Bik Van der Pol. *Birds Must*
Be Eliminated [Bird Shot], **2005.**
Installation at VU University
Amsterdam.

Abstract Habitats: Installations of Coexistence and Coevolution

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In 2005, Bik Van der Pol exhibited their piece *Birds Must Be Eliminated [Bird Shot]* in an exhibition space in the lobby of the main building on the VU University campus in Amsterdam. *Birds Must Be Eliminated* consists of a large cage with live birds, accompanied by a window covered with blue film and a quotation by Yves Klein in which the artist demands that all birds be shot so they can no longer pollute the boundless azure of the sky with their annoying presence. The piece, which was first realized in a simpler version in 2000 in New York (sans birds but with a gun leaning against the wall), refers to Yves Klein's 1961 "Chelsea Hotel Manifesto." In this text, Klein recalls lying on the beach as an adolescent, feeling "hatred for birds which flew back and forth across my blue, cloudless sky because they tried to bore holes in my greatest and most beautiful work."[1]

This passage reads like a cartoon version of aestheticism, pitting an art purified and abstracted from all earthly concerns against nature. Determined to purify teeming and unpredictable nature, to replace living multiplicity with an airy abstraction that mirrors his sublime mind, Klein takes the verb *to abstract* in its most literal sense: to take away or remove, in this case to remove the birds from the picture (from the sky). The birds in Bik Van der Pol's installation were not shot, but neither were they free as a bird; they were songbirds bred by human beings.[2] During the exhibition at VU University, animal rights activists decorated the door of the curator's office with threatening slogans and demands: "Free the birds" and "We know where to find you!"[3] Rather than being based on concrete complaints about the manner in which these particular birds were kept, the protest seemed like an anarcho-primitivist attack on the very fact that human beings have abstracted certain animals from a natural state.[4]

The birds in Bik Van der Pol's cage are the result of crossbreeding—of human thought and practice intervening in natural processes and effecting a transformation, a mutation. For all their tangibility, they are the products of abstraction—Bik Van der Pol confront Klein's purist dream of abstraction *from* unruly avian

life with the abstraction *of* certain "desirable" properties from known species and the production of new ones in the process. However, crossbreeding was much more haphazard and trial-and-error than contemporary forms of genetic engineering, which are implicated in the wholesale takeover and makeover of life by what amounts to a bioindustrial complex.[5] Capitalism, including biocapitalism, has made productive the theoretical and mathematical abstractions of science. In Oskar Negt and Alexander Kluge's words, capitalism "rests on the principle, that—for the first time in history—its abstractions break through into the productive sector."[6]

Biotechnology—that is, scientific abstraction entering into an ever closer alliance with financial capital—is perhaps the apogee of this development. The fabric of life itself becomes subject to a new wave of primitive accumulation, and what was common becomes proprietary. Biotechnology will further change what it means to be human as well as what it means to be a bird, speeding up the qualitative as well as quantitative transformation of a global ecosystem that now, in the anthropocene, is an economico-ecological system—an eco-economy—that is heading for a crash. As human populations are displaced and species go extinct, genetic expropriation will likely increase on multiple fronts, both in farming and in the domain of healthcare and human reproduction. René Riesel, a situationist turned shepherd and anti-GMO activist, has noted this means that the autonomy of life itself—which is autonomy over reproduction—is called into question.[7]

Given this context, some of the art projects under discussion in this article, which function as alternative aesthetic habitats for animals and human beings, may seem almost quaint. And yet: by abstracting organisms from given environments and forms of life, these installations make concrete and tangible abstract eco-economic systems and their historical transformations and tipping points. They foreground the concretion *of* abstraction as production, as ongoing material intervention and transformation. In the process, the question is raised as to which forms of coexistence are possible beyond the dismal alternatives of maximum economic exploitation, on the one hand, and primitivist "free the birds" screeds, on the other hand.

Pigs and People

Modern Western thought often took great care to set itself apart from the sensuous manifold of nature—defining animals as machines. Now that old definitions of the human are collapsing, both through developments in technoscience and in the humanities, human-animal relations are being recalibrated. At Documenta 10 in 1997, Carsten Höller and Rosemarie Trockel's *Ein Haus für Schweine und Menschen* (A House for Pigs and People) constituted a site for encounters between
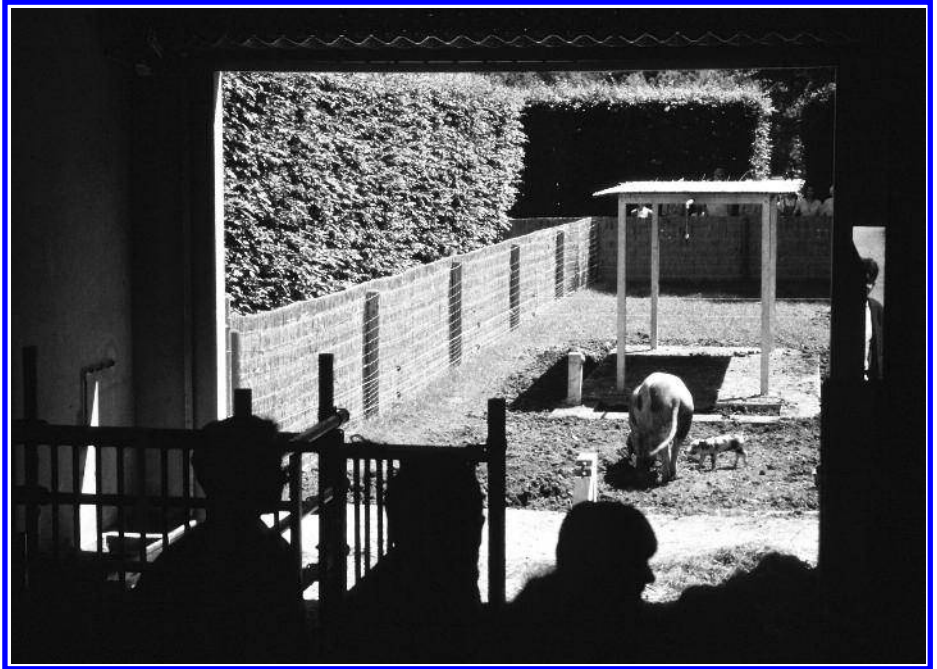
members of two species. The concrete construction contained two spaces divided by a large one-way mirrored glass window, through which Documenta visitors could see the pigs, while the latter saw only their own reflections.[8] The communication between the two species was thus reduced to a (one-sided) scopic relation, with the senses other than sight being largely canceled out. Yet while Höller and Trockel thus seemed to duplicate the objectification of animals (i.e., reduction to image-objects studied and manipulated by a gazing human subject), the "human" half of the installation contained a concrete incline on which people could recline and watch the pigs more or less from the same height. The vertical biped became horizontal, or at least diagonal.

Furthermore, the pigs were Bentheimer Landrasse, an archaic breed no longer in vogue in today's agribusiness. Yet these impressive, speckled swine were clearly not "nature." Rather, they were an ancient hybrid, a relic of a historical stage of the human-animal dialectic.[9] In their introductory text, the artists question the legitimacy of "all talk of an 'objective' limit (animal as object)," asking an extended series of questions about whether the killing of Scottish sheep with human genomes is permissible, about different degrees and kinds of consciousness, and about the interconnections between the subjugation of nonhuman beings and nonruling classes in various societies.[10] This discourse has affinities with contemporary reconsiderations, by Michel Serres, Bruno Latour, and many in their wake, of the subject-object dichotomy, as well as the culture-nature dichotomy. However, to state that Höller and Trockel's work replaces modern "subject-object narcissisms" with a celebration of the hybrid or the cyborg would be to oversimplify both that work and intellectual history.[11]

While many theories of cyborgs and hybrids explicitly or implicitly critique Hegelian as well as Marxian versions of the dialectic as being rigged in favor of the triumphant subject (be it Hegelian spirit or the Marxist class subject), John Bellamy Foster recalls Karl Marx's engagement with the natural world. The turn Western Marxism took in the 1920s with Georg Lukács's and Karl Korsch's revolt against undialectical positivism in recent forms of Marxism and their rejection of Friedrich Engels's ambitious but flawed attempt to think a "dialectic of nature"

had the unfortunate effect of limiting Marxian accounts of history. Beginning with the early work of Lukács in particular, *dialectical materialism* was redefined as *historical materialism* in narrow terms—in terms of a "purely" human history, even though Marx and Engels had considered natural and human history to be two branches of the same science.[12] Foster stresses, "From the start, Marx's notion of the alienation of human labor was connected to an understanding of the alienation of human beings from nature."[13] In Marx's own words,

> The view of nature which has grown up under the regime of private property and of money is an actual contempt for and practical degradation of nature. . . . In this sense Thomas Müntzer declares it intolerable that "all creatures have been made into property, the fish in the water, the birds in the air, the plants on the earth—all living things must also become free."[14]

According to Marx's anthropological conception of labor as the self-creation and self-objectification of man, labor as a social relationship set humankind apart from animals, resulting in properly *social* relationships (which animals cannot have.)[15] We may want to argue that this is still too Hegelian, too self-aggrandizing of spirit over dumb nature, that animals *do* form relationships and that "[living] things are singularities composed of relations and intensities. An approach that tries to think of life beyond structure, substance, or constitutive subject-object relationships."[16] Marx struck a precarious balance between promethean productivism and the desire to liberate the other of that promethean drive—the living beings that are subjected to it and at times produced by it. Jean Baudrillard, noting that Marx confused "the liberation of productive forces . . . with the liberation of man," quotes Marx to the effect that men "begin to distinguish themselves from animals as soon as they begin to *produce* their means of subsistence." He then asks, "Why must man's vocation always be to distinguish himself from animals?"[17]

A fair question, and one that resonates at a moment when a movement to give animals "human rights" is underway. However, this "elevation" is a historical fact. Smoothing over historical antinomies and the existence of asymmetries—of imbalances of power—is pointless. Human self-differentiation from animals is the original historical event; it is what produced history as something other than natural history, even at the hunter-gatherer stage. Trying to wish this *Urszene* of history away while acting in history and trying to gain some degree of agency amid portents of imminent global ecological and social cataclysm would be folly. Höller and Trockel's *House for Pigs and People* acknowledges this by temporarily and partially reversing the process—placing the human beings on an incline. For Sigmund Freud, the adoption of an upright posture by human beings took

them out of an animal word of smells and into a visual, scopic regime that created the need for sublimation, for repression, for culture.[18] The *House* acknowledges that this epochal shift cannot be canceled out by focusing precisely on the scopic relation between the people and the pigs behind their one-way mirror glass. In this way, the work reminds us of the need to prevent current accounts of hybridity and of nonhuman agency from becoming empty paeans that gloss over actually existing hierarchies and antagonisms. What we face—or rather: what we are part of—is a nonlinear dialectic of subject-objects, of quasi-objects and potential subjects, of perpetually shifting assemblages in the storm of history.

In the late nineteenth and early twentieth centuries, speculation on (proto-)human evolution was a hobby uniting theorists with vastly different ideological outlooks. When he remarks on the role played by labor in the becoming-human of apes, Freud is close to Engels's late, unfinished text "The Part Played by Labor in the Transition from Ape to Man." Here Engels points out the crucial role of the development of the *hand* as the real ground zero of humankind's elevation and unnatural (cultural) evolution:

> The first operations for which our ancestors gradually learned to adapt their hands during the many thousands of years of transition from ape to man could have been only very simple ones. The lowest savages, even those in whom regression to a more animal-like condition with a simultaneous physical degeneration can be assumed, are nevertheless far superior to these transitional beings. Before the first flint could be fashioned into a knife by human hands, a period of time probably elapsed in comparison with which the historical period known to us appears insignificant. But the decisive step had been taken, *the hand had become free* and could henceforth attain ever greater dexterity; the greater flexibility thus acquired was inherited and increased from generation to generation. Thus the hand is not only the organ of labour, *it is also the product of labour*.[19]

The hand interacted with the brain and with the faculty of speech, resulting in an "increasing clarity of consciousness, power of abstraction and of conclusion."[20]

But perhaps those powers of abstraction and conclusion are woefully underdeveloped—the latter in particular. Human beings have proven themselves systemically incapable of thinking through the medium- and long-term consequences of the ruling modes of production, distribution, and consumption. The cost of action would be uncomfortably high in the short term, and the long term is not sufficiently concrete for us right now—even though the anticipatory symptoms of a future gone wrong are all around us. Some solutions effectively propose an

exacerbation of abstraction rather than a return to traditional ways of doing things—pushing technoscience to a point where it will be sustainable. The problems of this approach are illustrated well by a 2001 project by Dutch architectural firm MVRDV, *Pig City*, which consists of digital renderings and animations that illustrate MVRDV's proposal for a new kind of pig farming in the Netherlands.[21] In contrast to many attempts to "free" animals from bioindustry or from research facilities, *Pig City* is a design for agroindustrial complexes on an unprecedented scale.

MVRDV notes that in the late 1990s, the Netherlands contained as many porcine as human inhabitants (more than fifteen million of each), and that the pigs and the crops for their fodder would require about 75 percent of the country's land if all farming were organic and the Dutch diet remained the same. The main feature of *Pig City*, which was first shown in 2001 as an installation in the Hague's Stroom Den Haag, are the massive Pig Towers, with elevators that transport fully grown pigs to the in-house slaughterhouse.[22] Each roof is equipped with a fish farm that produces part of the pigs' fodder, and biogas tanks provide energy.[23] While such features distinguish *Pig City* as an "ecological" project of sorts, MVRDV's answer to a perverse bioindustrial system is not less but more: a more extreme technoscientific abstraction, a vertical flight. Many fundamental issues are glossed over in this porcine New Babylon. Surely such a level of industrial organization must mean that no place is left for small- or medium-scale farming? Who owns the means of production? Is the investment so high that the pig-breeding process needs to optimized by using patented genetic markers for growth?[24] Will the pigs' DNA be proprietary software?

The constellation of the two "pig houses" is perhaps more illuminating than they would be in isolation. The pigs in Höller and Trockel's "house" are an example of traditional breeding methods, already archaic—yet the piece is not nostalgic. In literalizing an asymmetrical relationship while taking the human beings down a notch, the house provides literal and metaphorical *Denkraum*. Both porcine residences are sites of abstraction, but one is a deliberately modest

space for contemplation, with a slow pace bringing together art viewers and "ancient" pigs; the other is a productivist nightmare that attempts to square the industrial with the ecological. Neither is a solution to anything. Together, they articulate a problem: the problem of inhabiting abstraction along with a multiplicity of nonhuman beings. By now, the latter have been cast out of the "state of nature" that romantic ecologists loved to idealize as much as inner-city hipsters and refugees from ecological disaster. If the aim was once the dialectical transformation of the world, by now this transformation has gone beyond anything Marx could envisage. Rather than a classless society, we inhabit societies with ever-proliferating and ever-morphing class divisions—both human and nonhuman, and including humanized animals (pets) and dehumanized people.

All Systems Go

Some of Höller and Trockel's collaborative works from the 1990s recall Hans Haacke's work with "biological systems" from the 1960s. Like Haacke, Höller and Trockel appear to treat groups of animals as "biological systems" and place them in a constellation with human society—with biosocial systems. In addition to the house for pigs, one can think here of Höller and Trockel's 1997 installation *Addina*, which was installed in a stable in Palermo: a large oval or egg-shaped space was demarcated by polyester walls made from panels with egg-shaped negative forms. One horizontal row near the top, however, had one-way mirrors instead of indentations. Visitors could enter the central space and eat eggs or wafers; the producers of the eggs could only be heard, as they were behind the polyester wall. The chickens, however, could see the visitors, as they could climb up a perch and look through the one-way window. This reverses the situation of *Ein Haus für Schweine und Menschen*, where the one-way mirror worked the other way around.

Compare and contrast this with Haacke's *Chickens Hatching* (1969), in which the asymmetry between chicks and spectators is greater than in any piece by Höller and Trockel. The human beings in *Chickens Hatching* are part of a (social, art-world) system and thus on a higher level than the chicks. The latter are framed and looked at by the artist and the spectators. With its serial minimalist incubators and eggs giving "feedback" to the system by hatching, *Chickens Hatching* has all the hallmarks of late-1960s systems aesthetics.

Haacke's systems approach was informed by his dialogue with Jack Burnham, whom he had met for the first time in 1962.[25] In his 1968 book *Beyond Modern Sculpture*, Burnham attempted to go beyond formalist art history and criticism by discussing sculpture in terms of the biological needs it answers. Burnham

argued that in the art of the 1960s, "an age which sought vitality in latent visual metaphor," as in the works of Hans Arp, Constantin Brânçusi, and Henry Moore, was coming to an end.[26] What this meant was a transition from sculpture as monolith to sculpture as *systems aesthetics*.[27] Like Burnham, Haacke was interested in technological as well as natural *real-time systems*, as opposed to the idealist duration of traditional art and its appreciation.[28]

In 1969 Burnham noted,

> Some recent tendencies in Haacke's work intrigue me. One is a willingness to use all forms of organic life—from the most elementary to the most complicated. This seems a natural extension of his philosophy of natural systems. A work of last winter involved the incubation of chicks as an on-going process. Already Haacke is planning more complete animal "ecologies" where information is derived from the normal activities of animals in their environments. For a museum, he is planning a steady output of statistical information about visitors involving a small process-controlled computer and a display device.[29]

The reference is to Haacke's project for Burnham's own 1970 show Software at the Jewish Museum, for which Haacke planned an automated *Visitors' Profile* piece—though technical problems prevented the work from functioning, and an out-of-order sign was in place throughout the show.[30] In his description Burnham moves with breathtaking speed from hatching chickens to "more complete animal 'ecologies,'" under which he then appears to subsume the projected *Visitors' Profile*—"where information is derived from the normal activities of animals in their environments."

To treat the visitors to the Software show as being completely comparable to animals is clearly reductive, but the feedback model could be applied to all systems and their denizens, irrespective of species. Another project from Software may be instructive here: *SEEK* by Nicholas Negroponte and the Architecture Machine Group at MIT, which made the cover of the catalogue. *SEEK* was an environment for gerbils consisting of blocks that were moved around by a robotic arm in response to the gerbils' "disrupting" of the configuration. This cybernetic-behaviorist system was not a proposal for the perfect gerbil habitat but a demonstration of computerized real-time feedback with implications for human society. The question would seem to be what constitutes the difference between the human visitors responding to Haacke's questions and the gerbils tussling with the robotic arm?[31]

Burnham's show came at the high-water mark of artistic interest in systems

theory and cybernetics. In part, large shows such as Software and the 1971 Art and Technology show at the Los Angeles County Museum of Art spawned a critical backlash against what Max Kozloff called the "multimillion dollar art boondoggle."[32] What had seemed progressive to a large number of practitioners in the 1960s—art abandoning the commodity object in favor of an adaptation of new technologies and feedback mechanisms in the service of progressive, emancipatory social engineering—was now attacked for delivering art to the military-industrial complex hook, line, and sinker. While this critique won the day in the art world, the counterculture, especially in California, was replete with more continuities. As Fred Turner and others aver, genealogical lines can be traced from the *Whole Earth Catalog* to Silicon Valley and the Internet to neoliberal ideologies of self-organization as a substitute for state welfare or healthcare.[33]

Attempting to introduce a greater degree of differentiation, Brian Holmes distinguishes between the "hardliners of military cybernetics," who argued that "it sufficed to create the proper environment in order to generate the organism of your choice," and the "'hippie' version of cybernetics," which

> springs from an intense epistemological struggle over the uses of high-level technical, scientific and philosophical knowledge; and even if none of the cyberneticists was really a hippie, still it's to the counter-culture's credit that its participants recognized this struggle and tried to embody it in a more popular, daily-life sort of way.[34]

If this "hippie" version is usually identified as a predominantly Californian phenomenon, it had crucial manifestations elsewhere. In Amsterdam during the late 1960s, the former Provo and leader of the Kabouter movement, Roel van Duijn, concocted an eclectic mix of elements from fairy tales, esoteric sources, and the anarchist writings of Peter Kropotkin, as well as from cybernetics and systems theory.[35]

Van Duijn declared cybernetic theory to be an extension of dialectics, with feedback mechanisms either tending toward stability/homeostasis or at some point creating an upheaval, a dialectical tipping point. If cybernetics generally privileged homeostatic stability, van Duijn analyzed the Russian Revolution with cybernetic tools, arguing that the tsarist regime collapsed when it was no longer susceptible to negative feedback that might have modified its behavior: dependent on false or incomplete information, it could not prevent things from reaching a dialectical tipping point.[36] In order to prevent the *ecological* crisis from reaching such a dangerous tipping point, van Duijn and the Kabouters attempted to give critical sociopolitical feedback within and outside the system of capitalist parliamentary democracy in order to effect an anarchist remodeling of society,
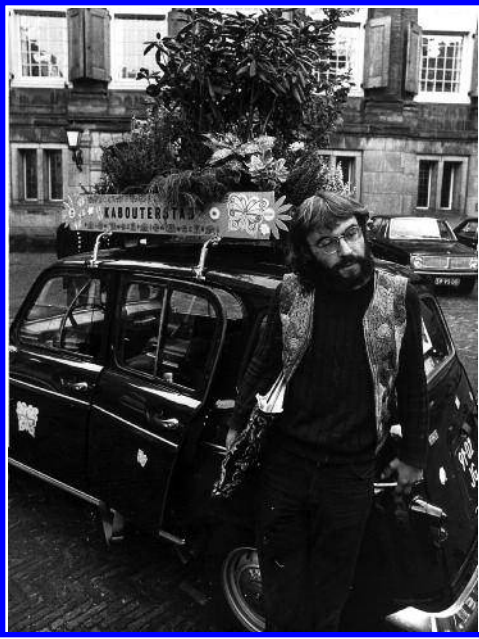
with small-scale and local production of food and most goods.

A major enemy for the Kabouters was the automobile, and while the ultimate goal was to make Amsterdam car-free, in 1969 van Duijn launched his plan to equip cars with small roof gardens, turning them into mobile green lungs. He presented the plan on Dutch television on October 14, 1969, attempting to use the medium to his advantage.[37] Even though van Duijn was well aware that a TV appearance itself would not change anything, with "ecological problems" becoming "content" like all the rest, he attempted to short-circuit the media ecology with "natural" ecology precisely by presenting a possible—though not entirely plausible—plan for action. Neither he nor any of his allies found much to agree with in Stewart Brand's all-American declaration that "The health of [the ecosystem] is forward—systemic self-education which feeds on constant imperfection."[38] The Dutch ex-Provos were far more skeptical of technology than Brand and his allies, at times to a fault; rather than space colonization, van Duijn's ideal was organic farming in the countryside.[39]
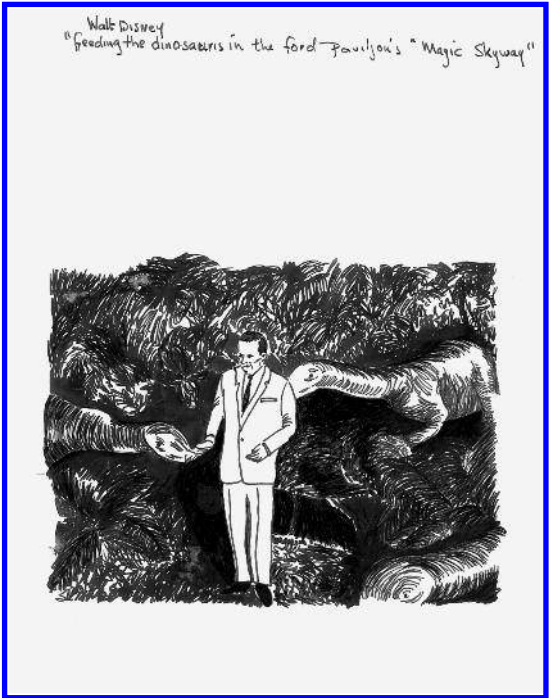
Haacke's artistic appropriation of systems theory and cybernetics was likewise part of the epistemological struggle over knowledge. Burnham, and Haacke in his wake, followed Ludwig von Bertalanffy in regarding systems theory as the master discipline and cybernetics as one specific if important form of "general systems theory" (dealing with communication).[40] The success of systems theory in the 1960s and the rise of the ecological movement toward the end of the decade went hand in hand with the popularization of the term *ecosystem*, which had been coined by Arthur Tansley and describes a concept that puts a premium on stability and equilibrium.[41] Like "nature," the notion of ecosystem was thus compatible with essentialist views of an unchanging and stable natural world. However, Gregory Bateson's "systems ecology" provided an opening by not only introducing the concept of a mental ecology but by stressing the role of technology in the ecosystem.[42] In the process, Bateson helped to speed up the transformation of an old "world of stable identity, conscious subjects and discreet objects into one of interaction, patterns, and networks," with all the ambiguous consequences this has entailed for subjectivation, power, and control.[43]

Some of Haacke's pieces appear to deal straightforwardly with "natural" ecology, such as *Ten Turtles Set Free* (1970), for which Haacke released ten tortoises bought from a pet store in the countryside of Saint Paul de Vence, home of the Fondation Maeght. With its release of abstracted animals back into nature, *Ten Turtles* is in a sense the opposite of *All Systems Go!*—a project for which Haacke

"Walt Disney
"feeding the dinosaurs in the ford Paviljou's "Magic Skyway""

attempted to train a mynah bird to pronounce the titular phrase for his (canceled) show at the Solomon R. Guggenheim Museum. Here, a caged bird is made to parrot human language, an ironic reference to systems theory, in the art system. In *Ten Turtles Set Free*, the animals have been "liberated": purchased as living commodities and then set free. They were released in the vicinity of a Provence art institution whose Joan Miró–designed garden evokes an ideal synthesis of nature and culture while the institution itself surreptitiously combines its not-for-profit status with the sale of prints published by the for-profit Galerie Maeght. In another 1970 piece at this site, *En vente à la Fondation Maeght*, Haacke broadcast the prices of these prints over the public address system of the foundation's theater—interrupted by the latest news from the Agence France Presse wire service.[44] Together, the pieces suggest a polemical analogy between the pet store and the Fondation Maeght, wit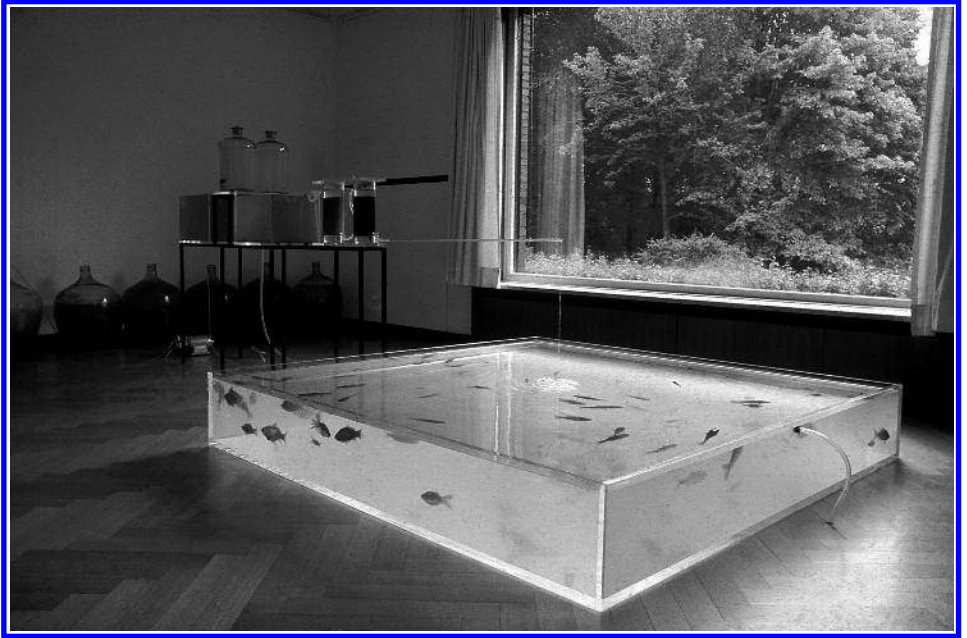h the turtles—belonging to the species Herman's Tortoise, which is indigenous to southern France—escaping the institution and being left to amble off into the undergrowth. With its focus on institutional constraints—which the turtles could escape but the artist could not—this is not exactly a "hippie" version of cybernetics or systems theory, but neither is it the military-industrial version. Something is set in motion. Or, rather, certain motions are released and allowed to trace their own paths through an environment that is changing and may pose challenges to the organisms in question.

By 1972, the year of the report of the Club of Rome and much concern over river and air pollution, Haacke's work had taken on an explicitly political dimension.[45] *Rhine Water Purification Plant* was shown in the Mies van der Rohe–designed Haus Lange Krefeld (which also contains a permanent white *Vide* room by Klein). The work featured a fish tank filled with filtered water from the heavily polluted Rhine, taken from a location close to the spot where the city of Krefeld dumped its untreated wastewater into the river.[46] At the same exhibition Haacke also showed his *Krefeld Sewage Triptych*, which listed the amount of untreated

sewage that went into the Rhine—specified by major company and total household. The work's center panel displayed a photograph taken at the seagull-infested spot in Krefeld-Uerdingen where the city discharged its waste into the river.[47] *Rhine Water Purification Plant* suggested the need to reestablish homeostasis by turning the Rhine's water into a viable underwater habitat once more, but the installation was dependent on an institutional and technological infrastructure, on electricity and fuel, and was therefore implicated, however modestly, in a political economy that destroys not only social fabrics but ecologies in order to stabilize itself. In contrast to chickens hatching, however, the piece acknowledged and foregrounded intersections and interferences among systems and counteracted the tendency to fetishize the self-sufficient and autarkic system or structure.[48] The project spawned a press investigation into the city's part in the pollution of the river—an example of social feedback with potential environmental effects.[49] In the terms of Félix Guattari, what happens here is the forging of transversal connections "between ecosystems, the mechanosphere and the social and individual Universes of reference."[50]

Burnham fell from grace rapidly after 1970, when his systems aesthetics was increasingly rejected by the left for its links to the cybernetic-military complex and when the use of MIT-facilitated high tech in art came to be eyed with increasing suspicion. However, as Caroline A. Jones writes, "the systems' virions survived. By the 1990s, what I would call systemic artworks had emerged with a vengeance. . . . In 2012, Burnham's concerns about everything from the consumption of natural resources to the implementation of machine technology seem tailor-made for the contemporary art world."[51] However, the focus was now less on the concept of the system, which was turned into a theoretical fetish during the late 1960s, and more on the realities of interdependence in the global economico-ecological system: interdependence between technology and global warming, between consumption and destruction, and among species.

More structurally than Haacke's practice, which reaches this point in the Rhine water installation, the later practices regard the natural and the social as homologous and coextensive. We are part of the ecosystem, which we have transformed almost beyond recognition. We are inside the ecological glass house.[52] Höller and Trockel's use of mirrored glass emphasizes the human spectator's own implication in the situation. Their pieces, as well as those by Bik Van der Pol, are traps for multiple gazes. Bik Van der Pol's *are you really sure that a floor can't also be a ceiling?* (2000) consisted of an architectural model based on Mies's Farnsworth House, turned into a butterfly habitat in which visitors could mingle with the lepidoptera. The piece combines references to butterflies' status as "indi-

cator species" for climate change and to the Farnsworth House's increasingly frequent inundation by a nearby river.[53] Functioning like a stage set, with the glass walls acting as membranes that are transparent to light while protecting the microclimate inside, this house for butterflies and human beings goes beyond the systems aesthetics of the 1960s by stressing human implication in a highly visual and visceral manner.

Such works are assemblages that try not so much to present a working model of a specific natural or biological system as to make interdependence and instability visible and sensible. In this, they are both concrete systems and a synecdoche for more general and complex systemic interrelations.

Cohabitation and Coevolution

Human beings and (other) animals do not have houses or homes in the same sense of the word. Postnomadic human beings are enthusiastic house builders, yet they are radically homeless in the world in a way that animals in their more limited environments are not. Höller and Trockel's *Häuser* present themselves as abodes for montages of different species, including human beings; for example, *Ein Haus für Schweine und Menschen*, or the *Augapfel* (2000), a "home for pigeons, human beings and rats." In this way, cohabitation can be reconceived as more than a simple hierarchical matter, with human beings on top and others—either domestic(ated) animals or pets—below. When Höller and Trockel's various "houses" were exhibited at the Musée d'art moderne de la ville de Paris in 1999, they were shown as models or as partial or reduced reconstructions.[54] The only "house" containing living animals was the home for urban silverfish. This single-species *Silberfischchenhaus* (Silverfish House) consists of a modified overhead projector that casts the insects' shadows on a white wall. If many of the works under discussion here abstract animals from various contexts by using the white cube as a medium of decontextualization, the *Silberfischchenhaus* itself contained an element of site-specificity: the silverfish were already at home in the museum, where they cohabit with human beings.

Pierre Huyghe's 2011 exhibition Influants at the Esther Schipper Gallery in Berlin consisted of a largely empty white cube. In a piece titled *Umwelt*, spiders

and ants shared the gallery space with the visitors, without being framed by a separate "house." Another element of the show, *Influenced,* supposedly consisted of a person with an influenza virus that might or might not be passed on to visitors.[55] The installation was, in Huyghe's words, a choreography that staged "cohabitation and at the same time separation" between the spiders, ants, human beings, and flu virus—with visitors potentially stepping on ants or carefully avoiding them.[56]

The title *Umwelt* is a reference to the work of Jakob von Uexküll, who distinguished between an animal's *Umgebung* and its *Umwelt*. Based on a neo-Kantian conceptual underpinning, Uexküll's work long predates the emergence of systems theory and systems ecology, but his central distinction effectively encapsulates the dialectic between, on the one hand, the "objective" structure and dynamic of the system and, on the other hand, the subject's position within it. The *Umgebung* (surroundings) is the "objective" context of an organism but is inaccessible to that organism, like Kant's *Ding an sich*. But while one can build a house for pigs and human beings, the pigs will experience this structure in a completely different way. What the organism actually inhabits is a subjective *Umwelt*, its "environment" or "milieu." These *Umwelten* can be reduced and highly abstract, as in the three-factor world of the tick.[57] In *A Thousand Plateaus*, two readers of Uexküll's work recall the

> unforgettable associated world of the Tick, defined by its gravitational energy of falling, its olfactory characteristic of perceiving sweat, and its active characteristic of latching on: the tick climbs a branch and drops onto a passing mammal it has recognized by its smell, then latches onto its skin (an associated world composed of three factors, and no more).[58]

Uexküll treats all organisms as subjects, no matter how primitive or advanced they are. These subjects are in a constant feedback loop with the *Umgebung*, which thus becomes their *Umwelt*—a feedback loop involving their sense organs (*Merkorgane*) and their acting organs (*Wirkorgane*). The drawings in Uexküll's book *Streifzüge durch die Umwelten von Tieren und Menschen* attempt to show different subjects' "symbolic" universes; for example, the environment of a sea urchin, a primitive "reflex republic," is represented as an Yves Tanguy–like landscape in which what are for us distinct objects become formless blobs.[59] Another

Right: The *Umgebung* and
Umwelt of the sea urchin. From
Jakob von Uexküll, *Streifzüge
durch die Umwelten von Tieren
und Menschen,* 1933. Image
taken from 1956 edition.

sequence of illustrations shows three meanings or "overtones" that a sea anemone can have for a hermit crab. A hermit crab will often have anemones on its shell in order to give it further protection. A crab with a "bare shell" will try to graft the anemone onto it. A crab without shell will try (fruitlessly) to crawl into the anemone, whereas one outfitted with a shell that has anemones on it will come to regard them as a meal if it goes without food for too long. In the illustrations, the sea anemone is given a different color in each case, representing the various "tones" of the anemone.[60]

One of Huyghe's aquarium-based *Zoodram* installations (*Zoodram 4*, 2011) contains a hermit crab that has been offered a particular type of housing: rather than a shell, it drags with it a bronze cast of a Brâncuşi head. For the crab, this object obviously has a very different "tone" than for a human observer. Here, the two (human subject and crab subject) have not only largely divergent *Umwelten* but different *Umgebungen.* For the crab, the *Umgebung* is largely constituted by the contents of the aquarium, with movements outside it presumably registering as a kind of background noise. For the human spectator, the aquarium is part of an art space, one of the elements among which she or he can move back and forth—without, however, being able to immerse himself or herself in the tank. The aquarium is a second framing device within the framing device that is the art space. The human spectator is between the two frames.

By contrast—as Huyghe states, explicitly referencing Uexküll's work—Influants at the Esther Schipper Gallery created a *copresence* of different *Umwelten* in the same *Umgebung.* The hermit crab and Influants's spiders and ants were part of Huyghe's 2013–2014 retrospective at the Centre Pompidou, which also included elements from his Documenta piece *Untilled*, such as the sculpture of a reclining figure with a beehive head and the dog with a pink front leg, which was walked around the show at regular intervals. At his worst, Huyghe uses theoretical pointers and historical markers to produce a kind of systems aestheticism, staging blue-chip funhouse displays with "big ideas" justification. However, a strong aspect of both Influants and some related works is their use of and reflection on art spaces as sites of abstraction, as well as their introduction of elements that go beyond cohabitation and broach the terrain of coevolution: *Umwelt*, by having insects arrange themselves with and in the "pure" white
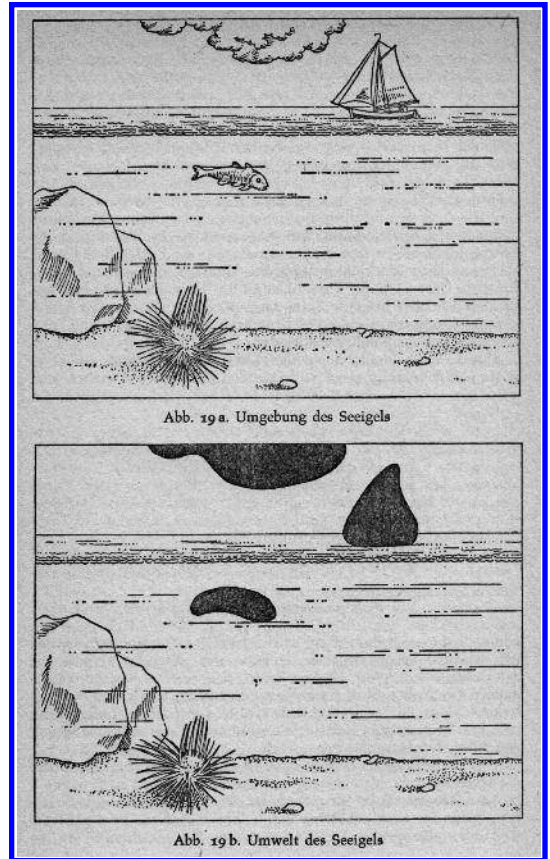
surroundings; and the unrealized *Mies Cube Gets Cold* from 2000, by fostering speculation on insects in fake jungles.

For the latter project, Huyghe proposed turning the ground floor of Mies's Neue Nationalgalerie in Berlin—a postwar temple to modernism—into a Cuban jungle. Mies's design is a variation on an office building he designed for Bacardi in Cuba, a project that was never realized because of the Cuban Revolution. The design was later repurposed for the *Frontstadt* of the Cold War, West Berlin.[61] Huyghe's jungle was supposed to have an artificial weather system based on the weather in Berlin from 1957 to 1968, as well as a film about actual insect life in the actual artificial jungles of Disney theme park attractions—where American and other tourists can get the sensation of "tropical adventure" without facing unpleasant social, political, and ecological conditions. If common house spiders are perfectly adapted to human habitations, could the proliferation of "artificial jungles" ultimately result in "artificial jungle life"? For their 2000 series of hand-copied "library drawings," *Catching Some Air*, Bik Van der Pol traced photographs from magazines and catalogues, mostly pertaining to the neo-avant-garde of the 1960s and 1970s. However, the drawings also include a set photo from *Planet of the Apes*, Haacke's tortoises, a giant greenhouse labeled "artificial nature," and Walt Disney "feeding" the audio-animatronic dinosaurs his company designed for the Ford Pavilion at the 1964 World's Fair.[62] Huyghe's project looks at a different aspect of the Disneyfication of nature, focusing not on Uncle Walt's cybernetic organisms but on a possible, as yet unrecognized coevolution in Disney's heart of darkness.

In 1974, Brand's *Whole Earth Catalog* morphed into the *CoEvolution Quarterly*, and the first issue noted,

> The term [i.e., *coevolution*] was introduced in 1965 by Paul Ehrlich and Peter Raven in their study of the predator-prey relationship of caterpillars and plants. They found that the eaters and the eaten progressively evolved in close response to each other—coevolved. . . . It seems that all evolution is coevolution. The beauty of the term is what it adds to the concept of ecology. Language such as "preserving the ecology" suggests something quite perfect—static, knoweable, oriented backward, unwelcoming to human foolishness . . . unreal. Ecology is the whole system alright, but coevolution is the whole system in TIME. The health of it is forward—systemic self-education which feeds on constant imperfection.[63]

This rhetoric notwithstanding, Brand was willing to abandon the earth (and presumably most species on it) as traditional site of coevolution as he started to

promote migration away from the blue planet through the founding of space colonies.[64] Later, he embraced the "de-extinction" of extinct species via genetic technology.[65]

As fuzzy and frequently dubious as the rhetoric of coevolution was in Brand's hands, the terms *cohabitation* and *coevolution* are both needed to understand the biosocial dialectic staged in recent art, which not only brings together different species but understands their interrelations as historical and mutable. But what *kind* of *Umwelt* is allowed to set the rules? In extracts from his then-upcoming book *Four Arguments for the Elimination of Television*, published in the winter 1977/1978 issue of *CoEvolution Quarterly,* former advertising executive Jerry Mander noted the extent to which the human environment—Uexküll's *Umwelt*—had become a media environment: "With natural environments having been replaced and remade into a new artificial form (cities, suburbs), environment itself had become media, an intervention between humans and direct personal experience and knowledge of natural process."[66]

If to abstract entails subtracting irrelevant traits or noise, reducing the number of stimuli until only the crucial information remains, then animals such as the tick or the sea urchin are masters of abstraction. With much more—too much, yet never enough—data at their disposal, human beings can take abstraction to a higher degree, calculating or guesstimating the effects of various actions on the *Umgebung* of various species, and on the global ecosystem. The effect of actions and of inaction: in the realm of the practico-inert, to use Perry Anderson's phrase, we have a rough idea of the massive butterfly effect that will result from doing nothing—that is, from continuing to do things as they are done now—but radical change is too much of a sacrifice.[67] The 1972 Club of Rome report, *Limits to Growth*, made abundantly clear—in artist Pedro Neves Marques's words—that a fundamental contradiction existed between "homeostatic management" of the ecology and the growth of the economy. In the past four decades of half-hearted and largely symbolic policy-making, the contradiction has only been exacerbated.

In his 1975 piece *Video Fish,* Nam June Paik replaced even the fake nature of the everyday aquarium: the fish swim before brightly colored video images. Paik's assemblage of natural ecology and media ecology also suggests that the fish's subjective world—their psychological ecology—can be altered as radically as the human subject was rewired through the advent of television and new media. We are all video fish. In 2014, thanks in part to professional media campaigns by right-wing think tanks, the number of people in the United States who believe that burning fossil fuels alters the climate had dropped from 71 to 44 percent.[68] Systemic self-education appears to exist only in terms of short-term economic

goals, on the basis of unsustainable dreams of continual growth—an education for death, until the fatal point is reached and Friedrich Engels's law of the transformation of quantity into quality kicks into action: the system tips.

Bacteria and Other Quasi-Subjects

In the context of a looming systemic ecological collapse, certain authors prognosticate with grim delectation that the notion of "humankind" will have to be given up altogether, as differences in access to good water and food, education and (last but not least) medicine, including the latest advances in genetics, will make posthuman conditions one of a bifurcation into different species.[69] Thus the posthuman future will be marked by asymmetries that are even more extreme than the current—already accelerating—class and race divisions.

In classic Western philosophy, only human beings could lay claim to subjecthood—with the white male bourgeois subject being the archetype and prototype, and blacks in particular being regarded as closer to animals, to brute bestiality and objecthood. The subject-object dichotomy has been problematized extensively, concomitant with new forms of subjectivation and systemic soft power since the 1960s and 1970s. While the subject is being undermined philosophically, its legal entrenchment appears to be firmer than ever. However, this entrenchment may in fact be another form of demolition or deconstruction. Nonhuman entities such as corporations lay claim to an ever more widely defined subjecthood, having long been treated as juridical persons. If "corporations are people," then why not animals? On the other hand, this very division is currently subject to cultural and legal contestation. The movement to give animals "nonhuman rights" seems like a literalization of Uexküll's Kantian treatment of animals as subjects rather than objects.[70] But is there really a "subject" called the tick—or, rather, a kind of assemblage of different triggers and responses, different affects? And what of the "original subject," the human being? Personhood is being redefined in terms of genetic reductionism, yet as Donna Haraway stresses, the human genome is found in only 10 percent of the cells that make up our bodies, the rest being accounted for a by a host a microorganisms with which each of us cohabits and by which we are not only *influenced* (to use Huyghe's term) but enabled in the first place.[71]

While Haraway uses microorganisms to plead for subjectivity as assemblage, such organisms have been at the forefront of biocapitalism, as the case of the bacterium *Pseudomonas* demonstrates. The Brussels-based organization Agency (founded by Kobe Matthys) builds and maintains an archive of "things" that have been subject to copyright conflicts. The term *thing*, adopted by Agency, has come

to the fore in a Heideggerian-Latourian sense precisely because it stands for the refusal of a Hegelian dialectic in which the subject always triumphs over and subsumes the object. Instead, "thingness" and related concepts can be used to map an open-ended and syncopated dialectic in which moments of subjectivation and objectivation can alternate in any number of ways—and collapse into one another. Among other things, Agency has selected a number of cases that raise the question whether nonhuman protagonists—such as animals, objects, or computer programs—can be considered creative and thus lay claim to authorship and copyright. Conversely, Agency has documented cases about human beings attempting to protect organisms as their intellectual property.

Agency's *thing 000773 (Pseudomonas)* was presented in 2013 at an exhibition in an abandoned greenhouse of the University of Wageningen in the Netherlands. For millennia, bacteria in cow dung slurry had been used in India to detoxify waste—for instance, oil spills.

> In 1971, Ananda Chakrabarty, an Indian micro-biologist at General Electric Company in Schenectady New York, extracted deoxyribo nucleic acid or DNA plasmids from four different bacteria from the pseudomonas family and inserted them into one single strain. By genetic transfer Chakrabarty grew bacteria that he hoped would break down multiple components of crude oil. These bacteria were to be used to clean oil spills. In 1972, after conversations with his co-workers Chakrabarty filed a patent application, assigned to General Electric.[72]

When Chakrabarty's patent claim was rejected because living organisms were seen as "products of nature" and not patentable, he appealed and won, making his *Pseudomonas* the first patented organism.

As the Court of Customs and Patent Appeals wrote, "*the fact that microorganisms . . . are alive . . . [is] without legal significance . . . for purposes of the patent law.*" Chakrabarty later stated, *"I simply shuffled genes, changing bacteria that already existed . . . like teaching your pet cat a few new tricks."*[73] During the exhibition, a *Pseudomonas* culture was presented in a petri dish—a "house" that is a product of scientific abstraction. Such a culture has a lifespan of about a month and needs to be replaced after that. However, more important than this simple display was the "assembly" of various experts and activists organized by Agency. In the case of *Pseudomonas*, this assembly—another was organized in 2014 in Brussels—drives home the point that the abstractions of technoscience are inextricably entwined with those of the law. Furthermore, both are highly *concrete abstractions*: they shape our reality, turning us into their objects. They thus demand an

active engagement.

In contrast to works by Höller and Trockel or Huyghe, Agency's practice appears to lack the element of sharing a space and of reciprocity. The petri dish was in the same space as the viewers and participants, but bacteria have a rather different kind of presence than chickens or pigs. Nonetheless: within this para-legal or metalegal framework the bacterium was more than an object lorded over by the human subject. As reframed by Agency, *Pseudomonas* attained an agency that turned it into a quasi-object and potentially into a quasi-subject.[74] This is not to say that the work proposes a flat ontology in which all distinctions are blurred: a night in which all cats are grey. Rather, we are dealing with highly unstable oppositions. If the subject—or, if subjectivation—presupposes movement and self-transformation, an ex-static becoming-other, then such subjecthood may ulti-mately reside most of all with the corporations that employ the Chakrabartys of this world. After all, with them lies the power to objectify others: from bacteria, rice, and pigs to people who—as producers, as consumers, or simply as obstacles or human refuse—become sub-subjects.

The *Pseudomonas* case makes explicit what remains relatively implicit in most of the works discussed in this article: the need for a global perspective that goes beyond abstract declarations and engages with the specifics of ongoing primitive accumulation, of frequently violent processes of abstraction and extrac-tion in South America, Africa, or Asia. As Agency stresses, the detoxifying prop-erties of *Pseudomonas* have been used in India for thousands of years through cow dung slurry or *gomaya* ("when sprinkled over oil spillage, the bacteria living inside cow dung soak and degrade crude oil").[75] The commons continue to be mined ever more thoroughly, ever more fundamentally. But the dynamic devel-opments of biocapitalism are bound up with an ongoing and accelerating eco-cide. Human and nonhuman (or "natural") history are rapidly running out of time, out of future. An assembly by Agency or a *House for Pigs and People* does not change this. But with pigs, chickens, bacteria, architectural interventions, and staged situations and debates, these works make the abstract problem appear con-cretely and aesthetically.

Agency. *Thing 000773*
(Pseudomonas), 2013.

Notes

1. Quoted in Bik Van der Pol, "Birds Must Be Eliminated," http://www.bikvanderpol.net/382/birds_must_be_eliminated/.

2. As a kind of footnote to *Birds Must Be Eliminated*, in 2013 Bik Van der Pol invited a local bird breeders club to participate in *Not all those who wander are lost*, during which local hobby societies and clubs demonstrated their activities in the shopping center Hoog Catharijne in Utrecht, as part of the art project *Call of the Mall*. *Not all those who wander are lost* was performed on July 6 and September 21.

3. *Ad Valvas* (VU University newspaper) 21 (24 February 2005): 1, 3.

4. Anarcho-primitivists see humankind's fall from grace in the transition from hunter-gatherer societies to agriculture and animal husbandry.

5. However, as René Riesel remarks in his trenchant critique of genetic technology and its role in contemporary technoscience and agriculture, the development of hybrid corn seeds in the US during the 1920s already had many traits that were later perfected with the advent of genetically modified crops: industrial production methods and the creation of dependencies among farmers. See [René Riesel], *Remarques sur l'agriculture génétiquement modifiée et la dégradation des espèces* (Paris: Éditions des Encyclopédie des Nuisances, 1999), 67–68.

6. Oskar Negt and Alexander Kluge, *Geschichte und Eigensinn* (Frankfurt: Zweitausendeins, 1981), 522.

7. Encyclopédie des Nuisances, "In the Name of Reason" (2001), https://libcom.org/library/name-reason-encyclopedie-des-nuisances. This text, probably cowritten by Riesel and Jaime Semprun, protests against Riesel's trial for having participated in the destruction of genetically modified rice at the CIRAD research center in Montpellier, France. The sabotage was the initiative of an "intercontinental caravan" that included Indian peasants. On Riesel's stance, see also Alain Leauthier, "The Progress of Submission Moves at a Frightening Speed: An Interview with René Riesel" (2001), trans. Not Bored!, *Not Bored!*, August 2007, http://www.notbored.org/riesel-interview.html, which includes critical footnotes by Ken Knabb that question, for instance, Riesel's frequent and affirmative references to the writings of Theodore Kaczynski, aka the Unabomber.

8. My concern here is the works coauthored by Höller and Trockel from 1996 to 2000. For a critique of Höller's early "taboo-breaking" flirtation with genetic and sociobological essentialism, and the sexist features of his discourse, see Sabeth Buchmann, "Von der High-Tech-Tauglichkeit der Kunst, oder wie Reaktion mit Dissidenz vertauscht wird," *Die Beute* 4 (1995): 69–77.

9. See Emily Martin, "Pigs as People; People as Pigs," in Carsten Höller and Rosemarie Trockel, *A House for Pigs and People* (Cologne: Verlag der Buchhandlung Walther König, 1997), 13–19.

10. Carsten Höller and Rosemarie Trockel, introduction to *A House for Pigs and People*, 7–12.

11. Detlev B. Linke uses the phrase "subject-object narcissisms" in his essay "Logarithmic Parallelism," in *A House for Pigs and People*, 22.

12. "We know only a single science, the science of history. One can look at history from two sides and divide it into the history of nature and the history of men. The two sides are, however, inseparable; the history of nature and the history of men are dependent on each other so long as men exist. The history of nature, called natural science, does not concern us here; but we will have to examine the history of men, since almost the whole ideology amounts either to a distorted conception of this history or to a complete abstraction from it." Crossed-out section from the draft of

Karl Marx and Friedrich Engels, "The German Ideology" (1845), pt. I, sec. A, in Marxists Internet Archive, n.d., http://www.marxists.org/archive/marx/works/1845/german-ideology/ch01a.htm.

13. John Bellamy Foster, *Marx's Ecology: Materialism and Nature* (New York: Monthly Review Press, 2000), 9.

14. Karl Marx, "On the Jewish Question" (1843), quoted in Foster, 74.

15. "Where exists a relationship, it exists for me: the animal does not enter into 'relations' with anything, it does not enter into any relation at all. For the animal, its relation to others does not exist as a relation. Consciousness is, therefore, from the very beginning a social product, and remains so as long as men exist at all. . . . On the other hand, man's consciousness of the necessity of associating with the individuals around him is the beginning of the consciousness that he is living in society at all. This beginning is as animal as social life itself at this stage. It is mere herd-consciousness, and at this point man is only distinguished from sheep by the fact that with him consciousness takes the place of instinct or that his instinct is a conscious one." Marx and Engels, "The German Ideology."

16. Jussi Parikka, *Insect Media: An Archaeology of Animals and Technology* (Minneapolis: University of Minnesota Press, 2010), 72.

17. Jean Baudrillard, "The Mirror of Production" (1973), in *Utopia Deferred: Writings from Utopie (1967–1978)* (New York: Semiotext[e], 2006), 106.

18. Sigmund Freud, "Das Unbehagen in der Kultur" (1930), in *Das Unbehagen in der Kultur und andere kulturtheoretische Schriften* (Frankfurt: Fischer), 64–65.

19. Friedrich Engels, "The Part Played by Labour in the Transition from Ape to Man" (1876), trans. Clemens Dutt, in Marxists Internet Archive, 1996, http://www.marxists.org/archive/marx/works/1876/part-played-labour/index.htm; emphasis in original. This work by Engels is an unfinished text that was later included in the *Dialectics of Nature*.

20. Engels, "The Part Played by Labour." Donna Haraway is mistaken when she states that Sherwood Washburn "generated the theory of tool use as the motor of evolution of the human body." Haraway's feminist critique of such theories nonetheless remains pertinent. Donna J. Haraway, *Simians, Cyborgs, and Women: The Reinvention of Nature* (London: Free Association Books, 1991), 25.

21. The project can be regarded as spinoff from MVRDV's previous exhibition and publication *Metacity/Datatown*, in particular of Datatown's agricultural sector. See MVRDV, *Metacity/Datatown* (Rotterdam: 010 Publishers, 1999), 95–115.

22. See Stroom Den Haag, "MVRDV: Pig City," n.d., http://www.stroom.nl/paginas/pagina.php?pa_id=3767667. Stroom exhibited Metacity/Datatown in 1998.

23. See "Pig City," n.d., http://architectenweb.nl/ap7238.

24. Monsanto's patenting of a gene marker for growth in pigs has long been the subject of intense activist and media attention. For the corporation's own version of events (which, in dispelling some "myths," gives more than enough reasons for genuine concern), see "Monsanto: Patent on Pigs?" *Monsanto: Beyond the Rows*, 16 April 2009, http://monsantoblog.com/2009/04/16/monsanto-patent-on-pigs/.

25. Marga Bijvoet, *Art as Inquiry: Toward New Collaborations Between Art, Science, and Technology* (New York: Peter Lang, 1997), 81. On Haacke, Burnham, and systems aesthetics, see also Luke Skrebowski, "All Systems Go: Recovering Hans Haacke's Systems Art," *Grey Room* 30 (Winter 2008): 54–83; Caroline A. Jones, "Reconstituting 'Systems Art,'" in *Hans Haacke 1967* (Cambridge: MIT List Visual Art Center, 2011), 4–27, http://listart.mit.edu/exhibitions/hans

-haacke-1967; and Alexander Alberro and Nora M. Alter, "Systems, Dialectics, and Castles in the Sky," in *Hans Haacke: Castles in the Sky* (Madrid: Museo Reina Sofía, 2012), 20–29.

26. Jack Burnham, *Beyond Modern Sculpture: The Effects of Science and Technology on the Sculpture of This Century* (New York: George Braziller, 1968), 16.

27. For Burnham's use of the term *system aesthetics*, see "System Esthetics" (1968), in *Great Western Salt Works: Essays on the Meaning of Post-Formalist Art* (New York: Braziller, 1974), 15–25.

28. See Jack Burnham, "Real Time Systems" (1969), in *Great Western Salt Works*, 27–38. Burnham here discusses several projects by Haacke.

29. Burnham, "Real-Time Systems," 30.

30. Skrewbowski, 65. In 2011, Haacke recalled what happened: "According to my memory, the people from MIT who were meant to do the computer programming for it were either overextended due to their work on other projects in the show or were not able to do it." Hans Haacke, e-mail to author, 28 April 2011. Skrewbowski specifies that the programmers were employees of the Digital Equipment Corporation (DEC) and worked around the clock but still failed. DEC was founded by former MIT engineers, which might be why Haacke either identified or later (slightly) misremembered them as being employed by MIT.

31. *SEEK* was deemed sufficiently emblematic of *Software* for it to be illustrated on the cover of the catalogue.

32. Max Kozloff, "The Multimillion Dollar Art Boondoggle," *Artforum* 10, no. 2 (October 1971): 72–76.

33. See Fred Turner, "The Politics of the Whole," in *The Whole Earth: California and the Disappearance of the Outside*, ed. Diedrich Diederichsen and Anselm Franke (Berlin: Sternberg Press, 2013), 43–48. See also (without direct reference to the *Whole Earth Catalog*), Luther Blisset, "Adam Curtis, Self-Organisation and UK Uncut: An Ecology of Weeds," New Left Project, 30 May 2011, http://www.newleftproject.org/index.php/site/article_comments/adam_curtis_self_organisation_and_uk_uncut_an_ecology_of_weeds; and Mark Fisher, "After Networks: In Defense of Adam Curtis," New Left Project, 20 July 2011, http://www.newleftproject.org/index.php/site/article_comments/after_networks_in_defence_of_adam_curtis.

34. Brian Holmes, "Cybernetics, Epistemological Struggles, Unwanted Consequences?" *Deriva continental: El neoliberalismo al revés* [blog], 28 July 2013, http://brianholmes.wordpress.com/2013/07/28/3215/.

35. Around 1970, Van Duijn often spelled his name with a *y*: Van Duyn.

36. Roel van Duyn, *De boodschap van een wijze kabouter* (Amsterdam: Meulenhoff, 1969), 89–90.

37. See the chronology in Coen Tasman, *Louter Kabouter: Kroniek van een beweging* (Amsterdam: Babylon-De Geus, 1996), 392.

38. [Stewart Brand], "CoEvolution," *CoEvolution Quarterly*, Spring 1974, inside cover.

39. Hans Korteweg and Roel van Duyn, "Weesp: Testgebied voor Philips-Duphar's zenuwgassen," *De paniekzaaier* 1 (November 1971): 5–9.

40. The great contribution of cybernetics, according to Bertalanffy, was the model of feedback regulation in both technology and biology—in the latter, homeostasis can be explained by the feedback model. Like cybernetics, systems theory has an implicit ideal of equilibrium: the living organism manages to overcome entropy and achieve a "fantastically improbable state" of equilibrium because it is an *open system* that can regulate its relations with the environment through negative feedback. Ludwig von Bertalanffy, *General System Theory: Foundations, Development, Applications*

(New York: George Braziller, 1969), 159, 161–163.

41. A.G. Tansley, "The Use and Abuse of Vegetational Concepts and Terms," *Ecology* 16, no. 3 (July 1935): 284–307. A search of the *New York Times* archive shows that the term *ecosystem* starts to be used in 1967 and 1968, but the frequency dramatically rises in 1969 and 1970.

42. Gregory Bateson, *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology* (1972; Chicago: University of Chicago Press, 2000), 477–501.

43. Orit Halpern, "Schizophrenic Techniques: Cybernetics, the Human Sciences, and the Double Bind," *S&F Online* 10, no. 3 (Summer 2012), http://sfonline.barnard.edu/feminist-media-theory/ schizophrenic-techniques-cybernetics-the-human-sciences-and-the-double-bind/.

44. *Hans Haacke: Unfinished Business* (New York: New Museum of Contemporary Art, 1986), 80–81. These works by Haacke were part of the exhibition L'art vivant américain—or, in the case of *En Vente à la Fondation Maeght,* of the accompanying performance program. In addition to *Ten Turtles Set Free*, Haacke also realized other pieces in the landscape surrounding the Fondation Maeght: *Transplanted Moss Supported in Artificial Climate* and *Goat Feeding in the Woods*.

45. In 1972, the *Fischsterben* (fish kill) in the Rhine attracted much media attention. See, for instance, "Kritische Grenze," *Der Spiegel*, 27 March 1972, http://www.spiegel.de/spiegel/print/ d-42972123.html.

46. *Rhine Water Purification Plant* was supplemented with related pieces and elements, such as the *Krefeld Sewage Triptych*. See T.J. Demos, "The Politics of Sustainability: Art and Ecology," in *Radical Nature: Art and Architecture for a Changing Planet 1969–2009* (London: Barbican Art Gallery, 2009), 22.

47. Hans Haacke, "Rheinwassseraufbereitungsanlage, 1972," in *Hans Haacke: "Obra Social"* (Barcelona: Fundació Antoni Tàpies, 1995), 76.

48. Haacke explicitly stated at the time that his work is about "interference in" systems. See Lucy Lippard, *Six Years: The Dematerialization of the Art Object from 1966 to 1972 . . .* (1973; Berkeley: University of California Press, 1997), 123.

49. Haacke, "Rheinwassseraufbereitungsanlage, 1972." See also Demos, "The Politics of Sustainability," 22.

50. Félix Guattari, *The Three Ecologies* (1989), trans. Ian Pindar and Paul Sutton (London: Continuum, 2005), 43. Guattari here draws on Gregory Bateson's work.

51. Caroline A. Jones, "System Symptoms," *Artforum* 51, no. 1 (September 2012): 116.

52. Demos argues that even the Rhine water piece "might be criticised for its failure to involve the audience more directly within its feedback loop; rather, it relegated viewers as mere observers of a system that excluded their immediate active participation." Demos, "The Politics of Sustainability," 22. While Haackean critique cannot do without a moment of distanciation, the Rhine water project contains an equally strong element of self-implication of the viewer as a citizen (of Krefeld or the Lower Rhine region).

53. Bik Van der Pol, *are you really sure a floor can't also be a ceiling?* http://www.bikvanderpol.net/ 50/are_you_really_sure_that_a_floor_cant_also_be_a_ceiling/. These references are not necessarily evident from the actual installation, making the work more allegorical than Höller and Trockel's "houses."

54. See *Maisons/Häuser Carsten Höller Rosemarie Trockel*, exh. cat. (Paris: Musée d'art moderne de la ville de Paris, 1999).

55. The protocol for *Influenced* states, "Prior to the exhibition, a person with the flu has to be

found. It is best if the person is already associated with the space, and naturally encounters people entering the space. If this person cannot be found, find a person that will accept to be injected with the 'flu shot' or a small cold. For the exhibition Influants in Berlin, Xanaflu was used." However, Xanaflu is an inactivated vaccine that is not infectious and does not normally produce flu-like symptoms (let alone a "small cold") in the injected person. Given the health risks of an influenza infection, this is perhaps for the better. Pierre Huyghe, *Influants Protocol, September 9–October 22, 2011* (Berlin: Esther Schipper, 2011), http://www.estherschipper.com/sites/default/files/ph/2011_ES_BERLIN/PH_Esther_Schipper_ENG_2(Protocol%2BPrice)@.pdf.

56. Timothée Caillou, interview with Pierre Huyghe, *Double* 22 (Fall/Winter 2011), http://www.timotheechaillou.com/conversations/pierre-huyghe/.

57. Jakob von Uexküll, *Streifzüge durch die Umwelten von Tiere und Menschen/Bedeutungslehre* (Hamburg: Rowohlt, 1956), 30–31.

58. Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota, 1987), 51.

59. Uexküll, 53.

60. Uexküll, 66–67, 97.

61. *Pierre Huyghe*, exh. cat. (Paris: Centre Pompidou, 2013), 85.

62. Bik Van der Pol, *Catching Some Air: Library Drawings* (Leeds: Henry Moore Institute, 2002).

63. [Brand], "CoEvolution."

64. Stewart Brand, ed., *Space Colonies: A CoEvolution Book* (London: Penguin, 1977).

65. On de-extinction, see the TED talk by Stewart Brand, "The Dawn of De-Extinction: Are You Ready?" TED, February 2013,
http://www.ted.com/talks/stewart_brand_the_dawn_of_de_extinction_are_you_ready.

66. Jerry Mander, "Four Arguments for the Elimination of Television," *CoEvolution Quarterly*, Winter 1977/1978, 40.

67. Perry Anderson, *Arguments within English Marxism* (London: New Left Books, 1980), 52.

68. Naomi Klein, *This Changes Everything: Capitalism vs. the Climate* (London: Allen Lane/Penguin, 2014), 35.

69. See, for instance, Tony Fry, *Becoming Human by Design* (London/New York: Berg, 2012), 205–209, 219.

70. Uexküll radicalized Kant's "Copernican revolution" and Deleuze, in turn, further decentered the animals, as Brett Buchanan emphasizes. Brett Buchanan, *Onto-Ethnologies: The Animal Environments of Uexküll, Heidegger, Merleau-Ponty and Deleuze* (Albany: SUNY Press, 2008), 13, 185.

71. Donna J. Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008), 3.

72. Agency, *thing 000773 (Pseudomonas),* text as part of the presentation in the context of Beelden of de Berg, Wageningen.

73. Agency, *thing 000773 (Pseudomonas)*; emphasis in original.

74. The term *quasi-object* is from Michel Serres, *The Parasite*, trans. Lawrence R. Schehr (Minneapolis: University of Minnesota Press, 2007), 224–34, and is also used by Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge: Harvard University Press, 1993), 51–55. My use of *quasi-object* differs from Latour's antidialectical account in particular. In opposition to Latour's desire to do away with antinomy and opposition, I see a need to think more dialectically, without reducing historical and mutable antinomies to static dualisms.

75. Agency, *thing 000773 (Pseudomonas)*.