On the Ecologies of Contemporary Art

Power Plants, *Variants* and Other Technical Milieus

André Rottmann

> "For the first time in the history of the planet, a species of its animate inhabitants is awakening to the awareness that it itself is always already intervening (i.e. technically, spontaneously) in a control loop of ecological structure, in which, on the other hand, it itself is always already integrated for the purposes of its conservation. The progress of technology [...] directly threatens [...] the life of our species accustomed to this and this temperature [...]. [...] The spontaneous control loop of technology will either be able to ward off the negative consequences or [...] adapt us to the new situation [...] which is now imagined to be unlivable. Certainly, a price will have to be paid [...]: either more and more non-human (perhaps also human) life on earth will be eradicated or other planets will have to be exploited. [...] When man will no longer reflect only on environmental pollution, but on this [...] universal structure [...], then the [...] romantic talk of the spirit that creates a nature for itself should also become intelligible [...]." (Kittler 2015: 189–90, transl. by A.R.)

Power Plants and Variants

In spring 2019, Berlin-based artist Hito Steyerl premiered her work *Power Plants*, which consisted of a total of six video sculptures, at the Serpentine Galleries in London. In the darkened rooms of the exhibition building in the middle of Kensington Gardens, 240 differently sized LED monitors of varying heights and orientations were mounted on metal scaf-

foldings. On these high-resolution screens, large-scale recordings without sound of plant blossoms that appeared to be opening or proliferating, but immediately closed or disintegrated again, were shown in highly saturated colors in endless loops against a deep black background. The light emanating from these short videos bathed the gallery space in a palette of red, pink, orange, white and green tones, while the scaffold structures as a whole were reminiscent of labyrinthine landscape architecture.

Figure 1: Hito Steyerl: Power Plants, 2019

For the exhibition, an artificial garden was created inside a neoclassical pavilion, located in the Gardens. However, the unsteady morphology and fraying contours of the luminous botanical motifs, even in view of their movement, already indicated that these were by no means depictions of real life. Rather, these plants owe their existence to the predictions of an artificial intelligence (AI) based on machine learning processes modeled on neural networks. Steyerl's *Power Plants* show technical images of fictitious vegetation calculated by an algorithm that purports

to predict the future. In collaboration with the artists and programmers Jules LaPlace and Damien Henry, Steyerl used existing film sequences documenting plant growth in fast motion and fed them into the program "Pix2Pix", specially adapted for her project via the network-based software development project called "GitHub". Within each sequence, the following cinematic image was calculated and generated by using pixel macro blocks from the previous section, identifying repetitive amounts of information, the patterns of which were respectively processed, thus gradually helping to form an artificial memory in the progressive recursion to previously called functions of the process. With each additional algorithmic process and the steadily growing amount of data associated with it, this memory was trained so that it could ultimately predict the continuity of a video for 0.04 seconds into the future with a high degree of probability and translate it into simulations that were combined with the digital source material in loops. Artistic creation (or design) was thus delegated to a digital automatism. Due to the extreme brevity of the calculated sequences, which paradoxically took months to create, Steyerl's mediatized *Power Plants* are characterized by oscillating between the poles of "expansion and corrosion" (Ebner, Gaensheimer, Krystof, Lista 2020: 112). In other words, their unfolding is interrupted and reset in a circular fashion, creating less the impression of a straightforward computer simulation than that of a *cadavre exquis* of digital textures and techniques.

In the early history of the first paradigmatic visual medium of modernism, botanical illustrations – notably Anna Atkin's 1840s cyanotypes of algae – already held prominence because, among other things, nature itself supposedly was written with light in the short circuit of photography and photosynthesis. These literal blueprints of the plant world were particularly suggestive in their ability to visually convey organisms and their milieu at the same time (cf. Armstrong 1998: 179–255). Under the high-tech conditions of the present, however, the viewers of Steyerl's *Power Plants* were confronted with views of an ecology that no longer seems to maintain any material, let alone indexical, relationship to nature. In Steyerl's work, blue (and other-colored) flowers, referring to Walter Benjamin's much-quoted photo- and film-theoretical essay

on "The Work of art in the Age of its Technical Reproducibility" from 1936, are defined and exposed as components in a "land of technology" (Benjamin 1969: 233). This land's cartography and constitution has fundamentally changed in that it is now characterized by an indissoluble interweaving of natural phenomena and their representation with technical systems that seem to operate according to recursive principles of self-organization and self-regulation.

A virtual interweaving of living organisms and digital operations is equally fundamental to Pierre Huyghe's work *Variants*, which was presented as a permanent site-specific installation at the Kistefos Museum, north of Oslo, in the summer of 2022. Located on a previously inaccessible island on the edge of the Norwegian institution's sculpture park in a wooded area near Jevanker, which is periodically closed off from the mainland due to flooding, the French artist's work initially appears as a dislocated diaphanous screen on which film sequences of this very area are continuously reproduced.

Figure 2: Pierre Huyghe: Variants, 2021

Screen and scenery thus appear to be interlinked – in part almost in a kind of *trompe l'œil*. Spectral sequences of branches, roots and trunks, leaves, earth and stones, honeycombs, bodies of water, insects, animals and mushrooms move past the viewer of Huyghe's work *en plein air* on seemingly mechanical tracks. The low-slung perspective of a freely roaming creature is adopted. However, *Variants* does not merely represent the local environment from such an implied perspective – albeit in a technological aesthetic that seems to favor contours over matter and thus purports to illuminate flora, fauna and minerals. Rather, the procedures and routines of this literally dynamic project measure, generate and modify the landscape permanently and in such a way that *natura naturans* and *natura naturata* become indistinguishable: Based on an extensive scan of the forested island using LiDAR technology ("light imaging, detection and ranging") – i.e. a laser-based variant of radar for atmospheric, distance and speed measurement in 3D – this is a real-time simulation. As Huyghe himself emphasized in a brief description of his project, the physical and digital environments should be permeable.[1] As in Steyerl's work, the moving images on the screen are primarily the result of the capacities of an artificial intelligence whose rules and prompts are derived from a fictional (and undisclosed) narrative by the artist about the island. According to the model of neural networks, the digital processes of machine learning constantly and automatically reveal unpredictable mutations of the habitat, which in turn participate in the subsequent and progressive algorithmic recursions within the successively but aimlessly unfolding simulation.

The artificial intelligence, calculating and storing the possibilities of an island for mutations and permutations and simulating them on the cleared screen, not only follows its own algorithmic protocols in a solipsistic manner, and on the basis of an automatically expanded set of data. At the same time, it is in direct, yet highly mediatized contact with the environment and its changing facets and factors: A self-monitoring camera eye screens the landscape and, just like the environmental sensors distributed and concealed throughout the entire terrain, constantly

1 https://www.kistefosmuseum.com/sculptur/variants.

provides real-time information on geochemical and biological activities, the local weather, the presence of animals (but also people, i.e. museum visitors), recurring flood water and its chemical composition, etc. Taken as a whole, this data influences the constantly running calculations and consequently produces effects on the screen in the form of modulations of the visible. Huyghe's work also supplements the soundscape of the forest by using an echo relay system to transpose sounds such as birdsong, cracking and crackling in the undergrowth or a train passing by in the distance into a soundscape that accompanies the AI mutations of the forest as a soundtrack. "There is", as art historian Ina Blom has phrased it, "[…] active growth within the model, just as there is growth in the island forest – growth that accelerates and decelerates based on the data feeds from the forest and the memories lodged in the simulation." (Blom 2022: 63) The environmental information flow remains unaffected by any human presence and attention. Nevertheless, living organisms and digital technologies are virtually interwoven in such a complex ecology. And this circumstance is first and foremost indicated and negotiable through the constitutive and inexhaustible alterity of the artwork itself, by way of the reflexivity that it can fundamentally activate, in the formulation of the art historian David Joselit, through the "unstable alliance of matter and image […]." (Joselit 2023: 12)

Since 2011, and with increasing intensity and complexity, Huyghe has been locating the previously discrete art object in hybrid networks of organic and non-organic elements, almost dissolving it in the process. It may hardly be coincidental that a series of aquariums entitled *Zoodram* marked the artist's ecological 'turn', as historians of science have argued that the aquarium around 1900 not only served as an instrument for researching marine biology, but also as a catalyst for the development of the very concept of "milieu", i.e. for understanding the reciprocal relationship between living organisms and their more or less technical environment (Vennen 2018: 121–124, 265–273; Wessely 2019). Instead of simulating habitats, Huyghe's biospheres stage theatrical settings that define their inhabitants as actors in a scenario and emphasize their own artificiality. His surrealistic *Zoodram 6*, for example, used a replica of Brancusi's iconic sculpture *Slumbering Muse* from 1910, which, in the spirit of

Jakob von Uexküll, became not only an *Umgebung* but also an *Umwelt* for a hermit crab (Uexküll 1956: 30–31; Lütticken 2015: 117). At the same time, this milieu appeared as a zone beyond even the man-made geological era of the Anthropocene, as a landscape in which only relics of so-called civilization can be colonized by other organisms. In contrast to these obviously still limited or confined dioramas, Huyghe's more recent projects, which measure the boundaries between artwork and environment, create completely operative habitats of interdependence and coexistence. However, they pose "the question of technology" (Heidegger 1977) all the more emphatically.

Ecologies of technology and contemporary art

It therefore seems apposite to define the works of Huyghe and Steyerl as reflections and manifestations of a "general ecology". Significant contributions to the development of this paradigm in cultural studies have been made by the media theorist Erich Hörl, who, following thoughts of Félix Guattari in particular, states that "there are thousands of ecologies today", be they social, political, technological or biological in character, and concludes that "there is hardly any area that cannot be considered the object of an ecology and thus open to ecological reformulation." (Hörl 2017: 1). In contrast to the original definition of the term in Ernst Haeckel's zoology, it is now also understood as an "ecology without nature". The term undoes its "sutures" with nature and shifts towards the once dichotomous field of technology; this, for its part, is likewise subject to a transformation, as it no longer obeys the "instrumental logic of means-end relations", but under the aegis of digital technologies has advanced to become an "absolute agent" without any given purpose, and expressing its own rationality (Hörl 2017: 2–3). The "new historical semantics of ecology" thus no longer indicate the sphere of nature, but concern, according to Hörl, "an environmental culture of control that is radically distributed and distributive, manifest in computers migrating into the environment, in algorithmic and sensorial environments." (Hörl 2017: 4–5). "Its main problem is the capture and control, the man-

agement, the modulation of behavior, of affects, of relations, of intensities, and of forces by means of environmental (media) technologies […]." (Hörl 2017: 10). The basis for this imperative is the collection of data in cybernetic environments, which is accumulated and utilized for the purpose of pre-empting possible preferences (in consumption or politics) or with the aim of anticipating a potentially controllable situation. Although Hörl's argumentation, in the tradition of so-called "German Media Theory", tends to privilege technological factors over all others or even to declare them the sole determinants of socio-political development, it goes far beyond a mere description of, for example, the extensive networks of "ubiquitous computing" or the "Internet of Things" (Hansen 2013; Easterling 2012). Following Michel Foucault's work on the history of modern government technologies from the 1970s, "general ecology" is defined not least as a new technology of power: "[M]edia technological 'infrastructures of distribution' render environmental even what used to be called *Umwelt* or 'environment'. Thus Environmentality, which is first implemented by media technology, is the contemporary form of governmentality." (Hörl 2017: 5)

Hörl's emphasis on an ecology beyond nature obviously inherits Kittler's invocation of a technical, i. e. primarily computer-based, intelligence that spiritualizes nature, as suggested in the epigraph. In both cases, precisely that separation of nature on the one hand and culture, technology and the social on the other is addressed, which, according to French sociologist of knowledge, anthropologist and philosopher Bruno Latour, has always failed to recognize the real and resolvable links between human actors and technical actors in the formation of modern sociality (Latour 1993). In view of the "New Climate Regime", in which the Earth's "critical zones", after Latour, are anthropomorphizing due to human influence while humans, for their part, are threatening to petromorphize in the sediments of their climate-damaging activities, the "nature/culture format" is becoming all the more obsolete. In one of his eight lectures titled *Facing Gaia* from 2013, Latour explained accordingly: "[…][T]he anthropocene does not 'go beyond' this division [between the social and the natural, A.R.]: it circumvents it entirely. […] Where we were dealing earlier with a 'natural' phenomenon, at every

point we now meet the 'Anthropos' […] and wherever we follow human footprints, we discover modes of relating to things that had formerly been located in the field of nature." (Latour 2017: 115–120) As a result, there is "a radically new distribution of the forms granted to humans, societies, nonhumans, and divinities." (Latour 2017: 119)

In view of projects such as Steyerl's in the Serpentine Galleries and Huyghe's in the Kistefos Sculpture Park, it could be argued that contemporary art in particular is becoming increasingly "environmentalized". From the 1960s onwards, art practices in Western Europe and North America were increasingly defined by reference to the circumstances of their production, distribution and reception: From Minimalist sculpture to so-called "Land Art" (cf. Nesbit 2014) to site-specificity or institutional critique, the artwork was no longer understood as a closed form and autonomous object, but appeared to be open to an expanded field of forces; since then, aesthetic experience and reflection are always referring to architectural, landscape, institutional, social or economic spheres. Following Hörl's concept of a "general ecology", a "realism of relations" (Hörl 2017: 7) is now predominant in art, too. Against this backdrop, Steyerl's *Power Plants* and Huyghe's *Variants* can serve as examples for a multitude of recent practices that create a changed relation to the contexts of global contemporary art in that they themselves implement concatenations between (seemingly) natural and increasingly informational elements, between different infrastructures and intelligences.

Such "ecologized" practices thus focus less on questions of sustainability and nature conservation; rather, *mutatis mutandis*, they aim to measure the virtual and real rapports between art and increasingly comprehensive environments, which are "interconnected" with the rationality that is owed to the applied calculation of algorithms. Beyond case studies on Steyerl's *Power Plants* and Huyghe's *Variants*, it is thus possible to outline an area predestined for contemporary art (history) and its genuine ecological imperative, which, in the light of concrete material practices, is able to indicate the interactions and tensions between the coexistent but by no means identical fields of aesthetics and technology (cf. Jones 2022: 20). Accordingly, the following considerations are guided by the question of how art recurs and reacts to

the technical milieu, i.e., in the apt phrasing of art historian Sebastian Egenhofer, to "the heterogeneous totality of tools, energy- and information-processing machines, sensors and channels, systems and vehicles" (Egenhofer 2020: 77) as their very own new ecological environment.

Mixed techno-geographical environments

The title of Hito Steyerl's project from 2019 is polysemic in that it not only interprets "plants" ambiguously, but also alludes to the different semantic registers of the English term "power" in three respects: Reference is made to electricity as the basic prerequisite of all data transmission and processing. At the same time, it refers to the simulated plants, to be regarded as "power plants" because they will develop sustainable abilities within future technical environments, which are described in short texts under female heteronyms from the (literary) history of botany (such as Johanna von Goethe, Bettina Stoetzer or Federica Campagna). However, these quotations from books that allegedly only appeared later in the 21st century were not conveyed through the conventional parerga of an exhibition (wall texts, signs, handouts, brochures, etc.), but were visually integrated into the digital infrastructure of Steyerl's project itself. Visitors to the Serpentine Galleries were able to download the *Power Plants OS app* onto their smartphones or use this application on iPads suspended from the ceiling to decipher QR codes embedded in microcement plinths, whereupon floating and animated blocks or spirals of text designed by typographer Ayham Ghraowi became visible on the respective screen – as an "augmented reality" between the video sculptures or near the walls, ceilings and floors of the gallery space, and all in various colors and based on the aesthetics of early internet browsers. While the promise of a glimpse of the future in the AI videos of plants tends to be disappointing, as argued above, these texts offer the results of an almost exuberant imagination. For example, an excerpt from the book *Pharmakopeia* by fictious author Dalia Pendell (a tribute to poet and ethnobotanist Dale Pendell who passed away in 2018), announced for 2021, on the efficacy of future algae species – as an evident tribute to Anna

Atkins' *Blue Prints* – read: "In the future, algae capable of near-infrared photosynthesis will produce valuable oxygen. Near infrared photosynthesis is light that is not visible to humans, just to cheap cameras, some Actual Reality applications and bees. Only specific algae are able to utilize the invisible spectrum of light to produce energy." (Steyerl 2019: 12) Steyerl is also known as the author of numerous speculative-theoretical texts on the connection between art, politics and media aesthetics (Steyerl 2017). In projections such as these, she creates alternative scenarios of the agencies distributed between biotic and abiotic, artificial and organic elements in milieus that, in the sense of the philosopher Gilbert Simondon, are only constituted through the existence of technical objects, as mixed techno-geographical environments (Simondon 1958: 55). Through the *Power Plants OS app*, both the space of the exhibition and the visitors were drawn into such a virtual milieu. However, the coupling of modified plant, optical apparatus, software and bees, as the quasi-scientific passage quoted (or rather penned) by Steyerl describes for the future, imagines material processes and effects that will largely elude human consciousness.

In this respect, and even in the present day, phenomena such as bioindication can be positioned at the supposed antipole to technology. Bioindication consists of microbiological processes in which chains of different organisms perceive environmental stimuli and indicate them through physical changes, behaviors, conditions and forms of colonization. As Jennifer Gabrys, a sociologist of technology, has put it: "Bioindication is a process occurring across multiple organisms as they are affected by, sense and even transform their environments." (Gabrys 2018: 350) Gabrys further explained, vis-à-vis NASA's "Ozone Bioindicator Garden Project", that it is important to understand the concept of nature beyond taxonomic orders of individual organisms as "*ecological* configurations of entities" (Gabrys 2018: 352), in which non-organic actors are also involved – and whose description is subject to technical routines and operations. An example is provided with the investigation of air pollution using lichens, characterized by being less plantlike than amalgams of fungi, algae and cyanobacteria, which, lacking their own roots, are closely conjoined to rocks and soils.

Huyghe's most recent project within the techno-geographical and biological milieu of a forest area could be understood as the material implementation and intensification of such *ecological* configurations of entities in the medium of art. Analogous to sympoiesis, i.e. the underground networking of trees, plants and fungi for the purpose of nutrient exchange, the technological processes in *Variants* and their underlying principles and logics (as Hörl states for "general ecology" as a whole) do not follow any comprehensible causal relationship of cause and effect. Accordingly, they remain beyond human perception and are consequently operative and active even and especially when the island is inaccessible to viewers due to the water level. In this aspect, *Variants* in Huyghe's practice continues the attempt to design concatenations between biotic and abiotic, artificial and organic elements in newly forged milieus, as it was already characteristic for his contribution to Skulptur Projekte Münster 2017: For *After A Life Ahead*, the artist created a sculptural palimpsest of interlocking components based on an extensive excavation of the geological layers beneath the playing field of a former ice rink, including a beehive, an incubator for HeLa cancer cells and a weaving cone in an aquarium, algae, mineral formations, building details (especially the roof lights), amorphous matter and natural sediments and a drone sound, all of which coexisted and interacted through sensors and subfloor cables, various algorithms, the simulations of an augmented reality cell phone app and machine mechanisms. The environmental sensors underground, among other occurrences, registered the flight frequencies of the bees in or out of the clay steles, and they were connected to the incubator and controlled the growth of HeLa cancer cells in it. In the cell phone app, this data made black triangular shapes appear on the visitors' screens, while similar shapes floated underneath the ceiling, next to the roof lights, and multiplied whenever the number of pathological organisms in the cooling unit increased. These virtual epiphanies disappeared when the cells died again, only to initiate a new life cycle. Associated with the processes of growth and decay, one of the roof lights opened with a creaking mechanical sound and closed again; light, rain, pollen and other influences entered the arena and affected the local climate as well as the tracked behavior of the bees. In this and many other ways,

Huyghe imagined and realized a landscape whose rationality and incessant processualism human actors could neither fully comprehend nor actively influence (Rottmann 2019; Ströbele 2024: 351–377). According to Latour, the "Old Climate Regime" was dominated by the image of the globe as a sphere inhabited by humans but visually distant at the same time, suggesting totality and passivity. In the reciprocal relationships of elements, as implemented in *After Alife Ahead* as well as in *Variants*, the "passage through connections" became tangible instead of "a relation between parts and the Whole" (dominant before). "[T]he hard lesson of actor-network theory", says Latour, "according to which there is no reason to confuse a *well-connected* locality with the utopia of the Globe, holds true for all associations of living beings."(Latour 2017: 135–136) With regard to his *Variants*, Huyghe stated accordingly: "You do not separate them between nature and simulation. It is neither one nor the other. It is not a binary. It is a chimera. A blur, an indifferentiation."[2]

In the Kensington Gardens surrounding the Serpentine Galleries, Steyerl exposed "a *well-connected* locality" by making another smartphone application available for visitors to download: As the above-quoted passage attributed to Dalia Pendell already suggests, in the change from inside to outside, a shift of emphasis from an augmented to an actual reality, from the supposed future to the present, is carried out on a referential, albeit not technological, level: This is because the *Actual Reality OS app* served to provide information about the social fabric surrounding the exhibition site in London, which is characterized by a stark inequality in the distribution of property, capital, mobility and resources, particularly in the boroughs of Kensington and Chelsea, on the basis of data and statements provided by local NGOs. The third level of meaning of "power" in Steyerl's project finally can be brought into focus, with which the authoritative, if not authoritarian dimensions of environmental technologies of power are addressed – and with it the question of the possibilities and strategies not only to identify these, but also to confront them critically and reflexively in the course of an

2 https://artreview.com/the-poetics-and-pitfalls-of-allegorithmic-art-pierre-huyghe-kistefos/

actualization of institutional-critical approaches in art. The power of fiction in *Power Plants* was replaced by that of a factography, which – unlike in canonical works of institutional critique (such as Hans Haacke's *Shapolsky et al. Manhattan Real Estate Holdings, A Real Time Social System, as of May 1, 1971*) (Deutsche 2015) – did not record economic conditions (such as those of domestic workers) from a distanced position, but from a structurally implied one, which almost inevitably results from the mechanisms of an environmental culture of control.

After scanning a QR code on one of three plinths in the park, visitors to Steyerl's London exhibition found themselves suspended in an environmental milieu interconnecting data and site that entailed an electronic soundtrack that uses so-called data sonification and a "deep mind" synthesizer to translate the underlying statistics into harmonious tone sequences. Visitors were immediately directed to the architecture of the art institution, which received an annex by Zaha Hadid in 2013 and was now modulated on a scale of 1:1 into three-dimensional virtual diagrams of the social inequality surrounding it. These virtual diagrams constantly adapted to the point of view of visitors and their technical devices; the data collections were complemented by floating lettering of the statements of workers employed in households or hotels in the area. Under the conditions of environmentality and its unconscious operations, this component of Steyerl's work creates an awareness of a reality that obeys the laws of profitability different from what the predictive calculations of artificial intelligence would suggest. Given the multitude of references to centrifugal facts and factors within a comprehensive technical milieu saturated by images, texts and media, Steyerl's project *Power Plants* may have exposed itself to the danger of itself being distributed within the coordinates of an incessantly expanding algorithmic and sensory environment. However, it harbors an exemplary and prognostic value of its own in giving contemporary art a perspective onto an open future in which the yields and excesses of this media ecology become equally tangible and negotiable.

Toward an aesthetics of the non-conscious

The media theorist Marie-Luise Angerer has claimed that "media-technological transformations and human-machine couplings" not only reorganize the concept of nature, but also introduce a "digital unconscious" that can hardly be dealt with in psychoanalytical terms (Angerer 2022: 15; see 67–68, transl. by A.R.). Angerer's argument expands on US media and literary scholar N. Katherine Hayles' 2017 book *Unthought. The Power of the Cognitive Nonconscious*, in which the latter introduced the term "non-conscious". On the one hand it denotes neuronal processes in the body that protect human consciousness from being overwhelmed by stimuli at intervals of milliseconds; on the other hand, Hayles discovers parallels not only to other life forms (such as plants in particular), but also to the capabilities of technical systems, so that biological and mechanical parts are de facto inextricably interwoven in medially expanded ecologies. The "non-conscious" manifests itself, for example, in technologically implemented intelligences and infrastructures – or, as Hayles calls it, "cognitive assemblages", when these merge with the perception of human subjects (as in the augmented reality app in Huyghe's *After ALife Ahead*) (Hayles 2017:2). In his project *UUmwelt*, on show at the Serpentine Galleries before Steyer's, the French artist accentuated such an aesthetic of the non-conscious in (at least) two ways: Fundamentally, the exhibition was based on the principle of the interdependence of biotic and abiotic actors insofar as flies were present in the gallery spaces alongside the visitors or hatched from breeding grounds in the floor shafts. The insects' behavior was influenced by skylights that were opened at irregular intervals, projections of warm light, computer-generated sounds (based on brainwave measurements transcoded by AI software) and artificial smells. The floor was covered with dust from the previously sandblasted walls, so that particles of matter were dispersed through the viewer's passage and fed into the gallery's climate. All of these factors of the exhibition dispositive contributed to the already changing light conditions, temperatures and humidity levels, which were in turn recorded by interacting sensors that ultimately controlled the image sequence and rate on five large-format LED screens on the

walls. On these luminescent panels, rapidly moving and changing digital images were shown, with sudden interruptions. All this was set up with a specific AI application, which also helps (Japanese neuroscientists claim) to read or to visually externalize thoughts: At Kyoto University, following Huyghe's instructions, members of the research lab there were shown a series of (20 to 30) images and image descriptions which followed the taxonomy of human, animal, machine. They were then asked to recall these motifs and ideas while an fMRI ("functional magnetic resonance imaging") scanner captured their brainwave data and fed the memory images into a "deep neural network" which in turn constructed synthetic representations of what the lab team members remembered by recourse to a photographic database. Huyghe, however, did not use an optimized single result per source, but rather assembled thousands of variants and played them back on the LED walls in the darkened rooms of the Serpentine Galleries as hectic, low-resolution proliferations with unclear references, whereby the sequence and rhythm were determined by the environmental sensors, which reacted not least to the presence of viewers (cf. Skrebowski 2019). Under the sign of the digital, the unconscious of machines and of the people become virtually indistinguishable.

Huyghe's "environments" exhibit networks of association in which, according to Latour, "any given interaction seems to *overflow* with elements which are already in the situation coming from some other *time*, some other *place*, and generated by some other *Agency*". Thus, "action is always dislocated, articulated, delegated, translated." (Latour 2005: 166) While the diverse data obtained from Kistefos island allows the AI algorithms to repeatedly modify the motifs of the filmic reproduction of the forest, some of these simulated entities leave the frame of the screen and can be found by visitors in nature at the outermost edge of the sculpture park in the form of 3D prints, precisely at the address mapped in the landscape's simulation. This is undeniably a predetermined breaking point, or at least the breaking function of this project, in that the immanence of the computer-based operations on which it is based is suspended in favor of a selective externalization and exposure of singular formations. Viewers encounter the carcass of an elk, for example, or de-

tect a flesh-colored structure reminiscent of mushrooms on a branch. These materializations of a bio-art oscillate between the poles of growth and decay, form and *informe*, the aesthetic and the abject.

The comparison between the appearance of this configuration on the LED screen and its coagulated sculptural realization suggests the surrealist *écriture automatique* as a genealogical point of reference insofar as Huyghe also translates a found morphology into an identifiable form – albeit not through the dynamics of the unconscious so often invoked by the avant-gardes, but by means of a "non-conscious" technology. However, the aporias of psychic automatism remain even in its contemporary transcription, by way of a "digital unconscious", into an automated algorithm. Media theorist Matteo Pasquinelli has recently described artificial intelligence and machine learning as "the *automation of automation*" (Pasquinelli 2023: 248). For Max Ernst's series of collotypes after frottages entitled *Histoire naturelle* from 1925/26, the art historian Ralph Ubl has emphasized that the artist, in his attempt to use the automatism of drawing to create authenticity, was confronted with the epistemological problem of visualizing the objective reproduction of a nature that had already disappeared before the appearance of the first human being (Ubl 2013: 69–75). Huyghe's project reverses this temporal (or primordial) perspective by imagining the (coming) ruins of the era of the Anthropocene. However, this prognosis is in turn determined or limited by the current capacities of the AI application used to project the ruins. According to Ubl, Ernst's mimetic impulse also meant that his images of a natural history in search of deep time hidden in the layers of childhood memory were always relegated to secondary and surrogate sources (such as natural history books and adventure novels) (Ubl 2013: 108–109). And even in *Variants*, the digitally calculated mutations of the landscape remain limited to the supplements of their representability. Using Alexander Galloway's term for virtual "gaming", it could be stated that Huyghe's ecologies function less completely algorithmically and more "allegorithmically", as they always remain synchronized with the legibility, or at least decipherability, of the given reality in the tradition of allegory (Galloway 2006: 91; see Rottmann 2019: 89).

At the interface of the digital and physical milieu, Huyghe *Variants* presents the idea of a nature on the horizon of our crisis-ridden present: successively contaminated and colonized by its own, technically induced mutations. Steyerl's *Power Plants* likewise holds out the prospect of new potent species in the convergence of (images of) biology and technology. In *Facing Gaia*, Latour called for an aesthetic in the sense of the "capacity to 'perceive' and to be 'concerned' […]." (Latour 2017: 145) Through forms of saturation and alienation, Huyghe and Steyerl create the highly mediatized aesthetic experience of interconnected environments, through which an ecology is thrown into vibrant relief in which the difference between nature and technology would once have been almost impossible to make. In his previously cited reflections on *Art's Properties*, Joselit argued that "[t]he history of art is drawn from […] socially embedded performances of alterity. […]. The temporality of these effects is distinct from the rhythms of conventional politics. Alterity's elsewhere or otherwise does not take place in the exclusively human realm of the state, or civil society. Art's special capacity is to configure multiple registers of experience (the spiritual, the terrestrial, the abstract, and the material) rather than remaining embroiled in the ephemeral conflicts of day-to-day politics. Its power *is its capacity to activate alterities*."(Joselit 2023: 3) This particular ability to activate reflections and affects by being strange and making strange is what gives "ecologized" contemporary (bio-)art its reach and relevance in the face of both our new climate regime and the cybernetic control circuits of environmental media that enclose us.

This text was delivered in part (on the work of Huyghe) as my Inaugural Lecture for the Professorship for "Theories of the Arts and Media" at The Faculty of Social and Cultural Sciences of the European University Viadrina in Frankfurt (Oder) on May 23, 2023. It also refers to a paper (on the work of Steyerl) given in the context of Section V, "Der ökologische Imperativ: Anschaulichkeit und Spekulation der Kunst" (organized by Toni Hildebrandt and Peter Schneemann) at the 5th Swiss Congress for Art History on June 23, 2022 at the University of Zurich.

Bibliography

Angerer, Marie-Luise (2022). Non-conscious. Affektive Kurzschlüsse zwischen Psyche und Maschine, Vienna: Turia + Kant.

Armstrong, Carol (1998): Scenes in a Library. Reading the Photograph in the Book, 1843–1875, Cambridge MA / London: The MIT Press.

Benjamin, Walter (1969): "The Work of Art in the Age of Mechanical Reproduction." In: Hannah Arendt (ed.), Illuminations, New York: Schocken Books, pp. 217–251.

Blom, Ina (2022): "Possibility of an Island. On Pierre Huyghe's Variants", in: Artforum 61/3, pp. 63–64.

Deutsche, Rosalyn (2015): "Property Values: Hans Haacke, Real Estate, and the Museum." [1986/1996] In: Rachel Churner (ed.), Hans Haacke, OCTOBER Files 18, Cambridge MA / London: The MIT Press, pp. 137–163.

Easterling, Keller (2012): "An Internet of Things", in e-flux Journal #31, January 2012, https://www.e-flux.com/journal/31/68189/an-internet-of-things [last accessed March, 19, 2024].

Ebner, Florian / Gaensheimer, Susanne / Krystof, Doris / Lista, Marcella (eds.) (2020): Hito Steyerl. I will survive: Films and Installations, Leipzig: Spector Books.

Egenhofer, Sebastian (2020): "Ströme, Filter und Sensoren. Alteritätsbezug von Technik und Kunst." In: Rebekka Ladewig / Angelika Seppi (eds.), Milieu Fragmente. Technologie und ästhetische Perspektiven, Leipzig: Spector Books, pp. 76–95.

Gabrys, Jennifer (2018): "Sensing Lichens: From Ecological Microcosmos to Environmental Subjects", in: *Third Text* 32/2-3 (special issue "The Wretched Earth: Botanical Conflicts and Artistic Interventions", ed. by Sheila Sheikh and Ros Gray), pp. 350–367.

Galloway, Alexander (2006): Gaming: Essays on Algorithmic Culture, Minneapolis MN: Minnesota University Press.

Hansen, Mark B. N. (2013): "Ubiquitous Sensation: Toward an Athmospheric, Collective, and Microtemporal Model of Media." In: Ulrik Ekman (ed.), Throughout. Art and Culture Emerging with Ubiquitous Computing, Cambridge MA / London: The MIT Press, pp. 63–88.

Hayles, N. Katherine (2017): Unthought. The Power of the Cognitive Nonconscious, Chicago IL / London: The University of Chicago Press.

Heidegger, Martin (1977): "The Question Concerning Technology" [1954]. In: Martin Heidegger, The Question Concerning Technology and Other Essays, New York / London: Garland Publishing, pp. 3–35.

Hörl, Erich (2017): "Introduction to General Ecology: The Ecologization of Thinking." In: Erich Hörl / James Burton (eds.), General Ecology: The New Ecological Paradigm, London: Bloomsbury, pp. 1–75.

Jones, Caroline A. (2022): "Symbiontics: A Polemic For Our Time." In: Caroline A. Jones / Natalie Bell / Selby Nimrod (eds.), Symbionts: Contemporary Artists and the Biosphere, Cambridge MA / London: The MIT Press, pp. 13–40.

Joselit, David (2023): Art's Properties, Princeton NJ / Oxford: Princeton University Press.

Kittler, Friedrich A. (2015): "Technik und Kosmologie." In: Tania Horn / Sandrina Khaled (eds.), Baggersee. Frühe Schriften aus dem Nachlass, Paderborn: Wilhelm Fink, pp. 189–190.

Latour, Bruno (1993): We Have Never Been Modern, Cambridge MA / London: Harvard University Press.

Latour, Bruno (2005): Reassembling the Social. An Introduction to Actor-Network-Theory, Oxford / New York: Oxford University Press.

Latour, Bruno (2017): Facing Gaia. Eight Lectures on the New Climate Regime, Cambridge / Medford MA: Polity Press.

Lütticken, Sven (2015): "Abstract Habitats: Installations of Coexistence and Coevolution." In: Grey Room 59, Spring, pp. 102–127.

Nisbet, James (2014): "Planetary Visions. Land Art, Minimalism, and the Whole Earth." In: James Nisbet, Ecologies, Environments, and Energy Systems in Art of the 1960s and 1970s, Cambridge MA / London: The MIT Press, pp. 67–128.

Pasquinelli, Matteo (2023): The Eye of the Master. A Social History of Artificial Intelligence, London / New York: Verso.

Rottmann, André (2019): "'The medium is leaking': Notes on the Work of Pierre Huyghe and the 'Ecologization' of Contemporary Art." In: Grey Room 77, Fall, pp. 84–97.

Simondon, Gilbert (1958): Du mode d'existence des objets techniques. Essais, Paris: Editions Aubier-Montaigne.
Skrebowski, Luke (2019): "On Pierre Huyghe's UUmweltanschauung: Art, Ecosystems Aesthetics, and General Ecology." In: *Grey Room* 77, Fall, pp. 66–83.
Steyerl, Hito (2017): Duty Free Art. Art in the Age of Planetary Civil War, London / New York: Verso.
Steyerl, Hito (2019): Power Plants, exhibition guide, Serpentine Galleries, London.
Ströbele, Ursula (2024): Hans Haacke und Pierre Huyghe. Non-Human Living Sculptures since the 1960s, Berlin / Boston: de Gruyter.
Ubl, Ralph (2013): Prehistoric Future: Max Ernst and the Return of Painting between the Wars, Chicago IL / London: The University of Chicago Press.
Uexküll, Jakob v. (1956): Streifzüge durch die Umwelten von Tieren und Menschen / Bedeutungslehre, Hamburg: Rowohlt.
Vennen, Mareike (2018): Das Aquarium. Praktiken, Techniken und Medien der Wissensproduktion (1840–1910), Göttingen: Wallstein Verlag.
Wessely, Christina (2019): "Watery Milieus: Marine Biology, Aquariums, and the Limits of Ecological Knowledge circa 1900." In: Grey Room 75, Spring, pp. 36–59.

Online resources

https://artreview.com/the-poetics-and-pitfalls-of-allegorithmic-art-pierre-huyghe-kistefos/ [last accessed March 22, 2024].
https://www.kistefosmuseum.com/sculptur/variants [last accessed March 19, 2024].

List of figures

Figure 1: Hito Steyerl; Power Plants, 2019; Stainless steel scaffolding structures, LED panels (3,9 mm pitch), multichannel video loop (12

video motifs, color, silent), LED text panels; Installation dimensions variable; Exhibition view: Hito Steyerl: Power Plants, Serpentine North Gallery, 2019; AR application design by Ayham Ghraowi, Developed by Ivaylo Getov, Luxloop; Courtesy the artist, Andrew Kreps Gallery, New York and Esther Schipper, Berlin/Paris/Seoul; © the artist / VG Bild-Kunst, Bonn 2024;Photo © 2019 readsreads.info.

Figure 2: Pierre Huyghe; *Variants*, 2021-ongoing. Scanned forest, real-time simulation, generative mutations and sounds, intelligent camera, environmental sensors, animals, plants, micro-organisms and materialized mutations: synthetic and biological material aggregate. Courtesy of the artist; Kistefos Museum; Hauser and Wirth, London and Esther Schipper Berlin/ Paris/Seoul; Photo © Ola Rindal.