Artists are now exploring the new knowledge and tools offered by modern biology to manipulate and create living and semi-living works of art. A striking example of this approach, recently introduced into the South African context, are the biological 'collaborations' by the artist Leora Farber working with bacteria and yeast to create biofibers- resembling human skin, which are then used to produce casts critiquing colonial histories[5].

5 Leora Farber, "The Scientific Lab as Studio/The Studio as Scientific Lab," in *Proceedings of the 2nd Arts Research African Conference*, 14–16 September, 2022, https://doi.org/10.54223/10539/35903.

When we consider machines as art and as artists, it is important to recognize that they are not simply tools or instruments, but active participants in the creative process. By using machines to generate creative outputs, artists are opening up new possibilities for exploration and expression, and creating a new form of co-evolution and co-production between humans and machines. The concept of technological singularity,[6] in which artificial intelligence reaches a point of self-improvement and surpasses human intelligence, has been a topic of concern for many researchers and thinkers in the field of artificial intelligence.

The criticisms proposed in this article are a response to how artificial agents (machines, algorithms) manifest themselves in an irreducible way through engagement with nature, forming open dynamic systems, from an individuation perspective.[7] This perspective is added to Stiegler's notion of *organology*[8] as a condition of human and technological constitution. To address this relationship, this article traces the art-machine-nature relationship, considering the work *Qatipana*[9] in its processes of ontogenesis[10] and epiphylogenesis in this becoming.[11] In this spirit, by addressing the notion of *hybrid ecology,* this article hopes to provide a philosophical foundation for a new understanding of natural and artificial creativity based on a notion of relational individuation that encompasses both human and non-human creativity. Through concepts of cultural techniques (scriptural, figurative, and computational), integrated with a self-representative potential, this article will attempt to show how these material relations contribute to generating a more substantial vision on some of the fundamental questions between natural and artificial systems.

Creativity, coevolution, and co-production are all important concepts in the realm of art being produced today, particularly when considering the role of machines as both art

6 Matthew O'Lemmon, "The Technological Singularity as the Emergence of a Collective Consciousness: An Anthropological Perspective," *Bulletin of Science, Technology and Society* 40, no. 1-2 (2020), 16. It is important to note that the idea of technological singularity remains highly speculative and controversial. While there are rapid advancements in AI and other technologies, the timeline and nature of a potential singularity are far from certain. As a result, discussions about the singularity often involve a wide range of viewpoints, from enthusiastic proponents to cautious sceptics.

7 Brian Massumi, "Technical Mentality Revisited: Brian Massumi on Gilbert Simondon," *Parrhesia* 7 (2009), 37.

8 Bernard Stiegler, "Elements for a General Organology," *Derrida Today* 13, no. 1 (2020): 72–94.

9 See https://qatipana.org/

10 Gilbert Simondon, "The Position of the Problem of Ontogenesis," trans. Gregory Flanders, *Parrhesia* 7 (2009), 6.

11 Bernard Stiegler, *La Técnica y el Tiempo I: El Pecado de Epimeteo*, trans. B. Morales Bastos (Argitaletxe Hiru, 2002), 135.

objects and artists.[12] Creativity is the ability to generate novel ideas or solutions, often through a process of imagination and exploration. This ability is not exclusive to humans, as machines can also be programmed to generate creative outputs, such as music, art, or writing. In fact, some argue that machines can even surpass human creativity,[13] as machines are capable of generating an almost infinite number of possibilities and combinations. Strictly speaking, a technical object is never out of date, since it can be actualized by a human being. This actualization involves more than mere usage. Technical objects can be used for other purposes than intended. This abuse of the object would reduce it to mere means without understanding the inner logic of it. An ethical attitude towards techniques is interested in the praxis of machines and attempts to accompany its genesis via analogy. On the other hand, co-evolution refers to the way in which two or more entities influence each other's development over time. In the context of art and machines, this can refer to the way in which artists and machines collaborate to create something new and unique. For example, an artist may use machine learning algorithms to generate novel ideas or forms, and then use their particular creative skills to shape those outputs into a final product. In another stage, co-production refers to the process of collaborative creation, where two or more entities work together to produce a single output. In the context of art and machines, this can refer to the way in which artists and machines work together to produce a final work of art. For example, a machine may generate a piece of music, and an artist may use that music as inspiration for a visual art piece, resulting in a co-produced work of art.[14]

12 For example, A3 K3, by Dragan Ilic (2017), is an interactive play experience created with machine technology and audience participation. Ilic uses an elaborate Brain Computer Interface (BCI) system, in which he controls a high-tech robot with his brain, through reader technology. The artist and the public draw and paint with the help of the robot on a vertical and horizontal canvas. The robotic arm is equipped with DI drawing devices that grasps, holds and manipulates various art media. Ilic thus provides a context in which people can improve and increase their art-making skills. Another example is the Neurotransmitter 3000, by Daniel de Bruin (2016), is a seven-meter-high construction that is controlled by biometric data. The author states that he wanted to change the usual one-sided relationship: a situation in which the body is overwhelmed by physical impressions, but the machine itself remains indifferent, unattended to what the body is going through. Therefore, Neurotransmitter 3000 should be more intimate, more reciprocal. Using sensors attached to the passenger's body that measure their heart rate, muscle tension, body temperature and orientation and gravity, the data is translated into variations in movement. And so, humans and machines intensify their bond. They meet again in a shared in-between space, where human responsiveness becomes the input for a bionic conversation.

13 J. Augustus Bacigalupi, "Creativity: Transcending the Cybernetic Mode via the Virtuality of Relevant Noise," Angelaki 28, no. 3 (2023), 86.

14 For example we have the works of Taryn Southern, a musician and content creator, who collaborated with AI to compose her album "I AM AI." The album includes songs where AI played a significant role in the creative process and DuettoBot, a collaborative AI project between musician Benoît Carré and AI researcher François Pachet, creates AI-generated music that can be played alongside a live musician.

Let's start this analysis by observing normative dichotomies (body/extension, real/prosthetic, mind/body, material/immaterial), which over time become indefinable. The focus of attention can travel from one result to another: from separation to relatedness, from integrity to hybridity. On the one hand, it is possible to provide specific phenomenological and physiological explanations for the informational kinaesthetic automaticity experience.[15] On the other hand, the immaterial, relational and performative nature of these experiences—the way in which they arise through human practices affordances/performances in threshold conditions and resort to subjective forms of psychic turning—overcome any phenomenological and physiological explanations. This type of analysis requires an understanding of body-technology relationships as personal, mutable, contextualised, and technically specified. Fundamentally, these types of relationships are explainable only through their performance. When performing the tension between the body and the machine, human and non-human from the organological individuation perspective established by Simondon and Stiegler, one can observe ways of inhabiting alternative forms of incarnation.

This distinction is mainly heuristic, that is, tentative and pragmatic, and the purpose of separating mediation from media will be to clarify the relationship between them. This ontological definition allows us to propose a genealogy of the machine as a processual and creative medium, which understands it in its material infrastructure and as a vector of communication,[16] through analysing the process of cybernetization and the expanded concepts of art from the 1960s. For example, one of the key Latin American figures in the development of cybernetic art was the Argentine artist Gyula Kosice, who founded the Madi movement in the 1940s. The Madi movement sought to create a new language of art that responded cybernetically to nature as well as to the fluid dynamics of modern life, drawing inspiration from cybernetic concepts such as feedback, information and interaction. Often incorporating technology and interactive logic, Kosice's artworks sought to create new expressive modes of spatiotemporal experience that drew from the principles of cybernetics. Another important figure in the development of cybernetic art in Latin America was the Brazilian artist Hélio Oiticica, associated with the Neo-concrete movement in the 1950s and 1960s. Oiticica's artworks, which included immersive installations, participatory events, and multimedia experiments, were inspired by the

15 About this phenomenon Jaana Parviainen tells us: "Precisely in the way we intuitively knew as infants on the basis of our tactile-kinesthetic experiences, and knew without the aid of scare quotes, of qualitative happenings and vitality affects. Such knowing is a manner or perhaps better, a style—of cognition that may be difficult for some adults to acknowledge since it is nonlinguistic and nonpropositional and, just as significantly, has no solid object on which it fastens" (Jaana Parviainen, "Bodily Knowledge: Epistemological Reflections on Dance," *Dance Research Journal* 34, no. 1 (2002): 14).

16 See the analysis by Yuk Hui, "Modulation after Control," *New Formations: A Journal of Culture/Theory/Politics* 84–85 (2015)

cybernetic concepts of feedback, communication, and self-organisation. Oiticica thought of his artistic production as a proposal to create new forms of social interaction and consciousness under the principles of cybernetics.

In this context, it is important to talk about *hybrid ecologies,*[17] hybrid from a symbiotic sense between the biological (organic individuals), the historical (culture) and the technological (artificial agents), and 'ecological' from an *organological* sense. From the latter, the term tries to reveal that we are at the dawn of what Stiegler describes as a new organological era (Stiegler, 2018). One of the key epistemological questions that Stiegler's *general organology* raises is the relationship between the organic and the inorganic and the necessity to consider the hegemony of a modern scientific thought that is at the root of the deep crisis of epistemological, ecological, and technological diversity that we face. Yuk Hui points out in this regard:

> Scientific thought wants to improve the capacity of the senses, while philosophical thought wants to develop other senses. It is in art where both can come together. Therefore, the relationship between art and technology is not yet determined.[18]

In recognition of that which is "not yet determined," this notion of *hybrid ecology* is based on a deep and sustained commitment to art, the biological, physical and computational sciences, which operate in conjunction with anthropological, philosophical and artistic modes of investigation. In some aspects this essay is related to the question made by Yuk Hui: What happens if we don't just ask ourselves how technology transforms the concept of art, but try to do the opposite and ask ourselves how art can transform technology?[19] By establishing this question as a turning point, we are able to see if it will allow us to look at a new field of possibilities and to return to address the relationship between art, technology, and nature. This question suggests that it is time to go beyond the prevailing techniques of computing and its complexity to accommodate the open and living processes of the world.

One of the key epistemological questions that this research raises is the relationship

17 The term hybrid ecology is appealed to in order to shed new light on the condition of philosophising in view of the "organic evolution" of digital machines on a planetary scale, which today would be equivalent to a "general ecology" as is proposed by Erich Hörl in Erich Hörl and James A. Burton, *General Ecology: The New Ecological Paradigm* (London: Bloomsbury Academic, 2017).

18 Yuk Hui, *Art and Cosmotechnics* (Minneapolis: University of Minnesota Press, 2021), 62, https://doi.org/10.5749/j.ctv1qgnq42.

19 Yuk Hui, *Art and Cosmotechnics,* 222.

between the organic and the organological.[20] On the other hand, we have the hegemony of modern scientific thought that leads us to a deep crisis in epistemological, ecological, and technological diversity, relegating practices that are far from what is understood as rational under this epistemic approach. First of all, we observe Gilbert Simondon's thought in these operational relations between the living and the technological. In the first instance, Simondon raises the possibility of a psychic-collective individuation through information; in that it is produced, as manifested when dealing with the structure of his main thesis, within biological individuation, Simondon shows how information can be used and transformed into energy for the constitution of a biological reality and a psychic reality. We can assume, therefore, that the question of language as a defining and differentiating instance of the human and the social does not interest him; at this point, he allows us to observe the processes and operational relationships in the media arts from an "informational transduction" of the téchnē-lógos-cosmos as an organological process of knowledge[21]. At the same time, Stiegler's concept of *organology* is relevant at this point, in terms of the limits that representation can entail for the conformation and expression of psychic reality—the theme of this linguistic turn—which for the purposes of this project is something that we take as a matter of study within the creative processes involved with artificial agents:

> Intelligence, here, whether in its "natural" or "artificial" forms, but I prefer to say in its organic or organological forms, is the achievement of a goal or an objective. There is no need for this goal to be a conscious representation, as Francisco Varela shows in a drawing in which he ridicules this type of "representational" hypothesis. However, what is involved with noetic intelligence is, in principle, access to consciousness, to the extent that it has the ability to access what Heidegger called *the how*: Heidegger is himself someone who deconstructs the metaphysics of the representation.[22]

20 Bernard Stiegler, "General Ecology, Economy, and Organology," in *General Ecology: The New Ecological Paradigm*, ed. Erich Hörl and James Burton, trans. Daniel Ross (Bloomsbury Publishing, 2017), 133. The fundamentals of a *general organology*, that is, a theory of the articulation of bodily, artificial, and social organs, is set forth in Stiegler. In addition to primary memory as the genetic information expressed in DNA and secondary memory acquired epigenetically through a complex nervous system, there is also tertiary memory, which Stiegler names *epiphylogenetic*. In this sense, for Stiegler organology refers specifically to the formation of organizational techniques, including writing, art, clothing, tools, and machines.

21 Simondon, "The Position of the Problem of Ontogenesis," 11.

22 Bernard Stiegler, "Artificial Stupidity and Artificial Intelligence in the Anthropocene," speech given on November 23, 2018, Institute of Ereignis, Shanghai, trans. Daniel Ross, 1, accessed July 14, 2024, https://www.academia.edu/37849763/Bernard_Stiegler_Artificial_Stupidity_and_Artificial_Intelligence_in_the_Anthropocene_2018

Secondly, this article seeks to open a question about the ways in which science has observed—and intervened—into the living. How do information and visualisation technologies shape these hybrid relationships between humans and non-humans that take place in scientific inquiry? Shaping not only the images, but also the visualisation and ordering instruments themselves, such as microscopes, botanical atlases, museums, and photographs, to demonstrate that the natural sciences have developed hand in hand with a primacy of vision, which created the forms of linkage with the living as an object of study. In this long genealogy of naturalistic visual knowledge, epistemological changes modified the relationships between the techno-scientific and the living. Since the mid-twentieth century, the rise of cybernetics and biotechnology have evidenced a shift towards design: in the life sciences it is no longer a question of investigating how natural processes work, but rather how one can act with these elements in a different way. In parallel, the ecological collapse—what scientists and intellectuals agree to call the Anthropocene—accounts for a paradigm shift, where the modern categories of "culture" and "nature" collapse, and confronts us with questions about the interspecies networks that shape our planet. Within the limits of this process of analysis of the creation of works with artificial agents, we critically reflect on these issues of science and the living by criticising the use of visualisation and design technologies used in the field of life sciences, revealing and reflecting on these processes (and other works that address similar issues), which involve the manipulation of the living, either through scientific procedures with techniques from other times or currently in force.

On the other hand, for Simondon, the revolt of minority groups against technology in the name of culture misinterprets the role of the technological, since he sees a rationality in technology that transcends the limits of cultural difference. More importantly, Simondon is hopeful that the deepening and increasing awareness of technology provides us with new perspectives for resolving the problem of alienation and antagonism between culture and technology. However, the issue is much more complicated than Simondon's optimism admits. In this process of both colonisation and modernisation, technological differences also maintain and reinforce power differences. In this context, addressing this issue from Simondon's perspective of individuation shows us that the relationship between nature and technology has a moral root that has been uprooted by planetary industrialisation. From there, the possibility of a renewed relationship between art, technology, and nature will be considered.[23]

Additionally, the audiovisual production industry generates various types of contamination,

23 Observing the discipline of art as the possibility of offering diversity in this relationship, proposing and reconstituting emerging modes of integration between a machine and a living being, under the focus of a technodiversity or a purposeful cosmotechnical reality. Yuk Hui, *Art and Cosmotechnics,* 211.

whether it is the accumulation of materials forcibly removed to access the minerals, or the materials left over from the chemical processes used for its processing, or the toxic residues drained by the accumulation of materials and technological devices beyond the useful life programmed for them, conforming their own medial geology.[24] Taking into account these concepts of individuation, organology, and hybrid ecologies, it becomes plausible to observe and analyse the current technological milestones from a reconsideration of the current state of our culture in relation to nature and technology: what defines nature and technology as an immanent, extensive, and unique prosthesis of the human being.

As a result of these observations on the development of works operating with artificial agents, we can observe that the relationship of the human being with technology should not be seen in terms of slavery.[25] Even though Flusser raises serious doubts about the humanist notion of agency, he also recognizes that machinic entanglement facilitates new kinds of action, which he sees as collaborations. Flusser even goes so far as to suggest that "this is a new type of function in which human beings are neither the constant nor the variable, but in which human beings and apparatus merge into one unit."[26] Flusser is writing about photographers, evoking the camera as a fivefold essential modern device (positioning, looking through the lens, pressing the shutter, taking the photo, developing) that takes human labour beyond the sphere of mere work, towards which we could call playful co-creation. But it could be said that his argument extends to other forms of human creativity. Flusser understands the creative activity of the photographer as an execution of the machine's program, which involves making a selection from the range of options determined by the machine's algorithm. We could suggest that this algorithmic relationship on which humans depend is not only updated in post-industrial society, but that it has been fundamental for the constitution of society and of the human as a technical being. This algorithmic relationship traces a fundamental relation to previous human relationships with technical objects such as fire, sticks, and stones.[27] The daily functioning of human beings also depends on the execution of a program: a sequence of possibilities enabled by various couplings of adenine, cytosine, guanine, and thymine, that is, DNA. As we have argued above, this proposition related to creativity and AI, should

24 Jussi Parikka, N. Katherine Hayles, Peter Krapp, Rita Raley, and Samuel Weber, eds., *A Geology of Media* (Minneapolis: University of Minnesota Press, 2015), 98. The violent transformation imposed on the trajectory of minerals, since their introduction into devices and human technological cycles, can be analysed from the perspective proposed by Parikka, for the development of a new materialism based on media theory and in view of its own geology. One that "can be seen as the intensive excavation of where (and when) the materiality of the media really is", from a perspective that collapses the deep time of its geological formation, the immediacy of its use and obsolescence, its integration into information technologies, and information and its future permanence as waste.

25 Cf. Gilbert Simondon, *Du Mode d'Existence des Objets Techniques* (Paris: Aubier, 2012).

26 Vilém Flusser, *El Universo de las Imágenes Técnicas: Elogio de la Superficialidad* (Buenos Aires: Caja Negra, 2015), 27.

27 Stiegler, *La Técnica y el Tiempo I,* 7.

not be taken as a postulation of a meaningless technological or biological determinism, which would remove from humans any possibility of action as artists, critics or spectators, and any responsibility for the actions we carry out. On the contrary, accepting our affinity with other living beings across the evolutionary spectrum and recognizing that our human lives are subject to biochemical reactions that we do not fully control undermines the humanist parameters of the debate on creativity, art, and artificial intelligence.[28]

2. Techno-organology in *Qatipana*

We can start by mentioning that a system can be defined in multiple ways, one of its oldest meanings being that which determines it as an ordered set of reasoning that explains certain phenomena. This is how Condillac defined the concept of system as early as the 18th century in his *Treatise on Systems*: "a system is nothing more than the arrangement of different parts of an art or science in an order where they all support each other, and where the latter are explained by the former. Those that explain the others are called *Principles*; and the system is all the more perfect, if the principles are few."[29]
With the emergence of cybernetics and the invention of "thinking machines"[30], the concept of system mutates to account for different modes of information exchange where living organisms or computational systems have the same information structure. But this second meaning of the concept of system does not annul the first given by Condillac; on the contrary, cybernetics considers the concept of system as a way of explaining phenomena that make the difference between the living, the organic, and the machinic less significant. In this way, everything can be understood from the point of view of a system made up of an input through which the information enters, through a mediating stage that analyses and processes the information, and the output that generates a response[31].

This aspect and attribute of "autoregulation" in a technical system was already reflected in Simondon´s *On the Mode of Existence of Technical Objects* and that is why Bellert—when trying to define the concept of the cybernetic system in the *Cahiers de Royaumont*

28 On this aspect we can take the notion of epiphylogenesis coined under Stiegler's anthropo-technical theorization, on the co-evolution of brains and tools, he invites us to think about a space of deanthropologization to account for a new relationship that must be defined between individuals and machines that foregrounds and emphasizes that there has never been anything called "the human." For him there are only processes of differentiation that historically make humans who they are, and do so in different ways, or the quasi-causality of becoming human, which operates through progressively differentiating environments and techniques.

29 E. Bonnot de Condillac, *Traité des Systèmes* (Paris: Ch. Houel, 1798), 8.

30 Norbert Wiener, "L'homme et la Machine," in *Le Concept d'Information dans la Science Contemporaine*, ed. Martial Guéroult (Paris: Paris: Gauthier-Villars; Les Éditions de Minuit, 1965), 110.

31 Ludwig von Bertalanffy, *General System Theory: Foundations, Development, Applications* (New York: Braziller, 1968), 17.

(1965) dedicated to the concept of information a colloquium where Wiener and Simondon, among others, were present—points out that the great merit of cybernetics is that "this science makes possible an analysis, based on common principles, of various apparently different issues, such as bio-organisms and techno-organisms."[32]

What happens then when an artwork demands to be understood as the interaction between a natural system and a machine? A starting point is through the analysis of the various elements that make up the system, in order to determine their characteristics and their role within it. *Qatipana* consists of three fundamental elements that constitute what we can call its techno-organism if we adopt Bellert's formula: i) a surveillance camera located in the observatory of a natural phenomenon (in this case, an ecosystem under observation), which transmits live through the web (input), ii) a perceptron that processes the information that the camera transmits, and iii) a real-time data visualisation generated by the interaction between the information collected by the camera and the perceptron that feeds on the said information (output).

In this sense, *Qatipana* offers ways to rethink the relationship between technology, human beings and nature in the contemporary world. *Qatipana* is thus an artificial intelligence platform that is fed information in real time from a camera installed in the Peruvian jungle. By recognizing patterns in these images, *Qatipana* produces an abstract three-dimensional form that is nothing more than an accumulation of algorithmic processes,[33] machinic information, and visual patterns that originate in nature. The human being as a spectator, then, is called here to recognize (himself) or be surprised (himself) in front of that abstraction. This work is problematized mainly through Simondon's notions of individuation and Stiegler's organology. The latter seems especially important, since it allows us to glimpse other non-human biological times that still inhabit the Peruvian jungle and recognizes a ontological flow in nature, and informs the evolution of *Qatipana*—which in Quechua means continuous movement.

32 Stanisław Bellert, "La Formalisation de la Notion du Système Cybernétique," in *Le Concept d'Information dans la Science Contemporaine* (Éditions de Minuit, 1965), 403.

33 The algorithm in *Qatipana* is made up of 1500 perceptrons. These perceptrons are trained to trigger information in dark areas (areas where light does not reach and the image cannot be defined), this allows providing a non-representational meaning to the learning of the work and with this, we provide a sense of other mediations and learning from the usual use of machine learning (entropy information metadata).

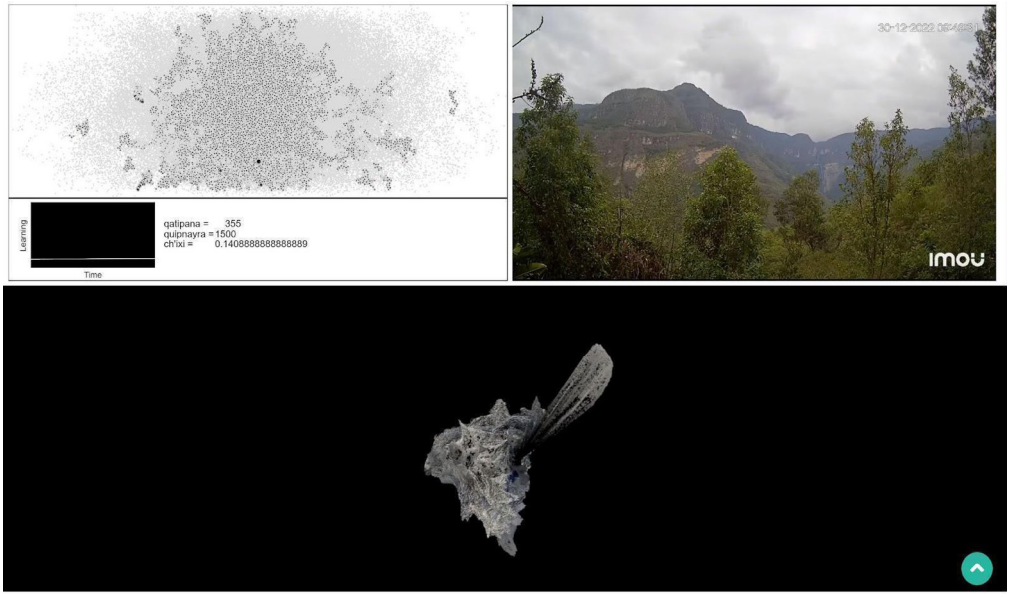

Fig. 1: The system Qatipana, the work is designed to be projected on 3 screens where the 3 ecological conditions are observed (organic, organic/inorganic, and culturally calculable)

As we show in figure 1, the ecosystem is observed through a surveillance camera. A surveillance camera, unlike old recording cameras, can make a live transmission through a video signal that is currently digital. Normally, this surveillance camera is located in a fixed place so its movement is limited: left-right-up-down, and although it does not require an operator, the remote system can intervene if necessary to execute these movements. A camera of this type can also have a zoom that approaches an object that requires better visibility, a zoom that in certain cameras can be equipped with a facial or movement recognition system.

The surveillance camera—*Qatipana*'s input—is an active entity that captures light information from the natural landscape in front of the lens. This capture of information works as a flow that enters the system permanently as it is transmitted live on the web. The characteristic of a surveillance camera is that it generates "the possibility of obtaining a vision without looking, where the video camera is controlled by a computer, the latter assuming for the machine, and not for any viewer, the ability to analyse the environment, the automatic interpretation of the meaning of events."[34] This situation described by Paul Virilio is precisely what happens in *Qatipana*, that is, the camera directs its mechanical

34 Paul Virilio, *La Machine de Vision* (Paris: Galilée, 1988), 125.

eye at an ecosystem, but this mechanical eye does not actually have the gaze provided by a human spectator who interprets and processes said information, since it is the perceptron that is in charge of processing the data that the surveillance camera transmits.

What *Qatipana* brings into play in this part of the system is a questioning of the traditional concept of creativity[35] that is always associated with a thinking human subject, also the artwork revolves around the concepts and processes of becoming and individuation through a hybrid system of information flow which, even though not the kind of dispositive systems theory was designed to read, offers some valuable empirical insights to test some key aspects of Simondon's information processing systems; this artwork aims to observe an algorithmic cycle performed by the cognitive system of an AI agent observing a living ecosystem. We are talking about coordinating and adopting the gaze to the devices, a process that began with the invention of the first visual prostheses such as the telescope or the microscope that allowed the limitations of the human eye to be overcome by expanding its visual field. With the invention of photography and cinema, it also becomes possible to generate an external memory of what is seen by these mechanical eyes.

This distinction is important because it is what allows us to attend to our own pharmacological situation[36], from which we have been evolving together with the technical-aesthetic devices (interfaces). Similarly, the acceleration also produced by digital information contributes to the externalization of the user's cognitive apparatus, precisely because it exceeds the limits of their cognition. If we add to this the amplification capacity of the informational content of algorithms (and its transformative potential), the scenario becomes even more conflictive. Information and its dissemination is so wide and diverse that a cognitive capacity such as that of the human being cannot fully synthesize it, generating an active externalism, assuming that the human organism is linked to an external entity in a bidirectional interaction, thus creating a coupled system that can be seen "as a cognitive system in its own right"[37] in its psychic apparatus, which we call an agency of organic-technical-digital assemblages.

35 Trevor Paglen, "Invisible Images: Your Pictures Are Looking at You," *Architectural Design* 89 (2019): 22–27, https://doi.org/10.1002/ad.2383. Incorporating this article with Stiegler's notion of organology to account for the new relationships that must be defined between individuals and algorithms, where classic concepts such as human creativity must be reviewed. Currently the creation of images is not limited to human visualization, because as code they can be processed by algorithms which do not need to "see."

36 Bernard Stiegler, *Taking Care of Youth and the Generations*, trans. Stephen Barker (Stanford, CA: Stanford University Press, 2010), 72.

37 Andy Clark and David Chalmers, "The Extended Mind," *Analysis* 58, no. 1 (1998), 8.

In *Qatipana*, not only is the ability to see through a mechanical eye of a camera what is at stake, but also the processing or analysis of what is seen nowadays.[38] This processing is carried out through a perceptron and not from a human subject that contributes their point of view, calling into question an entire perspectivist regime that sustains the eye as the centre from which the world is thought and analysed. Therefore, it is the entire perceptive process that is technologized or delegated to devices, which accounts for the profound transformations that technology brings and that forces us to redefine the traditional concepts of seeing or looking.

In this sense, this artwork advocates a shift from thinking of new media as a set of discrete objects to understanding media, old and new, in terms of the interconnected and dynamic processes of mediation.[39] It also describes what is at stake in this shift from thinking of technological media solely as things within our grasp and also to acknowledging our entanglement with these media on both a sociocultural and biological level.[40] This argument will lead us to ask the following question: if the media cannot be completely externalised from the issues or "users", then how could "we" engage with "them" differently? We must also consider the political and ethical implications of such commitments.[41]

38 Jean-Louis Déotte, "Le Milieu des Appareils," *Appareil* 1 (2008), 3. We can elucidate that these changes of seeing arise with the invention of perspective in the Renaissance, it inaugurates an era that we will call focalization, that is, space begins to be constructed and thought from an observer, or more precisely from the eye of the observer. The eye thus acquires a fundamental role, because from there, that is, from a certain point of view in the space and consequently the image is constructed. But perspective is not limited to the perceptive apparatus, but later other projective apparatuses emerged such as the photographic or cinematographic apparatus that will configure various periods of the gaze. All of these should be considered projective devices in the sense that a space and an image are projected from a point of view that constructs or builds the world.

39 On this point, Malabou is right to point out that contemporary digital machines are no longer mechanisms like those of the 18th century; they are recursive machines that employ non-linear causality to arrive at their *telos*. It is in that sense that they behave like organisms. See Catherine Malabou, *Morphing Intelligence: From IQ Measurement to Artificial Brains*, trans. Carolyn Shread (New York: Columbia University Press, 2019), 90.

40 An artifact's line of development appears to reveal the implications of a preexisting essence that unfolds with each improvement in its technical basis. Paths of development can be traced resembling the evolutionary progress of biological species. But in fact changes respond not just to objective conditions but to the purposes of the dominant actors. Designs are complicated by the multiplicity of interests they serve. The interventions of influential actors intersect and interact with unpredictable consequences. The result may block some familiar affordances and bring out others that lie undetected until new contexts support them or new actors discover them.

41 In this way, technology can be integrated with nature and human nature. The struggles for environmental technology, free expression on the Internet and humane, democratic and safe work are not extrinsic impositions of a purely technical essence, but rather respond to the tendency of technical development to innovate synergisms of natural, human and technical dimensions. Revealing the potentials waiting to be realized.

This dematerialization of the machine was already identified by Pontus Hultén, who actually speaks, in the title of his 1968 exhibition, of the "end of the mechanical age." This tension is highlighted very early in the introductory text to the exhibition: the mechanical age is fully experiencing its culminating phase but it is already seeing the symptoms of its near end, this on the threshold of the 1970s, and what will it see confirmed, such as this phenomenon of importance of mechanics is progressively eroded by advances in electronics, electromechanics, chemistry, biotechnology, and, in particular, software. For the theorist Jack Burnham, this exhibition by Pontus Hultén drew a demarcation line between "earlier 'machine art' and what might be defined as 'information systems and technology'."[42]

On the other hand, the idea of a general artificial intelligence (GAI), which would be capable of performing any intellectual task that a human being can, has long been a topic of fascination for many intellectuals and researchers in the field of machine learning. However, the pursuit of a GAI raises important questions about creativity and the potential consequences of homogenising our technological landscape. To raise the question of creativity in this context, one approach could be to start by acknowledging the potential benefits of a general AI, such as increased efficiency and productivity, improved decision-making, and new opportunities for innovation. However, it is important to recognize that a single, dominant form of AI could also have negative consequences, such as exacerbating existing inequalities and reducing the diversity of perspectives and approaches to problem-solving.

Observing this GAI phenomenon under the auratic condition of graspable materials refers to the sensory and affective qualities of physical objects that are experienced through touch, sight, sound, and other senses. These qualities, such as texture, weight, colour, and temperature, are often associated with a sense of uniqueness, authenticity, and presence, which are collectively referred to as the "agency" of an object. In the same way, the immaterial nature of the digital or electronic signal refers to the fact that digital information, such as binary code or electromagnetic waves, is not directly perceptible through our senses but must be translated into a visible or audible form through a computer or other digital device.

When these two different modes of experience are brought together in digital media,

42 Jack Burnham, "Art and Technology: The Panacea That Failed," in *The Myths of Information*, ed. Kathleen Woodward (Madison: Coda Press, 1980), 203–204. Burnham distinguishes between "the earlier 'machine art' and what might be defined as 'information technology and systems,'" then goes on to elaborate: "The latter includes artists' use of computers and display systems online, laser and plasma technology, environments controlled by light and audio sensors, all levels of video technology, colour copy duplication systems, strobe-light programmed and projected environments using sophisticated consoles, and artificially controlled ecological sites."

it creates a unique relationship between the material and immaterial. For example, a physical object, such as a sculpture or painting, can be digitised and reproduced as an electronic signal, which can be transmitted and experienced through a computer screen or other digital device. In this way, the agency of the physical object is transformed into a new form that can be experienced in a different way. This raises a question about the nature of embodiment and the relationship between our bodies and digital media. Are the capacities of our bodies the object or the subject of the action? The answer may depend on the specific context and perspective. In some cases, digital media may be seen as an extension of our embodied experience, allowing us to access new forms of knowledge, communication, and expression. In other cases, digital media may be seen as a form of disembodiment, in which the physical body is marginalised or ignored in favour of the virtual. In sum, the relationship between the agency condition of graspable materials and the immaterial nature of the digital or electronic signal raise a reflection about the nature of embodiment and the role of digital media in shaping our experiences of the world. While digital media can offer new forms of communication and expression, it is important to consider the ways in which it can also impact our relationship with the physical world and our sense of embodiment.

3. From Natural Cognitive Process to Artificial Cognition in *Qatipana*

The perceptron was developed by Frank Rosenblatt at the Cornell Aeronautical Laboratory and as a result of this research he published a report where he describes the main potentialities of this new invention. The perceptron is thus defined as "a device possessing such human-like functions as perception, recognition, concept formation, and the ability to generalise from experience."[43]

In the context of *Qatipana*, the perceptron is a techno-organ that has functions similar to those of humans, which allows it to perceive, recognize and of course learn, thus generating new knowledge that enhances the experience. In other words, the perceptron contemplates the totality of the perception process that is not limited to the eye, which in this case is a mechanical eye (the surveillance camera), but rather the process of understanding the image-data is delegated to the perceptron and this one it takes the decisions of the informational process to trigger as output, after this output it returns to its initial state. This indicates a self-regulation process that until the mid-20th century was only intended for biological processes. This is an example of what Stiegler means when he states that it is necessary to develop: "a general organology, that is, a reflection

43 Frank Rosenblatt, *The Perceptron: A Perceiving and Recognizing Automaton* (Cornell Aeronautical Laboratory, 1957), 1.

on the relationships between organisms, artificial organs and social organisations."[44]

Thus, the hybrid ecosystem of *Qatipana* reflects the technological society, the ubiquitous invasion of the interior, the collection of personal data and the ease of perpetual storage. Ultimately, it leads us to an anthropological problem. This stored information is ultimately discrete recordings (traces) of actions and language that constitute the makeup of cognitive psyches and communities. These data "traces" can be manipulated, shaped, reassembled, or even destroyed. Hence Stiegler states that "there is therefore an urgent need for a politics of memory"[45]. For his part, Norbert Wiener (co-creator of cybernetics) produced writings that address with rigour and depth the sociopolitical impact of scientific practices on the body, psyche, and community[46].

For Stiegler, organisms and what he calls artificial organs are deeply intertwined; the nature-technique dichotomy makes no sense to the extent that there is no state of nature that is not modelled by a certain technique.[47] *Qatipana* seeks precisely to highlight these types of issues, and questions the look as something exclusively human because today we share certain capacities that were our own with these artificial organisms that have human functions, as Rosenblatt points out. Thinking about the relationship we have with these new artificial entities that think or imitate the human, as Turing points out, is essential to understand our cognitive individuation in a contemporary world. [48] Among the thinkers who contributed to the birth of AI in the 20th century, Alan Turing stands out, who defined what computing was,[49] and devised a test to replace the question of whether a machine could actually think, the famous and controversial Test of Turing[50]. This is precisely radically opposed to Cartesian considerations regarding thought, language and mechanisms, since it assumes that a programmed machine can speak and pass said test. Turing proposes that any programmed or digital machine capable of imitating the inputs and outputs of the brain is, as a matter of fact, intelligent, and is so regardless of the materials that implement the machine or its mechanisms. In particular, Turing states that "if any particular machine can be described as a brain, we have only to program our digital

44 Bernard Stiegler, Économie de l'Hypermatériel et Psychopouvoir (Paris: Mille et Une Nuits, 2008), 90.

45 Bernard Stiegler, *Technique and Time I: The Sin of Epimetheus*, trans. Beatriz. Morales Bastos (Argitaletxe Hiru, 2002), 276.

46 Norbert Wiener, *Cybernetics or Control and Communication in the Animal and the Machine* (Cambridge, MA: The MIT Press, 2019), https://doi.org/10.7551/mitpress/11810.001.0001.

47 Bernard Stiegler, "Elements for a General Organology," *Derrida Today* 13, no. 1 (2020): 82.

48 Alan Turing, "Can Digital Computers Think? (1951)," in *The Essential Turing*, ed. B. Jack Copeland (Oxford: Oxford University Press, 2004; online edition, Oxford Academic, November 12, 2020), 476 https://doi.org/10.1093/oso/9780198250791.003.0019.

49 Alan Turing, "On Computable Numbers, with an Application to the Entscheidungsproblem," *Proceedings of the London Mathematical Society* 42, no. 2 (1936): 235.

50 Alan Turing, "Computing Machinery and Intelligence," *Mind* 59, no. 236 (October 1950), 436.

machine to imitate it and it too will be a brain"[51]. That is, it is postulated that intelligence is a byproduct of the computable function of a machine, regardless of its material, and that the key to creating intelligence consists of designing digital machines that imitate what a brain does.

Taking into account this observation about a self-regulating machinic system. If, as Virilio points out, the surveillance camera is an eye without a gaze, what happens when an artificial gaze is added to that eye? Can we continue talking about a gaze? Isn't it rather necessary to reconsider that concept which seems centred on an anthropocentric point of view?

The 'look' or gaze, refers not only to the perception of the objective data, nor simply to the recognition of patterns, but also "includes misrecognition, fantasy, dream, and hallucination"[52] Undoubtedly, the artificial gaze also makes mistakes or hallucinates, as Trevor Paglen's work in *Shoshone Falls, Hough Transform* demonstrates.[53] Although the latter speaks of "invisible images"[54] to account for how today data-images that are pure information do not need to be visible in order to be analysed by an algorithm, perhaps it would be more accurate to speak of a diverse visibility that is governed not so much by the sensible world, but rather by data analysis.[55]

In this way, from the field of artistic production with digital media, the following question arises: how do these new perception devices reconstruct the artist's gaze in their artistic productions today? As a possible answer, it is suggested to rethink the components

51 Alan Turing, "Can Digital Computers Think?," in *The Turing Test: Verbal Behaviour as the Hallmark of Intelligence*, ed. S. Shieber (Cambridge, MA: MIT Press, 2004), 112.

52 W. J. T. Mitchell, *Image Science: Iconology, Visual Culture, and Media Aesthetics* (London: University of Chicago Press, 2015), 27.

53 The work is based on a photograph by 19th-century photographer Timothy O'Sullivan, who famously took a photo of these falls on an inspection mission for the United States War Department. His images of this waterfall are some of his most iconic works and some of the best known images in Western landscape photography. Paglen's image is a close-up of the falls, with two computer vision algorithms overlaid. An algorithm searches for points that imply the existence of underlying lines, a computer vision technique used in self-driving cars and robotics in general. The second algorithm is finding shapes in the waterfall that it thinks are faces.

54 Paglen, "Invisible Images: Your Pictures Are Looking at You," 23–24.

55 Artistic and cultural techniques are no longer types of objects or processes, but rather complementary methods of stylizing our use of signs. These were understood in terms of significant structures or codification, typically applying models derived from linguistics and rhetoric. This telescope became the human plane. In parallel, this phenomenon reduced the constitution of the human plane to the question of the human subject (if not to its effective construction, then the impossibility of it or its subversion).

of media art and the image as a transmaterial process[56] that is, as assemblies that co-constitute us within its information assets, its algorithms, the textual properties of the code, the interactivity and the interfaces. In this sense, understanding the relationship between the artist and the technical medium is essential to avoid misunderstandings or alignments in the co-creative process with machines and to open up new fields of research for the production of contemporary art. For example, looking for new creativity perspectives, facing the transversality that the hybridization between artist, medium, and interface can offer, their social and production meanings on this new techno-ecological condition that could be substantially improved in the media arts.[57]

The third element that makes up the techno-organology of *Qatipana* is data visualisation, a fundamental element since it allows the data processed by the perceptron to be translated to a visual scale. Paul Virilio already points out that we pass "from vision to visualisation,"[58] and this takes on greater meaning when we consider the change in scale that we are facing today, when the volumes of information increasingly exceed human processing power.[59] That is why both scientists and sociologists or historians, for example Lev Manovich who conducts cultural studies through software, require visualisation in order to "see" the results of data processing. We may be closer now than ever to having machines that can see. What we do have are machines that in various ways interpret and transport the light data captured by a camera or sensor. And while this kind of thing is normally considered in terms of 'artificial visual perception' it remains questionable whether the algorithmic and topological signaletics of even the most sophisticated optoelectronic technologies approximate perception. What is not in doubt is the rapid exponentiation of these kinds of machines in every domain, most obviously in day-to-day interactions with smartphones, cloud computing and entertainment media.

56 Anna Munster, "Transmateriality: Toward an Energetics of Signal in Contemporary Mediatic Assemblages," *Cultural Studies Review* 20, no. 1 (March 2014), 158.

57 Invention can be seen as a process of signification that arises from saturation and an emerging problem. It is in the collective, both at the level of imagination and production as well as exchange and appropriation. Inventive objects/practices carry genetic and cognitive, affective and significant loads. Therefore, techno-aesthetic objects are directly related to technical and aesthetic invention, where creative imagination is the ability to invent techno-aesthetic objects, a communication capacity resulting from mediation processes between subjects and media.

58 Virilio, *La Machine de Vision*, 39.

59 Neuropsychology also proposes that our human consciousness is an interface that restricts perceptual 'information' to what we can handle/deal with – i.e. that we, as humans, already perceive volumes of information that exceed human processing power. It can be postulated that this is why we dream, to try to make sense (in a subconscious way) of that excess on a daily basis.

Visualisation should be understood as a procedure that allows the human eye to understand the results of certain analyses that the software performs with a quantity of information that is beyond the capacity of an individual to analyse. Thus, from technological mediations between humans and algorithms, techno-aesthetic objects emerge as an extension of the natural/cultural world, being key points of convergence and their positioning occurs through an action with a view to inserting them into aesthetic compositions. Aesthetics allows us to go beyond technological procedures, since technology is the means by which a certain aesthetic is produced. Aesthetics and technology are united by a continuous spectrum. Two thoughts intersect in the construction of the techno-aesthetic object: a thought that longs to give shape—the technical one, and a thought that extends into the totality—the aesthetic.

Qatipana feeds on the information that the security camera provides in real time at all hours. This information flow is analysed by the perceptron and this treatment is finally taken to a visualisation which translates the non-visible machinic analysis (since it is datum) into a pattern visible to the human eye.[60] From this point of view, data visualisation should be understood as a mode of human-machine interaction, since it establishes a communication bridge between the two. Similarly studying this type of image allows us to speak of info-aesthetics to the extent that "info-aesthetics also tries to study how the use of computers and the explosion of information change the very notion of form (for example, new forms are often variable, emergent, distributed and not directly observable)."[61]

Qatipana's data visualisation is a form in motion, as it is constantly nourished by the interaction between the data provided by the camera in real time and the processing of that information by the perceptron. It is not a visualisation in a fixed state, it is more like a kind of organism in constant mutation. From this perspective, the work highlights how the natural system, which is captured by the surveillance camera, is transformed into information and processed by the perceptron, to finally acquire a new form, this time digital through the visualisation, but also of an organic nature to the extent that it is in

60 The transductive process in the *Qatipana* algorithm (perceptron) is based on capturing data from the camera in observation of a landscape (pixels). This data undergoes a transformation according to daylight. The algorithm reacts to the shadow and the night (enactive process) and this is when the activity increases and is sent over the network to a digital image that is in constant morphogenesis receiving this data, this shows us the process of individuation and invention that Simondon postulates through biological systems and their relationship with the informational environment.

61 Lev Manovich and Everardo Reyes, "Info-Aesthetics," in *100 Notions for Digital Art*, ed. M. Veyrat (Paris: Les Éditions de l'Immatériel, 2014), 1.

constant mutation and transformation in the manner of natural systems.[62] In this sense, technicality arises from tendencies, powers, and capacities to produce or suffer an effect in a certain way; it is not found in an isolated technical individual, but in collective agencies that occur at different levels and layers. Technicality is situated as a moment of evolution that breaks with a sense of stable adaptation and search for balance in the world, to be situated in the successive resolutions of the tensions of a metastable system in constant transformation. In this context,"Simondon defines technicality as a result of a mismatch of being, a fundamental phase of the mode of existence constituted by the subject and the world"[63] that is, technicalism is inserted in a procedural thought constituted of different phases of momentary stabilities in a dynamic system.[64]

In short, *Qatipana* starts from optical-visual elements and ends in data visualisation. This means that with this work, we went from a predominance of seeing generated by optical devices that have predominated since the Renaissance with the invention of perspective, to an era of visualisation, understood as the time in which seeing passes into the background, since the algorithms that process digital images do not need to see to process information. It is a new type of visuality that has lost its original relationship with the visual, understood as optical, or Stiegler's organological point of view, to the extent that optical devices, such as the lens of a camera, can be understood as extensions or externalisations of human organs; in this sense, the camera in *Qatipana* is an externalisation of the human eye. On the contrary, visualisation breaks with this organological model because it does not refer to a perception, to seeing, but rather to a perception that we could call auxiliary, since the algorithm does not need to see the data that is processed. If, however, you want to make the human individual intervene, you need visualisation so that said treatment is understandable, that is, visualizable.

62 In fact, if the body and the environment are transductive correlates, they cannot be considered separate from each other, which means that the *Qatipana* concept of hybridity, taken as a model for the epiphylogenesis of the human being, outlines a return to the original condition of human technogenesis: the recursion that joins together bark and flint. In addition, starting from this original condition, this research proposes to reconstruct a different culture, one that, unlike Stiegler's proposals for technically supported (tertiary) memory, never cuts its links with incarnation as the hinge that connects the body and the environment, the zoological and the technical.

63 Liliana da Escóssia, *Relação Homem-Técnica e Processo de Individuação* (São Cristóvão, SE: UFS Editora; Aracaju: Fundação Oviêdo Teixeira, 1999), 55.

64 See Andreia Machado Oliveira, *Corpos Associados: Interatividade e Tecnicidade nas Paisagens da Arte*, Doctoral Thesis (Porto Alegre: UFRG, 2010).

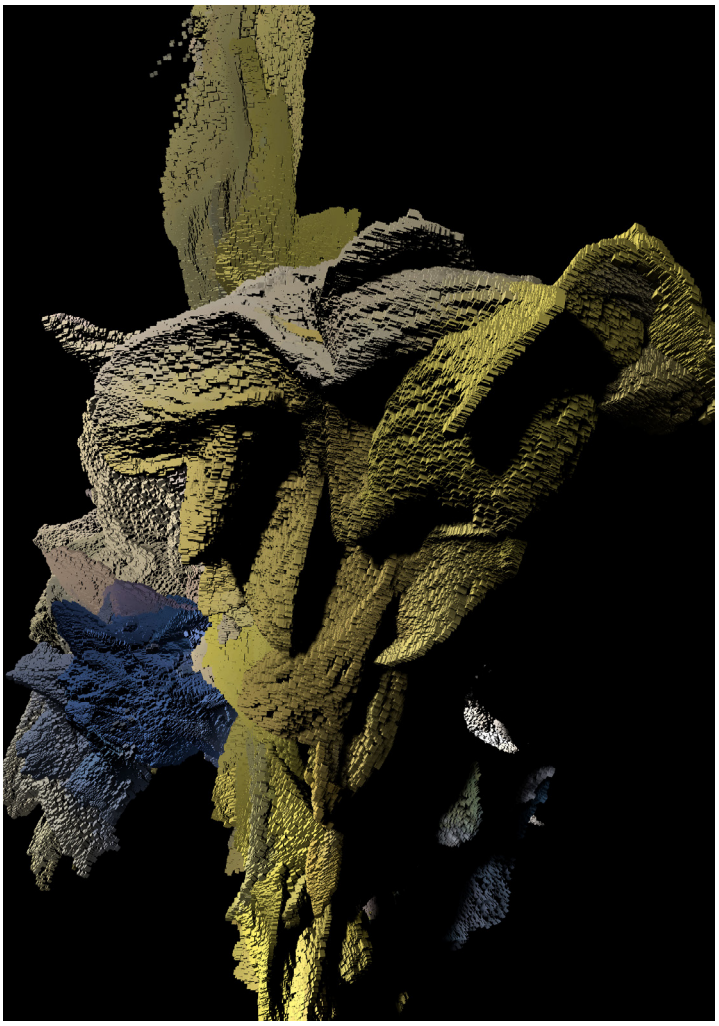

Fig. 2: Morphogenesis of the *Qatipana* algorithm in its informational individuation process

In this way, the complete subjectivation/objectification of individuals requires both individual and collective individuations, and thus allows us to observe a possible proposal for a psychic-socio-technological individuation for the social and artistic field. The term "individuation" refers to ontogenic genesis, and the developmental transformations that allow something to become distinctly different from its environment by taking on a form.[65] In the case of interfaces like *Qatipana,* this argument combines Simondon's notion

65 Gilbert Simondon and Andrew Iliadis, "Form, Information, and Potentials," *Philosophy Today* 63, no. 3 (2019): 579.

of transduction with the historical and cultural genealogy of an identity in the process of (co)constitution, as an interpretation of logic to a transfigured identity of technical and social systems. This is necessary in order to understand the processes of hominization and projection of external organs with digital technologies,[66] or at least to try. This look allows us to contrast models of building these production processes, under a rationality or way of thinking in a cosmo-eco-political sense. From this approach the model becomes the conduit through which, once again, metaphysics is seen from the perspective of technological entities, and art (Ars) is seen from the perspective of life.

4. Conclusion

As has been shown throughout this essay, Stiegler's work seeks to relate the notions of organology, in which he assumes that this organological process can lead to the interlocking of the subject and the object and lead to a loss of information. This process, however, leads to a pharmacological condition, and it is precisely this condition, brought from a conjunction between the noetic and the prosthetic, that leads us to a possibility of opening and of new individuations. For Simondon, this field delves into what he calls technical thinking, which dismantles and reconstructs the functioning of beings, elucidating their structures; where technical thought "operates" together with its associated medium (milieu). From this scheme, the inventive question arises in Simondon, which in turn connotes for him "becoming," since Simondon takes the position that things cannot be taken for granted, but rather come to be. What is constructed are fundamentally perspectives or paradigms, and the corresponding positions of the creative subject in its relationship with technical objects.

There are no guarantees that we can completely avoid the potential negative consequences of massive technological planetary industrialization,[67] but there are strategies we can adopt to mitigate these risks and re-open the question of the creative future of machines in relation to humans. One approach is to prioritise research and development in areas such as explainable AI, human-AI collaboration, and ethical considerations in AI. By developing AI systems that are transparent, accountable, and work in tandem with human operators, we can help ensure that AI is aligned with human values and goals, and that it complements rather than replaces human capabilities. One question that guides this

66 Bernard Stiegler, "Elements for a General Organology," *Derrida Today* 13, no. 1 (2020): 78.

67 What is characteristic of our contemporary age, according to Stiegler, is the systematic industrialization of human memory and cognition through digital technologies, a process with dramatic implications for individual human psyches as well as collectives. In our hyperindustrial societies, even the life of the mind is thoroughly technicized and industrialized and this happens in the context of an increasingly totalitarian capitalism.

article arises from observing the current processes of creating works with AI. This suggests that it is perhaps relevant to compare current claims about the "magnificence" and the incomprehensibility of AI with the arguments about the arts and new media.[68] In addition to invisibility and ubiquity, it is the alleged power of new media (and technology in general) that lends itself to this analogy. Furthermore, it seems impossible to know the full extent, content, and effects of new media. Who can touch all the content on the World Wide Web or know the real size of the Internet or mobile networks? Who can read and review all time-based online interactions? Who can expertly transition from social networking site analytics to cell phone novels to database algorithm hardware? Is it possible to get a global picture of the new media? On the other hand, Yuk Hui (2021) mentions that, nowadays, the discussion about art and technology has become more and more common, and invites us to reflect on what the "and" means here[69]. Thinking about that "and" perhaps means providing a new reading, which has a transforming power, so that from a reflection on our current situation we can imagine radical openings. This openness can bring reflections on *anthropotechnical* processes in the world and their relationships with reality. The concepts of pharmakon and organology generate a genealogy of the sensitive, where the bio-human, the technological and the social form the aesthetic and desire. According to Stiegler, there is no "human nature" without technique and vice versa.[70] We are part of processes of technical-technological individuation, where culture "becomes present" through technical objects and knowledge from the past that shape the present. Today it is necessary to focus on questioning the role of art,[71] in view of the limitation of the organic and the evolution of machine intelligence. Beyond the mere proliferation of technological devices and systems, said diversity involves rediscovering forgotten techniques, as well as new ways of approaching technology based on different purposes and ways of experiencing (ourselves) in the world. It is thus that, from this perspective, the relationship between artificial agents and their natural environment is deduced, and the organological genesis of these agents that are subject to potential changes conjugated with their metastable equilibrium is analysed. In this sense, their capacity for invention is evident (transindividual individuation and referred to the psycho-socio-technological), together with the information that the artificial agents integrate into their receptor-system and their "relational configurations." This allows us to conceive new ways of inorganic organisation together with its associated medium, organic "milieu," such as the

68 Andrew Pickering, "Art, Science and Experiment," *MaHKUscript: Journal of Fine Art Research* 1, no. 1 (2016): 1.

69 Hui, *Art and Cosmotechnics*, 49.

70 Bernard Stiegler, *La Técnica y el Tiempo I*, 223.

71 These roles of art practice as technique can address the ontological link in a technological world from different conceptual approaches, highlighting the distinction between mediation and media to clarify their relationship.

proposal of works that present this type of relationship.[72]

From there, one could raise questions about alternative models of AI development and deployment that prioritise diversity and inclusivity. For example, rather than focusing solely on the development of a single, all-encompassing AI, media activists could explore the potential benefits of developing multiple, specialised AIs that are tailored to different tasks and domains. Additionally, it is important to consider the potential social and ethical implications of an AI, such as issues related to privacy, bias, and accountability. By engaging in thoughtful discussions and debates about these issues, we can help ensure that the development of AI is guided by a commitment to techno-diversity, ethical considerations, and social responsibility.

In sum, in this article we are interested in observing how the radical determination and the contrast with nature and technology, the organic and the non-living, the human mind and the general vision of the unattainable today called Artificial Intelligence, can have different scales from a local grid to a planetary system. Now we want to ask ourselves what could be the implications of this redefinition of magnitudes, (the relationship between) machine and ecology, with opening questions in this field such as: How to think about the relationship between ecological, technological and aesthetic modes of existence? How are they different in terms of structures and operations? How do they participate in a form of coevolution? How might it be possible to reduce the fragmentation of human knowledge and experience by promoting integration, in particular the reintegration of technical developments into cultural understanding? From this perspective that knowledge of human culture necessarily goes through knowledge of technologies, Simondon[73] intentionally relates the word culture to the word cultivar, the plant and animal cultivation techniques of humans acting to modify the environment through technical gestures. In principle, there is no conflict between culture and technique; they oppose when one of the parties is in a static position, in which self-regulation dynamics do not occur, in which both are changed: positively as a transformation, negatively as a hazard. To Simondon, "[...] 'Culture' is the set of techniques of direct human manipulation that each human group uses to perpetuate itself in stability"[74], and culture may be in sync with technique or against it or vice-versa, which we see in most cases. Culture positively regulates the social when it appears as a regulator of social values upon appropriating technological knowledge and negatively upon denying and alienating such knowledge.

72 Some examples could be news sorting algorithms and social media bots, which influence the information citizens see; the credit scoring algorithms that determine lending decisions; online pricing algorithms that determine the cost of products differentially among consumers, etc.

73 See Gilbert Simondon "Cultura y Técnica." Translated by Margarita Martinez. In *Amar a las Máquinas: Cultura y Técnica en Gilbert Simondon*, ed. Javier Blanco, Diego Parente, Pablo Rodríguez and Andrés Vaccar (Buenos Aires: Prometeo Libros, 2015).

74 Gilbert Simondon, *Du Mode d'existence des Objets Techniques* (Paris: Aubier, 2012), 33.

With the help of our newly acquired knowledge of life processes at the technological level, from ecologies to molecular biology, we can exercise an increasing degree of control over the manipulation of living biological systems, as the technosphere ("man-made") and the biosphere ("nature") are increasingly indistinguishable. The ability to cut and paste genes from different organisms, the prospect of engineering artificial genes, and the possibility of coercing functional living tissue (outside an organism) to grow and behave according to human-determined plans are just a few examples of this merger. However, what happens to these operational relationships from a creative individuation? Artists are now exploring the new knowledge and tools offered by modern biology to manipulate and create living and semi-living works of art. The idea of a possible techno-ecology, an ecology of machines, is proposed in this article, indicating the need to take into account the combination and recursion, reflexivity and continuity, at any scale, from science to art, understanding that we are going to continue finding cycles and patterns of repetition of "the system" that deals with itself.

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