Pierre Huyghe, *After ALife Ahead*, 2017. Ice-rink concrete floor, sand, clay, phreatic water, bacteria, algae, bee colonies, chimera peacock, aquarium, black switchable glass, Conus textile, incubator, human cancer cells, genetic algorithm, Augmented Reality, automated ceiling structure, rain, ammoniac, logic game. Exhibition view of Skulptur Projekte Münster, Germany, 2017. Courtesy of the artist; Marian Goodman Gallery, New York; Esther Schipper, Berlin; Hauser & Wirth, London; Galerie Chantal Crousel, Paris. Photo credit: Ola Rindal. © Pierre Huyghe/ ADAGP, Paris/ARS, New York, 2026.



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Artificial Life and the Living Dead: Pierre Huyghe's Ecological Aesthetics and the Becoming Environmental of Computation

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Picture the universe as a gigantic computer—a literally universal Turing machine.[1] Imagine life and technology were ultimately one and the same: computation.[2] *After ALife Ahead*, Pierre Huyghe's iconic contribution to the 2017 edition of Skulptur Projekte Münster in Germany, helps us envision such a scenario. The work articulates what Jennifer Gabrys has termed "the becoming environmental of computation": the permeation of our physical environment with—and its administration by—embedded sensor and information technology.[3] *After ALife Ahead* can be described as an ecosystem that comprises organic as well as technological components.[4] But it goes far beyond staging mutual interactions between machinic and organic agents. As this article will show, *After ALife Ahead* operationally collapses world and computational models into one another. It is this deeper sense in which the work undermines traditional distinctions of nature and culture or nature and technology. To grasp what is at stake in this collapse and in Huyghe's *ecological aesthetics* at large, this article examines the function of computation in *After ALife Ahead*.

After ALife Ahead was installed in a former ice-skating rink that was opened up to its environment through substantial architectural interventions. Huyghe had the concrete floor cut according to the shapes of an ancient puzzle, the Stomachion. Between the remaining islands of concrete a crater landscape was excavated, reaching as far as 10 feet below ground level. The ceiling was perforated and the openings equipped with pyramid-shaped motorized shutters. Air, germs and insects, groundwater and rain thus entered into the hall. Within large puddles grew algae. An archaic clay sculpture housed a bee colony. Initially, two peacocks inhabited the hall.[5] In the center, on an island of concrete, stood an aquarium made of switchable glass, home to a sea snail and a fluorescent

fish. Nearby human cancer cells were growing in an incubator.

These different elements were operationally linked through media technology. The pattern of the sea snail was scanned and converted into a score that produced a drone, switched the aquarium opaque or transparent, and controlled the skylights. The opening of the latter, in turn, altered the room temperature and CO_2 levels, which were captured by distributed sensors. Further sensors tracked the movements of bees and visitors. An automated analysis of the aggregated data regulated conditions within the incubator—temperature and CO_2 levels—and thereby the frequency of cell division. If the amount of cells exceeded certain thresholds, this triggered the emergence of virtual objects, which visitors could see with the help of an augmented reality app. These pyramidal virtual objects drifted through the space, propagated upon collision, and gradually faded away over time. A genetic algorithm regulated how their resistance to such fading away increased or decreased from generation to generation depending on environmental data. At the same time, fading pressure increased with the opening of the skylights, which in turn was triggered by the emergence of particularly resistant objects among other factors.

After ALife Ahead has been widely celebrated as paradigmatic of an important strand of contemporary art, which has been variously referred to as an "'ecological' current," the "'ecologization' of artistic practice," or most concisely "ecosystems aesthetics."[6] I propose to call this strand of contemporary art *ecological aesthetics* to point to both its art-historical genealogy and to its situatedness within a larger history of knowledge. Ecological aesthetics can be understood as an updated version of relational aesthetics and its concern with operatively putting to work relational forms, rather than representing alternative worlds.[7] If relational aesthetics, of which Huyghe is generally seen as a protagonist, primarily conceived of these relations in terms of sociability, ecological aesthetics now includes more-than-humans in its relational forms and conceives



them ecologically. The notion of ecological aesthetics, however, evokes not only the relational aesthetics of the 1990s, but also the "systems esthetics" of the 1960s, both of which constitute important moments within the current work's art-historical lineage, about which more below. Luke Skrebowski's apt designation of work like Huyghe's as ecosystems aesthetics stresses this latter, crucial connection.[8] I offer *ecological aesthetics* as an alternative to signal a broader frame of reference both within art history and beyond. Echoing in particular James Gibson's ecological psychology, the notion of ecological aesthetics emphasizes the work's situatedness within a formation of knowledge that operationalizes relations between organisms (or other agents) and their environments.[9] More generally, the term *ecological aesthetics* marks the work's participation in the present actualization of cybernetic principles of control under the banner of ecology, which, as I will argue, has to be situated within a longer history of biopolitics.

After ALife Ahead has become a key point of reference for an "ecological turn" in art history, which differentiates itself from the broader field of ecocriticism by focusing on technology and the legacy of cybernetics.[10] At the core of this "ecologized" art-historical reception is an operational—rather than allegorical or symbolic—understanding of the work in question.[11] One central concern underlying these discussions is therefore the relationship between such ecologial aesthetics and contemporary forms of power. Eric de Bruyn, André Rottmann, and Luke Skrebowski, among others have incisively pointed out such work's proximity to "ecological governmentality," "algorithmic governmentality," or what Hörl, drawing on the work of Michel Foucault, has termed "Environmentality."[12] Building on these highly instructive discussions of environmentality and its art-historical ramifications, this article shifts the focus to environmentality's functional interaction with complementary forms of power—both within Huyghe's work and within the becoming environmental of computation at large. It examines how exactly *After ALife Ahead* operationally captures life, and how the sovereign power over life and death is implicated in these operations, making it emblematic of our current form of biopolitics. The thesis is that—despite all rhetoric of nonhierarchical self-organization—*After ALife Ahead* is structured by asymmetries, both within and around the work, and that these asymmetries articulate the sovereign "break between what must live and what must die": from the clandestine removal of algae and other unwanted growth to the work's implication in the legacy of racial segregation.[13] This is both indicated and concealed by a recurring trope in discussions of Huyghe's work, one that enjoys great prominence in current discourses on technology more broadly, namely, the decentering—or even the disappearance—

Pierre Huyghe, *After ALife Ahead*, 2017. Ice-rink concrete floor, sand, clay, phreatic water, bacteria, algae, bee colonies, chimera peacock, aquarium, black switchable glass, Conus textile, incubator, human cancer cells, genetic algorithm, Augmented Reality, automated ceiling structure, rain, ammoniac, logic game.

Exhibition view of Skulptur Projekte Münster, Germany, 2017. Courtesy of the artist; Marian Goodman Gallery, New York; Esther Schipper, Berlin; Hauser & Wirth, London; Galerie Chantal Crousel, Paris. Photo credit: Ola Rindal. © Pierre Huyghe/ADAGP, Paris/ARS, New York, 2026.

of the human in the course of a convergence of technology, intelligence, and life.[14] It is by way of this trope that the analysis will proceed, examining the different ways in which viewers, the artist, and one particular human being disappear in this work.

The Becoming Environmental of Computation

Huyghe frequently links the constitution of his works as ecosystems, in which more-than-human agents interact, with a disappearance of human spectators. "Things are in themselves, they don't have a dependence on the person. They are indifferent to the public," says Huyghe in a 2015 interview, looking back at his early ecosystems work *Untilled* (2013), which was installed at documenta 13 in Kassel, Germany.[15] "Each thing, a bee, an ant, a plant, a rock, keeps growing or changing."[16] This idea is taken up in numerous discussions of Huyghe's subsequent work. Artist and writer Patricia Reed, for example, sees Huyghe's works as models of a "new condition [that] emphasizes the coexistence of diverse relations—across intelligences, across sub-systems, across entities, across scales—to the point of not necessarily requiring a human gaze at all."[17] In the catalogue accompanying Huyghe's 2018–2019 exhibition *UUmwelt* at the Serpentine Gallery in London art historian Dorothea von Hantelmann writes: "In contrast to the idea of an artwork entirely addressed to the human gaze, Huyghe's objects incessantly form and transform themselves, independently of whether they are being observed or not."[18] This is certainly correct. But, as any conservator can attest, the same could just as well be said of any oil painting or other work of art. The work's viewer-independent existence and activity is not really the point, if one wants to grasp the ways in which *After ALife Ahead* does indeed fundamentally decenter the viewer. In order to approach this question, the work has to be situated both art-historically and within the history of knowledge.

After ALife Ahead—and ecological aesthetics more broadly—can be seen as a continuation of the unbounding of Western art after modernism, that is, of the work of art's opening toward its context that was marked by minimalism.[19] It is worthwhile dwelling on this canonical history for a moment, because it is by returning to minimalism and its phenomenological concern with the work's environment that one can begin to grasp the impact of that environment's computerization. In contrast to the modernist work, which recedes behind the composition of which it is the carrier, the minimalist object famously presents itself as a unified gestalt—as an object in space. The composition is no longer inside the work, but the work is inside the composition, or as Robert Morris famously put it: "The better new work takes relationships out of the work and makes them a function of space, light, and the viewers field of vision."[20] The minimalist

object thus draws attention to the exhibition space as a concrete architectural container and to its own situatedness more generally.[21] First understood primarily in phenomenological terms, this "site specificity" of the work of art could soon be conceptualized institutionally, socioeconomically, and discursively within the context of institutional critique, geologically by land art, or cybernetically by what Jack Burnham theorized as systems esthetics.[22] By now the importance of the latter in particular for artists working within an ecological aesthetics framework, such as Huyghe, has been variously pointed out.[23] As Benjamin Buchloh has noted, *After ALife Ahead* itself recapitulates key moments of this genealogy—from Hans Haacke's systems sculptures to Daniel Buren's work of the 1960s to the Land Art of Robert Smithson.[24]

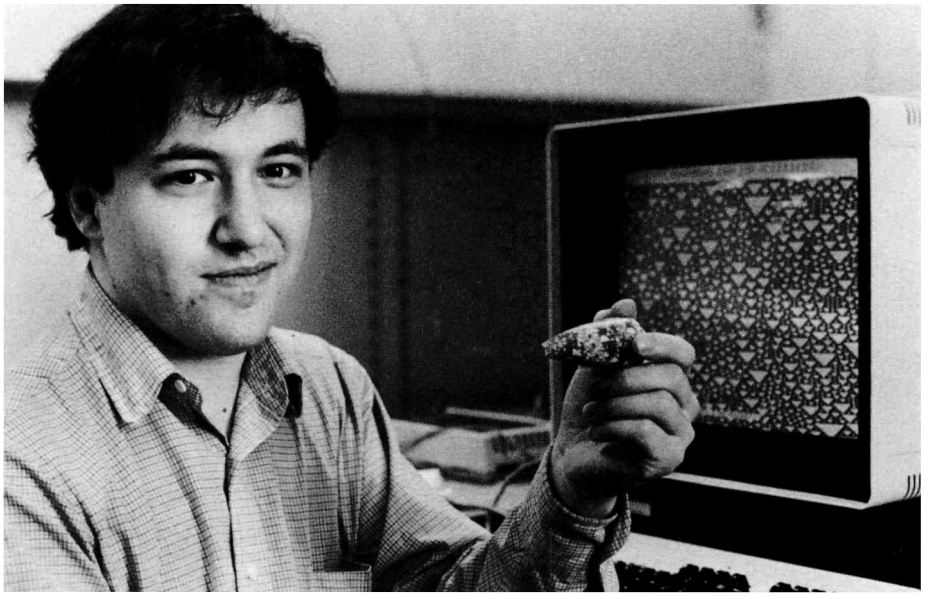
But *After ALife Ahead* also points to scientific developments, and parsing these as well is crucial for grasping the operational convergence of life and computation, which the work stages, and which is characteristic of ecological aesthetics and of the becoming environmental of computation at large. The sea snail Conus textile in the middle of the hall, for example, is a piece of living history of science. As mentioned above, a scan of the sea snail's pattern controls

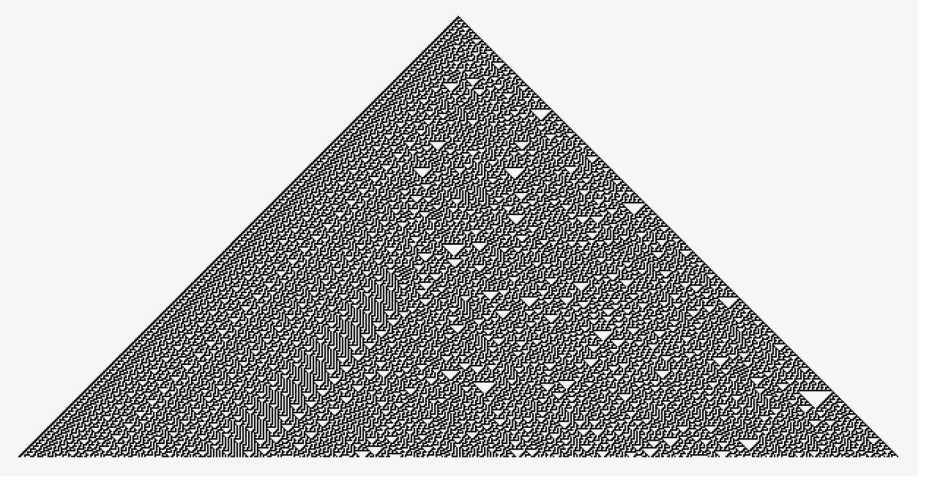


Pierre Huyghe, *After ALife Ahead*, 2017. Ice-rink concrete floor, sand, clay, phreatic water, bacteria, algae, bee colonies, chimera peacock, aquarium, black switchable glass, Conus textile, incubator, human cancer cells, genetic algorithm, Augmented Reality, automated ceiling structure, rain, ammoniac, logic game. Exhibition view of Skulptur Projekte Münster, Germany, 2017. Courtesy of the artist; Marian Goodman Gallery, New York; Esther Schipper, Berlin; Hauser & Wirth, London; Galerie Chantal Crousel, Paris. Photo credit: Ola Rindal. © Huyghe/ADAGP. Paris/ARS, New York, 2026.

central mechanisms of *After ALife Ahead*'s ecosystem. But the sea snail is not only scanned and thereby turned into an object of computational processes. In 1983 Stephen Wolfram, then a young physicist at the Institute for Advanced Studies in Princeton, suggested that the sea snail's pigmentation adheres to the rules of a cellular automaton.[25] Following Wolfram, this would mean that the sea snail in *After ALife Ahead* is not just an object of computation, but that it performs computations itself, or rather that it *is* computation.[26]

Cellular automata are discrete computer models that can be imagined as computing cell tissue. They take the form of grids, whose cells can take on one out of a finite number of states, for example, on and off—or, more to the point, alive and dead. These grids develop incrementally, all cells in parallel, a mathematical function defining the next state of each cell depending on the current states of itself and its neighboring cells. First theorized by John von Neumann in the 1940s, from the 1970s onward cellular automata have played a central role in the formation of the research field artificial life, or ALife for short, to which the title of Huyghe's installation refers. In passing over this central reference, the vast existing literature on *After ALife Ahead* neglects a key component.[27]





For ALife, and Wolfram as one of its most famous proponents, can be seen to anticipate the convergence of the concepts of life, technology, and intelligence currently observable within prominent theories of environmental or planetary computation and articulated by Huyghe's ecological aesthetics.[28] Undertaking systematic research into one-dimensional cellular automata in the 1980s, Wolfram developed a taxonomy of their behaviors. He conjectured that at least one out of the 256 elementary cellular automata that exists is Turing-complete, which is to say that it can perform any computation of which today's digital computers are capable.[29] Wolfram further found that even these simplest cellular automata generate extremely complex patterns and discovered striking similarities with patterns found in physical systems, such as the sea snail. Wolfram henceforth developed the view that cellular automata do not merely represent natural systems, but that they produce—or rather *are*—these natural systems.[30]

In the form of the sea snail housed in an aquarium in the middle of the installation, this figure of life as computation and the universe as Turing machine literally takes center stage in *After ALife Ahead*. In the installation, however, this ontologically conceived convergence of life and technology, of world and computational model, is juxtaposed with an operational one: the augmented reality (AR) app. Like Pokémon GO, which was released when Huyghe was developing the work, and which was immensely popular at the time the installation opened to the public, *After ALife Ahead*'s AR displayed virtual entities that interacted with the physical environment.[31] The virtual pyramids' emergence was triggered by the propagation of cells within the incubator; their lifespan was affected by the opening of the skylights, which was in turn set off by the appearance of especially resistant pyramids, themselves resulting from the simulation of an evolutionary process that was also affected by various environmental data.

This staged interaction between virtual objects and physical world, however, obscures what is at stake in the becoming environmental of computation, and what Huyghe's ecological aesthetic itself does at an operational level. Computational model and reality do not merely interact here—they operationally collapse into one another. To grasp the scope of this operational convergence, it is instructive to return to ecological aesthetics' roots in minimalism. To quote Morris again, the minimalist object takes "relationships out of the work and makes them a function of space, light, and the viewers field of vision."[32] The field of vision is crucial here. One experiences the minimalist object in question by moving around it, as one compares each new perspective with the already perceived gestalt. As with a melody, one's experience of the object consists not simply in a single view or tone, but in each view's or tone's

Top: Stephen Wolfram, ca. 1983. © Los Alamos National Laboratory.

Bottom: Cellular automaton Rule 30 at 300 steps. Produced using Wolfram Language. © Wolfram Media.

correlation with remembered and anticipated ones. This phenomenological account of the experience of a minimalist object can also be applied to Huyghe's virtual pyramids—with a decisive difference, however, in how perception is operationalized. For here the field of vision is doubled. The AR recapitulates—in fact, it would be more accurate to say *pre*capitulates—the viewer's perception in real time. Bluetooth beacons capture the viewer's position within the installation.[33] The accelerometer and gyroscope built into the smartphone that runs the app register its orientation in space. So-called markerless tracking examines the camera input for contrast points in short intervals and compares it to preceding inputs. This way each viewer's individual field of vision can be calculated and the pyramids displayed accordingly.

The augmented reality thus technologically implements precisely the phenomenological understanding of human perception that was so central to minimalism. Or rather, it supplements and interlaces human perception with computational sensing. It not only models the evolution of virtual objects, but also, at the same time—in order to even render them correctly—models the viewers themselves. The infrastructure of perception is thereby partially externalized in the form of sensors and information technology, and embedded into an environment, which arranges itself in accordance with machinic memories and anticipations, thereby feeding back into the viewers' behavior.[34] Huyghe's is an ecological aesthetics in precisely this sense as well: It acts on and through the relation between viewer and environment, which it computationally mediates and controls. While it stages *interactions* between virtual pyramids and their physical environment, it thus operationally implements a *convergence* of computer model and reality—namely, of the viewers' behavior and its computational model—that effectively undermines their distinction. In spite of Huyghe's claims, human viewers thus by no means disappear. Quite the contrary: They are doubled as computational models. Crucially, the model hereby feeds back into that which it models in such a way that their relationship can no longer be characterized as representational, but only as recursive, effectively collapsing both into one another.[35]

After ALife Ahead thus effectively—if only locally and partially—implements by technological means Wolfram's phantasm of sea snails and the physical universe at large as computers.[36] *After ALife Ahead* thereby presents itself as part of a becoming environmental of computation that defines our present. However, the work and much of the accompanying discourse obscure what is at stake in this process, namely, the formation of an environmental governmentality and the ecological update of a biopolitical regime.

Environmentality

As shown above, *After ALife Ahead* constitutes a computerized environment permeated with sensors and effectors. It measures variables such as temperature, CO_2-levels, precipitation, water quality, or oxygen levels within different zones, tracks the movement of bees or the division of cells, and continually captures the visitors' activity. In this respect, it resembles the so-called smart environments that increasingly make up the everyday surround of city dwellers in the global North and beyond. The types of data utilized by Huyghe's AR alone—smartphone location as tracked via bluetooth beacons, the device's orientation registered by internal sensors, not to mention camera input—elsewhere reveal "dwell time" spent in a particular aisle while shopping or one's degree of intimacy with other persons.[37] Embedded information technology not only makes our environment sensitive to our behavior, however. It also allows our environment to respond to it, and to reconfigure itself around each individual so as to modulate behavior.[38] In the case of *After ALife Ahead*, such personalization merely serves a perspectively correct rendering of AR content and thus ensures that all viewers see *the same* augmented reality.[39] In the case of contemporaneous search engines, social media, etc., however, personalization famously has the opposite effect: Here it creates so-called filter bubbles, that is, no longer different perspectives onto the same reality, but altogether different realities and the corresponding behaviors. Such personalization is in no way limited to social media feeds, but extends far beyond, permeating our physical environment. Networked devices, which communicate among one another, collect data, and adapt their behavior accordingly, make up the Internet of Things, estimated to comprise 21 billion or even more than 75 billion devices.[40]

This becoming environmental of computation implements a form of power, whose main features Michel Foucault, discovered already in the behaviorist "environmental technology" of neoliberalism.[41] This "environmental type of intervention," Foucault notes, replaces "the internal subjugation of individuals" associated with discipline and normalization.[42] Rather than operating directly on subjects and their "mentality," it constitutes a "governmentality which will act on the environment and systematically modify its variables."[43] Accordingly its correlate is no longer a legal subject or moral subject, but an actor exclusively defined by the fact that their behavior "responds systematically to modifications in the variables of the environment" or whose behavior, in the words of Gary Becker cited by Foucault, "accept[s] reality."[44] The name Foucault gives to this form of power that acts on reality itself is "environmentalité."[45] This conception of the environmental comes into its own with the becoming environmental of computation as it is articulated in the Internet of Things—and in

the ecological aesthetics of *After ALife Ahead*.

When discussing his work, Huyghe glorifies this governmental function of environmental computation as a nonhierarchical form of self-organization within more-than-human relations. He speaks of "the perfection of self-organization" and, in the catalogue accompanying his 2024 exhibition Liminal in Venice, postulates: "There's no longer any hierarchy between those present."[46] In the above-cited interview with Kolja Reichert, Huyghe distances himself from the cybernetic terminology of networks and instead aligns himself with a rhetoric of entanglement or interweaving. "Others speak of networks, I prefer speaking of webs. Things here are less networked than they are heterogeneous systems that are entangled."[47] Ursula Ströbele adopts this view: "[I]n contrast to a cybernetic conception of systems—which nevertheless resonates here—these are heterogeneous, mutually entangled, partly invisible systems."[48] Ströbele furthermore points out Huyghe's interest in Donna Haraway's writings on autopoiesis, which famously oppose that very term and its cybernetic legacy, and instead propose the counterconcept of sympoiesis to emphasize the primacy of relations over relata, which "make each other through semiotic material involution, out of the beings of previous such entanglements."[49] As opposed to such interpretations, however, *After ALife Ahead* does not so much present an interplay of entangled processes of becoming—let alone a sympoietic web of relations, which produce the terms they relate in the first place. On the contrary, Huyghe's work consists in the design of control mechanisms and communication channels between entities defined in advance, as evidenced by documents of the production process and of the work's maintenance over the course of the show as well as by Huyghe's descriptions of the work. A drawing for *After ALife Ahead* published in Huyghe's 2019 Serpentine catalogue, for example, links distinct entities, such as bacteria and cancer cells, with lines labeled "INFLUENCE."[50] Even more paradigmatic is a photograph of *After ALife Ahead* included in *Pierre Huyghe: Liminal*.[51] It shows an isolator board hosting four sensors to measure oxidation-reduction potential, dissolved oxygen, temperature, and pH.[52] The board is connected to a microprocessor underneath, which is in turn connected to a single-board computer labeled BACTERIA, presumably indicating the entity to be represented by the four isolated data streams. The photo is emblematic of what Erich Hörl has called the "mathematics of power" at the core of environmentality. Reducing "relations to calculable, rationalizable, exploitable ratios," to "extensive vectored relations between pre-given terms," this mathematics of power is fundamentally opposed to sympoietic "becoming-with" as envisioned by Haraway.[53] It presents a restricted form of ecology that reduces the plethora of relations making up the real to a very few selected ones, which it deems

secondary.[54] This restriction played out very concretely in *After ALife Ahead*. For example, cracks emerged in the clay sculptures due to the material's drying, as Ströbele notes.[55] The bees housed within them preferred these cracks to the designated entry holes, thus evading the motion sensors supposed to track their activity.[56] Rather than letting this process of continuous material transformation happen and embracing its potential for the emergence of new relations and new entities, Huyghe regularly had the sculptures repaired outside opening hours.[57]

Huyghe's claim that in his installations "there's no longer any hierarchy between those present," thus belies the highly asymmetrical relations between different bodies mediated by environmental computation both within and beyond the installation, to which we will return in the third section.[58] It also systematically leaves out of the picture the asymmetry between "those present" inside the installation and its architect and his team, whose agency on it Huyghe's claim implicitly denies. Huyghe has even proclaimed: "I am looking for things that make it impossible for me to exert authority about what I'm making. I'm creating my own tools of anti-control."[59] The work's art-historical and critical reception echoes such statements. Von Hantelmann, too, speaks of "anti-control" and Reichert observes that Huyghe seemed to want "the material and the technologies . . . to take over and [himself] as author to disappear."[60]

There is a long lineage of such relativizations of artistic agency. Think, for example, of John Cage's aesthetic of silence, whose paradigm, as Branden Joseph has shown, is the exhibition of "nature, understood as an immeasurably complex realm of unregulated differentiation."[61] Huyghe's work, however, is by no means a framing of found, nature-like emergence. *After ALife Ahead* was constructed according to detailed plans, involving multiple highly specialized contractors and requiring enormous resources. What is more, Huyghe kept intervening—from outside, as it were—over the duration of the exhibition, as shown above. These interventions consisted not only in modulating individual behaviors by tweaking specific parameters, for example, adjusting the overall temperature to increase the activity of the bees. As documented by internal communication, they also included sovereign decisions to eliminate algae from the aquarium or to "extract any . . . unwanted growth" from the hall, which mostly occurred outside opening hours.[62]

Given the extensive planning, elaborate construction, and continued interventions during the course of the exhibition, it might seem surprising at first that Huyghe talks down his artistic agency in such a manner—and that much of the reception follows suit.[63] But this common trope of ecological aesthetics is merely one art-specific articulation of a rhetoric of self-organization that dominates much broader discourses, and whose function is to render mute

questions concerning the shapeability of social and ecological relations—and to obscure their asymmetries.[64] Ecological aesthetics makes precisely such questions disappear from view when, as in the case of *After ALife Ahead*, system design is played down in the name of autopoiesis, sympoiesis, or self-organization. Again, this occurs not only in statements surrounding the work, but also on an operational level within the work itself, with interventions taking place outside opening hours. This obfuscation of the system designer's impact on the system, too, makes *After ALife Ahead* emblematic not only of ecological aesthetics, but also of today's planetary roll-out of environmental computation.

The Living Dead

Huyghe's work participates in a discourse that not only disregards the governmental character of environmental computation, but also its function within a larger biopolitical regime. And this despite the fact that environmentality's functional interaction with complementary forms of power can be discovered within the work itself: in another piece of living history of science included in *After ALife Ahead*, namely, the cell culture. These so-called HeLa cells constitute the first and most frequently used human cell line. Their origin is a tissue sample taken from Henrietta Lacks, an African American patient at the Johns Hopkins Hospital in Baltimore in 1951, a few months before her death from cervical cancer. As was customary at the time, this extraction of tissue occurred without consent.[65] The resilience and rapid proliferation of HeLa cells has since enabled numerous medical breakthroughs, among them the polio vaccine and in vitro fertilization.[66] Over sixty thousand scientific articles and seventeen thousand patents are based on research with HeLa cells.[67] The cell line has been commercialized and used not only in cancer and AIDS research, but also to test the tolerance of cosmetics—and within an art installation.[68]

Huyghe's use of HeLa cells is mentioned in passing by von Hantelmann and other authors writing about *After ALife Ahead*, but only very recently has it been problematized. With a view to the cells' function as a clock mechanism in Huyghe's *After UUmwelt* (2021) and *Liminal* (2024) exhibitions, where the rhythm of cell division controlled the display of AI-generated imagery, Luke Skrebowski pointedly argues that Huyghe's utilization of HeLa cells "artistically analogizes . . . the way in which (racial) capitalism has always sought to modulate production ('clock time'), and thus value extraction, at the level of control of the bios" in ways that "risk aestheticizing black nonbeing."[69] It is important to recognize that this is by no means accidental. *After ALife Ahead*'s incubator, as it regulates the proliferation of HeLa cells, manifests an extreme, but absolutely consistent form of environmental computation. First of all, cell

division constitutes an ideal object of environmental capture: It is a perfectly quantifiable and calculable behavior, which can be fully regulated by managing environmental parameters. Second, HeLa cells are bare biomass stripped of any rights and are exemplary in that as well. For, as noted above, environmental computation is not concerned with legal subjects but grasps life itself, whose monetization, optimization, resilience, and security it pursues—whether in the name of climate protection, counterterrorism, precision farming, or personal fitness. *After ALife Ahead*'s integration of HeLa cells explicates this fundamental biopolitical orientation of environmental computation. Third, the fact that the cells growing in the incubator are *HeLa* cells points to the racism inherent in biopolitics. At the time of racial segregation, Johns Hopkins's so-called public ward was Lacks's only option for receiving any medical help at all.[70] The clinic today emphasizes that collection of tissue samples at the time occurred "regardless of race or socio-economic status."[71] Science writer Rebecca Skloot, however, notes that there existed a widespread unspoken consensus among medical staff that destitute Black patients were to serve as research subjects in exchange for treatment. Skloot cites Lacks's doctor, Howard Jones: "Hopkins, with its large indigent black population, had no dearth of clinical material."[72]

HeLa cells are emblematic of the fact that the extreme, systemic discrimination Lacks was subjected to continues to this day. While profits in the billions of dollars have been—and continue to be—reaped from HeLa cells, Lacks's children, up until recently, were unable to afford medical treatment of chronic diseases. Foucault refers to such forms of systematic neglect as "indirect murder" or "killing" in the name of an optimization of life.[73] Taking up this line of argument, Achille Mbembe speaks of "forms of social existence in which vast populations are subjected to conditions of life conferring upon them the status of living dead."[74] Lacks's cells embody this undead form of existence: They are literally made to live, while Lacks was let die in the name of life. They are a macabre emblem of Foucault's scheme of modern, biopolitical racism as a "break between what must live and what must die."[75]

The discrepancy—or rather, the connection—between the immense profits extracted from Lacks's cells, on the one hand, and her own as well as her descendants' disadvantaged social position, on the other, has long been problematized outside the art field. Skloot's broadly received book *The Immortal Life of Henrietta Lacks* was published in 2010 and filmed in 2016 with Oprah Winfrey in the lead role. The television drama premiered on HBO in April 2017—just a few weeks before the opening of *After ALife Ahead*. At the very moment when the history of HeLa cells and the circumstances of their extraction and utilization were being widely discussed, Huyghe simply listed the cells as "human

cancer cells."[76] Even when Huyghe discusses the cells as "echoes of human presence or residual subjects" in an interview, he avoids any reference to the specific human being Henrietta Lacks and to the conditions of their availability for his work.[77]

Here, at the very latest, the function of the topos of an impending disappearance of "the human," which is repeatedly invoked not only in Huyghe's work and its reception, but also—euphorically or apocalyptically—in discussions around technological developments more broadly, becomes apparent.[78] The collective singular conceals the very different relationships of really existing people and collectives with more-than-humans, and their often asymmetrical relationships with one another. The becoming environmental of computation, however, cannot be separated from these concrete social relations. It is as much structured by them as it serves their stabilization. Every smart city or high-tech art installation has a flip side: the sacrifice zones, in which mineral deposits are extracted or processed through highly toxic procedures—often with devastating consequences for local more-than-human populations.[79] Furthermore, the embedded information technology itself treats different target groups in vastly different ways. While at one end of the spectrum smart watches optimize activity levels, mindfulness, sleep, and nutrition, at the other end, military decision support systems compute targets for air strikes in asymmetrical wars. Somewhere in between these extremes, predictive policing systems filter members of ethnic minorities out of urban traffic.[80] Environmental computation operationalizes not only an environmental type of governmentality, but also the sovereign "break between what must live and what must die."[81] With Foucault, environmental computation can thus be seen as the most recent articulation of a biopolitical paradigm, whose optimization of the processes of life has from the very start been connected to racist logics of purification. The presence of HeLa cells in *After ALife Ahead* points beyond the work and its fascination for the becoming environmental of computation and calls on viewers to think about precisely these functional interactions and historical continuities: between environmental management of behaviors and direct or indirect killing, between the optimization of life and racist discrimination, between a supposed disappearance of "the human" and the persistence of social relations of domination, and between the very different ways in which viewers, artist, and Henrietta Lacks "disappear" in this work.

As a vital element of Huyghe's work, the HeLa cells thus point to a set of questions that pertain to an analysis of ecological aesthetics in general. How does a given work grasp life at an operational level? What mode(s) of power does it thus operationalize? What status does it confer to the relations that make up its

form? Are they primary and constitutive of the relata, which are thus mutually constitutive? Or are they vectors between bounded entities defined in advance, quantifiable and computable? And ultimately, how does the work relate to the becoming environmental of computation as it currently unfolds? Does it propose alternative or divergent modes? Is it mainly symptomatic? And if so, what does it tell us about its underlying condition? Asking such questions will be crucial if we want to engage productively with an art that is no longer allegorical or symbolic but fundamentally ecological and operational.

After ALife Ahead demonstrates that ecological aesthetics is bound to fall short of the emancipatory claims implicit in its rhetorics of de-hierarchization, self-organization, and an expansion of agency to more-than-human beings, if the very operational mode it adopts is the mode of environmentality.[82] The relational forms the work installs, and which characterize the discourse around it, are part and parcel of a broader merging of biology and technology that threatens to eclipse the social as a category and that is structurally blind to asymmetries of power. This merging itself being an articulation of the current radicalization of biopolitics, we have to ask ourselves whether one can hope to grasp this development solely on its own terms, as ecological aesthetics seek to do. Rather than dismissing it as merely symptomatic, however, the challenge posed by work like that of Huyghe, lies in thinking through it while keeping one's analytical method from following the artistic practice in merging into neocybernetics. Only then can one grasp what the work discovers about the becoming environmental of computation.

Notes

I would like to thank Matthew Vollgraff as well as the reviewers for their insightful comments and helpful suggestions. Thanks also to Magnus Schäfer and Christopher Williams-Wynn for their attentive readings of early drafts of this article. Translations are my own unless otherwise noted.

1. See Bernhard Siegert, "The Map Is the Territory—Dissolving the Barrier between Media and Nature," *Spark*, 2022, 16–23: 20. Siegert formulates this thought experiment to convey the essence of the physical Church-Turing thesis, with which he associates Stephen Wolfram's ideas about cellular automata, more about which follows below.

2. See Blaise Aguera y Arcas, *What Is Intelligence? Lessons from AI About Evolution, Computing, and Minds* (Cambridge, MA: MIT Press, 2025), 10,12; Benjamin Bratton, "Foreword," in *What Is Intelligence?*, 7. In *What Is Intelligence?* Google VP/Fellow and CTO of Google's Technology & Society Agüera y Arcas puts forth such a vision:

> I define life as a self-modifying, computational state of matter that arises through evolutionary selection for the ability to persist through time by actively constructing itself, whether by growing, healing, or reproducing. Yes, everything alive is a computer! . . . Understanding the deep role computation plays in our universe, and the way it links the seemingly disparate fields of physics, chemistry, and biology, both sheds new light on evolutionary theory and sets the stage for understanding the computational nature of intelligence. Aguera y Arcas, "What Is Intelligence?," 10–12.

In the foreword, Benjamin Bratton suggests:

> Are these three words—life, intelligence, technology—actually different names for the effects of a more general process? Just as life is a factory for making more life, and technology is a factory for making more technology, now life makes technologies that make new life that makes new technologies. Ultimately, it may be the same factory, and at its heart is computation. Bratton, "Foreword," 7.

3. Jennifer Gabrys, "The Becoming Environmental of Computation: From Citizen Sensing to Planetary Computerization," *TECNOSCIENZA: Italian Journal of Science & Technology Studies* 8, no. 1 (2017): 1.

4. See, for example, André Rottmann's seminal account in André Rottmann, "'The Medium Is Leaking': Notes on the Work of Pierre Huyghe and the 'Ecologization' of Contemporary Art," *Grey Room*, no. 77 (2019): 77.

5. Ursula Ströbele, *Hans Haacke und Pierre Huyghe: Non-Human Living Sculptures seit den 1960er-Jahren* (Berlin: De Gruyter, 2024), 364–365. As Ströbele traces in her meticulously researched book, the permit to include the peacocks was revoked about four weeks after the opening of the exhibition. The peacocks had at that point already been removed due to behavioral anomalies presumably caused by the inadequate habitat.

6. Eric C.H. de Bruyn, "A Proposal: Must We Ecologize?," *Grey Room* 77 (2019): 60, https://doi.org/10.1162/grey_a_00279; Rottmann, "'Medium Is Leaking,'" 85; Luke Skrebowski, "On Pierre Huyghe's UUmweltanschauung: Art, Ecosystems Aesthetics, and General Ecology," *Grey Room*, no. 77 (October 2019): 77; and Skrebowski, "Realizing Our Ecologization? On Ecosystems Aesthetics and Contemporary Art beyond Institutional Critique," *Grey Room*, no. 99 (April 2025):

88. In their groundbreaking dialogical contributions to *Grey Room* no. 77, de Bruyn speaks of an "'ecologization' of artistic practice" since the 1960s and Rottmann of an "'ecologization' of contemporary art" epitomized by Huyghe. Rottmann, "'Medium Is Leaking,'" 88–89, 94n3. Rottmann clarifies that this refers to a particular strand of art only, initially speaking of an "'ecological' current" of art and referring to Huyghe's "'ecological' projects," but dropping the quotation marks about halfway through the text. Luke Skrebowski coins the term "ecosystems aesthetics," which explicitly refers to the systems esthetics of the 1960s. All three refer to Erich Hörl's discussion of general ecology.

7. In his eponymous volume, Nicolas Bourriaud characterizes the work in question as either objects generating or transforming social relationships or those relationships themselves. Nicolas Bourriaud, *Relational Aesthetics*, trans. Simon Pleasance and Fronza Woods with the participation of Mathieu Copeland (Dijon: Les Presses du réel, 2002), 28–29. Caroline Jones characterizes the artists included in her 2022 exhibition *Symbionts*, which also features a work by Huyghe, as proponents of a "more-than-human relational aesthetics." Caroline A. Jones, "Symbionts: A Polemic for Our Time," in *Symbionts: Contemporary Artists and the Biosphere*, ed. Caroline A. Jones et al. (Cambridge, MA: MIT Press, 2022), 18.

8. Skrebowski, "Realizing Our Ecologization?, 88. Skrebowski speaks of "an ecosystems aesthetics within contemporary art (which recovers and extends the postformalist systems aesthetics of the late 1960s and 1970s)."

9. See also Erich Hörl, "The Environmentalitarian Situation: Reflections on the Becoming-Environmental of Thinking, Power, and Capital," *Cultural Politics* 14, no. 2 (2018): 160. Hörl notes that Gibson's

> neo-ecological thinking of affordances already implies the possibility of operationalizing, automatizing even, the relationships between organisms (especially humans) and their environments by, precisely, managing and controlling affordances. Environmental psychology and behavioral control have to be understood comprehensively as a kind of experimentalization of environmentality that produces an environmentalitarian knowledge of control.

10. de Bruyn, "A Proposal," 59, 61.

11. de Bruyn, "A Proposal"; Rottmann, "'Medium Is Leaking,'" 89; Skrebowski, "Realizing Our Ecologization?" 107. Citing Bruno Latour, de Bruyn's introduction asks whether art history "must . . . ecologize." In his response, Rottmann notes that "the ecological in Erich Hörl's sense . . . seems to have gained prominence over the allegorical in Huyghe's recent work." More recently, Skrebowski has contrasted the symbolic mode of institutional critique, exemplified by Andrea Fraser, with Huyghe's operative one in another crucial contribution to the ongoing debate.

12. Rottmann, "'Medium Is Leaking,'" 90; de Bruyn, "A Proposal," 62; Hörl, "Introduction to General Ecology: The Ecologization of Thinking," in *General Ecology: The New Ecological Paradigm*, ed. Erich Hörl and James Edward Burton, trans. Nils F. Schott (London: Bloomsbury Publishing, 2017), 4. See also the excellent overview in Christopher Williams-Wynn, "Uneven Environmentality: The Discordance of Cybernetic Control at the Centro de Arte y Comunicación, 1971–1973," *Grey Room*, no. 97 (2024): 47–49.

13. Michel Foucault, *"Society Must Be Defended": Lectures at the Collège de France, 1975–76*, ed. Mauro Bertani and Alessandro Fontana, trans. David Macey (New York: Picador, 2003), 254.

14. Examples concerning Huyghe's work include—in addition to Huyghe's own statements,

more about which below—Dorothea von Hantelmann, "Situated Cosmotechnologies: Pierre Huyghe's *Untilled* and *After Alife Ahead*," in *Pierre Huyghe*, exh. cat., ed. Rebecca Lewin, Natalia Grabowska, and Anne Stenne (London: Koenig Books, 2019); Patricia Reed, "From Projection to Embedding: Sense-Making and Conceptual Inadaptation," in *Pierre Huyghe: Liminal*, ed. Anne Stenne and Jacqueline Feldmann (Rome: Marsilio arte, 2024). For the trope of the disappearance of the human within broader discussions of technological developments, see note 78.

15. Christopher Mooney, "Pierre Huyghe," *ArtReview*, 17 February 2015, 97, https://artreview.com/october-2013-feature-pierre-huyghe/.

16. Mooney, "Pierre Huyghe," 97.

17. Reed, "Projection to Embedding," 183.

18. von Hantelmann, "Situated Cosmotechnologies," 19.

19. See de Bruyn, "A Proposal," 62.

20. Robert Morris, "Notes on Sculpture, Part 2," *Artforum* 5, no. 2 (1967): 21.

21. Cf. Ströbele, *Haacke und Huyghe*, 382–383, 396. Ströbele links Huyghe's "situation aesthetics" to minimalism and Morris in particular.

22. Cf. Miwon Kwon, "One Place after Another: Notes on Site Specificity," *October* 80 (1997): 85–110, which famously distinguishes three types of site-specificity: phenomenological, institutional/social, and discursive, which she associates with minimalism, conceptual art and institutional critique, and second-generation institutional critique, respectively.

23. Jones, "System Symptoms," *Artforum International* 51, no. 1 (2012): 116; Sven Lütticken, "Systemic Aestheticization," *Texte zur Kunst* 29, no. 114 (2019): 167; Skrebowski, "On Huyghe's UUmweltanschauung," 79; Ströbele, *Haacke und Huyghe*, 377. See further Rottmann, "'Medium Is Leaking,'" esp. 89–90; de Bruyn, "A Proposal," 60. While Rottmann stresses the differences between Huyhge's work and Haacke's systems esthetics, he nevertheless situates Huyghe's work within the context of a "more general 'ecologization of art' since the late 1960s," of which Haacke's systems works are emblematic. De Bruyn similarly situates Hyughe's work vis-à-vis that of Smithson. Important early critical recoveries of Burnham's work and its legacy are Pamela M. Lee, *Chronophobia: On Time in the Art of the 1960s* (Cambridge, MA: MIT Press, 2004); Sabeth Buchmann, "From Systems-Oriented Art to Biopolitical Art Practice," in *Media Mutandis: A NODE.London Reader: A Survey of Media Arts, Technologies and Politics* (London: NODE.London, 2006).

24. Benjamin H.D. Buchloh, "Rock Paper Scissors: On Some Means and Ends of Sculpture at Venice, Munster, and Documenta," *Artforum International* 56, no. 1 (2017): 285. Buchloh views these different strands of sculpture as "incompatible."

25. Stephen Wolfram, "Cellular Automata," *Los Alamos Science*, no. 9 (Fall 1983): 5–6.

26. Siegert, "Map Is Territory," 20. My following account draws on Siegert's work as well as on Francesco Berto and Jacopo Tagliabue's entry in *The Stanford Encyclopedia of Philosophy*, Summer 2025 ed., s.v. "Cellular Automata," accessed May 28, 2026, https://plato.stanford.edu/archives/sum2025/entries/cellular-automata/.

27. A rare exception is Ströbele's book, which does address the work's title, but leaves it at preliminary speculations: "*A* could stand for *artificial*, maybe for *Artificial Intelligence*, or it references the electronic control elements, the algorithm, and the sensors." Ströbele, *Haacke und Huyghe*, 376.

28. See note 2.

29. The cellular automaton in question is known as Rule 110, based on Wolfram's classification system. It has since been proven by Matthew Cook that Rule 110 is indeed Turing-complete. See Matthew Cook, "Universality in Elementary Cellular Automata," *Complex Systems* 15, no. 1 (2004): 1–40.

30. See Siegert, "Map Is Territory," 20. Berto and Tagliabue, "Cellular Automata." Ultimately Wolfram advances the theory shared by Konrad Zuse and Edward Fredkin that, in the words of Berto and Tagliabue, "the physical universe is, fundamentally, a discrete computational structure," that "[e]verything in our world—quarks, trees, human beings, remote galaxies—is just a pattern in a [cellular automaton]."

31. Pokémon GO is a mobile application developed by Niantic Labs and released in July 2016. Utilizing the smartphone's GPS data and camera input, it generates a so-called augmented reality, in which users can catch little cartoon monsters, the eponymous Pokémon, at locations in the physical world. Pokémon GO was immensely popular immediately upon its release, downloads exceeding 500 million by the end of the first year. See *Encyclopaedia* Britannica Online, s.v. "Pokemon," accessed November 4, 2025, https://www.britannica.com/topic/Pokemon-electronic-game; *Encyclopaedia Britannica Online*, s.v. "Pokémon GO," accessed December 1, 2025, https://www.britannica.com/procon/Pokemon-GO-debate.

32. Morris, "Notes on Sculpture, Part 2," 21.

33. For details of the technological setup see "Luxloop—After ALife Ahead," accessed 2 January 2026, https://www.luxloop.com/projects/afteralifeahead.

34. See also Siegert, "Map Is Territory," 21. About present-day computational environments, Siegert here notes: "Consciousness communicates with its algorithmitized environment only through a doppelgänger, a 'data subject' who disposes of capacities of memorization of the immediate past and of an anticipation of the future, unavailable for the cognitive capabilities of the corresponding brain."

35. Following Huyghe, I have focused here on human viewers, but in principle the same goes for other systems as well.

36. See also Siegert, "Map Is Territory," 21. Siegert writes:

> Even if the physical interpretation of the Church-Turing thesis [which claims that the universe is a Universal Turing Machine or UTM—JS] is wrong, we observe the rise of technologically embodied algorithmic processes that nevertheless may prove it effectively right—not in the sense that the UTM is ontology but in the sense that the cultural technique of computation is becoming environmental and thereby gives rise to a new elemental space, a new real, in which elemental and technological media become indiscernible.

37. In 2018 *WIRED* reported Facebook filing a patent for "using the devices of Facebook app users to identify wireless signals . . . from the devices of other users" as well as "gyroscope and accelerometer to analyse movement patterns" to determine the significance of users' relationship. Elise Thomas, "A Creepy Facebook Idea Suggests Friends by Sensing Other People's Phones," *WIRED*, 4 November 2018, https://www.wired.com/story/facebook-phone-tracking-patent/. For a brief introduction into the use of beacons for monitoring shoppers in stores, see Brinda Gulati, "Beacon Technology in Retail: A 2026 Guide to Proximity Marketing—Shopify India," Shopify, accessed January 18, 2026, https://www.shopify.com/in/blog/the-ultimate-guide-to-using-beacon-technology-for-retail-stores.

38. Orit Halpern, Robert Mitchell, and Bernard Dionysius Geoghegan, "The Smartness Mandate: Notes toward a Critique," *Grey Room*, no. 68 (2017): 118. Halpern, Mitchell, and Geoghegan aptly speak of "an individual and customized 'information-environment' around each individual" that is generated by smart technologies.

39. "Luxloop—After ALife Ahead." As Luxloop, the company who developed *After ALife Ahead's* AR, writes: "We built a server-based system that allowed users' devices to sync to this autonomous world so that even at capacity of 200+ viewers, all visitors would see the same augmented system and animations in real time."

40. Satyajit Sinha, "Number of Connected IoT Devices Growing 14% to 21.1 Billion," *IOT Analytics*, 28 October 2025, https://iot-analytics.com/number-connected-iot-devices/; "Internet of Things (IoT)," NIST, U.S. Department of Commerce, accessed January 3, 2026, https://www.nccoe.nist.gov/iot.

41. Foucault, *The Birth of Biopolitics: Lectures at the Collège de France, 1978–79*, ed. Michel Senellart, trans. Graham Burchell (New York: Palgrave Macmillan, 2008), 261.

42. Foucault, *Birth of Biopolitics*, 260.

43. Foucault, *Birth of Biopolitics*, 260, 271.

44. Gary S. Becker, "Irrational Behavior and Economic Theory," *Journal of Political Economy* 70, no. 1 (1962): 12; Foucault, *Birth of Biopolitics*, 269; Brian Massumi, "National Enterprise Emergency Steps toward an Ecology of Powers," in *Ontopower: War, Powers, and the State of Perception* (Durham, NC: Duke University Press, 2015), esp. 25–26.

45. Foucault, *Naissance de La Biopolitique, Cours Au Collège de France, 1978–1979* (Paris: Gallimard/Seuil, 2004), 266. The English edition (Foucault, *Birth of Biopolitics*, 261) translates *environmentalité* as "environmentalism." Thomas Lemke, Gabrys, and others have pointed out that this translation lacks the association with governmentality and furthermore carries the risk of being confused with the policy field pertaining to environmental concerns such as climate change. Thomas Lemke, *The Government of Things: Foucault and the New Materialisms* (New York: New York University Press, 2021), 243n.1, https://doi.org/10.18574/nyu/9781479808816.001.0001; Gabrys, "Programming Environments: Environmentality and Citizen Sensing in the Smart City," *Environment and Planning D: Society & Space* 32, no. 1 (2014): 35n.2, https://doi.org/10.1068/d16812. As Lemke notes in his careful reading of Foucault, this notion of *environmentality* puts forth a "distinctive ecological understanding of the environmental as both technological and natural: 'the problem of the milieu to the extent that it is not a natural milieu.'" Lemke, *Government of Things*, 168–169. Lemke cites Foucault, *Society*, 245. Lemke's translation is modified. The published English translation reads "[a]nd also the problem of the environment to the extent that it is not a natural environment."

46. Kolja Reichert, "Künstler Pierre Huyghe: 'Statische Dinge sind so vorhersehbar,'" *Frankfurter Allgemeine Zeitung*, 15 June 2017, https://www.faz.net/aktuell/feuilleton/kunst-und-architektur/superkunstjahr-2017/interview-mit-pierre-huyghe-bei-skulptur-projekte-15055606.html; Anne Stenne, "Pierre Huyghe in Conversation with Anne Stenne," in *Pierre Huyghe: Liminal*, 9.

47. Reichert, "Künstler Pierre Huyghe."

48. Ströbele, *Haacke und Huyghe*, 372.

49. Ströbele, *Haacke und Huyghe*, 310; Donna Jeanne Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham, NC: Duke University Press, 2016), 60. Haraway writes:

"Nothing makes itself; nothing is really autopoietic or self-organizing" (58). It should be noted, however, that Haraway concedes that "as long as autopoiesis does not mean self-sufficient 'self making,' autopoiesis and sympoiesis, foregrounding and backgrounding different aspects of systemic complexity, are in generative friction, or generative enfolding, rather than opposition" (61).

50. Lewin, Grabowska, and Stenne, eds., *Pierre Huyghe*, 211.

51. Stenne and Feldmann, *Pierre Huyghe: Liminal*, 377.

52. The isolator board is Whitebox Labs' Tentacle Shield model, which is built to host up to four EZO circuits by Atlas Scientific; the specific circuits used here can be identified in a larger version of the photograph that was temporarily available on the website of Andy Cavatorta, an artist and engineer involved in the construction of *After ALife Ahead*. (The image was accessed in December 2024 at https://andycavatorta.com/media/studio/20170529_140238.jpg. It is no longer available online.) See Whitebox Labs, "Tentacle Shield for Arduino Documentation," accessed 3 January 2026, https://www.whiteboxes.ch/docs/tentacle/t1/#/.

53. Haraway, *Staying with Trouble*, 60; Hörl, "Introduction," 8. Hörl here juxtaposes the "mathematics of power" to becoming as conceived in Eduardo Batalha Viveiros de Castro, *Cannibal Metaphysics: For a Post-Structural Anthropology*, ed. and trans. Peter Skafish, Univocal (Minneapolis: University of Minnesota Press, 2014), 160.

54. Hörl, "Introduction," 7, 10. Hörl speaks of "restricted ecology" as well, but in a different sense, opposing the "restricted ecology of nature" to "technoecology," into which it is transformed in the process of cybernetization.

55. Ströbele, *Haacke und Huyghe*, 360.

56. Ströbele, *Haacke und Huyghe*, 368.

57. Ströbele, *Haacke und Huyghe*, 360–361, 368. Ströbele cites a note by Huyghe's studio, according to which in one case the cracked sculpture evoked a smiling face and this association in particular was to be eliminated.

58. Stenne, "Conversation," 9.

59. Reichert, "Künstler Pierre Huyghe."

60. Von Hantelmann, "Situated Cosmo-Technologies, 22; Reichert, "Künstler Pierre Huyghe."

61. Branden W. Joseph, "John Cage and the Architecture of Silence," *October* 81 (1997): 99.

62. Email by Huyghe's studio to the Münster project team, 25 April 2017, cited in Ströbele, *Haacke und Huyghe*, 361. See also Ströbele, *Haacke und Huyghe*, 367–368, 376.

63. A notable exception is Ströbele, who points out the tension within Huyghe's practice between his professed intention to foster emergence and surrender control on the one hand and his interventions into emergent dynamics on the other. Ströbele, *Haacke und Huyghe*, 390–391, 408.

64. For example, Anicka Yi's gallery, Pace, notes about the artist: "Environmental, bacterial, and entropic forces shape her works, challenging traditional notions of permanence and authorship." See "Anicka Yi Draws on Scientific Inquiry to Explore Human Existence, the Symbiotic Relationships between Living and Non-living Forms, and the Inherently Mutable Nature of the Universe and Its Systems," Pace Gallery, accessed April 17, 2026, https://www.pacegallery.com/artists/anicka-yi/. For nonartistic exmples, see the critique of neocybernetic politics in Anna-Verena Nosthoff and Felix Maschewski, "'We have to Coordinate the Flow' oder: Die Sozialphysik des Anstoßes: Zum Steuerungs- und Regelungsdenken neokybernetischer Politiken," in *Jahrbuch Technikphilosophie 2019: Steuern und Regeln* (Baden-Baden: Nomos, 2019).

65. "Upholding the Highest Bioethical Standards," accessed December 6, 2025, https://www

.hopkinsmedicine.org/henrietta-lacks/upholding-the-highest-bioethical-standards.

66. Rebecca Skloot, *The Immortal Life of Henrietta Lacks* (Crown Publishers, 2010), 18.

67. Skloot, *Immortal Life*, 522, 327.

68. Skloot, *Immortal Life*, 360, 180.

69. Skrebowski, "Realizing Our Ecologization?," 107–08.

70. Skloot, *Immortal Life*, 36–37.

71. "Upholding the Highest Bioethical Standards," Johns Hopkins Medicine, accessed 1 June 2026, https://www.hopkinsmedicine.org/henrietta-lacks/upholding-the-highest-bioethical-standards.

72. Skloot, *Immortal Life*, 61. Cf. bell hooks's powerful critique of the racism structuring Skloot's own narrative. bell hooks, "Tragic Biography: Resurrecting Henrietta Lacks," in *Writing beyond Race: Living Theory and Practice* (New York: Routledge, 2013), 81–91.

73. Foucault, *Society Must Be Defended*, 256. Foucault indicates that such "indirect murder" complements rather than replaces direct annihilation: "When I say 'killing,' I obviously do not mean simply murder as such, but also every form of indirect murder: the fact of exposing someone to death, increasing the risk of death for some people, or, quite simply, political death, expulsion, rejection, and so on."

74. Achille Mbembe, "Necropolitics," trans. Libby Meintjes, *Public Culture* 15, no. 1 (2003): 40.

75. Foucault, *Society*, 254.

76. "Skulptur Projekte Archiv," accessed 6 December 2025, https://www.skulptur-projekte-archiv.de/en-us/2017/projects/186/. While in the work's official specification of medium the cells are listed as "human cancer cells," Nico Anklam's brief description of the work on the same website does refer to "the HeLa cell line." The specifications for *Living Cancer Variator* (2016), "a test-run" for *After ALife Ahead* first shown at the Palais de Tokyo in Paris in 2016, refer to "human cells," as does the exhibition guide to Huyghe's 2024 exhibition *Liminal at Punta della Dogana* in Venice. Aldo Buscalferri and Dominika Hadelova, "The Exhibition Is Not a Hysteric Object—Pierre Huyghe," MATTO, no. 5 (June 2021), n.p.; Stenne and Feldmann, *Pierre Huyghe: Liminal*.

77. Buscalferri and Hadelova, "The Exhibition Is Not a Hysteric Object," n.p.

78. For a broad range of examples, see Benjamin H. Bratton, *The Stack: On Software and Sovereignty* (Cambridge, MA: MIT Press, 2015); Friedrich A. Kittler, "The World of the Symbolic—A World of the Machine," in *Literature, Media, Information Systems: Essays*, ed. John Johnston, trans. Stefanie Harris (New York: Routlege, 1997); Nick Land, "Meltdown," in *Fanged Noumena: Collected Writings 1987–2007*, ed. Robin Mackay and Ray Brassier (Falmouth: Urbanomic, 2011); Eliezer Yudkowsky, "Pausing AI Developments Isn't Enough: We Need to Shut It All Down," *Time,* March 29, 2023.

79. Cf., however, Williams-Wynn, "Uneven Environmentality," esp. 50, whose provocative thesis is that the uneven development of environmentality offers entry points for critique and resistance.

80. See, for example, Amnesty International, *Netherlands: We Sense Trouble: Automated Discrimination and Mass Surveillance in Predictive Policing in the Netherlands* (2020), https://www.amnesty.org/en/documents/eur35/2971/2020/en/, about the aptly titled Sensing Project, a prototype launched in the Dutch city of Roermond in 2019.

81. Foucault, *Society*, 254.

82. This entanglement of artistic practices experimenting with advanced technology and tech-

niques of government and control is not unique to ecological aesthetics. Examining artistic projects at and around the 1970 World Exposition in Osaka, for example, Yuriko Furuhata has traced the "historical resonance between the architectural practice of designing the environment, the artistic practice of constructing the environment, and the governmental practice of managing the environment" in postwar Japan. Yuriko Furuhata, "Multimedia Environments and Security Operations: Expo 70 as a Laboratory of Governance," *Grey Room*, no. 54 (2014): 72. I thank the anonymous reviewer for pointing me toward this article.