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AI & SOCIETY (2024) 39:53–63
https://doi.org/10.1007/s00146-023-01765-3

MAIN PAPER

Qatipana: cybernetics and cosmotechnics in Latin American art ecosystems

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Received: 10 October 2021 / Accepted: 15 May 2023 / Published online: 20 September 2023
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Abstract
In this essay, we explore the philosophical and theoretical resonances of the artwork *Qatipana* from the perspective of some key insights of Gilbert Simondon's information processing system approach. *Qatipana* (Quechua word that means flow, sequence, transmission) is a hybrid ecosystem 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. In particular, we are interested in observing how Simondon's becoming and individuation play out in an algorithmic cycle performed by the cognitive system of an Artificial Intelligence agent: how does mono-technology and computerization of cultural techniques influence the nature of knowing the affection of being with others (people, things, animals)? We contrast Simondon's contributions with the work of Norbert Wiener and Stafford Beer on information in cybernetics and the cosmotechnics and Technodiversity of Chinese philosopher Yuk Hui. Furthermore, we offer a provisional assessment of the reach, limits, and possibilities this kind of symbiotic crossing of technologies and arts: it is a field filled with challenges and unresolved complexities that should encourage us to recognize the urgency that is implied in the disruptive (and creative) we can see unfolding in social and political life. The already pervasive (and growing) presence of computational systems has become both a tremendous risk and a vertiginous deployment of liberating opportunities. Latin America and elsewhere are desperately calling for an insightful and imaginative engagement.

Keywords Individuation · Art ecosystems · Third-order cybernetics · Syncretism and "mestizaje" · Cosmotechnics

1 Introduction

This essay explores the relation between art, technology, and natural systems focusing on the Qatipana project and with the help of a conceptual framework that includes a reconsideration of theoretical work on cybernetics, with particular emphasis on its application in Latin America. This exploration emerges from a question about the decolonization of artificial intelligence and the artistic ecosystems. Crucially, this question concerns the intricate differentiation between art and technology as a concrete event in European and Western culture, particularly between the seventeenth and eighteenth centuries. As we know, up until the crisis of the rationalism of the Enlightenment, the definition of art varied between different areas of material and conceptual techniques. The division between art and technology concepts in the eighteenth century is a Eurocentric problem; in other regions, that division did not exist. This point should be present at the beginning of a debate on (de)colonialism and ecosystems.

Cosmotechnics, according to Yuk Hui (2017), means the unification of the cosmic order and the moral order through technical activities. Modern technology has broken the traditional relationship between cosmos and technique; it has become a gigantic force which transforms every being into a mere "permanent reserve" (*Bestand*), as Martin Heidegger observes in his famous 1949 lecture *The Question of*

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Technique (Heidegger 1997). In the first part, we argue that in light of Simondon's theory of individuation (Simondon 2009a), we can observe a process of the dynamic world by which everything arises: technology, living beings, individuals, groups and thoughts.[1] Seen from the perspective (of) "causal rationality" in the West, the modes of production that occur under this logic are erroneous and problematic in a Latin American context. Our argument combines Hui's notion of cosmotechnics with Varela's epistemological genealogy as an interpretation of the autopoietic logic of biological and social systems to understand the processes of syncretism and projection of science and technology close to cybernetics in Latin America, or at least try. This look allows us to contrast models of building these production processes under rationality or way of thinking in a cosmo-eco-political sense. From this perspective, it makes it the conduit through which, once again, metaphysics is seen from the perspective of art, and art is seen from the perspective of life.

Qatipana (https://qatipana.org/) is a research project that proposes to develop an artificial agent within the framework of an artistic work, through which we explore the intersections of art and technology, machine and nature. The work consists of an online platform that hosts this artificial agent (AI), which observes a natural ecosystem, and through this observation, it acquires its own individuation processes. Thus, as Qatipana allows us to observe and document the process of individuation of this artificial agent, it helps us to rethink the relationship between art, machine, and nature and consequently make a contribution to the ongoing debate about the ways in which we generate knowledge today through technological means, a debate that (at least in Latin America, and with respect to its social, political, and artistic repercussions) is still in its infancy. In this spirit, Qatipana hopes to contribute some key philosophical insights for a new understanding of natural and artificial creativity based on a notion of relational individuation that encompasses both human and non-human agency through concepts of cultural techniques (scriptural, figurative, and computational) which the artificial agent integrates. The attempt is to show how these material relationships contribute to exploring some fundamental questions in natural and artificial systems, as well as some of the challenges and dangers that technological developments exert on social and political life.

Furthermore, we argue that while digital and network technologies initially seemed to offer new hope for the reorganization of work (for instance, in the case of the free software movement), the subsequent rise of smartphones and social media, network effects, and algorithmic platforms, appears to have turned these hopes into empty illusions. Unless something completely unlikely happens, this dystopian trend seems set to continue. Qatipana is a form of creative and technological activism that integrates the concepts of cosmopolitics and cosmotechnics to operate a reconciliation between the universal and the particular; between nature, politics, and technology. This symbiosis between the natural and the artificial has become a call to establish possible third-order cybernetics, as conceptualized by authors such as Dulmini Perera (2021), who considers cybernetization processes as a generalized ecology concerned with life and the production, exchange, and consumption of meaning. Moreover, cybernetization can lay the foundation for an ecological explanation of meaning. This third-order cybernetics extends beyond the realm of living organisms and their environments to ecologies of ideas, power, institutions, media, etc. In this sense, cybernetization would be radically environmental, since it postulates the primacy of relationships over fixed terms, binary oppositions, and linear logic. Furthermore, following Uexküll (2010), we consider the need to reverse the traditional approaches to study the relationship between organisms and their environment, recognizing that the crucial characteristic of the living is to create a medium for itself. Finally, we consider how the relationship between art, machine, and natural systems coupled with Yuk Hui's concept of cosmotechnics allows us to investigate the role of technology in our understanding of a pluralistic technodiversity in Latin America.

2 A brief look at the genesis of cybernetic systems in Latin America

The disposition for self-transformation, the dialogical (not merely tolerant) acceptance of different identities, comes precisely from the acknowledgment of the contingent present in every identity, from its grounding in the pure political will, and not in some ancestral mythical order, which no matter how earthly it appears, it ends up becoming supernatural and metaphysical. This disposition is what gives the identity affirmation of the Latin American majorities—concentrated in something very subtle, almost only an arbitrary fidelity to a preference of forms—the dynamism and the capacity for metamorphosis that would be required by an imagined modernity beyond its capitalist stagnation (Bolívar Echeverría 2010).

Bolívar Echeverría tells us that there is a certain "evanescent condition" which implies that "identity is always linked to risk and to something completely strange, which always appears elusive and insurmountable and is, for that

[1] Individuation, for Simondon's terms, does not produce only the individual, but also the associated environment. The individual is, then, a certain phase of being that possesses a pre-individual reality with potentials that individuation is unable to consume. Being is in becoming and therefore has the ability to become out of phase in relation to itself and to resolve its tensions, understood as the change from one state to another, that is, becoming (Simondon 2015).

very reason, the most typical fuel of any identity" (Echeverría 2001). In turn, Simondon raises the possibility of a psychic-collective individuation through information which occurs within individuation, as it is manifested when treating the structure of his main thesis: "Thanks to this orientation of being in relation to itself, to this affective polarization of all content and of all psychic constituents, […] the being preserves its identity." (Simondon 2015) That is why the concern arises to develop a reflective approach to technical media, always within the framework of transformations and continuities, often underground, within the cultural practices and traditions that coexist in a specific territorial space.

We claim that the concept of cosmotechnics allows us to sketch a critical Latin American perspective that considers the polymorphous reach of colonization in the origin of neo-baroque aesthetics that grounds the "carnivalization" at the center of Latin American techno-socio-epistemic productivity:

> [the] space of dialogism, polyphony, carnivalization, parody and intertextuality, the baroque would thus appear as a network of connections, of successive filigree, whose graphic expression would not be linear, two-dimensional, flat, but with depth, width and dynamics. (Sarduy 1972).

In this sense, the Cosmotechnics approach must also be understood as the origin of a configuration that allows us to understand the codependency between human and machine and its politics. Precisely from the materiality understood from an organological approach (Stiegler 2020a, b), we can observe how human and machine materialities dialogue, uniting and expanding the identity crossing of both with the environment. The analysis that we follow in this essay focuses on "types of environments"—interior, exterior and technical—which are mutually diffracting, which means that "there is never just one mean, but only means" (Stiegler 2020a, b). In Stigler's words, this diffraction process is carried out through the production of technical organs (exo somatic) from the production of those specifically related to memory (exo amnestic) and is in relation to human body interaction, delivering an aesthetic transfigured in the representation of an identity, unrealized and transcended, staged as a different reality.

One of the milestones of this Latin American Cosmotechnical can be observed in the early 1970s in Chile, under the socialist government of Salvador Allende and the "Unidad Popular." In 1994, the University of Chile published a new edition of the crucial study by the Chilean biologists Humberto Maturana and Francisco Varela: De máquinas y seres vivos. Autopoiesis: la organización de lo vivo (On machines and living beings. Autopoiesis: the organization of the living) (Varela 1994), on the occasion of the twentieth anniversary of its first publication (Maturana 1972). This edition featured two new forewords by each author. In its sections, Varela briefly describes his personal journey in conceiving the first formulations of the concept of Autopoiesis, working with Maturana and later with other colleagues, until reaching the conclusions he summarized in 1994. In this itinerary, Varela explains in detail the key contributions of the cybernetician Heinz von Foerster in the first formulations of 1969 and later in the dissemination of the first manuscript. He also highlights the contributions of the cybernetician Stafford Beer and the Synco project team—or Cybersyn—between 1971 and 1973. In particular, it was Beer who decisively applied the concept of Autopoiesis to social systems, anticipating insights of Niklas Luhmann's, reaching far beyond the initial expectations of Varela and Maturana, who developed the concept restricted to the field of biology. Furthermore, from the time when he was working in the Faculty of Medicine of the Pontifical Catholic University, Varela mentions the influence of Professor Joaquin Luco, who instilled in him an enthusiastic interest in neurophysiology. What his text does not specify, perhaps because Varela thought it was a well-known antecedent, is the collaboration of Luco with the Mexican cybernetician Arturo Rosenblueth in the late 1930s at Harvard University. Rosenblueth was a key contributor to the formulations and gestation of first-order cybernetics, working alongside Norbert Wiener, Walter Cannon, and Julian Bigelow. Thus, even before Professor Humberto Maturana was a student and colleague, Varela's training had another line of influence and affiliation connecting him with the Latin American scientific effort in developing a syncretic and idiosyncratic form of cybernetics in constant dialogue with other latitudes.

One of the best-known references in the field of art and the technological medium is the Chilean Juan Downey, whose work on the use of new technologies was as relevant as the questions about the context in which the question about art was posed. Indeed, Downey is often mentioned among the pioneers of video art (along Nam June Paik and others). Consider, for instance, his Anaconda: Map of Chile (1973), in which he places a large anaconda over a large map of Chile as a representation of the ways in which certain North American mining companies were refusing to lose extractive control over the territory. Or, to cite another example, we can consider his experience with the Yanomami indigenous people of the Brazilian jungle: Downey settled there with his family, sharing and living with them, assimilating their ways of representing space and time, owning the new technical media, making use of the video camera in ways never seen before in other Western conceptions of film, space, and architecture (Bonet et al. 2000).

Furthermore, we need to relate these lines of influence with the epistemological features of the Cosmotechnological approach. Indeed, we need to approach the idea of Cosmotechnology through an analysis of scientific practices and

their socio-political context. In particular, it is important to take into account the fact that capitalism can be described as an epistēmē, whose operator is information, but also as an anti-epistēmē, because it installs generalized proletarianization.[2] Moreover, this process entails that knowledge is destroyed and diversity is systematically eliminated and that new theoretical informatics must learn to functionally take into account the need for diversity. In this context, the notion of technodiversity (Hui 2020) appears as a way of challenging the hegemony of the universal calculability that prescribes arrangements between technical systems and social and biological systems. In particular, the most direct and explosive consequence of this approach is the recognition of a way of seeing technology that, away from the "causal rationality" that dominates in the West, is guided by the logic of the development of life (cf. Van Kessel 1989). While Western technology's horizon tends to be reduced to the material, the logic of life allows us to see a new dimension present in Andean technology: a "symbolic technology" manifested in rituals of production and technological discourses.

Finally, we could consider the work of Viveiros de Castro and how he conceptualizes the "habitat" (and how it might relate to current debates on the concept of the environment). For Viveiros de Castro, ever since its (re)birth in "modern science," current technoscientific epistemologies and practices are in urgent need of a "new habitat" because of the ways these epistemologies are now presented. As well as, the ways "physical reality" is defined and understood are still bound to a set of claims that (forcefully but uncritically) tend to generate an opposition between an intelligible view of the world (associated in many ways with divine creation) and the view of the world as we know it in historical practice and experience. Moreover, the scientific (or scientist) view that defines "physical reality" as objective, beyond our only human fictions, claims a position of judgment against all other "realities," including that of all other ("human") sciences. Frequently, it is a position that scientists themselves do not know how to leave, even when they want to. In fact, Viveiros de Castro's point seems to be that it is a "habitat": they feel that as soon as they abandon the safe position of claiming that they are "discovering" physical reality beyond changing appearances, they will be helpless, unable to resist the reduction of what they are themselves producing following "methodological" recipes that instrumentally effectuate a type of reductive judgment that they use against all other realities. Thus, Viveiros de Castro problematizes the formation of an Amerindian ontology which promotes an inconstant, non-figurative or formal aesthetic, which exposes a dimension in which meaning is not part of the articulation of the imaginary, the symbolic, and the aesthetic. However, rather corresponds to the experience of a disarticulation of meaning, of the senses (which can be observed, for instance, in shamanism), as an understanding of the real that is as multi-naturalist and perspectivist (cf. Viveiros de Castro 2010).

3 First-, second-order and relational ecologies: "the art of life"

The French philosopher Bernard Stiegler tells us that: "tendencies play out in an irreducible way with counter-tendencies, forming open dynamic systems. Today, platforms tend to eliminate this play, and this is why today's state of fact inherently calls for the question of diversity. The challenge is to introduce new conditions for variability, reconstituting noodiversity" (Stiegler 2020a, b).

In his pivotal 1948 Cybernetics or the control and communication in the animal and the machine, Norbert Wiener defines cybernetics as "the science that studies the communication and automatic regulation systems of living beings applying them to electronic and mechanical systems that resemble them" (Wiener 1948). Furthermore, as Matthew Johnson specifies during his residency at the National Institute of Cardiology (INC) of Mexico (where Arturo Rosenblueth invited him), Cybernetics is "the interdisciplinary study of the structure of regulatory systems. In other words, it is the science that studies energy flows closely linked to control theory and systems theory" (Johnson 2000).

However, despite the impact of this book, Wiener insists that the principles of first-order cybernetics were already established in the article co-authored with Arturo Rosenblueth and Julian Bigelow, "Behavior, Purpose and Teleology" (Wiener 1943), where they establish a scheme of "first-order," "second-order," etc. behavior prediction.

In 1967, with the support of Heinz von Foerster, the anthropologist Margaret Mead was instrumental in supporting the historical role of second-order cybernetics (Mead 1968). Previously, in 1942, Mead, along with the psychologist Gregory Bateson and the sociologist Lawrence K. Frank, attended a conference delivered by Arturo Rosenblueth at the Josiah Macy Jr. Foundation, in which the Mexican scientist talked about feedback and circular causality. At that time, the research of Mead, Bateson, and Frank was focused on the relationships between humans and the environment (Guzik 2009).

[2] For Stiegler (2020a, b), the anthropocene is presented above all as an "entropocene", combining thermodynamic entropy, biological entropy, and informational entropy, and destroying all libidinal economy, leading to a capitalism based purely on drives, because it is purely computational. Thus, from his pharmacological proposal, he observes that reconstituting a political and libidinal economy means to rework an epistēmē and an epistemology that is equivalent to a neganthropology (and neganthropocene) of the automated human.

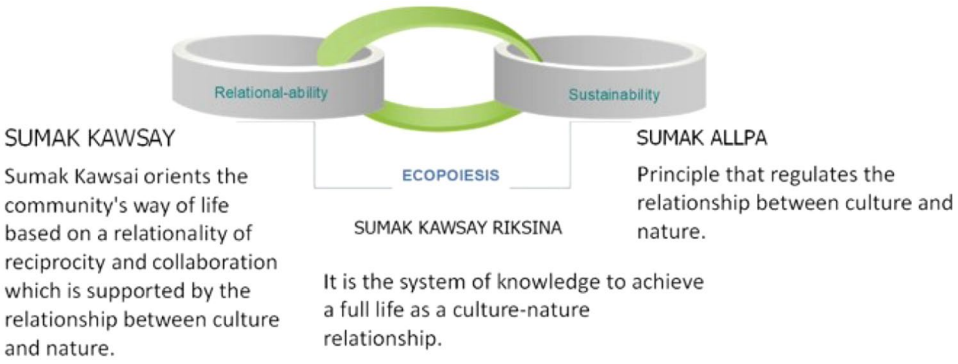


Fig. 1 Ecological viability, from the ecosystem to the Ecotome @Leonardo Lavanderos 2021

The environment is crucial in cybernetics, particularly in terms of the discussion about second-order prediction and management of behavior. Stafford Beer also developed an expanded vision that requires considering the concept of the environment from the double perspective of social and natural variables, placing it as one of the three essential elements of his Viable System Model (VSM) of second-order cybernetics. The three basic elements are the decision space (fundamentally the consciousness of the human being), the social and natural environment, and the technique or technology playing the role of mediator between the first two, not as the cosified objective but as a process of interaction or mediatization. A fourth element is produced from these three basic elements: action (Beer 1981).

Furthermore, it is also convenient to consider the extension of the environment concept in the MML (Latin American World Model), proposed as a critical perspective by the computer center of the Bariloche Foundation in Argentina (Grondona 2020), which Hugo Scolnick and Amilcar Herrera directed. This proposal reached international resonance, but unfortunately, we see many of their negative predictions realized and many of their warnings unheard of today.

Returning to the architect Dulmini Perera and her third-order cybernetics approach, the influence of cybernetics in the formulation of an alternative ecological (relational) explanation has been largely neglected. However, the Anthropocene (both as discourse and as a material condition) has brought to light the need to rethink environmental histories and environmentalism in architecture beyond reductive binary logics. The once separate categories of culture and environment now give way to an ecological approach in which they appear as co-constructed, providing a broader transdisciplinary circuit for exploring the logics of living systems in ways that are not restricted to anthropocentrism.

Finally, we should consider the work of cyberneticists Alejandro Malpartida and Leonardo Lavaderos from Argentina and Chile. They proposed an overcoming of the use of the environment concept, characteristic of Beer's VSM (Beer 1981) (Fig. 1), considering that Beer's model conceptualized the environment as a "thing" external to the system. Consequently, Malpartida and Lavanderos proposed alternative relational cybernetics instead of Beer's "interactive cybernetics" (Lavanderos 2015). Furthermore, they argued that their perspective explicitly coincides with the epistemology of Ayllu and Kawsay, emphasizing the syncretic condition of Latin American formulations. Highlighting, for instance, the fact that there in these cultures, there is no dualism and that the art/technology separation, characteristic of Enlightened Western Europe culture and its subsequent technocratic division that does not recognize aesthetics as science. However, they also defended the idea that one should not fall into new forms of decontextualizing fetishism formed of misconceived "timeless" claims. Then, it is not a question of returning to an ideal (nonexistent) primitive state but rather of recognizing, confronting, and proposing a relational viability characteristic of a mestizo culture. Thus, the question presents itself: how can indigenous epistemologies and ontologies contribute to the global relationship between society and Artificial Intelligence?

Both the figure on Relational Cybernetics and the question above try precisely to overcome the standardization of an ecological thought mediated by a methodology based on the foundations of cybernetics. To do that, it is necessary to think of nature no longer as a system (at least not a stable system) but rather as a sum of radical and incommensurable changes and displacements (as shown, for instance, by the studies conducted by Daniel Botkin (Botkin and Keller 2010) or Steward Pickett (Pickett et al. 2007). In keeping with this idea, Hui writes in Art and Cosmotechnics, in a chapter entitled "The status of machine intelligence today": "The human and the world become understood as a unity maintained by feedback loops. However, this feedback loop also creates a closed world of input and output, demand and supply, realized by and in the industrial world. Such a world based on reductionist cybernetics is doomed to be a closed one" (Hui 2021). In a similar vein, Varela has pointed out that the military coup of 1973 meant a crucial and violent disruption of these scientific developments in the South.

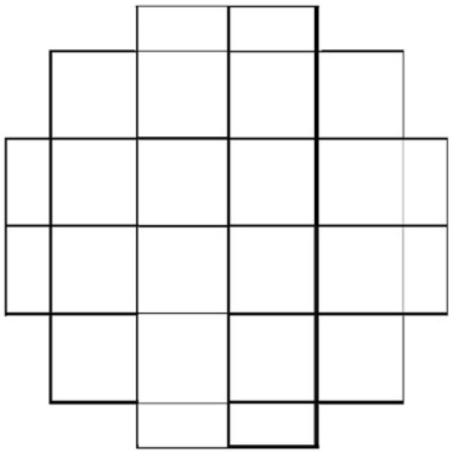


Fig. 2 Andean cross or Chakana. Own source

The geometric structure that represents time and space and that we know today as characteristic of the Tahuantisuyo region is also a system of social representation of the relationships of the human being with other equivalent entities that, from the objectualization of the Western European perspective, are called environmental. In turn, the model of the 20s, extirpated from the institutional debate on local education, allows a possible contrast of this representation of systems of meaning (Fig. 2). The underlying anthropocentric ideology in the system of the perspective inaugurated by modern capitalism was contemporary at the beginning of the colonization process.

In sum, in the 40s, there would have been a first founding moment of first-order cybernetics, in which the role of the Mexican scientist Arturo Rosenblueth was fundamental. This condition was not only widely recognized by Norbert Wiener himself, but decades later, it would be recognized by Margaret Mead from the perspective of second-order cybernetics, elaborated in part by her in the late 60s. A second fundamental moment for second-order cybernetics, and its relationship with Latin America, was the Cybersyn project. In practice, it allowed Stafford Beer to demonstrate and evolve the ideas of second-order Cybernetics by applying them to the specificity of the Chilean situation. Fifty years after that second emblematic milestone, we reach the revision of principles and extension to possible new horizons of relational cybernetics as proposed by Malpartida and Lavanderos. It is presented as a path to a third-order, supporting a new platform, where the stories of global cybernetics can be bound together, beyond the center-periphery model (this, for instance, is also what Professor Soenke Zehle (2021) is proposing with the concept of transculturality). Today, it becomes necessary to rethink these paths (first-, second-order, and relational cybernetics) in new concrete instantiations.

4 Art and cosmotechnics: qatipana and the case for technodiversity

In an interview with the Chinese philosopher Yuk Hui (Dunker 2020), he brings us closer to a systemic process of relationships between the existing divisions between culture, nature and technology: "The intervention of human beings in the environment defines the process of hominization, the evolutionary and historical becoming-human and its politics. It is beyond our capacity to outline this process; however, human civilization could be seen as an intimate and complicity relation between humans and their environment".

Jacob von Uexküll proposes “a walk-through unknown worlds,” worlds strange to us but known to other creatures, worlds “as diverse as the animals themselves” (Uexküll 2016, p. 43). We must create, he suggests, an imaginary soap bubble around each creature. Each of these bubbles contains only the perceptions the creature has access to and from which it forms its own true world. Each of these bubbles represents the world as it appears to organisms themselves. As each organism perceives differently, there are as many of these worlds as there are organisms in nature. Thus, Uexküll does not consider organisms as mere objects but as subjects defined by their perceiving and acting. Everything that an organism perceives is part of its perceptual world (Merkwelt), while everything that an organism does is part of its operating world (Wirkwelt). The perceptual and operational world together forms a closed unit called Umwelt, its environment (Uexküll 2016). In this way, even if the same objects are present in a certain environment, they will not be perceived in the same way by different organisms and will not have the same meaning for them.

A second key concept in Uexküll’s work with respect to the relationship between an organism and its environment is that of regularity, or conformity-with-a-plan (Planmäßigkeit). Uexküll calls conformity to a plan, or regularity, to the force of nature “that combines multiple details into a whole by means of rules. Higher rules, which unite things separated even by time, are in general terms called plans” (Uexküll 1926). Elsewhere, Uexküll defines conformity-with-a-plan as “a rule that extends through time and space,” “a rule in living nature, which is revealed even in the mechanical processes of the organism,” and as “a super mechanical law” (Uexküll 1926). Conformity-with-a-plan is responsible for the creation of all organisms and their Umwelten; it is like the score that delineates the melody, accounting for all nature. Ultimately, conformity-with-a-plan ensures perfect complementarity between the different organisms and their Umwelten.

In this way, Uexküll delineates his position in contrast to Darwinian adaptation. Indeed, according to the

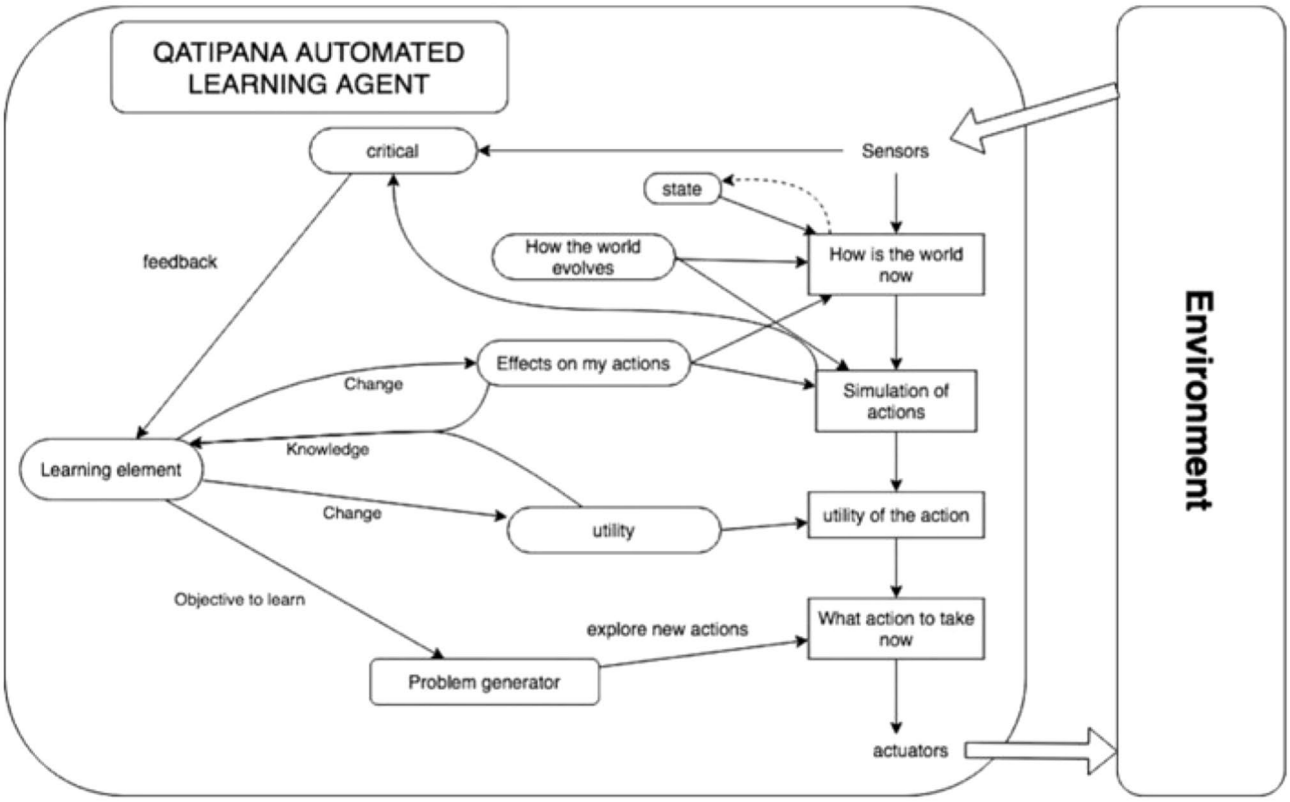


Fig. 3 Qatipana artificial agent architecture. Recovered from Filinich, Renzo and Chibey, Tamara (2020)

concept of adaptation, each organism is the product of influences to which it has been exposed for thousands of years. Through countless cycles of trial and error, organisms reach their proper form, a final product adapted and congruent to the conditions of the environment in which they are found. For Darwinism, the struggle for existence determines that organisms compete with each other, a struggle in which only the "most adapted" can survive. In contrast, for Uexküll, it is impossible for an organism, even a machine in which all the parts fit together correctly, to emerge through such a mechanism:

> "Certainly, a powerful imagination is required to assume that any machine capable of functioning could arise in this way." (Uexküll 1926) In other words, for Uexküll, it is impossible for a cooperative structure to emerge from a competitive mechanism instead of nature producing all its organisms following a plan. The fit between the different parts of an organism and between the organism and its Umwelt is not produced by erosion or external molding, but they are adjusted. They are congruent with each other from the beginning. This congruence is guaranteed by a plan, which is what builds organisms in harmony with their Umwelten.

With respect to the "plan", Uexküll recognizes that deviations can occur that are responsible for generating the illusion of the variability of organisms. These deviations are of secondary importance, and Darwin's mistake was to put them at the center, as the main feature, when the main feature really is the plan itself. It goes without saying that the notion of conformity-to-a-plan is not without its difficulties. One could, for example, raise the objection that the reduction of all nature to a super-mechanical rule, which includes all the functional circles established between organisms and their Umwelten, also entails the reduction of the concept of subject to the mere assemblage of circles. It is unlikely to leave much room for the autonomy and creativity characteristic of organisms. Understood as an alternative to this ontogenetic explanation, the concept of the symbiotic body in Qatipana can be seen as the transduction[3] of the organism and the machinic environment (Fig. 3). This symbiosis provides a better original (technical) complementary

[3] Simondon describes transduction as "an ongoing individuation"; it is "an interval" that is a substance in its modulation with matter. Based on this premise, the individuation process is uncertainly "metastable", but for that reason, it is also inventive, as is the case of the processes that emerge from the contingencies deploying biological and algorithmic entities, as is the case of Qatipana.

model for the precise reason that it invests in the creativity of the incarnation. Therefore, instead of assuming that technical and living evolution face each other extrinsically, Qatipana bets everything on the intrinsic correlation of the two: machinic environments can become triggers for creative evolution precisely, because they are at stake in embodied life, and embodied life can induce modifications of the hybrid environment precisely as a means to intensify itself, to exert its margin of immortality. 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 the symbiotic body, taken as a model for the epiphylogenesis[4] 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. No matter how complex the culture becomes, it will always harbor, at its very core, the symbiotic transduction of life before any further division. That is why an artistic revolution and its relationship with technological media are necessary.

The Qatipana project advocates a change in thinking about new media[5]: a change from focusing merely on a set of discrete objects, to understand the media, old and new, in terms of the interconnected and dynamic processes of mediation. Qatipana calls on us to move beyond our understanding of the media only as elements within our reach to recognize our entanglement with the media on both a socio-cultural and biological level. This argument will lead us to pose the following question: if the media cannot be completely outsourced from the subjects or "users," then how could "we" engage with "them" differently? We must also consider the political and ethical implications of such commitments. If the first moderns provided us with a mechanistic vision of the world through geometrization (Kepler, Galileo, Newton, Descartes, etc.) and experimental science (Bacon and Boyles), now with cybernetics as the realization and concretization of organicist thought that began to culminate in the late eighteenth century, can we finally end modernity with cybernetics? Do we not already find in cybernetics, and its planetary version, the theory of Gaia, a generic logic that rests on the recognition of the relationship between the living being and its environment? Furthermore, in Qatipana, these questions are transposed within the Latin American context: what is the decolonial turn within digital platforms in their algorithmic causal assemblage, taking into account that the social assemblages that they articulate are, in first, assemblages of the sensible? In sum, we recognize the need to rearticulate the notion of modernity, that is, "the exterior created from the interior". In that context, border or liminal thinking is an epistemological position that emerges from the colonial difference, not as the result of rejecting modernity, but of reaching a way of thinking and feeling rooted in a body situated in the exteriority of modernity, what Mignolo calls an "epistemic disobedience" (Mignolo 2006).

A key moment in this debate about new media draws on the work of Martin Heidegger and Bernard Stiegler to explore the relationship between "media" and "technology," advancing the concept of mediation as an intrinsic condition of being in (and becoming with) the technological world. Indeed, mediation plays a key role in the production of agency and sensibility that operates through bio-informatization, algorithmic–digital calculations, and a "machinic" individuation process. To do so, we need a renovated theoretical framework and conceptual toolbox that allows us to distinguish between the question of mediation and the question of the media (information). This distinction is primarily heuristic (tentative and pragmatic), and the purpose of separating mediation from the media will be to clarify the relationship between them. Henri Bergson's (élan vital) philosophical method of division and reintegration, re-appropriated by Simondon (transduction), should be particularly useful for this analysis. In this section, we would like to qualify, if not effectively correct, this proposal by placing its ecological (or, as I would prefer to say, transductive) conception of the technological body in the context of recent theoretical debates on life and its correlation with the concept of human. Doing so will demonstrate that the Qatipana understanding of the incarnation of the living is more sophisticated than previously realized and that it is deeply rooted in a comprehensive theory of life.

[4] For Stiegler, the concept of epiphylogenesis "recapitulative, dynamic and morphogenetic accumulation (phylogenesis) of individual experience (epi), designates the appearance of a new relationship between the organism and its environment, which is also a new state of matter: yes the individual is an organic matter and therefore organized, its relationship with the environment (with matter in general, organic and inorganic), when it comes to a who, is mediated by this organized but inorganic matter that is orgonon, the tool with its teaching role (its role as an instrument), the what is in that sense, the what the who invents and the what as well as that one is invented by the latter"(Stiegler 2002).

[5] By introducing us to some lesser-known episodes in the deep history of digital machines and art, Qatipana attempts to address technology as the driver of today's world and the people who bring these machines to life in relationships/operations. With an eye on both the computable and the incomputable, Qatipana shows how computing emerges or does not emerge, how digital thrives but also atrophies, how networks interconnect while also fraying and falling apart. By rebuilding outdated technology with current software, this project shows how the past is brought to light in new ways, from intricate algorithmic patterns similar to weaving on a hand loom, to astonishing simulations of artificial life. As an update on the past, this project is also an assessment of all that remains unquestionable as we continue to live in the aftermath of this long digital age.

In his context, Simondon foregrounds the original coupling of embodied human life with what the Macy scientists called the "informational environment." As an original supplement (Derrida 1971) in the transductive correlate of the human body, information constitutes the basis of any activity that would (in)form the "epiphylogenetic" evolution of the human being (evolution by means other than life, following the concept of Stiegler). Here, we try to analyze the consequences of this radical gesture for our understanding of life, the human, and the state of the techniques in the union between them. As has been observed, the purpose of Qatipana's provocative program will be the constitution of architecture of reversible destiny and its most recent formulation of an ethic of crisis.

For Simondon, and this is his revolutionary contribution to philosophy, one should think of individuation not from the individual's perspective but from the perspective of the process that originated it. In other words, individuation must be thought of in terms of a process that not only takes the individual for granted but is its result:

> If one supposes that individuation not only produces the individual, one would not attempt to pass quickly through the stage of individuation to reach the final reality that is the individual, one would try to understand ontogenesis in the entire progression of its reality, and knowing the individual through individuation, rather than individuation through the individual (Simondon 2009b).

Therefore, the problem lies not in how techné leaves the domain of the human in the course of becoming technologies but in how these processes of "exteriorization" change the very concepts of number, image, comparison, space, time, or city (cf. Stiegler 2002). However, the anthropological category of "exteriorization" does not fully do justice to these processes, as they operate retroactively and recursively in the original techniques. For instance, along with the text and the book, the practice of reading has also changed in the course of digitization and the algorithmization of knowledge processing. Similarly, the concept and the practice of comparison have changed over time, later becoming an operation based on data extraction and machine learning. In an archaeological and mediatic way, we must consider the technological state of life as a starting point from which to ask what cultural techniques were used in the first place.

In sum, Simondon presents us with an integral conception of embodied life: one in which life is, from the beginning, bios, that is, a life endowed with a supplementary dimension: supplemented with the reason or politics that have co-determined the Western philosophical conception of the human being.[6] However, in Qatipana, the architecture of the supplement in question is not that of reason or its politics, but rather the supplement of its architecture itself: the original relationship of the "individual" properly speaking with something exterior, with the environment (Umwelt), the transduction of the architectural body itself. Suppose this original relationship forms the basis for subsequent transductive materializations of the body in the biosphere, up to the point of knowledge proper (the ontogenetic relationship envisioned at the beginning of this chapter). In that case, its bodily origins indicate affiliation with that other Greek term for life, *zoe*, the root of the same term (zoology) that is considered complemented in the epiphylogenetic evolution of humans and other species.

5 Conclusion

Recent developments in high-tech fields, such as robotics, nanotechnology, computer science, and the entire spectrum of genetics, bio, and neuroengineering, suggest that contemporary culture is not only on the brink of a new scientific revolution and technology but is already entering a qualitatively different period in its historical evolution. A distinctive feature of this period is the ultimate exploration of the foundations of living and non-living matter and the application of discoveries in this field to the physical nature of the human being. This is a radical departure from the past when the application of technologies was directed primarily to the outside world, not to humanity itself. It seems that the price of such scientific development has never been so high: humanity is beginning to reform itself according to its own conceptions of its biological structure and evolution.

Although the analysis surrounds our own experiences of the work during the investigation, we do not imagine Qatipana as a report on these commitments. Therefore, it is not surprising that these investigations between art, science, and technology set new precedents, fascinating and at the same time terrifying. What are the aesthetic and ethical implications of particular experiments in fields like bio-art? What are the prospects for the widespread application of new technologies? What kinds of worlds will they create? These are just a few of the questions that are subject to

[6] As Derrida (reading Rousseau's *Essay on the Origin of Languages*) points out, metaphysics consists in excluding non-presence, determining the supplement as simple exteriority, as pure addition or pure absence. What is added is nothing, since it is added to a full presence to which it is external. The paradox is that the addition is annulled because it is considered as a pure addition. The concept of origin or nature is then nothing more than the myth of the addition of supplementarity annulled by the fact of being purely additive (cf. Derrida 1971).

lively debate in these disciplines. In turn, Latin American artists have not kept themselves out of the public discussion about these developments, interpreting both the formal and conceptual characteristics of the new technologies in their works. In this text, we hope to have delivered some keys that are often overlooked in the assimilation of new technologies in the field of contemporary art. All the more as the critical approach raises from different colonized systems of meaning, making it crucial for those critical attempts to access the original system in which the critique is embedded.

We believe that digital practices, such as experimental works of art and representations, serve a crucial critical role and have an indirect (though undeniable effect) on the social and political. However, a redefinition of digital practices is certainly needed, since they question the very nature of our accepted ideas and belief systems regarding new technologies. In this sense, any challenge to understand the processes of decolonization must assume that traditional distinctions between art and technology are an external factor that faces processes of local syncretism ("mestizajes") that were not linked to the specific context of the reaction of Romantic philosophy to the Enlightenment. From this point of view, there is still much to be done in unpacking the historical techno-socio-epistemic processes that Latin America went through since the conquest. Andean peoples have known how to "andinizar" a large number of techniques originated in Europe, integrating them into their systems without severely undermining their identity, systemic unity, and its own logical cohesion. However, this process is far from being free of complications and risks: "enriched" Andean technology is progressively vulnerable to a growing number of "alien" technical elements originating from modern Western technology. Indeed, now "modernization" often means des-Andinization, making the process of syncretism increasingly unstable.

As Yuk Hui suggests, to think about the possibilities that open up when examining the machines of our present, it is essential to ask ourselves about the limits enclosing alternative ways of recognizing a diversity not only of machines but also of singular sensibilities. Anchored to borders from which we can visualize, feel, and coexist with other ways of dealing with our surrounding world. Such openness might well be summarized in Yuk Hui's words:

> "To open this ecology of machines, we will need first of all, to go back to the concept of ecology. The fundamental of ecology is diversities, since it is only with biodiversity (or multi-species including all forms of organisms including bacterial) that the ecological system can be conceptualized. To discuss the ecology of machine, we will need a different notion in parallel to *biodiversity*, which we call *technodiversity*" (Hui 2020).

Let this text be an artifact that invites us to generate questions not only about Hui's thoughts but also challenges us when interacting with those devices and machines that are also part of an incessant search to reveal the invisible and mysterious that interacts with us at every turn. In this context, we can precisely give life to the Qatipana symbiosis, an ontological cross between the artificial and the natural, the particular and the universal, whose communication extends to the informational and energetic plane. (cf. Filinich and Chibey 2020) Where can we recognize Latin American diversity so we can later develop it further at our own pace?

Data availability The author declares that [the/all other] data supporting the findings of this study are available within the article.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

Beer S (1981) The brain of the firm, 2nd edn. Wiley, Chichester
Bonet E et al (2000) Juan Downey. IVAM, Valencia
Botkin Daniel B, Keller Edward A (2010) Environmental science earth as a living planet. Wiley, Chichester
Derrida, J (1971) De la gramatología. Siglo XXI, Buenos Aires
Dunker A (2020) On technodiversity: a conversation with Yuk Hui. Los Angeles review of books. https://lareviewofbooks.org/article/on-technodiversity-a-conversation-with-yuk-hui/ Accessed 29 Jul 2021
Echeverría B (2001) La identidad evanescente: Las ilusiones de la modernidad. Tramasocial, Quito
Echeverría B (2010) América Latina: 200 años de fatalidad, *Sin Permiso*. https://www.sinpermiso.info/textos/amrica-latina-200-aos-de-fatalidad Accesed 29 Nov 2021
Filinich R, Chibey T (2020) QATIPANA: processes of individuation on the relationship between art machine and natural systems. Crit Hermeneut 4(1):65–88
Grondona A (2020) Los límites del desarrollo rebatidos desde el Sur. Circulación, representaciones y olvidos alrededor del Modelo Mundial Latinoamericano. Pasado Abierto Revista Del CEHis 11:76–94
Guzik R (2009) Investigación temática. De lo local a lo global, nuevas perspectivas en historiografía de la educación. Relaciones de un científico mexicano con el extranjero, el caso de Arturo Rosenblueth, Revista Mexicana de Investigación Educativa 14 (40)
Heidegger M (1997) La pregunta por la técnica (Trad. F. Soler). In: En J. Acevedo (Ed.), Filosofía, ciencia y técnica.Editorial Universitaria. (Original work published in 1954) 111-148
Hui Y (2017) On cosmotechnics. Techné: Res Philos Technol 21(2/3):319–341
Hui Y (2020) Machine and ecology. Angelaki 25(4):54–66
Hui Y (2021) Art and cosmotechnics. E-flux, Minneapolis
Johnson M (2000) Glosario. Archaeological theory. An introduction. Ariel, Barcelona
Lavanderos L, Massey K (2015) From manufacture to mindfacture. Business Science Reference IGI Global, Pennsylvania
Maturana H, Varela F (1972) De máquinas y seres vivos. Universitaria, Santiago de Chile

Mead M (1968) Cybernetics of cybernetics. In: von Foerster H and others (eds) Purposive systems: Proceedings of the First Annual Symposium of the American Society for Cybernetics. Spartan Books, New York and Washington, 1–11
Mignolo W, Tlostanova M (2006) Theorizing from the borders: shifting to geo- and body-politics of knowledge. Eur J Soc Theory 9(2):205–221
Perera D, Kousoulas S (2021) All is in formation: architecture, cybernetics, ecology. Footprint, n. 28, Faculty of Architecture and the Built Environment, TU Delft
Pickett et al (2007) Ecological understanding: the nature of theory and the theory of nature. Academic Press, Massachusetts
Sarduy S (1972) El barroco y el neobarroco: Obras Completas. G. Guerrero & F Wahl, Madrid
Simondon G (2009a) La Individuación: a la luz de las nociones de forma y de información. La Cebra/Cactus, Buenos Aires
Simondon G (2009b) The position of the problem of ontogenesis. Parrhesia 7:4–16
Simondon G (2015) Comunicación e información. Cactus, Buenos Aires
Stiegler B (2002) Tomo I: El pecado de Epimeteo, La técnica y el tiempo. Hondarribia: Hiru
Stiegler B (2020a) Noodiversity technodiversity. Angelaki 25(4):67–80. https://doi.org/10.1080/0969725X.2020.1790836
Stiegler B (2020b) Elements for a general organology. Derrida Today 13(1):72–94
Van Kessel J (1989) Ritual de Producción y discurso tecnológico. Revista Chungará 23
Varela F (1994) Identidad Somática y Sistema Inmunitario. In: De máquinas y seres vivos. Autopoiesis: la organización de lo vivo, Maturana, Humberto & Varela, Francisco. Universitaria, Santiago de Chile, 54–55
Viveiros de Castro E (2010) Metafísicas caníbales. Katz, Buenos Aires
von Uexküll J (2010) Milieu animal et milieu humain. Bibliothèque Rivages, Paris
von Uexküll J (2016) Andanzas por los mundos circundantes de los animales y los hombres. Cactus, Buenos Aires
von Uexküll J, Mackinnon, D (1926) Theoretical biology. K. Paul, Trench, Trubner & co. ltd.; Harcourt, Brace & company, Inc., New York
Wiener N (1948) Cybernetics or control and communication in the animal and the machine. Hermann, Paris
Wiener N, Rosenblueth A, Bigelow J (1943) Behavior, purpose and teleology. Philos Sci 10(1):18–24
Zehle S (2021) bauhaus imaginaries. Exploring transcultural archives of systemic design https://www.k8.design/hochschule/k8/projects-select/projects-details/bauhaus-imaginaries Accesed 18 Dec 2021

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