

Artistic Imagination Beyond Technotopic Futures

Imagination artistique au-delà des futurs technotopiques

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ABSTRACT

This essay¹ begins with the question what the future is and how humanity has attempted to predict and control it throughout history. Drawing on philosophers such as Rousseau, Bernard Stiegler and Yuk Hui the article unfolds the argument that the idea about the future is closely intertwined with the development of technology. The evolution of *tertiary retention* (Stiegler) and *tertiary protention* (Hui) leads to the contemporary situation in which the calculating techno-logos has become so ubiquitous that it has set the horizon for both utopian (e.g. futurism) and dystopian (e.g. cyberpunk) visions of the future. To overcome the ethical myopia of such discourses, we need to find a radical imagination beyond the techno-topic horizon. The essay discusses two interactive art-science projects “Mitigation of Shock” (Superflux 2017-2019) and “Aerocene Pacha” (Saraceno 2020) as examples which transcend the techno-topic framework by transforming technology from the inside. These works unfold beyond the images and narratives *about* technology. Instead, they utilize technoscientific instruments only to radically reverse thinking about what technology could be and how it could contribute to the creation of desirable futures. Rooted in the DIY ethos of experimentation and inventiveness these artworks raise heightened awareness of human interdependence with other non-human species and intelligences and profound concern for ecological balance. Grand narratives of the future, infused with enthusiasm or fear, are replaced with patience, care, and receptivity to the full complexity of situations in the present. The future in this case is neither abstract nor empty, and although fundamentally open to transformation, it is alive in the present. Such projects generate new forms of cognition and attune our senses to potentialities existing beyond the calculated probabilities, proposed as an automated self-reproduction of the technocratic logos governing existing socio-political forms of coexistence.

KEYWORDS

Future, tertiary retention, tertiary protention, technotopia, artistic imagination.

RÉSUMÉ

Cet essai s'ouvre par une interrogation : qu'est-ce que l'avenir, et comment l'humanité s'est-elle employée, à travers l'histoire, à le prévoir et à le gouverner ? En dialogue avec Rousseau, Bernard Stiegler et Yuk Hui, il soutient que l'idée d'avenir est indissociable de l'essor de la technologie. L'évolution de la « rétention tertiaire » (Stiegler) et de la « protention tertiaire » (Hui) a conduit à la situation contemporaine où le techno-logos calculateur, devenu omniprésent, fixe l'horizon des visions tant utopiques (le futurisme) que dystopiques (le cyberpunk). Pour déjouer la myopie éthique de ces discours, il s'agit d'inventer une imagination radicale, au-delà de l'horizon techno-topique. L'essai examine deux projets art-science interactifs — *Mitigation of Shock* (Superflux, 2017-2019) et *Aerocene Pacha* (Saraceno, 2020) — comme exemples paradigmatiques d'œuvres qui transcendent le cadre techno-topique en métabolisant la technologie de l'intérieur. Ces œuvres se déploient au-delà des images et des récits sur la technologie ; elles n'emploient les instruments technoscientifiques que pour renverser, à la racine, notre manière de penser ce que la technologie pourrait être et comment elle pourrait contribuer à l'invention d'avenirs désirables. Portées par un ethos DIY (Do It Yourself) d'expérimentation et d'inventivité, elles cultivent une conscience aiguë de l'interdépendance humaine avec les espèces et intelligences non humaines, ainsi qu'une attention exigeante à l'équilibre écologique. Les grands récits de l'avenir, habités d'enthousiasme ou de crainte, cèdent le pas à la patience, au soin, et à une réceptivité accordée à la complexité intrinsèque des situations présentes. L'avenir, en ce sens, n'est ni abstrait ni vide ; s'il demeure fondamentalement ouvert à la transformation, il est déjà vivant dans le présent. De tels projets engendrent des formes inédites de cognition et affinent

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nos sens aux potentialités qui excèdent les probabilités calculées — celles-là mêmes qui reconduisent l'auto-reproduction automatisée du logos technocratique régissant les formes socio-politiques existantes de coexistence.

MOTS-CLÉS

Avenir, rétention tertiaire, protention tertiaire, technotopie, imagination artistique.

*The future starts anew at any moment,
this moment is always in the present,
this moment is always now.*
Hito Steyerl²

*L'avenir,
Tu n'as point à le prévoir mais à le permettre.*
Antoine de Saint-Exupéry³

1. Introduction

Thinking about the future requires imagination. The future does not exist; it is yet to come. We may have knowledge of the past based on our experience, but we do not have the same immediate experience of the future. It is unknown and unpredictable, radically new and different from the present and the past. At the same time, we cannot resist being drawn into its gravitational field. The future becomes the present with equal inevitability for every being. Although it predictably arrives for each and every one of us, it is formless, without content, unwritten. Not in the sense of an unrecorded history that happened in the far-away depths of a distant past, which we keep no document of and cannot recover. Not at all. The future is the ultimately unwritten, unpredictable, and unimaginable – a history that does not yet exist and is still to be written. Yet we cannot let this fundamental, ontological openness simply “fill itself” with content. Rather, the radical openness of the future obliges us to *invent* what humanity and the world could be, and will be.

Origin of the concept of the future

² Hito Steyerl: *This Is the Future*. Portland Art Museum, 2019, <https://portlandartmuseum.org/event/hito-steyerl-this-is-the-future/>

³ “As for the future, your task is not to foresee it, but to make it happen.” Antoine de Saint-Exupéry, *La Citadelle*, Gallimard 1948, 164.

In *Discourse on the Origin of Inequality* (1755), Rousseau draws an idealized picture of the savage man abiding in a timeless state of blissful harmony with nature and his consequent falloff into a state of civilization. It is precisely that fall out of the garden of Eden which introduces temporal progress and the idea of the future into the world.

Rousseau imagines the ideal man as living outside the inevitable turning of time. The origin myth is placed in the first part of the *Discourse* and is preceded by a general introduction, which explains the necessity of such fictional approach. "Let us begin then by laying all facts aside" (Rousseau, 1993, p. 50). Facts will lead us nowhere "as they do not affect the question" situated outside the empirical domain of history (*ibid.*). Yet the fable is certainly not in the domain of pure fantasy either, because there is some evidential necessity that dictates its fabrication. Evidence, which dates back to before all facts.

The primordial man is primordial because of his direct symbiosis with nature. He is not yet seduced by the artificial in the form of artifacts and technologies (Rousseau, 1993, p. 52-53). Without the mediation of his technical prostheses, the natural man is healthy – as healthy as a man can be – and "the only instrument he understands" is his own body (*ibid.*, p. 53). In him there is no fissure that would be provoked by a process of differentiation beyond himself, since he depends on nothing external to his body. Civilization and its associated technical progress is what will weaken him. While the civilized man depends on tools and machines that can always prove insufficient, the man in the primordial state has the advantage of constantly having all his forces at his disposal, of being always prepared for any event, and of carrying himself "perpetually whole and entire" (*ibid.*, p. 54). Being self-sufficient, he knows no social alliance and feels no need to belong to larger communities. The Aristotelian *homo politicus* comes only with the "fall" of the soul into factuality.

Everything is identical for this original man, who has no notion of otherness. Yet, it is precisely that ability to become other which is the very essence of time. "His soul, which nothing disturbs, is wholly wrapped up in the feeling of its present existence, without any idea of the future, however near at hand; while his projects, as limited as his views, hardly extend to the close of day" (*ibid.*, p. 62). Since the original man has neither imagination, nor future, nor even memory or past, he is almost devoid of love or any desire.

[E]verything seems to remove from savage man both the temptation and the means of changing his condition[...] His imagination paints no pictures; his heart makes no demands on him. His few wants are so readily supplied, and he is so far from having the knowledge which is needful to make him want more, that he can have neither foresight nor curiosity. (Rousseau, 1993, p. 62)

In this way nature guarantees not differentiation, but equality of all. Everything repeats itself in an identical manner and this identity guarantees the strengthening of the same to the maximum degree of which humanity is capable. While residing in this primitive perfection, the primordial man is unaware of his own mortality (ibid., p. 56), and this positions him outside of time. He knows neither past nor future and dwells in a constant present. His denaturalization occurs the moment he becomes aware of his own finitude and imperfection. The consciousness of mortality is what constitutes rational knowledge, passion, and projection toward the future. Freedom, as an expression of the pursuit of perfection, replaces the blissful state of perfection. To that end, reason expands the human horizon beyond the immediate and develops itself as a capacity for foresight. The idea of the future is formed as an anticipation of the possible – what by its nature is not immediately here and now, but which we may fear or desire as something that could come to pass. Possibility is essentially an opening toward the future, which does not exist for Rousseau's original perfect man, because that would imply some insufficiency, a striving to project outside oneself, and a capacity for change. In this sense, with the introduction of the concept of time, the soul falls from pure being into becoming. The becoming of time unlocks the possibility for a thing to change by renouncing its identity in the next moment, to become something different from itself – to develop, to evolve, but also to degrade, to disintegrate, to decay, and to admit inessential, accidental characteristics into itself. To have a future means first of all to “fall” into time, to be imperfect and unfinished.

For Rousseau, the maximum is at the beginning, and the fall begins with civilization. Civilization leads to disintegration through decay, through consumption, through exteriorization into objects and technologies. And this leads to a world in which nothing is immediately at hand anymore. When everything turns out to be mediated and instrumentalized, the primordial man finds his world destabilized. Technological mediation between nature and man is the source of social inequality and the need for ethical norms to overcome it.

In this speculative narrative about the origin of man, we see that the birth of the idea of the future goes hand in hand with the development of the concepts of the

technological and the ethical. The need for ethical reflection arises with the emergence of society and inequality. Society and inequality, in turn, are an inevitable consequence of the realization of human finitude and the necessity of overcoming it through artificial adaptations, namely techniques. The term "techniques" includes both material tools and symbolic artifacts, that is, cultural codes, rituals, language, communication skills, etc., which follow certain rules (algorithms). "Techniques involve both gestures and tools, sequentially organized by means of a 'syntax' that imparts both fixity and flexibility to the series of operations involved" (Leroi-Gourhan, 1993, p. 114).

The vision for the future in historical perspective

"Knowledge of the future is a contradiction in terms," writes Bertrand de Jouvenel (de Jouvenel, 1967, p.5). And yet, since the dawn of civilization all peoples have created rituals and practices to predict the future and to tame the fundamental uncertainty that each new day brings. In the following pages, we will trace how the idea of the future has transformed from something predetermined and stable to something open to continuous innovation and change. In this historical overview, we distinguish two types of processes: the drive to foresee and the practices of intervening in the future.

All ancient civilizations knew some form of divination. Knowing the future was the prerogative of the gods, a gift of prophets, oracles, and clairvoyants, of witches and magicians, and not least of astrologists (Adam; Groves, 2007, p. 2-3). Traditional methods are aimed at finding answers about specific events and destinies. Greek mythology tells us that before taking a significant decision one often sought the counsel of oracles, the most famous of which was at Delphi. We are all familiar with the story of Oedipus and how attempts to prevent the fate predicted by prophecy only leads to its fulfillment. Even a god cannot change a predetermined fate, concludes Herodotus while narrating the story about King Croesus of Lydia (Herodotus, 2008, Book I, p. 6-94). Fortune tellers, shamans, prophets, and astrologists share the assumption that the future is predetermined and that special esoteric skills are required to reveal its secrets.

Traditional techniques for intervening in the future include habits, customs and rituals, as well as laws, rules and moral codes that make the behavior of others predictable and enable a certain degree of control over the unknown (Adam; Groves,

2007, p.8). In this case, the use of social institutions and practices is how the future is domesticated, and uncertainty is limited enough to make social interaction possible. The fear of death is overcome through ritual and religious practices. Myths of heroism respond to the need for immortality, and permanence is ensured through the production of artifacts that outlive their creators. In this spirit, according to a popular Arab proverb “Man fears time, but time fears the pyramids.”

This kind of continuity, embodied in material artifacts (books, technical instruments, media, artworks, etc.) and cultural techniques, Bernard Stiegler recognized as “tertiary memory” (Stiegler, 1998, p.246). Tertiary memory is the collective historical and cultural experience that becomes individual experience without being directly lived. By internalizing this external memory, the individual becomes a mature subject and active member of society, while collective memory “comes alive”. Instead of starting from scratch with each generation, we are born into a technically organized symbolic order whose past (the so-called “tradition”) we accept as our own. This continuity, on the one hand, helps transmit and preserve collective experience through the ages, but on the other hand, it is also the mechanism that allows a society to set new horizons for its development by transforming its tertiary memory.

While other living organisms evolve by adapting according to the principle of natural selection, humans evolve also technically, using tools to create new possibilities that extend the scope of any biological program (Stiegler, 1998, p. 151). Stiegler borrows from Leroi-Gourhan the concept of “adoption” to designate the way in which we inherit the technical knowledge accumulated by society. To adopt a technology, we must interpret it through the prism of our world and thus rethink and transform it. The degree of adoption is what determines our ability to participate in defining the values and building the institutions that are the fabric of our technologically mediated environment. Through the adoption of different techniques and codes we create difference, at an individual (*individuation*) or collective (*transindividuation*) level (Simondon, 1989). Individuation implies a process of increasing self-differentiation of the individual from its previous self by assimilating new cultural codes, technologies, skills and knowledge. This process allows for the active invention of future selves and consequently for the transformation of the passive individual into a unique person with a recognizable role in social and cultural life. Transindividuation implies the same process of self-construction and self-differentiation on a collective level – at the level

of a given community (for instance a tribe, an ethnic group, a nation, or even all of humanity).

At the end of the 16th and beginning of the 17th centuries, the evolution of tertiary memory leads to a transformation in the ways of predicting and intervening in the future. With the development of modern science, the first attempts are made to forecast the future on the basis of empirical data and their rational analysis. General rates of change, rather than individual destinies or unique events, become the focus of prognostic attention. With the application of statistical calculations, it becomes possible to extrapolate existing data about groups of people and facts into the future and to predict social patterns with surprising accuracy. This is the beginning of probabilistic calculations. As Richard Lewinsohn notes, “[p]robability statements are merely projections of the past into the future, on the assumption that the causes – no matter whether they are known precisely or not – will remain the same and continue to have the same effects” (Lewinsohn, 1961, p. 248). It has also been established that the larger the data sample, the closer probabilistic forecasts come to the final result. While this method of prediction does not do much to inform people of their personal fates and fortunes, it significantly improves socio-political planning and policy.

Whereas archaic predictions draw their knowledge from a timeless dimension of “eternity”, in which the future exists in some form, scientific forecasting relies entirely on knowledge of past facts. If there are no existing collections of past facts (databases), scientists would have no sure basis on which to calculate the future. This evolution of tertiary memory leads to a new understanding of the future and the horizon it sets for potential projections – individual and collective. The future displaces the past as the projection of the “golden age” of a given society (Adam; Groves, 2007, p. 54). Utopian literature is born, as is the idea of progress as a guiding value that sets the ethical framework of new societies. This framework is based on a theory of continuous improvement, displacing the traditional myth of an idyllic past – take for instance the “Garden of Eden” from the Old Testament – and a present that grows ever more distant from its golden age. The goal is not to recreate tradition and the divine plans and laws embedded in it, but to create new models of social harmony and happiness through scientific and technical control over nature. Faith in providence and divine causes is replaced by reason and the past-based causal determinism of the new physical sciences.

Belief in progress means that the future cannot be predetermined or given. Instead, it must be emptied of content and opened to development and change. The ends are not predestined by external sources (gods and ancestors) but are established by the people who exist in the present. This fundamental shift from providence to progress forces the cycles of repetition in the ancient understanding of time to break open to form a line with a single direction – namely from the past to the future.

The future becomes an abstract, objective and empty concept within Newtonian mechanics (ibid., p. 72). This makes it the subject of scientific predictions based on extrapolating mathematical relations between phenomena beyond the present. The value of potential futures gets decided with the help of statistical methods for quantifying future gains and losses that result from each of the alternatives. The decisions about the future and the fate of the community are no longer determined by common value shaped by tradition. Instead, ownership of the future passes into the hands of fragmented individuals through the mechanisms of economic choice. Gradually, at the end of the 20th century, the grand narratives of perfection and progress from the modern era are replaced by as many pursuits of profit as there are agents (ibid., p. 72).

The evolution of tertiary memory in the 21st century reinforces these tendencies even further. The past turns into a present archive of digitized databases that provide the source for an extrapolation into the future calculated by computational models. Analyzing the forms of prognosis carried out by predictive algorithms – such as various recommendation systems like Netflix, Amazon, etc. – Yuk Hui observes that the evolution of tertiary memory has reached a stage where, from being a passive bearer of a community's collective memory, technical objects have turned into an active form of "tertiary protention" (Hui, 2018, p.146-147; 2021, p. 80-81). Cognitive machines are no longer only a passive medium for memory support, but actively participate in the knowledge acquisition and future imagination. Tertiary protention is an automatic projection into the future that usurps or marginalizes the individual's active directedness. It is "a form of anticipation that is no longer my own subjective projection but rather a projection that is imposed on me and proceeds ahead of me" (Hui, 2021, p. 80) organized by technical automation. The autonomous and fragmented individuals of the modern era find themselves drawn into the mechanisms of algorithmic preemption, recommendation, and attention-grabbing, with no way to step outside the horizon set by the logic of development of the technical system itself.

In other words, remaining just as fragmented, they are by now far from those autonomous individuals driven by the libidinal economy of desire.

As a result, in the contemporary era of so-called “artificial intelligence”, attention, perception, and imagination are reduced to capacities for selection, while the options for choice are set by predictive computational models. These systems, foundational to the digital economy, rely on the extraction, archiving, indexing and statistical analysis of user behavior. Their algorithmic *logos* turns every particle of analog data, energy or matter into computable streams of digits, just as King Midas turns into gold everything he touches killing it in the process. Human attention, choices, emotions, desires, weaknesses, preferences, gestures, movements and kinetic energy are captured by the algorithms and converted into streams of digital data that are used by neural networks to preventive steering of human attention and the suggestion of future choices, preferences and gestures. The existential time of each individual, which is unique and immeasurable in its essence, is fragmented and reorganized so that it becomes comparable in the form of automatic predictions that guide behavior (Hui, 2021, p. 81). Carried out on a global scale, predictive automation overshadows humanity's collective imagination of the future by replacing it with mechanical and homogeneous forecasting based on recycling past patterns of behavior. The automatic projection sees the future as a straight timeline of constant technological progress, encompassing the globe and leading to the transhumanist singularity. This is a future that has no real alternatives and will inevitably “arrive at us” (Hui, 2021, p. 82), following the inexorable logic of technological development.

Bernard Stiegler likewise warns of the dangers of adapting to such a passive becoming (*devenir*), which leads to entropy, and contrasts it with the incalculable future (*l'avenir*), which is open to genuine transformation and differentiation and which we embrace by actively projecting ourselves forward. The notion of becoming, defined as changing states linked by cause and effect, does not by itself constitute a future, but must be understood as the basis that can be transformed into a possible future: “If the to-come is not the future, there is no future without the to-come, but there is a to-come without future” (Stiegler, 2011, p.176). Simply equating becoming with the future amounts to a kind of mechanical nullification of the future. In his later works, Stiegler analyzes this kind of future-less becoming through the lens of automation as: “the fatality of an *automatic becoming* [*devenir automatique*], that is, a becoming without a future [*sans avenir*” (Stiegler, 2013, p. 53).

To counter this, we must produce singularities that are irreducible to such a uniform sequence of becoming. It is these distinctions that generate a multitude of new and unexpected possibilities for the future. Differentiation, however, does not happen by itself, but is born through the *critical adoption of scientific and technological achievements*. In the contemporary epoch, the sciences and technologies merge into a common instrumental approach that serves the interests of investing capital. To resist the mechanized becoming organized by capital and technoscience, we must begin to explore alternative possibilities for inventing the future through systematic experimentation with the latest technologies (Stiegler, 2011, p.191).

With the recent breakthrough in artificial intelligence, our ability to understand the world and give it meaning seems more than ever intertwined with the digital tools that shape our lives. Resistance to an automatic future does not consist in destroying the algorithms that steer it, but in rethinking technology beyond the consumerist principle and industrial forms of overexploitation. It is not possible to open up a future simply by interrupting the flow of becoming in some way through the pure destruction of existing social structures or the complete rejection of existing technologies. What we must seek is the transformation of becoming into future through a dynamic reformulation of the relationship between the indeterminate and the calculable, the improbable and the probable. If we want to remain architects of our own future, we must be able to think about these developments not so much critically as creatively.

Art would therefore play a key role in liberating the potential for imagining a future beyond the limits of industrial expectations. The strength and persistence of the creative impulse are fueled by the longing for “that infinity of the desirable” (Stiegler, 2010, p.47), which makes it incalculable. It becomes an unattainable ideal that remains beyond the logic of capital and drives the sublimating potential of desire to constantly overcome its own limits and project itself into the future by the way of individuation (Stiegler, 2010, p.42-43).

Utopian vision of the future

The art that is most openly obsessed with the future was defined in 1908 by Filippo Tommaso Marinetti in his “Manifesto of Futurism”. In its historical time, it was quite a radical document.

We will sing of the great crowds agitated by work, pleasure and revolt; the multi-colored and polyphonic surf of revolutions in modern capitals: the nocturnal vibration of the arsenals and the workshops beneath their violent electric moons: the gluttonous railway stations devouring smoking serpents; factories suspended from the clouds by the thread of their smoke; bridges with the leap of gymnasts flung across the diabolic cutlery of sunny rivers: adventurous steamers sniffing the horizon; great-breasted locomotives, puffing on the rails like enormous steel horses with long tubes for bridle, and the gliding flight of airplanes whose propeller sounds like the flapping of a flag and the applause of enthusiastic crowds (Marinetti, 2009).

The technologies described – some familiar and others, like airplanes and the automobile, still new at the time – are depicted as beautiful, often fast, and almost always dangerous and “violent”. The last feature makes the technologies even more exciting, whether it is the knife-like glint of bridges or the steering wheel associated to a guillotine. This is a call to the future, heard by the technology-obsessed Futurists of the early 20th century.

So badly did the Futurists yearn to leave the past behind, both as aesthetic sensitivity and as political system, that they advocated full eradication of history. In this vein, they called for the destruction of museums and libraries and the embrace of the brutal machine logic of the modern world. “For art can only be violence, cruelty, injustice” (Marinetti, 2009). In one of his manifestos, “Marinetti calls on futurists to ‘dehumanize’ the voice and to ‘metallize’ the face, to render the body as anonymous as ‘semaphores’ and as geometric as ‘pistons’” (Foster, 2004, p.122); in another, he proposes merging the pilot with the airplane (*ibid.*). The Futurists are directed to accelerate the prosthetic evolution of the human species so that the new man of modernity is “endowed with surprising organs: organs adapted to the needs of a world of ceaseless shocks” (Marinetti *qtd in ibid.*).

The fantasies of the Futurists and their value system are tinged with misogynistic, racist and colonial overtones, which make them at times downright retrograde and conservative, rather than revolutionary and progressive. According to testimony by Mussolini himself, Futurist ideas and aesthetics played a key role in shaping the propaganda tactics and media profile of Fascism (Gentile, 2003, p. 41).

The lack of creative reflection on the vaunted new technologies is evident also in the style in which these topics are addressed. *Poupées Électriques* (1909), the only play written by Marinetti, is a conventionally structured psychological drama whose main interest lies in attributing human emotions to the behavior of machines (Patterson, 2005). By 1912, Marinetti sought to revolutionize style and typography. He

called this new type of literature “words set free” (*le parole in libertà*) (Marinetti, 1914). Liberated words destroy syntax, use verbs in the infinitive, eliminate adjectives and adverbs, suppress punctuation and employ mathematical and musical symbols. Despite their innovative stylistic potential, these onomatopoeic imitations of city sirens, war explosions and clattering bursts of the typewriter serve more to directly replicate the noise of the world rather than to free themselves from it. In their visual art, the Futurists adhered to established painting techniques, such as the brushstrokes of the Neo-Impressionists, adapting them to the subjects of the modern city. In *The City Rises* (1910), with similar brushstrokes Umberto Boccioni portrays the metropolis as a colorful storm, more powerful than any in nature, in which construction is barely distinguishable from destruction. For the Futurists, the creative power of modern technologies lies in their destructiveness. In his essay “The Work of Art in the Age of Mechanical Reproduction” (1936), Walter Benjamin writes that in Futurism “self-alienation has reached such a degree” that humanity “can experience its own destruction as an aesthetic pleasure of the first order” (Benjamin, 1969, p. 242).

In short, the Futurists see revolutionary potential in technology, but their approach can be regarded as an uncritical embrace of a technological determinism. Just like contemporary transhumanists, they seem to believe that the logic of technology alone will lead to a new stage in history and alter humanity for the better. It seems that they preferred “to be driven by the automobile more than to drive it” (Montfort, 2017, p.56).

Futurism is a vivid example of a utopian vision of the future within a technotopic horizon. Its creative impulse is directed more toward adapting to the pace of mechanical becoming (*devenir*) rather than challenge it with an innovative vision of the future (*l’avenir*). Even though in the early 20th century simply adapting to the new machines (airplanes, automobiles, photography, cinema, telegraph, etc.) and learning to use them for their intended purpose required effort, Stigler insists that such adaptation would be a far too passive reaction to what is happening, which bursts upon us and develops independently of us.

Dystopian visions of the future

In the 1980s, cyberpunk culture emerged – bringing forth dystopian and often overtly nihilistic imaginaries of the future. Its modes of expression reactivate the

Romantic poetics of the eighteenth and nineteenth centuries – particularly their preoccupation with the sublime, the uncanny and the transgressive – while simultaneously renewing Futurism’s aesthetic investment in the world of machines. Unlike Futurists, however, authors such as Bruce Sterling and William Gibson formulate a literary and aesthetic program that counters the utopian teleology of early science fiction. Rather than enthusiastically endorsing the technological progress, they attune their audience to the disorientation, fragmentation and sensory overload brought forth by a “future shock” as theorized by Alvin Toffler (Toffler, 1970). For them a society that rushes headlong toward the premature arrival of the future (*ibid.*, p. 11) appears dangerously naïve. They advise against an uncritical reliance on technology and emphasize its potentially pernicious consequences.

Gibson's *Neuromancer* (1984), perhaps the most iconic cyberpunk novel, seems to invest in an escape into the past, rather than materialize a desire for alternative future. Its obsessive migrations into cyberspace register a desperate attempt to flee the cumbersome, ailing and tormented “flesh”. This gesture is no longer a metaphysical ascent from matter toward Hegelian Spirit or Ideas, where the Self finds its true home, but a disassembling of the Self within the machine matrix: not a disembodied quasi-divine Self, but a disintegrating, wounded one. What manifests in cyberspace as secondary processes of memory, experience and data acquisition corresponds, at the level of the flesh, to scars, damage and pain.

Beyond its foundational literary works (e.g., *Neuromancer*, 1984) and cinematic expressions (e.g., *Blade Runner*, 1982), cyberpunk proliferates across a wide array of audiovisual media, including American comic books, Japanese manga and anime (e.g., *Akira*, 1988; *Ghost in the Shell*, 1995), video games, tabletop role-playing games, music, and even fashion. Cyberpunk narratives have played a crucial role in articulating and interpreting the complexities of the contemporary technocultural epoch. In the twenty-first century, many of the genre’s once-dystopian projections have, to a considerable extent, become features of everyday life. Cyberpunk literature is marked by its engagement with technological phenomena such as virtual communication, digital networks, and emerging social media platforms; advances in genetic engineering and increasingly common prosthetic augmentations of the body; the mediated intimacy of global historical events and cyber warfare conducted through disinformation and hacking; and the progressive virtualization of financial capital. Fredric Jameson identifies cyberpunk as the supreme literary

expression of late capitalism itself (Jameson, 1991, p.419), describing it as “as much an expression of transnational corporate realities as it is of global paranoia” (*ibid.*, p. 38).

The anthology *Mirrorshades* (1988), edited by Bruce Sterling, attempts to outline the contours of the emerging cyberpunk subculture and to expose the tension between the rebellious sensibility of the solitary outsider and the movement’s growing visibility as it edges toward the cultural mainstream. Cyberpunk, Sterling argues, produces “the overlapping of worlds that were formerly separate: the realm of high tech, and the modern pop underground” (Sterling, 1988, xiii). Cyberpunk authors confront a new stage of science and technology – “pervasive, utterly intimate” – that penetrates “under our skin” and “inside our minds” (*ibid.*, xiv). Consequently, the dominant themes running through cyberpunk narratives include “body invasion: prosthetic limbs, implanted circuitry, cosmetic surgery, genetic alteration,” alongside the “even more powerful theme of mind invasion: brain–computer interfaces, artificial intelligence, neurochemistry—techniques radically redefining the nature of humanity, the nature of the self” (*ibid.*).

In *Schismatrix Plus* (1996), Sterling elaborates cyberpunk’s posthuman imaginaries, envisioning futures in which technological evolution fundamentally reconfigures the human. The novel’s two dominant factions – the Mechanists and the Shapers – embody divergent yet equally “barbaric” or non-human orientations: on one side, the mechanized cyborg stripped of compassion and empathy; on the other, the “enhanced” *Übermensch* marked by a sense of superiority bordering on racialized elitism. The narrative oscillates between nihilism and a kind of tech naïveté, wavering between fascination with and suspicion of future technologies. In a gesture reminiscent of Rousseau, Sterling attributes the dissolution of human societies to the unchecked advance of science and technology as impersonal, destabilizing forces. He observes that new “sciences and technologies had shattered whole societies in waves of future shock” (Sterling, 1996, p. 304).

Addressing cyberpunk’s persistent Cartesian dualisms – self/other, flesh/spirit, material/virtual, biological/technological – Nicola Nixon argues that “cyberpunk fiction is, in the end, not radical at all. Its slickness and apparent subversiveness conceal a complicity with ’80s conservatism” (Nixon, 1992, p. 231). The genre ultimately promotes an ideology in which extreme individualism, alienation and the fragmentation of subjectivity appear as unavoidable responses to the

accelerating pace of technological innovation. Despite its critical charge, cyberpunk culture helps “onboard” (Steyerl, 2025, p. 74) broad segments of society to the idea that invasive technologies can and will permeate even the most intimate aspects of everyday life. At the same time, it fails to offer any substantive alternatives to the dominant techno-industrial paradigm. In this sense, cyberpunk also fails to transcend the technotopic horizon that continues to shape aesthetic sensibilities and ethical norms in the contemporary world.

Beyond the technotopic horizon of the future

In the following pages, we will look at examples of art that goes beyond the technotopic horizon, while neither rejecting nor glorifying existing technologies. Instead of telling stories *about* technology, this art rethinks and *transforms it from within*. As a result, the direction of technological determinism is reversed. Instead of techno-*logos* generating the imaginary horizon for the evolution of culture and human nature, aesthetic and human values determine how technology will develop and be used. New ethical values, attuned to the transformations of the historical epoch, arise spontaneously from the local interaction of various living and non-living agents.

Mitigation of Shock – Superflux (2017-2019)

Superflux's art-science project *Mitigation of Shock* is a real-life experiment that transports visitors into the near future of climate change and the associated scenarios of food insecurity, economic and political instability, and social fragmentation.

I still remember the day we moved into this flat. It feels like a dream now; like someone else's life. The way we lived, the things I was thinking about back then, the things that concerned me. I was old enough to buy my own home, but in many ways, I was like a child. I guess we all were. Like spoiled teenagers, we had everything we needed but always sought the things we wanted and didn't have. I can hardly imagine taking anything for granted now. When everything was certain, nothing meant anything. Now nothing is certain, but everything we have is like a blessing. Take the neighbors who live in this block for instance. I never used to like them. I don't know why. Probably their taste in music or something. [...] To be honest, they still have a terrible taste in music. But now we share this deep sense of solidarity and mutual dependence. We don't know what we'll face tomorrow, but whatever it is we know we'll face it together. Not because of some shared political viewpoint or because we read the same books, or whatever it was that I once used to judge friends from strangers. [...] The point is, we're in this together. Not because of some vain affiliation, but because of everything we face together, and because we've seen what happens to those who try to face it alone. Like the people who thought the prices in the supermarket will come back down again or the empty shells will soon be full. Like those who once thought the market could fix a global famine, like feeding billions on a dying planet with a

broken climate could simply be a problem of economics. Actual madness. Collective psychosis. A lot has changed over the years. I still remember the time when there were people out on the streets shouting, fighting, smashing stuff up. But slowly we found ways of working together. Now we get together, we build and experiment to see what works. We look out for each other. And when an experiment fails everyone covers the shortfall. And if it succeeds, we share the knowledge and it becomes everyone's success. If there's one thing that really hit home for me, it's that everything is interrelated and interdependent. It's been a hard lesson but I think we all made peace with it now. I just wish we could've learnt it a little sooner. (Superflux, 2017, voice over narration)

To create a sensory and immediate experience of such a world, the Superflux team furnished an apartment in London as it would look in 2050 and another apartment in Singapore as it would look in 2068. Once comfortable living spaces designed for a world of automated living, global commerce and material abundance, the apartments have been adapted to a future that was not supposed to happen. Newspapers scattered around and the current radio program reflect the tension in this new world of extreme weather conditions caused by climate change, in which global supply chains are collapsing. Recipes in the kitchen and books on the shelves reveal the changes in the production, storage and consumption of food. Everyday goods are frequently unavailable or have become expensive luxuries.

The visitor of the apartments sees a mini-workshop and internet-connected devices that continue to operate at the fringes of the space, attempting to connect to networks and services from a long-vanished world. Experimental food-growing shelves occupy the space. Repurposed computers monitor humidity and temperature. An artificial DIY ecosystem – called "fogponics" by the authors – grows edible vegetation using a nutrient mist that allows plants to absorb more nutrients, use less water and grow faster than in soil (Superflux, 2017, p. 2019).

Scattered around the apartment is evidence of experimentation with other types of food sources: gathering insects, trapping wild urban animals (in London) or urban aquatic creatures (in Singapore), growing mushrooms and wild herbs, raising worms and preserving food. These changes in food production, procurement and storage have led to the development of new recipes that seek to maximize the available proteins, micronutrients and vitamins. Improvised recipes for dishes – among them worm burgers, fried cockroaches with wild peppers, and fox stew – can be found scattered around the kitchen. The titles of the books on the shelves are no less telling: *Pets as Protein; Food for the Home Producer; Diet for a Small Planet; New Meat: Family Cooking with Alternative Protein; How to Cook in Times of Scarcity*, etc.

This future is far from the abundance of our present. The apartments' inhabitants have learned to see new value in frugality, resourcefulness and ingenuity. Local practices of exchange and trade have developed in the place that was once occupied by global capital. Local networks of trust and cooperation compete with state infrastructures of governance.

Outside the window improvised shelters and dwellings are visible, inhabited by people displaced from low-lying areas due to rising sea levels and extreme weather events. Greenhouses are installed on the roofs. Smoke rises from sites of civil unrest.

The imaginary re-creation of a potential future is not limited to the climatic consequences of global warming, thereby taking into account the complex combination of intertwined forces, such as public infrastructure, transportation, energy, water, housing, individual technological adaptability, autonomy, community representation, and more. The impact of these key variables is skillfully manifested in the tiniest details of the space, highlighting the complexity of the envisioned future world and the interdependencies between various game-changing factors.

It is this concept of interdependence that ultimately led us to the final outcome. Over the course of the project, we realised how important it was to explore our deeply entangled relationships with other species and non-human entities. To explore what it would mean to design not simply “tools” that do our bidding, but to design with a more-than-human approach; to design as co-inhabitants of the same complex, ecological system in which humans and non-human species co-exist. A reminder that we don't exist in isolation. We never have. But now we are entering a time where we can no longer live in the illusion of isolation, we can either embrace this new understanding and work with its implications or face the hubris of our inaction. (Superflux, 2017)

The process of creating the project differs notably from the classic approaches in science-fiction texts (literature, audiovisual and performing arts) that unfold utopian or dystopian visions of the future. First, the Superflux team conducts extensive research on climate change, accompanied by in-depth interviews with experts from NASA, the UK Met Office and the Future Forum, along with independent specialists in biotechnology, the social sciences, agriculture and economics. Drawing on this research and other scientific methods of data collection, the authors carry out a prognostic analysis (Superflux, 2017). This analysis provides the model of the near-future world that the team then physically builds.

Exploring various materials and methodologies, the authors fabricate prototypes of alternative food-production systems. For that purpose, they hack high-tech tools and smart devices, combining them with cheap or discarded materials.

Much like scientific practice, achieving the final results requires multiple iterations of experiments and repeated readjustments of customized apparatuses until they function properly. After many months of trial and error, stacks of mushrooms, cabbage and chili peppers begin to thrive in an optimally lit indoor environment, with the plants sustained at a controlled temperature by a nutrient-dense fog. Green, bubbling tanks of spirulina flourish, glowing beside a mealworm farm. In line with the hacker's ethos, the creative team at Superflux has open-sourced the instructions for building the computerized ecosystem so that it can be "adopted" (in Stiegler's sense) by ordinary households for the purposes of their autonomy and survival (Superflux, 2017).

Mitigation of Shock is not merely a speculative fiction, but a whole world situated in the future that can be inhabited, albeit briefly, in the present. The technologies that are part of this future are not merely described, but *invented, manufactured and embedded* in the fictitious world. They are an integral part of both the preparation of the art project and the art installation itself. Moreover, these new technologies are invented according to a hacker's ethos that is neither the Luddite ethos of rejecting technical progress, nor the transhumanist ethos of late capitalism, where global exploitation of resources, ruthless consumerism and the naïve belief that all problems are solved only with more and newer technologies reign. The hacker's mindset is technologically savvy. It is an attitude of experimenters who value localized collaborations, the autonomy of small collectives, awareness of the mutual dependence and coexistence of humans with other non-human species and intelligences, and a sensitivity and care for ecological balance. The grand narratives of the future, infused with enthusiasm or fear, are replaced with patience, care and sensitivity to the full complexity of present situations. This type of sensibility knows how to "stay with the trouble" (Haraway, 2016) and studies "the arts of living on a damaged planet" (Tsing *et al.*, 2017). Such understanding of the future remains fundamentally open to unexpected events, all the while refuting the "abstract" and "empty" concept of modernity that turns alternative futures into calculable variables of profit. The future that *Mitigation of Shock* depicts is neither abstract nor empty, and although open to transformation, it is alive in the present. It inhabits the relationships that establish the interdependence of things and that contain the potential to trigger unforeseen and unforeseeable consequences.

Aerocene Pacha – Tomás Saraceno (2020)

Another example of a project that goes beyond the horizon of technotopic thinking about the future is the sculpture-flying apparatus *Aerocene Pacha* by the Argentine multimedia artist Tomás Saraceno. On January 25, 2020, a hot air balloon lifted pilot Leticia Noemi Marquez into the sky and landed her safely back on the ground, using only the sun and air as energy sources. The flight lasted 16 minutes and the distance traveled was 668 meters. The slogan “Water and life are worth more than lithium” was manifested on the balloon. The flight was carried out without the use of fossil fuels, lithium batteries, solar panels, helium, hydrogen or carbon emissions, making it the most sustainable human flight in aviation history and earning it 32 world records recognized by the World Air Sports Federation (FAI) (Saraceno, 2020).

“Humans have always dreamed of flying. Today, that dream has become a nightmare. What if we could fly differently?” poignantly asks Saraceno (Saraceno, 2020). In answer to his own question, he creates not just a fictitious vision of future technologies, but the technology itself that overturns our notions of traveling by air. His aerosolar performance aims to open up prospects for a new technological era without toxic air pollution and without exploiting local communities or the environment.

To accomplish his project, Saraceno collaborates with representatives of the 33 indigenous communities of Salinas Grandes, descendants of the ancient Incas, whose existence is threatened by lithium mining on their lands. The first flight is accompanied by a ceremony in honor of Mother Nature, Pachamama, which is where the project gets its name. In Incan cosmology, Pachamama is the spatiotemporal connection that links the subterrestrial, terrestrial and celestial realms. “Lifted only by the sun, carried only by the winds, the free flight embodies an ethical commitment to the atmosphere and planet Earth, towards re-understanding how to ‘fly with our feet on the ground’” (Saraceno, 2020). Saraceno sees his work as a reversal of the values of the “Capitalocene” and the birth of the era of the “Aerocene”.

Technically, Saraceno is developing a new aerosolar technique that reimagines the hot-air or pressure balloons known to date. The ultraviolet rays of solar radiation are captured by the balloon's membrane and absorbed into the air-filled interior, raising its temperature above that of the external air and thereby generating lift in the atmosphere. Officially certified and capable of lifting a net weight of over 250 kg and up to two passengers, the balloon is the result of extensive collective research into lighter-than-air materials and innovative design conducted by the Aerocene Foundation in partnership with various experts (Saraceno, 2020). Just like Superflux,

following the DIY ethos (or rather its collective “do-it-together” iteration) Saraceno uploads on the Internet the complete instructions for the design of his flying apparatus, making its construction accessible to everyone.

Antoine de Saint-Exupéry once wrote: “As for the future, your task is not to foresee it, but to make it happen” (De Saint-Exupéry, 1948, p.146). Futurism and cyberpunk are valuable subcultural movements because they raise the question of the future and its inevitable connection to the evolution of technology. The future as a concept cannot be thought without careful reflection on technological design. Technological and scientific development should not be let only to technocrats but requires the capacity for radical imagination that comes from art. Art that is oriented toward the future. Such art employs the tools of science and technology, but does not have the same constraints on imagination. Though founded on scientific facts and methods, interactive art projects such as *Mitigation of Shock* and *Aerocene Pacha* are not beautiful visualizations of scientific concepts. Rather, such projects generate new forms of knowledge and attune our sensibility to the potentialities hidden in the present situation beyond the horizon of possible choices determined by instrumental reason. The creative reinvention of technology’s foundation is the only antidote against the automatically generated becoming that forecloses genuine future alternatives.

Conclusion

In conclusion, here is a summary of the features that unite this type of artistic practices:

1. **Beyond utopia and dystopia:** Instead of drawing grand narratives of the future they overcome the technotopic horizon by embracing the full complexities of the factual conditions and local contexts.
2. **Artistic imagination transforms technology:** These artistic projects transcend mere image and narrative. They build entire worlds and invent unthinkable futures, transforming technologies on the way. In these works, art does not position itself as external to the technical (or the scientific); rather, it uses it as a means to radically overturn our thinking about what technology could be and how it could contribute to creating desired futures.
3. **Hacker ethos and open collaboration:** The technologies invented by these creative teams are deeply rooted in the collaborative hacker’s ethos

– DIY practices, open source and open science – whereby all participants are empowered in determining the value orientation of the future.

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