Techné:
Research in Philosophy and Technology
Volume 21, Issues 2–3 (2017)

Special Issue on the Anthropocene

Guest Editors
Pieter Lemmens, Vincent Blok, and Jochem Zwier

Contents

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 114–126 DOI: 10.5840/techne2017212/363

Toward a Terrestrial Turn in Philosophy of Technology

Guest Editors' Introduction

Pieter Lemmens, Vincent Blok, and Jochem Zwier

The Future of Philosophy of Technology

The initial spark that ultimately led to this special issue on "Philosophy of Technology in the Age of the Anthropocene" was the attendance by two of the guest editors, in July 2013 at the 18th Biennial International Conference of the Society for the Philosophy of Technology in Lisbon, of a plenary lecture by Langdon Winner on the future of philosophy of technology. In this timely and prescient lecture, entitled "A Future for Philosophy of Technology—Yes, But On Which Planet?," Winner delivered a kind of stocktaking of the contemporary state of philosophy of technology and presented two areas in which rapid developments are taking place currently that call for more profound critical engagement by philosophers of technology (Winner 2013).

The first area, quite familiar and in fact the theme of this conference, was that of digital information networks and the information society, which arguably possess huge democratizing and citizen-empowering potential but can equally be employed by big info-corporations like Google, Facebook, Amazon, and Apple to disempower and enslave citizens and reinstall feudal relationships on a high-tech level.

Pieter Lemmens, Faculty of Science, Institute for Science in Society, Department of Philosophy and Science Studies, Radboud University Nijmegen, P.O. Box 9010, 6500 GL Nijmegen, the Netherlands; pieter.lemmens@ru.nl.

Vincent Blok, Management Studies Group and Philosophy Group, Wageningen University, Hollandseweg 1, 6706 KN Wageningen, the Netherlands; www.vincentblok.nl; Vincent.blok@wur.nl.

Jochem Zwier, Faculty of Science, Institute for Science in Society, Department of Philosophy and Science Studies, Radboud University Nijmegen, P.O. Box 9010, 6500 GL Nijmegen, the Netherlands; Jochem.zwier@ru.nl.

The second area, just as urgent but much less familiar terrain for the philosophy of technology did not pertain to specific developments in technology itself but to the destructive side effects of technological progress upon the planetary ecosystem on which all technological development and all human existence as such ultimately depends. Considering the topics that most philosophers of technology are engaged with at the moment, it may be argued that the threat posed to this ultimate condition of possibility of our technological societies—a threat that has so far gone by the name of 'global ecological crisis' but is currently being reconsidered and reconceptualized as the 'Anthropocene'—is the glaring blind spot of contemporary philosophy of technology, its 'unthought' if we may use a term of Heidegger in a somewhat different register.

Much of today's philosophy of technology, Winner observed, still quietly assumes that the fundamental underlying conditions that enabled the rise and continuation of our industrial societies can be taken for granted. Yet these conditions, on the one hand a steady supply of cheap fossil fuels and on the other a stable global climate favorable to human civilization, are rapidly receding. This will in all probability severely disrupt humanity's current technological endeavor, affecting its basic patterns and putting under stress all our civilization's institutions, practices, social structures and beliefs. As it actually seems to be the case that philosophy of technology is still 'utterly unprepared' for the challenges this future predicament poses, we have taken the initiative, with this special issue of *Techné*, to challenge philosophers of technology to reflect on the implications for their discipline of this new and wholly unprecedented situation.

The Anthropocene as a New Planetary Condition

This new situation, as it becomes clearer every day, is nothing less than that of an entirely new and unexpected planetary condition. According to Earth System scientists, the Earth as a whole is caught in a fundamental rupture and is moving into a new state. It is leaving the relatively stable and benign state that is known as the Holocene, the geological period of the last 11,700 or so years which is now retrospectively perceived as a rather unique period, the rare 'long summer' (Fagan 2004, Dumanoski 2009) that allowed for the rise and flourishing of civilizations based on agriculture and later industrialization, and is entering a much more instable and unpredictable state now which has been termed the Anthropocene, as famously suggested at the turn of the century by the Nobel prize–winning Dutch atmospheric chemist and climate scientist Paul Crutzen (Crutzen and Stoermer 2000, Crutzen 2002). The Anthropocene is basically characterized by (1) the fact

that the human (*anthropos*) has gained geological agency and has by now become the most important geological factor on the planet, trumping all the natural factors, and (2) that as a result the Earth System is responding by shifting into a new state space that will be accompanied by huge changes in the Earth's atmosphere and biosphere, global warming and the collapse of vital ecosystems being two of the most pregnant and pressing issues (Barnosky et al. 2012).

As the Australian author Clive Hamilton writes in his book *Defiant Earth: The Fate of Humans in the Anthropocene*, what is changing with the Anthropocene is the very "being-nature" of the Earth itself (Hamilton 2017, 7), which has "ontological meaning" and therefore "invites us to think about the Earth in a new way, an Earth in which it is possible for humankind to participate directly in its evolution by influencing the constantly changing processes that constitute it" (ibid., 21). This means that we have to fundamentally change our relation to what was once called 'nature' and is now disclosed as a tiny film of negentropic activity covering a planetary body, the so-called biosphere, our ultimate and one and only yet seriously endangered life support system, for the continued existence of which we will have to become increasingly responsible ourselves. Philosophically, the Anthropocenic condition necessitates a renewed ontological questioning of nature—nature *as* Earth—and technology (also technology *as* Earth) in their increasing entanglement (Blok 2016b).

It may be considered obvious that the Anthropocene has resulted first of all from the process of industrialization that started in the late eighteenth century with the invention of the steam engine and the onset of industrial capitalism, and has gained real momentum with what is called 'The Great Acceleration' among Earth System scientists, which started after the end of the Second World War with the exponential growth of the global economy enabled principally by computerization and new transportation technologies (Steffen et al., 2015). The anthropocenic—and that is to say: anthropogenically induced—disruption of the Earth System that is referred to by Isabelle Stengers as 'the intrusion of Gaia' (Stengers 2015) and that entails profound changes in the Earth's lithosphere, atmosphere, hydrosphere and biosphere, results from the continuous expansion of the planetary technical system that Heidegger started to call enframing (*Gestell*) in the 1950s and that is now being reconceptualized from an explicitly planetary perspective as the *technosphere* (Haff 2014).

It is on the future development of the planetary technosphere that the future of the biosphere now crucially depends, the fate of the one determining the fate of the other. As a thoroughly and inevitably technological creature, the *anthropos* is now

confronted with the urgent task of fundamentally reframing the technosphere—which also constitutes what Pierre Teilhard de Chardin and Vladimir Vernadsky have termed the noosphere yet without explicitly acknowledging its technological constitution—from a largely destructive and exploitative into a more constructive and care-taking part of the Earth System (Lemmens and Hui 2017). This is a task for which philosophy of technology, qualitate qua, should be eminently prepared or at least should be ready to prepare itself for.

When Winner asked in his keynote at the SPT 2013 conference in Lisbon: "Upon what planet do today's philosophers of technology think they are living? And in what period of human history do they imagine themselves to be involved?" (Winner 2013), he launched the question that in our opinion is bent to become the most pressing problematic for any future (of) philosophy of technology. Responding to this question in our view means that we need to start thinking about the implications of the new, anthropocenic Earth which we are from now on inhabiting for the philosophy of technology, i.e., for its general conception of technology and approach to technological innovation, its methodologies and research orientations, and its frameworks for understanding both the human-technology relation and the nature-technology relation.

The Contributions

Questions that we put forward in our call for contributions were: what kind of world lays ahead of us given the truth of the new anthropocenic condition? How should we attune our technologies, for instance the global digital network technologies or the NBIC technologies more generally, to this new situation? What kind of new technologies and social institutions should be invented to deal with the impending energy crisis and climate catastrophes. What kinds of changes in our technological thinking are needed for this new age? What kinds of technopolitics and ecopolitics are needed and what can we already see emerging on the horizon in this regard? Should philosophy of technology assume a more ecological or even eco-centric focus, and eventually a geological or geo-centric focus, instead of studying technical artifacts or (socio)technical systems only? What should we think of proposed 'big time' solutions like geo-engineering, eco-technics and atmo-design, and what of new technological paradigms like homeotechnology (Sloterdijk), biomimicry and the biobased economy?

All of these questions, and many others besides, are addressed in some sense in the twelve articles that make up this special issue, most of which have an explicitly theoretical orientation although some deal with empirical cases as well. In

what follows we will give a short preview of all the contributions. Partly based on our reading of those contributions, we will put forward some general observations and finally conclude with some suggestions and recommendations for a possible future 'philosophy of technology in the age of the Anthropocene.'

In "Earthing Technology: Towards an Eco-Centric Concept of Biomimetic Technologies in the Anthropocene," Vincent Blok kicks of the issue with arguing for a more eco-centric and Earth-oriented approach to technology development within the new condition of the Anthropocene. In particular, he focuses on the potentials of the emerging technology paradigm of biomimicry or biomimesis for sustainable and eco-friendly technology design. He thereby discusses two opposing views on employing biomimesis that can be found in the literature, a more traditional and still anthropocentric one, which aims at recruiting it for human management and control of the Earth's life support systems, and a more genuine Earth-oriented and eco-centric one which renounces the will to control and instead aligns itself with the responsive conativity of a nature understood in dualist terms as a composition of undifferentiated materiality and differentiated natural-technological hybrids. Referring among others to Spinoza and the work of Jane Bennett, Blok makes a case for the latter approach and concludes his contribution with distinguishing five principles for an eco-centric concept of biomimesis that can guide a more ecosystem-friendly trajectory of future technological development.

Massimiliano Simons's article, "The Parliament of Things and the Anthropocene: How to Listen to 'Quasi-Objects,'" examines the usefulness of Bruno Latour's work for reconsidering the role of technology in the Anthropocene, focusing especially on his well-known concept of the 'parliament of things,' through which he understands the Anthropocene, not as a new world but as a new attitude to the world. This concept is first clarified by comparing it to Isabelle Stengers's concept of 'cosmopolitics' and tracing its affinities with Michel Serres's notion of the 'quasi-object.' Simon then goes on to show that it is within the 'postlinguistic' framework of the 'parliament of things' that a different view of technology development in the Anthropocene *sensu* Latour should be understood, a view in which 'things' are granted a voice of their own and a shift can be made from technologies of control to technologies of negotiation, which exemplify what Latour calls the parliament of things.

Building on the œuvres of both Hegel and Teilhard de Chardin, Hub Zwart develops a dialectical perspective on the Anthropocenic challenge in his "From the Nadir of Negativity towards the Cusp of Reconciliation: A Dialectical (Hegelian-Teilhardian) Assessment of the Anthropocenic Challenge." The respective views

of these thinkers are employed and interpreted not only so as to present a diagnostics of our current planetary situation but also to offer a prognostics of our emerging planetary future. Although a pre-anthropocenic thinker, Hegel's dialectics of nature and spirit allows us to articulate what is currently at stake with the planet as it enters the anthropocenic state. The French philosopher and paleontologist Pierre Teilhard de Chardin is read as one of the first thinkers of the Anthropocene, although *avant la lettre*, and moreover as an author providing prognostic clues for our anthropocenic future. Discussing his views on self-directed evolution, on the on-going absorption of the biosphere by the noosphere, and on the emerging options for an overcoming of our current crisis, Zwart concludes with arguing that biotechnology should take a radical biomimetic turn, shifting from a domestication of nature by technology to the domestication of this technological domestication, that thinking should become distributed and collective, and that the Anthropocene must be sublated into what he calls the *Noocene*.

Byron Williston offers a surprising, somewhat counter-intuitive Heideggerian analysis of geoengineering in "The Question Concerning Geoengineering." Arguing that we are still living in the end-Holocene, being the period of ecological crisis, and explicitly depicting the Anthropocene as the emerging 'postnatural' age in which we will be bound to exist in a highly technologically mediated relationship to the rest of the planet, he considers the increasingly prominent proposals for geoengineering and asks whether or not such proposals can be accused of being objectionably human-centric, serving only our narrowly-defined species interests and fully replacing *physis* by *techne*, thus completely eliminating the Earth's natural autopoietic regimes. Using Heidegger's concept of enframing, Williston then shows how a 'preservationist application' of geoengineering, in which it does not determine the coming into being of beings within the Earth System but instead preserves and guarantees the conditions under which their self-emergence or *autopoiesis* will be allowed to continue in the future, can prevent such an undesirable outcome.

In their article "Saving Earth: Encountering Heidegger's Philosophy of Technology in the Anthropocene," Jochem Zwier and Vincent Blok argue that the relevance of the Anthropocene for the philosophy of technology consists of the fact that it makes us sensitive to the ontological dimension of contemporary technology. They first show that the Anthropocene has ontological import in that it inevitably presents the Earth as managerial resource and the human as planetary manager. As such it offers a concrete experience of what Heidegger abstractly described as the essence of modern technology and referred to as enframing. Technology in the

Anthropocene concerns the whole of being, which also indicates that the latter's technical origin is ontological. The authors go on to show that the Anthropocene is ambiguous insofar as it both accords and discords with what Heidegger called the 'danger' of technology. This is taken to imply that the Earth now gains ontic-ontological status, which calls for a reconsideration of Heidegger's insistence on the primacy of the ontological above the ontic. In their conclusion, the authors claim that the Anthropocene entails that the Heideggerian 'saving power' of technology as well as the related comportment of 'releasement' should become 'Earthbound,' which introduces us to what they designate as a 'saving Earth.'

Agostino Cera argues in "The Technocene or Technology as (Neo)Environment" that the best term for our current age is not 'Anthropocene' but 'Technocene,' since it is not the human but technology that here and now represents the true 'subject of history.' Technology produces a (de-natured) nature that constitutes the (neo)environment in which humans are destined to live. Given this, Cera proposes a new definition of both man's humanity and of technology. Whilst man switches from *natura hominis* to *conditio humana*, the peculiarity of which can be defined on the basis of the *anthropic perimeter* consisting essentially of man's worldhood, technology emerges as the *oikos* of contemporary humanity, assimilating the latter to an animal condition by forming its (neo)environment. As it is technology that currently forms the world, our age should be called the Technocene, which corresponds on the one hand to the emergence of technology as (neo)environment and on the other to the 'feralization' of man. He concludes by proposing a strategy for 'anthropological conservatism,' meaning a pathic desertion that is understood as a possible (pre)condition for the beginning of an 'authentic Anthropocene,' in which the human will be finally fully human.

In his relatively short contribution "Rebranding the Anthropocene: A Rectification of Names," Langdon Winner provides a frivolous yet fierce critique of the whole idea of the Anthropocene in his own unsurpassable way. Despite its possible advantages, Winner contends, the term Anthropocene for our current age is ultimately misleading and moreover unhelpful in both philosophical and political deliberations. It is profoundly anthropocentric and reeks of the techno-triumphalism of promethean 'Man' with a capital M, but what is most off-putting about it is the word's tendency to identify the human species as a whole as the culprit of the current, controversial changes in the Earth's biosphere, whereas its proximate sources can be much more accurately identified. Offering as an alternative the ludicrous notion of 'Langdonpocene,' Winner aims to illustrate the—in his view—bombastic pomposity and misplaced narcissism behind the notion of

the Anthropocene, in which he perceives echoes of the many discussions about 'Man and . . .' in countless publications of the twentieth century, which is a conceit that is now outmoded and rightly overcome in more recent writings on science, technology and society.

In "How to Differentiate a Macintosh from a Mongoose: Technological and Political Agency in the Age of the Anthropocene," Arianne Conty critically engages with the work of Bruno Latour and proposes a correction to his familiar concept of a 'democracy of things' as a framework for technology development in the context of the Anthropocene. Latour introduced this framework as a critique of the nature/culture divide in the social sciences, with the intent of attributing agency not only to human subjects but also to other living and nonliving actants. This has led in many STS circles to the adoption of a 'flat ontology' putting all forms of agency on a par. Although acknowledging the usefulness of granting autonomous agency to non-human actants in the context of the Anthropocene, Conty warns for the dangers of the widespread habit to reify the agency of technological tools as separate from human agency. Against this tendency, she argues for the necessity of conducting causal analyses that trace such agency back to its source in human political organization in order to adequately respond to the Anthropocene.

Starting from a critical reflection on the renewed relation between nature and technology in the Anthropocene, Yuk Hui argues in his article "On Cosmotechnics: For a Renewed Relation between Technology and Nature in the Anthropocene" for the necessity of a dialogue between the philosophy of technology and the anthropology of nature. The collapse of the nature-culture dichotomy that is one of the key characteristics of the Anthropocene is echoed in today's so-called 'ontological turn' in the anthropology of authors like Descola, Viveiros de Castro and also Latour. Hui contrasts this 'ontological turn' in anthropology with the attempt by the French philosopher of technology Gilbert Simondon to overcome the antagonism between culture and technics. Bringing these voices together is fruitful, he shows, for re-conceptualizing the relation between nature and technology in the context of the Anthropocene. One way of initiating this dialogue attempted by Hui in this article is to think about ways of reconciliating nature and technology through his concept of cosmotechnics, by which he understands the unification of the cosmic order and moral order through technical activities. Entering into a dialogue with the ontological turn, he argues, may allow us to rediscover multiple cosmotechnics beyond the current discourse of technology, limited as it is to Greek *techne* and modern technology coming out of Western modernity.

In "Techno-Optimism and Rational Superstition," Alexander Wilson develops a critique of technological optimism and examines some of its implications. He first contextualizes some contemporary variants in relation to some opposing contemporary strands of techno-pessimism, skepticism and fatalism and shows that it is often instrumentalized in the sense that it is assumed to impact the evolving state of affairs. He then argues that this presupposes some form of retro-causation, where the future is thought to somehow retroactively influence the past. This makes it fundamentally superstitious and that of course contradicts it to our common understanding of reason and rationality. Applied reason, Wilson continues, is conceptually entangled with this superstitious optimism about continued technological success. To account for this, he appeals to evolutionary theory, showing that the biological origins of reason will by nature tend to produce rational agents which are superstitiously bound to realism and causality, and therefore implicitly optimistic about technology's capacity to overcome contingency.

In "Beyond Adaptation and Anthropomorphism: Technology in Simondon," Danika Drury-Melnyk examines the possible importance of the work of Gilbert Simondon for current discussions on climate change and the Anthropocene. Although his work of course predates the coining of this term, the non-anthropomorphic view of technology he developed makes him in many ways a philosopher of the Anthropocene. With Simondon, Drury-Melnyk criticizes the popular idea that technology can be used to adapt to the practical problems of the Anthropocene. Rejecting the narrative of adaptation for its neglect of the crucial importance of metastability and constitutive relationality in both nature and society as well as its instrumentalist ignorance of the fact that technology always institutes its own norms and relations, she argues for a Simondonian, non-anthropomorphic and non-adaptive approach to technologically responding to the Anthropocene that centers on relation and the potentializing nature of technology rather than on a particular view of the human subject or society.

The final contribution by Bernard Stiegler, entitled "What Is Called Caring? Beyond the Anthropocene," deals with the question under what conditions it is still possible for us to think in today's era of the Anthropocene, in which the human has become the decisive factor in the evolution of the biosphere. The crucial horizon of this question, structurally neglected by philosophy, is that thinking is thoroughly conditioned by a technical milieu of retentional dispositives that have the character of *pharmaka* which can both support and undermine that thinking. The Anthropocene results from modern technology's domination of the Earth through industrialization, currently unfolding as a process of generalized digital automa-

tion and tending to eliminate reflection and block any genuine questioning of its own development, as such engendering a state of generalized entropy that also affects thinking or the noetic. The radical undermining of the very possibility of thinking and questioning thought by Heidegger in terms of enframing should be understood as a pharmacological situation that calls for a therapeutic reversal of the toxicity of current digital technologies into a remedial instrument for realizing a negentropic turn beyond the Anthropocene and toward the Neganthropocene. This requires that thinking starts to understand itself as caring, i.e., as a taking care of itself by taking care of the technical *pharmaka* that thoroughly constitute and condition it and that can render human life as noetic life both deeply unlivable and profoundly worthwhile.

Toward a Terrestrial Turn in Philosophy of Technology

An obvious conclusion that can be gathered from considering the multiplicity of ideas put forward in the various contributions to this issue, is that is time for philosophy of technology to start taking into account the earthly context of technology and technological change as well as the fact that this earthly context is itself an increasingly technologized context. It is our view, therefore, that the Anthropocene as the new terrestrial condition for global humanity calls again for more broad-ranging and whole-oriented approaches in the philosophy of technology, not so much as a correction but as a complement to the now dominant micro-level analyses of concrete artifacts and particular social use contexts favored and promoted by what has been called the 'empirical turn' since the 1990s. Indeed, it urgently requires more macro-oriented and what is more also renewed ontological approaches that question and theorize technology's changing planetary condition (and conditioning).

As such, we would like to propose a 'terrestrial turn' in philosophy of technology, and that is to say an approach that considers technology not just empirically anymore and not even just as the broad socio-cultural phenomenon that traditional philosophers of technology like Marcuse, Jaspers and Ellul saw in it, but that theorizes it explicitly in its planetary context and as a planetary phenomenon in its own right. This is a true game-changer because it forces philosophers of technology to fundamentally reconsider and re-evaluate technology, technological innovation and progress not just from an environmental perspective but within an entirely new planetary horizon.

Philosophy of technology needs to become capable—and urgently so—of facing the many new and unprecedented technological and ecological challenges

that the emerging Anthropocenic and thoroughly 'Earthbound' condition will present to a planetized humanity that is *threatened* by its own technology yet destined to start *remedying* this situation through this very same technology, by explicitly taking care of its increasingly instable, unreliable and precarious earthly habitat (Blok 2015). As such it needs to develop an understanding of, on the one hand, what it means for technology having to become more "earthly" (Blok 2017) and, on the other, for the Earth to become increasingly technological (Blok 2014). In this respect, to conclude, we see three promising areas of research for a terrestrially oriented philosophy of technology.

A first important area of research is opened up by the need to examine how the Earth as a system should be understood exactly in the light of the Anthropocene, i.e., as profoundly affected by the global technical system—e.g. in a holistic way or not, cybernetically or more geophysiologically as suggested in the Gaian paradigm (Schneider et al., 2008). The main question for a terrestrial philosophy of technology here is how to conceive of the relation between the four principal geospheres (the litho-, hydro-, and atmosphere but foremost the biosphere) and the technosphere, given the fact that technology is not just embedded in ecology anymore but is increasingly becoming its very foundation, such that the future habitability of the earth is becoming the technological question par excellence.

A second important area of research touches upon proposals for geoengineering as they have gained more attention in recent years as well as on the possibilities and pitfalls of more Earth-oriented and bio-adaptive technology paradigms like biomimicry and ecomimesis. These terms, which refer to bio- and eco-centric forms of technology based on or inspired by mechanisms and processes found in (living) nature, are allegedly more suited for the challenge to take care of our earthly habitat (Dicks 2016, Blok 2016a).

A third important area of research are the ecological and eco-therapeutic potentials of the planetary-scale digital network technologies that constitute the current digital 'noosphere' and fundamentally condition humanity's responsiveness and response-ability vis-à-vis the Earth System (Lemmens forthcoming). The question here concerns the possibilities of constructing a more earth-aware, eco-attentive, and eco-responsive global digital network as a necessary instrument for confronting the challenges of the Anthropocene and to establish a genuine Earth-caring civilization. An important issue here is the relation between the digital noosphere and other planetary spheres and the question how the various agencies of the Earth system in all their entangled complexity relate to human agency such as it is co-constituted through technology within global sociotechnical assemblages

Acknowledgements

We would first of all like to thank all the authors for their willingness and sustained effort in contributing to the realization of this issue, which we deem to be a great success. We would also like to thank the many reviewers who have kindly offered their time to provide critical feedback to the manuscripts. In particular we want to express our gratitude to Henry Dicks, Bart Gremmen, and Hub Zwart, who were so generous to offer their precious time to review quite a few manuscripts. Last but not least a great thanks to *Techné*'s editors in chief, Neelke Doorn and Diane Michelfelder, for their willingness to support this project and finally to Michael Poznic, *Techné*'s managing editor, who carefully supervised the final editing of the papers.

References

Barnosky, Anthony D., Elizabeth Hardly, Jordi Bascompte, Eric Berlow, James Brown, Mikael Fortelius, Wayne Getz, John Harte, Alan Hastings, Pablo Marquet, Neo Martinez, Arne Mooers, Peter Roopnarine, Geerat Vermeij, John Williams, Rosemary Gellespie, Justin Kitzes, Charles Marshall, Nicholas Matzke, David Mindell, Eloy Revilla, and Adam Smith. 2012. "Approaching a State Shift in Earth's Biosphere." *Nature* 486: 52–58. https://doi.org/10.1038/nature11018

Blok, Vincent. 2014. "Reconnecting with Nature in the Age of Technology." *Environmental Philosophy* 11(2): 307–32. https://doi.org/10.5840/envirophil20149913

Blok, Vincent. 2015. "The Human Glance, the Experience of Environmental Distress and the 'Affordance' of Nature: Toward a Phenomenology of the Ecological Crisis." *Journal of Agricultural and Environmental Ethics* 2(5): 925–38. https://doi.org/10.1007/s10806-015-9565-8

Blok, Vincent. 2016a. "Biomimicry and the Materiality of Ecological Technology and Innovation." *Environmental Philosophy* 13(2): 195–214. https://doi.org/10.5840/envirophil201692035

Blok, Vincent. 2016b. "Thinking the Earth." *Environmental Ethics* 38(4): 441–62. https://doi.org/10.5840/enviroethics201638437

Blok, Vincent. 2017. "Earthing Technology: Towards an Eco-centric Concept of Biomimetic Technologies in the Anthropocene." *Techné: Research in Philosophy and Technology* 21(2–3): 127–49. https://doi.org/10.5840/techne201752363

Crutzen, Paul J. 2002. "Geology of Mankind." *Nature* 415(23). https://doi.org/10.1038/415023a

Crutzen, Paul J., and Eugene F. Stoermer. 2000. "The 'Anthropocene.'" *Global Change Newsletter* 41 (May): 17–18.

Dicks, Henry. 2016. "The Philosophy of Biomimicry." *Philosophy and Technology* 29(3): 223–43. https://doi.org/10.1007/s13347-015-0210-2

Dumanoski, Dianne. 2009. *The End of the Long Summer: Why We Must Remake Our Civilization to Survive on a Volatile Earth*. New York: Three Rivers Press.

Fagan, Brian. 2004. *The Long Summer: How Climate Changed Civilization*. Cambridge: Basic Books.

Haff, Peter. 2014. "Technology as a Geological Phenomenon: Implications for Human Well-Being." *Geological Society London Special Publications* 395(1): 301–09. https://doi.org/10.1144/SP395.4

Hamilton, Clive. 2017. *Defiant Earth: The Fate of Humans in the Anthropocene*. Cambridge: Polity.

Lemmens, Pieter. Forthcoming. "Re-Orienting the Noosphere. Imagining a New Role for Digital Media in the Era of the Anthropocene." *Glimpse*.

Lemmens, Pieter, and Yuk Hui. 2017. "Reframing the Technosphere: Peter Sloterdijk's and Bernard Stiegler's Anthropotechnological Diagnoses of the Anthropocene." *Krisis: Journal for Contemporary Philosophy* 2017(2): 26–41.

Schneider, Stephen H., James Miller, Eileen Crist, and Penelope Boston, eds. 2008. *Scientists Debate Gaia: The Next Century*. Cambridge, Mass.: MIT Press.

Steffen, Will, Wendy Broadgate, Lisa Deutsch, Owen Gaffney, and Cornelia Ludwig. 2015. "The Trajectory of the Anthropocene: The Great Acceleration." *Anthropocene Review* 2(1): 81–98. https://doi.org/10.1177/2053019614564785

Stengers, Isabelle. 2015. *In Catastrophic Times: Resisting the Coming Barbarism*. London: Open Humanities Press.

Winner, Langdon. 2013. "A Future for Philosophy of Technology—Yes, But on Which Planet?" Keynote Lecture at 18th SPT Biannual meeting, Lisbon, Portugal.

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 127–149 DOI: 10.5840/techne201752363

Earthing Technology: Towards an Eco-centric Concept of Biomimetic Technologies in the Anthropocene

Vincent Blok

Abstract: In this article, we reflect on the conditions under which new technologies emerge in the Anthropocene and raise the question of how to conceptualize sustainable technologies therein. To this end, we explore an eco-centric approach to technology development, called biomimicry. We discuss opposing views on biomimetic technologies, ranging from a still anthropocentric orientation focusing on human management and control of Earth's life-support systems, to a real eco-centric concept of nature, found in the responsive conativity of nature. This concept provides the ontological and the epistemological condition for an eco-centric concept of biomimetic technologies in the Anthropocene. We distinguish five principles for this concept that can guide future technological developments.

Key words: Anthropocene, biomimicry, ecomimesis, philosophy of technology, sustainable technology

Introduction

Philosophy of technology can be criticized for narrowing its scope to concrete artefacts and their uses, thereby neglecting Earth's ecosystem in which these artefacts occur and operate. According to Langdon Winner for instance, philosophers can no longer take the availability of "cheap and readily available petroleum" for granted that "fuels virtually every function of our technological civilization" (Winner 2013). Besides the energy crisis, global warming threatens the existence of a stable, favourable climate on which the functioning of modern technological societies depends. This raises the question not only of how philosophers of

Vincent Blok, Management Studies Group and Philosophy Group, Wageningen University, Hollandseweg 1, 6706KN Wageningen, The Netherlands; www.vincentblok.nl; Vincent.blok@wur.nl.

technology should respond to the changing environment in which technologies operate, but also of how we as a society should attune our future technologies to this new situation. Should philosophers of technology and STS scholars assume a more ecological or even eco-centric focus, instead of focusing on technical artefacts or (socio)technical systems only?

In this article, we reflect on these changed conditions under which new technologies emerge—energy crisis, global warming and so forth—in order to answer these questions. In section one, we conceptualize these changed conditions of the current age in terms of the Anthropocene; the Anthropocene is a new geological epoch, in which the human has become the most influential 'terraforming' factor on Earth. Global warming is one of the main characteristics of the Anthropocene. On the one hand, it shows our dependence on Earth's carrying capacity for our human existence. This, on the other hand, calls for the transition to a more sustainable future, including sustainable technologies. This raises the question of how to conceptualize sustainable technology in the Anthropocene.

In section two, we explore a more eco-centric approach to technology development, called biomimicry or bio-inspiration. Biomimicry or biomimetics is "a new science that studies nature's models and then imitates or takes inspiration from these designs and processes to solve human problems" (Benyus 2002, 1). Biomimicry can be considered an eco-centric approach of technology development, because it takes the *bios*, nature or the eco-systems of planet earth as point of departure in the development of new technologies. According to Janine Benyus, one of the founding mothers of the biomimetic movement, *homo industrialis* has reached the limits of Earth's carrying capacity and is "hungry for instructions about how to live sanely and sustainably on the Earth" (Benyus 2002, 1). Biomimicry provides a potentially new and ecosystem-friendly approach to technology development, which is no longer characterized by the domination and exploitation of nature, but by learning and exploration (Myers 2012; Forbes 2005). Benyus for instance argues that the first industrial revolution is characterized by the domination and exploitation of nature, whereas the second—biomimetical—industrial revolution is characterized by learning from, and exploring, nature (Blok and Gremmen 2016).

We discuss opposing views on biomimetic technologies in the Anthropocene, ranging from an anthropocentric orientation with a strong focus on human management and control of Earth's life-support systems (section 2), to an eco-centric orientation in which the earth and human agency become intertwined. With an eco-centric orientation of biomimetic technologies, we mean that natural agency

informs biomimetic technologies, without committing a priori to the anthropocentric context in which they are applied. The point of departure of such an eco-centric approach is found in the responsive conativity of nature, and involves a dualist notion of nature—nature as undifferentiated materiality and nature as differentiated natural-technological hybrids (section 3). The advantage of this dualist concept of nature is that it enables us to acknowledge the immanence of thinking in the physical in the Anthropocene while at the same time acknowledging an asymmetry between nature and (human) technology. We will show that this concept of nature provides the ontological and the epistemological condition for an eco-centric concept of biomimetic technologies in the Anthropocene. We distinguish five principles or conditions for an eco-centric concept of biomimetic technologies that can claim to provide an ecosystem-friendly approach to technology and should guide future technological developments in the Anthropocene. In section 4, we draw conclusions and reflect on the implications of this concept of biomimetic technologies for human agency in the Anthropocene.

1. The Changed Conditions of Technology in the Anthropocene

The changed conditions in which we currently live can be conceptualized as the Anthropocene. According to atmospheric- and geo-scientists like Will Steffen and Paul Crutzen, humans have increasingly become a geophysical force since the industrial revolution (Steffen et al. 2007). According to Crutzen, the Anthropocene can be defined as the geological epoch supplementing the Holocene—the warm period of the last ten to twelve millennia—which is dominated by humans (Crutzen 2002); or, more precisely, the epoch in which the geological conditions and processes of Earth's life-support systems have been profoundly altered by human activity. Examples of human influence on Earth's dynamics and future states are erosion due to deforestation, agriculture, global warming, the chemical composition of soils, seas and the atmosphere.

The first occurrence of human impact on the natural environment did not take place during the industrial revolution. Since the Neolithic for instance, humans have modified landscapes by agricultural practices and predation of animals. Nevertheless, "the human imprint on the environment may have been discernible at local, regional, and even continental scales, but preindustrial humans did not have the technological or organizational capability to match or dominate the great forces of nature" (Steffen et al. 2007, 614). Most Anthropocenologues argue that the starting point of the Anthropocene is found in the industrialization of society around 1800, because the exponential increase in the use of fossil fuels had an

enormous impact on Earth's systems and accelerated in the phase after the Second World War, resulting in the global economy we know today (Steffen et al. 2007). In contrast with the age of modernity, in which humanity was conceptualized as *opposed* to and transcending the natural environment, Earth becomes humanized and the human becomes naturalized in the Anthropocene. "The Anthropocene represents a new phase in the history of both humankind and of the Earth, when natural forces and human forces became intertwined, so that the fate of one determines the fate of the other" (Zalasiewicz et al. 2010, 2231). Humanity can no longer be conceived without the natural and technological environment on which it depends, and Earth's planetary population by humans makes it impossible to conceptualize nature without human cultivation, preservation and development.

Because it is becoming increasingly clear nowadays that humanity is using more natural resources than Earth can provide, and that we need two or more planets to support our modern way of living in the future, the third phase of the current Anthropocene should consist in human stewardship of Earth in order to ensure the sustainability of Earth's life-support systems for human life on earth. In this respect, the term Anthropocene not only describes our current situation but primarily sensitizes us to the idea that we have to take responsibility for Earth's sustainability (Kolbert 2011). The Anthropocene provides a radical new opportunity for such stewardship, because it overthrows classical dichotomies like nature-technology or nature-culture: "The long-held barriers between nature and culture are breaking down. It's no longer us against 'Nature.' Instead, it's we who decide what nature is and what it will be. . . . Living up to the Anthropocene means building a culture that grows with Earth's biological wealth instead of depleting it. Remember, in this new era, *nature is us*" (Crutzen and Schwägerl 2011).

Although the official confirmation that Earth has entered a new geological epoch has still to be issued by the *International Commission on Stratigraphy*, the concept of the Anthropocene has been taken up by philosophers like Bruno Latour and Timothy Morton. For Morton, the idea that nature is us becomes very concrete in his experience of global warming. Nowadays, the evidence for global warming is so massive that there is no longer a position possible outside of it; whereas in earlier ages, it was possible to externalize waste to the environment, we nowadays realize that every externalization returns like a boomerang and impacts Earth's life-support systems (Morton 2013). Framed in more philosophical terms, the experience of global warming is the experience of the whole of being, in which the one who experiences this whole is included.[1] Phenomena like global warming provide the experience that all of Earth is an 'interior space' without any possible

position outside of it (Sloterdijk 2009), forcing "us to acknowledge the immanence of thinking to the physical" (Morton 2013, 2). So whereas philosophers like Nietzsche saw the "de-anthropomorphizing of nature and the re-naturalizing of man" as the primary objective of their philosophical work (Nietzsche 1988, 201), the factual experience of the Anthropocene concerns not only the ontic experience of our dependence on the biosphere, but also the ontological experience of the immanence of thinking to Earth. It primarily concerns the identity of both human existence and Earth's natural environment. Contrary to the characteristic of human existence as opposed to and transcending nature, this ontic-ontological experience of the whole of being in which human existence is included, i.e., the experience that we live on Earth and *as* Earth, characterizes the Anthropocene epoch.

This brings us to the following question. If the current phase of the Anthropocene demands a human stewardship of Earth in order to ensure the sustainability of Earth's life-support systems on the one hand, while the Anthropocene on the other hand shows the immanence of thinking to the physical, what then exactly is the role of human agency in general, and of human technology in particular? What does it mean to *exist* in the Anthropocene?

2. The Eco-Mimesis of Technology in the Anthropocene: Contested Conceptualizations

Scholars like Crutzen and colleagues still see a significant role for human agency in the stewardship of Earth: "We should adapt our culture to sustaining what can be called the 'world organism.' This phrase was not coined by an esoteric Gaia guru, but by eminent German scientist Alexander von Humboldt some 200 years ago. Humboldt wanted us to see how deeply interlinked our lives are with the richness of nature, hoping that we would grow our capacities as a part of this world organism, not at its cost. His message suggests we should shift our mission from crusade to management, so we can steer nature's course symbiotically instead of enslaving the formerly natural world" (Crutzen and Schwägerl 2011). In this view, the sustainability of Earth's life-support systems is threatened by global warming, and human agency is needed to manage the course of nature. Crutzen argues for a *symbiotic* way of steering nature's course, "that grows with Earth's biological wealth instead of depleting it" (Crutzen and Schwägerl 2011).

This symbiotic way of steering nature's course can be conceptualized as biomimicry or biomimesis.[2] According to Peter Sloterdijk, recent developments in technology and science, like biotechnology and synthetic biology, show that they are not purely natural or technological, but rather hybrid forms of technology that

are similar to nature: *homeo*-technology (derived from *homeo*-, 'similar,' 'alike'). With this, we are on the "threshold of a form of technology that will be sufficiently developed to enable us to radically imitate nature" (Sloterdijk and Heinrichs 2006, 329). In biomimicry, technological developments imitate or take inspiration from the operating principles of nature, like "nature runs on sunlight," "nature fits form to function," "nature recycles everything" (Benyus 2002). It studies the design of natural systems—the ability of geckos to climb overhanging walls with the help of toepads with millions of hairs that can conform to surfaces—and then imitates these designs to solve human problems; the ability to attach objects to, and detach objects from, the wall, gecko tape and so on. Proponents of biomimicry claim that it provides an alternative for the *homo industrialis* who primarily exploited the natural environment, and consists in exploring and learning from nature about how to live and act in a sustainable way. Nature's instructions for living sustainably on Earth are found in 3.8 billion years of evolution, in which plants and animals developed the ability to fly, capture energy, see and hear, and so on. "In short, living things have done everything we want to do, without guzzling fossil fuel, polluting the planet, or mortgaging their future. What better models could there be?" (Benyus 2002, 2). To the extent that biomimetic technology acts and performs in accordance with the operating principles of nature, it can claim to be a symbiotic management approach to nature's course and to grow with Earth's biological wealth (Benyus 2002).

Although biomimetic technologies can be considered *symbiotic* to nature's own design principles, they presuppose at the same time an anthropocentric position of human agency. From the perspective of Crutzen's call for stewardship of Earth in the third phase of the Anthropocene for instance, it is clear that nature is dependent on the good management of human agency: "it's we who decide what nature is and will be" (Crutzen and Schwägerl 2011), and this entails the obligation to take care of Earth's future. A similar role of human agency can be traced in the literature on biomimicry.

This anthropocentric position also becomes clear in Benyus's focus on engineering, and in this respect, on 'human' problems that should be solved by technology: "biomimicry is the conscious *emulation* of life's genius" (Benyus 2002, 2) (emphasis added). *Emulation* of nature means not only *imitation* but also *competition* with nature, for instance in the built environment. In Sloterdijk's concept of biomimicry (homeo-technology), the anthropocentric position of human agency becomes clear in his belief that the integration of the biosphere and the

technosphere under the direction and guidance by human cognition can guarantee a sustainable future (Sloterdijk 2001).

The paradoxical result of the anthropocentric orientation of biomimetic technologies in the Anthropocene is that human agency on the one hand mimics "nature's biological wealth instead of depleting it," while, on the other hand, nature is seen as a patient without agency, dependent on human technology and management. In fact, biomimetic technologies in the Anthropocene not only *mimic* nature, but also *perfect* nature, which it cannot do itself. Or as Forbes puts it: "Bio-inspiration is the new science that seeks to use nature's principles to create things that evolution never achieved" (Forbes 2005, 1).

These two forms of biomimicry as imitation and perfection of nature can be traced back to the metaphysical tradition. In Aristotle's *Physics*, we can find the classical definition of the concept of *mimesis*, from which the concept of biomimicry is derived. According to Aristotle, technology and nature are essentially the same because technology mimics nature (Aristotle 1980). Technology either—on the basis of nature—accomplishes or perfects what nature is not capable of effectuating itself or imitates (*mimeitai—mimesis*) nature. There are, therefore, two types of the technological *mimesis* of nature according to Aristotle. First of all, there is the mimetic copy or reproduction of the naturally given, and secondly, there is another type of *mimesis* based on the deficiency of nature. Nature is not capable of producing or effectuating everything, and, in this case, mimicry productively supplements the capabilities of nature (Lacoue-Labarthe 1998; Blok and Gremmen 2016).[3]

Biomimicry as perfection of nature presupposes a deficiency in nature. In the Anthropocene, this deficiency can be conceptualized as Earth's inability to accommodate an increasing world population *and* ensure the sustainability of Earth's life-support systems at the same time. It is for this reason that nature has to be supplemented by technology, for instance by mitigating or geo-engineering strategies to secure the sustainability of Earth's life-support systems. Or, as the environmental scientist Erle Ellis puts it: "It is no longer Mother Nature who will care for us, but us who must care for her. . . . We most certainly can create a better Anthropocene. We have really only just begun, and our knowledge and power have never been greater. We will need to work together with each other and the planet in novel ways. . . . In the Anthropocene we are the creators, engineers and permanent global stewards of a sustainable human nature" (Ellis 2011, 27).

There are at least two reasons to question the anthropocentric orientation of biomimetic technologies in the Anthropocene. We can argue that the exploitation

of Earth in the industrial age is rooted in such anthropocentric humanism, i.e., in the standpoint of mastery of the human will to master and exploit the natural world as a commodity for human needs (Blok 2015). According to environmental philosophers like Plumwood, the assumption of a fundamental dualism between nature and human agency gave rise to the idea that human agency can solve the environmental crisis we face today by engineering and technology (Plumwood 2002), which in fact consists in the exploitation of nature (Sloterdijk and Heinrichs 2006). This bias of anthropocentrism is also confirmed in many examples of biomimetic practices that just pretend to integrate life in order to sustain the planet but can be characterized as enslaving the formerly natural world. One can think for instance of the Oyster-techture, in which oysters are exploited to build wave-attenuating reefs to protect the shore from wind, filtering water and so on, or the introduction of genetically modified bio-luminescent trees, in which trees are used to illuminate city-centre streets for instance (Myers 2012). The difficulty in distinguishing between symbiotic approaches and enslaving approaches is that both presuppose an anthropocentric role of human agency as the manager of Earth's natural resources (Blok 2015).

The same primacy of human agency can be found in the discourse on the Anthropocene. In his insightful article, Jeremy Baskin has shown that proponents of the Anthropocene argue for planetary engineering and management of the humanized Earth (Baskin 2015). Whereas the mitigation strategy attempts to improve technology and management of natural resources to take the human pressure off Earth's life-support systems, the geo-engineering strategy introduces radical new technologies and control systems to save the planet, like anthropogenic emissions of aerosol particles into the atmosphere to counter greenhouse gas effects, the sequestration of CO_2 in underground reservoirs and so on (Steffen et al. 2007). Baskin comes to the following conclusion:

> The idea (and the evidence) that humanity is now the dominant earth-shaping force combines with the data showing that the condition of the patient is serious, possibly terminal. Humanity and its planet are now in a critical and exceptional state. This both generates and draws upon an attraction to global-scale technological 'solutions' and earth management, under the guidance of the scientists-engineers best placed to understand, interpret and help shape the necessary interventions. These are responses aimed either at bringing us back from the brink, or at taking us to a new and better-managed future Earth. In both versions, the Anthropocene is both diagnosis and cure, both description and prescription. (Baskin 2015, 22)

In other words, it is questionable whether biomimetic technologies really can claim a symbiotic way of managing nature's course, instead of enslaving the natural world, as long as the point of departure is found in an anthropocentric position of human agency as the manager of Earth's life-support systems. At the same time, it is exactly the experience of the Anthropocene that shows the impossibility of such an anthropocentric position of human agency and can initiate the transition from a conceptualization of humans-as-opposed-to-nature to a conceptualization of human existence as living-on-Earth-and-as-Earth, as we have seen in the previous section. This is the first reason to reject the anthropocentric orientation of biomimetic technologies in the Anthropocene and to consider a more eco-centric orientation.

A second reason is that, however true it may be that humanity currently has a significant impact on Earth's dynamics, scientific findings make it increasingly clear that Earth's systems themselves are inherently unstable and characterized by transformation, change and volatility: "Whatever 'we' do, ice cores and other proxies of past climate profess to us, our planet is capable of taking us by surprise. With or without the destabilizing surcharge of human activities, the conditions most of us take for granted could be taken away, quite suddenly, and with very little warning" (Clark 2011, xi). A phenomenon like global warming shows on the one hand that humans in fact have a significant role in Earth's history, but on the other hand precisely diminishes the role of human agency because it displaces human existence from the centre of Earth's historical development and leaves us embarrassed regarding the question of what in fact the role of human agency is in the Anthropocene (Morton 2013).[4] It is questionable whether human agency can claim to manage nature's course in the Anthropocene, to say the least; deep geological time convinces us, on the contrary, of the eco-centrism of the preconditions for human agency, i.e., the significance of Earth's systems on which human agents and their technologies entirely depend. In the Anthropocene, it is increasingly acknowledged that Earth is not only the ontic condition of the possibility for the emergence of a world in which humanity is the manager of the natural resources (Blok 2016), but also the ontological condition out of which human life emerges (Blok 2015), as we shall see in the next section. This is the second reason to reject an anthropocentric orientation of biomimetic technologies in the Anthropocene and to consider a more eco-centric orientation.

In the next section, we take this rejection of anthropocentrism as a call to take the idea that *nature is us* more serious, and to explore a natural concept of nature,

which serves as a point of departure for our 'earthing' technology, i.e., for an eco-centric but still dualist concept of biomimetic technologies in the Anthropocene.

3. Earthing Technology: Towards an Eco-Centric Concept of Biomimetic Technologies[5]

With an eco-centric orientation of biomimetic technologies, we mean that nature itself and natural agency informs our concept of biomimetic technologies, without committing a priori to the anthropocentric context in which they are applied. In order to develop such an eco-centric orientation of biomimetic technologies in the Anthropocene, we can already draw the negative conclusion that our efforts to earth technology by developing an eco-centric notion of biomimicry is in no way comparable to the anthropocentric conceptualization. To the extent that current biomimetic practices are inspired by such an anthropocentric notion of biomimicry, an eco-centric concept of biomimicry does not necessarily align with the way current biomimetic practices proceed. On the contrary, our eco-centric concept of biomimetic technologies contains a call to earth technology in the third phase of the Anthropocene and provides guidelines for *future* biomimetic technologies.

We therefore first ask which concept of nature should be at stake in an eco-centric orientation of biomimetic technologies in the Anthropocene. The starting point for our considerations is found in an early philosophical insight that is nowadays increasingly accepted in science: the idea that not only humans, but all things, have agency (Latour 1993). One of the origins of this idea can be found in the work of Spinoza.[6] According to Spinoza, "each thing, as far as it can by its own power, strives [*conatur*] to persevere in its own being" (Spinoza 1992, part 3 proposition 6). For Spinoza, this conativity is not an *ontic* will or impulse of living systems towards self-preservation, but an *ontological* principle of all beings: "The conatus to preserve itself is the very *essence* of a thing" (Spinoza 1992, part 3 proposition 7) (emphasis added); conativity is a 'cosmogenic' or world-building capacity of nature itself to articulate and establish the being or *identity* of beings. Furthermore, for Spinoza, this conativity is not limited to *living systems*, because *every* body is conative according to Spinoza. On the one hand, we can argue that conativity is not only a principle of living nature, but primarily a principle of matter, i.e., of each material body on Earth.[7] On the other hand, we can argue that this concept of conativity of material entities extends the domain of the 'living' from the traditional animate to the 'inanimate,' i.e., 'living matter' as key element in the generation and self-regulation of Earth as a dynamic system (Vernadsky 1998; Lovelock 2006; Clark 2011).[8] In this article, we therefore conceive conativity as

a principle of Earth's materiality, thus including nature. As a consequence, our concept of biomimicry is not confined to the mimesis of 'living' nature, as seems to be the case in Dicks's (2016) work, and should be considered as eco-mimesis.[9]

To what extent can we consider conativity to be *essential* for natural entities, i.e., to what extent does conativity articulate the identity of natural entities? In Spinoza's view, only one common substance—*Deus sive Natura*—constitutes the universe. All natural entities that we encounter in the world are *modes* or *modifications* of this one substance. As such a mode, each material entity is resistant to everything that can take its existence away, and this resistance is precisely the conativity or striving to preserve oneself as such a mode of the common substance (Spinoza 1992, part 3 proposition 6). Conativity is essential then because it *differentiates* the identity of natural entities from the common but undifferentiated substance—it articulates and establishes the self or identity of the tree and the stone for instance *as* modes of nature (*self*-perseverance)—and prevents at the same time their relapse into this common substance (self-*perseverance*).

If we frame Spinoza's idea of a common substance in more profane terms and highlight the 'naturalistic' framework that he introduces, we can say that all natural entities that we encounter in the world—the stone, the tree, human beings—are modes or modifications of nature. As such a modification of nature, each natural entity strives to preserve itself (self-perseverance). If, however, this striving is *essential* for each natural entity, conativity cannot be understood at an ontic level as a struggle for the existence of these entities, but at an ontological level as the impulse[10] in nature to differentiate and establish the identity of natural entities like stones and trees as modes of this undifferentiated nature.

The essentiality of conativity for natural entities shows in other words that conativity is not a will or power of natural entities to preserve themselves (*autopoiesis*) but primarily a principle by which nature becomes delimited *as* stone, tree and so on. Conativity is literally an endeavouring, an effort; and the essentiality of conativity consists in its endeavour to articulate and establish the differentiated identity of natural entities *as* modes of undifferentiated nature. On the one hand, conativity is needed to differentiate and establish these natural entities from undifferentiated nature in which they are embedded ('self'-perseverance). On the other hand, conativity is needed to maintain and persevere these differentiations and prevent their relapse into undifferentiated nature again (self-'perseverance'). These two aspects of conativity are also confirmed by recent insights into Earth and life sciences; Earth's history is characterized by an inherent instability in which life forms but also inanimate conditions of life like climate changes emerge, adapt to

the changing environment and disappear again: "The vision that has been emerging, through a succession of discoveries, controversies and convergences, is one in which instability and upheaval, rhythmical movement and dramatic changes of state are ordinary aspects of the earth's own history" (Clark 2011, xii). The inherent instability of nature indicates undifferentiated nature, out of which differentiated nature or relatively stable bodies like stones and trees emerge ('self'-perseverance) and maintain (self-'perseverance') themselves. With this, a dualistic notion of nature appears—undifferentiated nature and differentiated nature - in which undifferentiated nature is the origin of differentiated nature like stones and trees.[11]

A first round of reflection on a naturalist concept of conativity makes clear that conativity primarily consists in the articulation and establishment of the self- or identity of natural entities as differentiations from undifferentiated nature. This is the first characteristic of conativity that we can discern as a principle of nature.

What is the consequence of this principle of conativity of nature for an eco-centric orientation of biomimetic technologies? It implies that precisely these two aspects of the conativity of nature ('self'-perseverance or self-assertion and self-'perseverance' or self-preservation) are mimicked in eco-mimetic technologies. The advantage of conceptualizing the conativity of nature in terms of self-perseverance is that an eco-mimesis of this conativity consists in the articulation and perseverance of the self or identity of natural-technological hybrids. Just like the self or identity of natural entities are differentiated from undifferentiated nature, eco-mimetic technologies are differentiations of undifferentiated nature and form natural-technological hybrids as such differentiations of undifferentiated nature. Eco-mimetic 'self'-perseverance can be understood as the articulation of the self or identity of natural-technological hybrids (self-organization and self-design) and associated with the autonomy, adaptability and headstrongness in their growth, whereas eco-mimetic self-'perseverance' can be understood as self-regulation and as the self-healing or self-repairing capacity of natural-technological hybrids. What is primarily mimicked in an eco-centric orientation of biomimetic technologies is nature's conativity—a conato-mimesis—that results in conative natural-technological hybrids.

With this, the eco-centric orientation of biomimetic technologies turns out to be different from the conceptualization of technology as instrument in the hand of human beings to control and manage Earth's life-support systems (Crutzen, Ellis, etc.). An example can be found in eco-mimetic bio-robotics or artificial intelligence, in which not only specific human functions are mimicked

and perfected, but especially capabilities associated with self-perseverance (self-organisation, autonomy, self-regulation etc.). Another example is a biorefinery in which bacteria, waste streams and humans are interconnected and form 'living machines' (Todd and Todd 1994). The consequence of an eco-centric orientation of such bio-mimetic technologies is, however, that we have to acknowledge the independence and agency of natural-technological hybrids, their uncertainty and unpredictability. On the one hand, eco-mimetic technologies in the Anthropocene are natural-technological hybrids characterized by agency (self-perseverance) and therefore on the other hand beyond human control. The agency of things already implies that nature itself does not always serve our agenda and withdraws from our control (Latour 1993). The incorporation of the conativity of nature in our technological design extends this uncontrollability to natural-technological hybrids and increases the autonomy, as well as the uncertainty and unpredictability of their future development. The lack of control is already at stake in current technologies like smartphones and internet, but will increase in case of eco-mimetic technologies like bio-robotics or biomimetic artificial intelligence.The lack of (human) control is the price we have to pay for the eco-centric orientation of biomimetic technologies in the Anthropocene.

Let us consider now a further consequence of conativity as the articulation of the identity of natural entities as differentiations of undifferentiated nature: 'I' am not primarily conative but 'I' am the performative constituent of the conativity of nature. This means that conativity as a principle of nature consists in the endeavour to differentiate and preserve natural entities like stones and trees, me and you, from undifferentiated nature as modes of nature, which remain embedded in this conative or 'vibrant' materiality of nature (Bennett 2010). We can compare this endeavour to differentiate with Kauffman's ideas about the *origins of order*, i.e., the spontaneous emergence of order out of chaos by the self-organization of complex biological systems (Kauffman 1993). This reveals a second characteristic of the conativity of nature: undifferentiated nature itself is a non-identity—or chaos in Kauffman's terms—that articulates the identity of natural entities—or order in Kauffman's terms—without the possibility of being identified itself. Nature itself is always heterogeneous to, and always transcends, the identity of actual natural entities as differentiations (order) from undifferentiated nature (chaos).

With this, our dualist concept of nature is further articulated. Undifferentiated nature concerns non-identity whereas differentiated nature concerns the identity of natural entities. This dualist notion of nature implies a fundamental limitation of any eco-centric orientation of biomimetic technologies; nature (as

non-identity) is always heterogeneous to the eco-mimetic articulation of natural-technological hybrids in the Anthropocene. The advantage of this dualist concept of nature is that it enables us to acknowledge the immanence of thinking in the physical in the Anthropocene—i.e., immanent nature, which is the starting point of any eco-centric orientation of biomimetic technologies—while at the same time acknowledging the fundamental asymmetry between (undifferentiated) nature and (differentiated) natural-technological hybrids. This asymmetry is not only an epistemic limitation of what is known—Earth as *terra incognita*—but also an ontological asymmetry. Aristotle argued that *steresis* or absencing belongs to the self-emergence of nature. This tendency of nature to withdraw itself can be found in the hardness and impenetrability of the things around us—the self-closedness of a stone—but also in undifferentiated nature from which the identity of natural entities emerges, stabilizes and into which they recede again (Blok 2016). In other words, this dualist concept of nature enables us to acknowledge a radical asymmetry between (undifferentiated) nature and (differentiated) natural-technological hybrids, without reintroducing the classical dichotomy between nature and technology. On the contrary, it enables us to acknowledge both immanent nature, which is mimicked in an eco-centric orientation of biomimetic technologies, and the complexity and heterogeneity of nature, which puts a limit to our ambition to mimic and incorporate nature.

A further advantage of such a dualist concept of nature is that it enables us to acknowledge the fundamental possibility of failure of biomimetic technology. Authors like Benyus and Sloterdijk sometimes suggest that biomimicry is intrinsically or ethically 'good' (Sloterdijk 2001, 230–31). At the same time, it is clear that design can be misused and that designers can be biased or frail and use their power for their own purposes (Myers 2012). This possibility of failure does not, however, necessarily have to be found in a dichotomy between nature—understood as somehow intrinsically good—and human technology—which may turn out to be fallible. A dualist concept of nature may explain why biomimetic technologies sometimes fail. An eco-centric orientation of biomimetic technologies aims to mimic and even incorporate nature's principles in the development of natural-technological hybrids, but, because nature withdraws itself both at an epistemic and an ontological level, biomimetic technologies become fundamentally fallible because of missteps, misuse or controversy. At the lowest level of consideration, it may turn out that they mimic the identity of natural entities that are still emerging or entities that in fact have already receded into undifferentiated nature for instance; Earth's system itself is inherently unstable and characterized

by transformation, change and volatility as we have seen. In general however, we can state that eco-mimetic natural-technological hybrids are fallible because they try to mimic something that is beyond their control. This acknowledgement of the uncontrollability of nature and, with this, the fallibility of natural-technological hybrids seems to be highly relevant in the 'risk society' in which we currently live (Beck 1992), in which our ability to make final judgments about the future impact of present technologies is fundamentally limited. This fallibility of technologies is the price we have to pay for an eco-centric orientation of biomimetic technologies in the Anthropocene.

If we conceive conativity as a principle of nature, rather than as a principle of natural entities, the question is why undifferentiated nature differentiates natural entities like stones, trees and human beings that build Earth's eco-systems.

According to Spinoza, nature is not only conative but also *associative*; this means not only that the conativity of nature articulates and establishes natural entities as modes of nature that can affect other entities in the environment, but also that these entities are in this at the same time *affected* by other entities, which are in their turn also constituted by the conativity of nature. According to Spinoza, each mode of nature is already a composition of simple modes, which affect and are affected by one another, i.e., which are primarily *responsive* to one another and form the relatively stable bodies we encounter in the world, ranging from simple bodies like stones and human beings to complex networks and alliances of bodies like Earth's ecosystems. Or as Jane Bennett puts it: "because each mode suffers the actions on it by other modes, actions that disrupt the relation of movement and rest characterizing each mode, every mode, if it is to persist, must seek new encounters to creatively compensate for the alterations or affections it suffers. What it means to be a 'mode,' then, is to form alliances and enter assemblages: it is to mod(e)ify and be modified by others" (Bennett 2010, 22).

If we conceptualize this associativity at an ontological level, i.e., at the level of undifferentiated nature that articulates and establishes the identity of natural entities, these entities are not only the product of the conativity of nature, because this conativity is at the same time responsive to the conativity of (other) differentiated nature.[12] This responsive conativity of nature articulates the relatively stable bodies like stones, trees and animals that form Earth's eco-systems. In other words, in the differentiation of natural entities by the conativity *of* nature, these entities are at the same time constituted by their responsiveness *to* the conativity of (other) nature and build the relatively stable bodies and complex systems in which the identity of natural entities are interconnected and interdependent. A second

round of reflexion on a naturalist concept of conativity reveals the responsiveness of conativity as a third characteristic of the conativity of nature.

This third characteristic of the conativity of nature casts the first characteristic—its self-perseverance—in a new light. Self-perseverance can still give the impression that nature is characterized by self-regulation and the avoidance of the transgression of these limits (*restrictive* nature), but the associative responsiveness of conativity to (other) nature makes clear that self-perseverance is also the source of every new configuration and new differentiation of the identity of natural entities in the environment. This generativity of new differentiations does not only consist in the constitution of simple modes of nature that are characterized by self-perseverance and therefore simply grow. Because they are already affecting and affected by other modes, the conativity of nature results in the differentiation of new and more complex modes, for instance natural-technological hybrids and the eco-systems in which they are embedded.

As a consequence, an eco-centric orientation of biomimetic technologies is characterized not only by conativity as self-perseverance, but at the same time by responsiveness to the conativity of (other) nature. In this responsive conativity, natural-technological hybrids are constituted, but also grow and differentiate adjusted or new hybrids, which in the end recede into undifferentiated nature again. This responsiveness of natural-technological hybrids to the conativity of nature does not remove the asymmetry between (undifferentiated) nature and natural-technological hybrids but rather reinforces this asymmetry. On the one hand, the eco-centric orientation of biomimetic technologies acknowledges the instability of nature, which differentiates natural entities—ranging from stones and trees to the complex eco-systems and atmospheric and biological conditions of life—without expecting any 'return' by human agency as manager (Bataille 1991); the cosmogenic act of nature constitutes the conditions of the possibility on which human existence, including natural-technological hybrids, entirely depends. Because of this dependence, on the other hand, the eco-centric orientation of biomimetic technologies is precisely *responsive* to the conativity of nature, i.e., to its cosmogenic activity, which constitutes the conditions on which these natural-technological hybrids depend. An eco-centric orientation of biomimetic technologies prevents us from focusing on the self-perseverance of an isolated natural-technological hybrid, without any responsiveness to the wider ecological context in which these hybrids emerge and fade away, ranging from the eco-systems in which they are embedded to the dynamic systems on which they depend at both the ontological and the epistemological level. The constitution of natural-technological hybrids

serves the sustainability of Earth's life-support systems, but is at the same time aware that the conditions on which they depend are not part of their jurisdiction and that changes and transformations of nature can suddenly withdraw this support without consulting us. Or as Clark puts it: "We cannot simply excavate, render transparent, or recompose the messy, unstable, even violent play of material forces out of which we ourselves have emerged. And this means that alongside our capacity for action, the very condition of our active orientations in the world is a kind of primordial passivity, a susceptibility in the face of all that is not ours to make or even know" (Clark 2011, 52). This passivity of natural-technological hybrids regarding the support of Earth, irrespective of their agency to take care of the future of the planet, is the price we have to pay for an eco-centric concept of biomimetic technologies in the Anthropocene.

In Table 1, the findings regarding the principle of conativity as principle of nature and its translation in five principles of an eco-centric orientation of biomimetic technologies are summarized.

4. Conclusion

The aim of this article was to broaden the perspective of philosophy of technology and to include the ontological conditions under which new technologies emerge and are used. In the current age, these conditions can be defined in terms of the Anthropocene. We have seen that, if we take the idea seriously that, in the Anthropocene, nature is us, it unsettles self-evident dichotomies like nature-technology and nature-human in which technology is normally understood. At the same time, the Anthropocene opens an ontological dimension out of which current and future technologies have to be understood; if we take this ontological dimension seriously, we have to acknowledge that, in the Anthropocene, technology should be earthed and conceived as eco-mimetic.

Next, we raised the question of how eco-mimetic technologies have to be understood under the conditions of the Anthropocene, i.e., how they are attuned with Earth's eco-systems. In section 2, and we discussed opposing views on the bio- or eco-mimesis of technology. Having rejected an anthropocentric orientation of biomimetic technologies in section 2, we reflected on an eco-centric but at the same time dualist concept of nature as the ontological and epistemological condition for an eco-centric concept of biomimetic technologies in the Anthropocene in section 3. We defined five principles of eco-mimetic technologies in the Anthropocene; this enabled us to find an alternative for the anthropocentric orientation with a focus on the management and control of Earth's life-support systems. It is

Table 1: Five principles of an eco-centric orientation of biomimetic technologies in the Anthropocene

Principle of conativity as principle of nature	**Principles of an eco-centric orientation of biomimetic technologies in the Anthropocene**	**Consequences for human agency in the Anthropocene**
Consists in the articulation and establishment of the identity of natural entities as differentiations from undifferentiated nature (*self*-perseverance) and the prevention of their relapse into undifferentiated nature again (self-*perseverance*)	Eco-mimetic technologies incorporate the *self*-perseverance of nature, in which the self or identity of natural-technological hybrids is constituted (self-organization, self-design) Eco-mimetic technologies incorporate the self-*perseverance* of nature, in which the self-regulation, self-healing/ self-repairing and adaptability of natural-technological hybrids to new or changing circumstances is constituted	The self-organization of natural-technological hybrids implies the acknowledgement of the agency, relative autonomy and headstrongness of these hybrids Eco-mimetic technologies are no longer instruments in the hand of human being to control and manage Earth's life-support systems, but uncertain, unpredictable and beyond (complete) human control
Withdraws itself (non-identity) in the articulation and establishment of the identity of natural entities	Eco-mimetic technologies acknowledge both immanent nature, which may be mimicked in natural-technological hybrids, and transcendent nature, which puts a limit to our ambition to mimic nature in our technological design	Eco-mimetic technologies are not intrinsically good but are fallible and may be biased Fallibility and biases are not necessarily due to human agency, but may also be due to the instability and volatility of nature itself The uncontrollability of (undifferentiated) nature limits human agency in the management and control of Earth's life-support systems
In the articulation of the self or identity of natural entities (differentiated nature), undifferentiated nature is responsive to the conativity of (other) nature and builds the eco-systems in which the identity of natural entities are interconnected and interdependent	The self-perseverance of eco-mimetic technologies is responsive to the conativity of (other) nature in the generation and articulation of new, adjusted and more complex natural-technological hybrids Responsiveness of biomimetic technologies consists in the responsiveness to the wider ecological context on which the existence of these natural-technological hybrids depends	Eco-mimetic technologies are characterized by a primordial passivity, because they are primarily responsive to the conativity of nature Eco-mimetic technologies serve the sustainability of Earth's life-support systems, notwithstanding the fact that the ecological conditions on which they depend do not fall under their jurisdiction (acknowledgement of the asymmetry between (undifferentiated) nature and natural-technological hybrids)

clear that these five principles do not necessarily align with the way current biomimetic practices proceed. On the contrary, our eco-centric concept of biomimetic technologies contains a call to earth future technologies in the Anthropocene, i.e., provides guidelines for future eco-mimetic technologies. On the one hand, these five principles can guide future technology development in the Anthropocene. On the other hand, these future technologies can claim to be more ecosystem friendly. In what way?

The experience of global warming primarily brings us 'down to earth.' This means, first, that global warming provides an experience of the whole of being in which we are included. This experience forces us to leave the anthropocentric orientation of human biomimetic agency behind. This primordial 'passivity' of human agency corresponds with a primordial openness and responsiveness to the conativity of nature, in which natural-technological hybrids are performatively constituted. This 'passivity' of human agency, however, goes hand in hand with a biomimetic 'activity,' namely, the articulation and establishment of natural-technological hybrids ('self'-perseverance), which are responsive to the ecological context on which their existence—i.e., their self-'perseverance'—depends. By articulating and establishing these natural-technological hybrids, human agency performs a eco-mimesis in which its identity as responsive to the conativity of (other) nature is constituted ('self'-perseverance) and maintained (self-'perseverance') by attuning the development of eco-mimetic technologies to Earth's life-support systems, without lapsing again into the role of manager of the planet. On the one hand, eco-mimetic technologies in the Anthropocene are natural-technological hybrids characterized by agency themselves (self-perseverance) and beyond human control. On the other hand, the earthing of technology by the incorporation of the conativity of nature in our technological design even increases the autonomy of these hybrids, and, with this, the uncertainty and unpredictability of their future developments. In the Anthropocene, human eco-mimetic agency consists in an eco-mimesis, in which natural-technological hybrids are constituted that are attuned to Earth's life-support systems, but in the awareness of the fact that the ecological conditions on which they depend do not fall under their jurisdiction and that changes and transformations of nature can suddenly withdraw its support without consulting us.

Notes

I would like to thank Pieter Lemmens and the anonymous reviewer for their fruitful comments on an earlier draft of this article.

1. This means that contrary to philosophers like Heidegger, who argued that the age of technology was characterized by the oblivion of being, we argue that the Anthropocene provides precisely an opportunity to have an experience of 'being' (Zwier and Blok 2017). This experience of the whole of being implies that human being is brought down to Earth and, second, that all our efforts to transcend earthly existence are to no avail (Morton 2013).

2. With this, we do not want to imply that Crutzen and Schwägerl had such a concept of biomimesis in mind. In fact, they did not reflect systematically on their notion of a symbiotic way of steering. In this article, we take their call for a symbiotic way of steering as an inspiration to develop a biomimetic notion of symbiotic steering. For an introduction of the philosophy of biomimicry, see Blok and Gremmen (2016). In this article, we use the terms biomimicry, biomimesis and biomimetics interchangeably. For the differentiation between these notions, see the insightful work by Dicks (2016).

3. In fact, one can argue that biomimicry as technology does not make sense if it does not strive to enhance and improve the modus operandi of nature. In this respect, we can conclude that the anthropocentric position is central in biomimetic technology. We can even argue that only the second form of *mimesis* as perfection of nature can claim to be biomimetic technology in the proper sense of the word.

4. In this respect, Baskin is right that, in the literature on the Anthropocene, the human constructedness of nature is explored, whereas the nature-constructedness of humans is neglected (Baskin 2015).

5. Parts of this section have been published already in Blok 2016.

6. In fact, Spinoza derived his concept of conativity from ancient philosophers like Lucretius and Cicero (Groome 1998, 29). Nonetheless, we call Spinoza one of the origins because he was the first philosopher to develop a full concept of conativity as a principle of nature.

7. The distinction between *living* nature and *dead* matter is already questioned as a typical *modern* distinction (Jonas 1966). According to Folz, the distinction between *phusis* (nature) and *zoe* (life) consists in the fact that *zoe* "designates a particular character of *phusis* within which self-emergence is intensified" (Folz 1995, 132). However, nature is often identified with life, or as Alfred N. Whitehead puts it: "Neither physical nature nor life can be understood unless we fuse them together as essential factors in the composition of 'really real' things whose interconnections and individual characters constitute the universe" (Whitehead cited in Folz 1995, 131). Contrary to Folz, we claim that the expansion of our concept of 'life' to include Earth's materiality provides a concrete principle of nature that can be used in biomimetic practices.

8. Whereas Peter Forbes, one of the proponents of biomimicry, argues that "what makes bio-inspiration possible is the miracle that nature's mechanisms do not

have to be 'alive' to work" (Forbes 2005, 5), we argue here that we have to extend the domain of the 'living' to the inanimate or materiality in our concept of biomimicry.

9. Although eco-mimicry or eco-mimesis would be a better name for what we have in mind here, we continue the vocabulary of biomimicry and speak of an *eco-centric* orientation of biomimicry in this article.

10. *Conatio* is a translation of the Greek *horme*, impulse or onset.

11. In this, we deviate from Spinoza's original intuitions, which were precisely monist by nature.

12. One can argue that, as long as matter is undifferentiated, it cannot respond to anything other because, prior to difference, there is nothing other for it to respond to. Although we can argue that the traditional concept of causality is inappropriate to conceptualize the *event* of responsive conativity, the question makes clear that future research should be dedicated to this event character of responsive conativity.

References

Aristotle. 1980. *The Physics*, trans. Philip Wicksteed and Francis Cornford. Cambridge/London: Loeb Classical Library/Harvard University Press.

Baskin, Jeremy. 2015. "Paradigm Dressed as Epoch: The Ideology of the Anthropocene." *Environmental Values* 24: 9–29. https://doi.org/10.3197/096327115X14183182353746

Bataille, Georges. 1991. *The Accursed Share*, vol. 1, trans. Robert Hurley. New York: Zone Books.

Beck, Ulrich. 1992. *Risk Society: Toward a New Modernity*. London: Sage.

Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.

Benyus, Janine. 2002. *Biomimicry: Innovation Inspired by Nature*. New York: Harper Perennial.

Blok, Vincent. 2015. "The Human Glance, the Experience of Environmental Distress and the 'Affordance' of Nature: Toward a Phenomenology of the Ecological Crisis." *Journal of Agricultural and Environmental Ethics* 28(5): 925–38. https://doi.org/10.1007/s10806-015-9565-8

Blok, Vincent. 2016. "Biomimicry and the Materiality of Ecological Technology and Innovation: Toward a *Natural* Model of Nature." *Environmental Philosophy* 13(2): 195–214. https://doi.org/10.5840/envirophil201692035

Blok, Vincent, and Bart Gremmen. 2016. "Ecological Innovation: Biomimicry as a New Way of Thinking and Acting Ecologically." *Journal of Agricultural and Environmental Ethics* 29: 203–17. https://doi.org/10.1007/s10806-015-9596-1

Clark, Nigel. 2011. *Inhuman Nature: Sociable Life on a Dynamic Planet*. Los Angeles: Sage.

Crutzen, Paul J. 2002. "Geology of Mankind: The Anthropocene." *Nature* 415: 23. https://doi.org/10.1038/415023a

Crutzen, Paul J., and Carl Schwägerl. 2011. "Living in the Anthropocene: Toward a New Global Ethos." *Yale Environment 360*. http://e360.yale.edu/feature/living_in_the_anthropocene_toward_a_new_global_ethos/2363/ (January 24). Accessed April 10, 2016.

Dicks, Henry. 2016. "The Philosophy of Biomimicry." *Philosophy and Technology* 29(3): 223–43. https://doi.org/10.1007/s13347-015-0210-2

Ellis, Erle C. 2011. "A World of Our Making." *New Scientist* 210: 26–27. https://doi.org/10.1016/S0262-4079(11)61376-6

Folz, Bruce. 1995. *Inhabiting the Earth: Heidegger, Environmental Ethics, and the Metaphysics of Nature*. New York: Humanity Books.

Forbes, Peter. 2005. *The Gecko's Foot: Bio-inspiration—Engineered from Nature*. London: Fourth Estate.

Groome, Thomas H. 1998. *Sharing Faith: A Comprehensive Approach to Religious Education and Pastoral Ministry: The Way of Shared Praxis*. Eugene, OR: Wipf and Stock.

Jonas, Hans. 1966. *The Phenomenon of Life*. New York: Harper and Row.

Kauffman, Stuart A. 1993. *The Origins of Order: Self-organization and Selection in Evolution*. Oxford: Oxford University Press.

Kolbert, Elizabeth. 2011. "Enter the Anthropocene—Age of Man." *National Geographic* (March): 77.

Lacoue-Labarthe, Philippe. 1998. *Typography*. Stanford, CA: Stanford University Press.

Latour, Bruno. 1993. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press .

Lovelock, James. 2006. *The Revenge of Gaia: Why the Earth Is Fighting Back—and How We Can Still Save Humanity*. New York: Penguin.

Mathews, Freia. 2011. "Towards a Deeper Philosophy of Biomimicry." *Organization & Environment* 24(4): 364–87. https://doi.org/10.1177/1086026611425689

Morton, Timothy. 2013. *Hyperobjects: Philosophy and Ecology after the End of the World*. Minneapolis: University of Minnesota Press.

Myers, William. 2012. *Biodesign: Nature, Science, Creativity*. London: Thames & Hudson.

Nietzsche, Friedrich. 1988. *Nachgelassene Fragmente 1884–1885*. Kritische Studienausgabe, Band 11. München: DTV/de Gruyter.

Plumwood, Val. 2002. *Environmental Culture: The Ecological Crisis of Reason*. New York: Routledge.

Sloterdijk, Peter. 2001. *Nicht Gerettet. Versuche nach Heidegger*. Frankfurt am Main: Suhrkamp.

Sloterdijk, Peter. 2009. *Du mußt dein Leben ändern. Über Anthropotechnik*. Frankfurt am Main: Suhrkamp.

Sloterdijk, Peter, and Hans-Jürgen Heinrichs. 2006. *Die Sonne und der Tod. Dialogische Untersuchungen*. Frankfurt am Main: Suhrkamp.

Spinoza, Baruch.1992. *Ethics: Treatise on the Emendation of the Intellect, and Selected Letters*, trans. S. Shirly. Indianapolis: Hackett.

Steffen, Will, Paul J. Crutzen, and John R. McNeill. 2007. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Ambio* 36(8): 614–21. https://doi.org/10.1579/0044-7447(2007)36[614:TAAHNO]2.0.CO;2

Todd, Nancy, and John Todd. 1994. *From Eco-Cities to Living Machines: Principles of Ecological Design*. Berkeley, CA: North Atlantic Books.

Vernadsky, Vladimir. 1998. *The Biosphere:* New York: Copernicus. https://doi.org/10.1007/978-1-4612-1750-3

Winner, Langdon. 2013. "A Future for Philosophy of Technology—Yes, But On Which Planet?" Keynote lecture at SPT biannual meeting, Lisbon, Portugal.

Zalasiewicz, Jan, Mark Williams, Will Steffen, and Paul Crutzen. 2010. "The New World of the Anthropocene." *Environmental Science & Technology* 44: 2228–31. https://doi.org/10.1021/es903118j

Zwier, Jochem, and Vincent Blok. 2017. "Saving Earth: Reflections on Technology in the Anthropocene." *Techné: Research in Philosophy and Technology* 21(2–3): 222–42.

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 150–174 DOI: 10.5840/techne201752464

The Parliament of Things and the Anthropocene: How to Listen to 'Quasi-Objects'

Massimiliano Simons

Abstract: Among the contemporary philosophers using the concept of the Anthropocene, Bruno Latour and Isabelle Stengers are prominent examples. The way they use this concept, however, diverts from the most common understanding of the Anthropocene. In fact, their use of this notion is a continuation of their earlier work around the concept of a 'parliament of things.' Although mainly seen as a sociology or philosophy of science, their work can be read as philosophy of technology as well. Similar to Latour's claim that science is Janus-headed, technology has two faces. Faced with the Anthropocene, we need to shift from technologies of control to technologies of negotiations, i.e., a parliament of things. What, however, does a 'parliament of things' mean? This paper wants to clarify what is conceptually at stake by framing Latour's work within the philosophy of Michel Serres and Isabelle Stengers. Their philosophy implies a 'postlinguistic turn,' where one can 'let things speak in their own name,' without claiming knowledge of the thing in itself. The distinction between object and subject is abolished to go back to the world of 'quasi-objects' (Serres). Based on the philosophy of science of Latour and Stengers the possibility for a politics of quasi-objects or a 'cosmopolitics' (Stengers) is opened. It is in this framework that their use of the notion of the Anthropocene must be understood and a different view of technology can be conceptualized.

Key words: Anthropocene, parliament of things, Bruno Latour, Michel Serres, Isabelle Stengers

> So many other entities are now knocking on the door of our collectives. Is it absurd to want to retool our disciplines to become sensitive again to the noise they make and to try to find a place for them? (Latour 2005b, 262)

Massimiliano Simons, Centre for Metaphysics, Philosophy of Religion and Philosophy of Culture, Institute of Philosophy (HIW), KU Leuven, Kardinaal Mercierplein 2 - bus 3200, BE-3000 Leuven (Belgium); massimiliano.simons@kuleuven.be.

1. Introduction

In the last decade, it has become popular to speak of the dawn of a new epoch, the Anthropocene. Introduced in geology in the early 2000s, this new era refers to the moment when human activity started to have a significant or even a dominant influence on the planet (Crutzen 2002). There is still a discussion going on concerning the official recognition of this new label and the precise moment when the Anthropocene has started, ranging from the birth of agriculture, the Industrial Revolution to the first atomic bombs (e.g., Zalasiewicz et al. 2015). More recently philosophers have started to mobilize this concept in their reflections on nature and technology as well (e.g., Morton 2014; Stiegler 2015).[1] Two clear examples of philosophers who have taken up this notion of the Anthropocene are Bruno Latour (2013; 2014; 2015) and Isabelle Stengers (2011a; 2015). Especially in Latour's work, however, this notion appears as an extension of an approach he has been working on for decades.

Around twenty-five years ago, Latour was already calling for a new form of democracy, namely "a democracy extended to things themselves" (Latour 1993, 142). In an age of climate change, nuclear disasters, GMO's, aids and economic crises, we cannot limit politics to subjects alone. These problems are neither pure politics, because they involve natural phenomena, nor pure nature, for they only exist due to the mediations of humans. We are thus in need of an "object-oriented democracy" or a *Dingpolitik* (Latour 2005a, 14), which implies a rethinking of the role of science and technology and linking them with their political aspects. For Latour, this requires the creation of a "parliament of things": a place where both humans and nonhumans can be represented adequately (Latour 1993, 144). Latour's and Stengers's use of the notion of the Anthropocene must be seen in the extension of this project, resulting in a very specific understanding of what it in fact implies. As we will see, for them the Anthropocene is not about the dawn of a new world, but rather of a new attitude towards the world, in the line of such a parliament of things.

However, it is hard to grasp what Latour has in mind when introducing this 'parliament of things.' At first sight, it seems to be a problematic notion: incorporating things contradicts the history of philosophy. While philosophers used to see direct knowledge of the objective world as unproblematic, authors since Kant have problematized this idea: our knowledge of the world is always mediated, by the categories of our understanding according to Kant, or by language, anonymous structures or ideology according to more recent authors. How, then, can one make

room for things? How can we ever know what things really are or want, when we are buried under representations, social constructions, ideologies or power relations? In opposition to the 'prelinguistic stance' of earlier thinkers, where knowledge of the thing in itself seemed possible, we are children of the linguistic turn: nothing is known without mediation through language.

One way to cope with things is to deny the truth of this linguistic turn. One could return to a prelinguistic position and claim that, at least for the sciences, a direct contact with the world is possible. This is not the option Bruno Latour chooses. The Anthropocene as an epoch demands a different response, for it both shows that the traditional conceptions of science and technology cannot be maintained, and that purely linguistic approaches are unable to conceptualize climate change, since they cannot conceptualize the non-linguistic intrusion of nature in our politics. The science of climatology offers us a picture completely different from that of a science of certainty by direct contact with the facts themselves or a complete technological control. Rather, "the very notion of objectivity has been totally subverted by the presence of humans in the phenomena to be described—and in the politics of tackling them" (Latour 2014, 2).

Although Latour is most of all known for his work on the sciences, I argue that his perspective also offers us a new view of the role of technology in the Anthropocene. In his work, for instance, we can find a criticism of geoengineering, i.e., the idea that the negative consequences of climate change and the Anthropocene can be managed by introducing more controlling technologies. For Latour such claims boil down to, in reaction to the impasse of modernity, we must "become even more resolutely modern" (Latour 2015, 21). However, his own work consists of a fundamental dismantling of this modern condition. In his analysis of modernity and the Anthropocene, there is therefore a clear vision on technology present. The parliament of things is Latour's alternative to the modern constitution. If it is not an alternative technology itself, then it is at least a new setting to shape the technologies for the Anthropocene.

It is no accident that in his work Latour often refers to Michel Serres's *Le contrat naturel* (Latour 2004b; 2014; 2015). In this book Serres was already trying to cope with the new problem of climate change: how can we deal with an active nature that refuses to play to role of inert matter, in which "the earth is moved" by our actions (Serres 1995, 86)? Latour can be seen as a student of Serres, in the sense that both aim to develop a *postlinguistic stance*: interactions with things are still real and meaningful even if everything is mediated through language. Latour's views on science and technology must thus be seen as a part of a French tradition

of thinkers, including Serres and Stengers, that try to go beyond language without neglecting the lessons of the linguistic turn. Their philosophy is a postlinguistic philosophy aimed to let things speak again. Although initially developed for different purposes, they see the Anthropocene and the "intrusion of Gaia" (Stengers 2015, 44; Latour 2015) as the ultimate proof that this postlinguistic correction of our views on nature, science, and technology is necessary.

This article will aim to excavate Latour's different conception of technology by sketching his postlinguistic philosophy, initially developed around the concept of the 'parliament of things' to understand his unique approach to the Anthropocene (Latour 2014; 2015). First, I will elaborate on Michel Serres's philosophy of the quasi-object, which can be considered as the groundwork for this postlinguistic project, since both Latour and Stengers are deeply influenced by his work. Next I consider how their background in the sciences made them look for this new postlinguistic perspective and the different view on technology it implies. Finally, I will reexamine the concept of the parliament of things and the Anthropocene.

2. Serres's Philosophy of Relations

The philosophy of Michel Serres can be described as "a general theory of relations" or "a philosophy of prepositions" (Latour and Serres 1995, 127; Serres 2003). He opposes traditional philosophies that start from the subject or the object. According to Serres, these philosophies neglect the third aspect of every relation: "By that I mean the intermediary, the milieu. . . . What is between, what exists between. The middle term" (Serres 2007, 65). His own main focus is the analysis of relations between things and how these relations come into being. For Serres relations are the foundation of both the subject and the object (Serres 1987, 209).

In his early Hermès series, Serres is mainly concerned with an analysis of communication, but this can be generalized to an analysis of relations. His early work must be situated in the tradition of structuralism, but of a specific kind. It is often forgotten that French structuralism has two varieties: one is the famous linguistic structuralism, inspired by de Saussure, but the other one is a mathematical structuralism, inspired for instance by the Bourbaki group. Serres's work is mainly inspired by the second variety (Serres 2003, 230).[2]

What is the relevant difference between these two strands? Linguistic structuralism is linked to the idea of language, and thus with a speaking subject and with culture. Mathematical structuralism, on the other hand, is broader. As Serres often points out, these structures can be both present in natural phenomena, such as DNA, but also cultural phenomena, such as music. Information is not just

emitted by humans, but also by nonhumans (Serres 1972, 101). In this context the concepts of *noise* and *communication* are central in Serres's philosophy: we should understand the world as one big network of communicative relations, communication which is not limited to humans but can also be applied to nonhumans. Or as he states:

> There is a constant and continuous dialogue between things which form the historical fabric of events and laws, among whom my intervention is exceptional. . . . The general informational language is the fundamental and continuous relation between objects. Even before their deciphering, the certainty that it exists induces the certainty that the external world exists, in the mode of a communicating network, of which all the networks I know and could constitute are singular, exceptional cases, approximating to imitate the real world. (Serres 1972, 110)[3]

For an analysis of communication, this implies that, instead of analysing it by putting the struggle between messenger and receiver at the centre, one has to focus on the relation between them. This relation is not taken for granted, but has to be permanently constructed and maintained. This is done by the mutual war that messenger and receiver wage against a common enemy: the background noise that must be silenced in order to communicate at all. Or as Serres puts it: "To hold a dialogue is to suppose a third man and to seek to exclude him; a successful communication is the exclusion of the third man" (Serres 1969, 41). To create a relation you always have to invoke or exclude a third instance, the medium, that guarantees this. Think for example about the necessary silence of other people, but also the world outside, to make someone able to read a text.

This excluded third (*le tiers exclu*) is a central figure in the philosophy of Serres. It is not only present in linguistic communication, but in every possible relation. As we shall see, it will also be applicable to technological relations. To understand how relations are being destroyed or distorted on the one hand or amplified and created on the other, you need to focus on this third figure. In later work Serres will respectively use the figures of the 'parasite' and the 'quasi-object.'

2.1. The Logic of the Parasite

For Serres, the parasite is by definition always present because noise is always present. If the starting point is the world as one big relational network, then communication is not the establishment of relations, but the exclusions of the irrelevant ones. Not order but disorder is the starting point: "The rational is a rare island

which emerges, from time to time" (Serres 1977, 11). Order and communication, on the other hand, always have to be produced and made from this disorder. This is done, according to Serres, through the act of 'translation': noise and interference are silenced, and incomprehensible clatter is translated into a common language that both messenger and receiver can understand.

This however leads to distortion in two ways. First of all, every creation of order implies a reduction, distortion and translation of this original communicative network. Yet the complexity of the network always exceeds the rational model, which can be applied to it (Serres 1982, 174). In this sense, this implies a form of violence against a reality that is more complex than the models we use to talk about it. Secondly, a perfect exclusion is never possible, because not all parasites can be excluded. Practically, this is impossible because there are simply too many parasites and it is difficult to know which relations are essential and which are redundant. Logically, one ends up in a regression as well, because the act of exclusion is itself the creation of a new relation (and thus an invitation of new parasites).

Parasites are the noise that should be excluded if one wishes to communicate at all, but they can never be excluded completely. They can only be reduced to an acceptable level. In such a case, there will still be parasites but it will be claimed that they do not distort the message *in a relevant way*. This is however a mere claim, and they might still change the message in a relevant way without us being aware of it. By definition, a parasite will try to stay unnoticed by presenting itself as only transmitting the message without any distortion. Every communication, every technology, and even every relation in general is thus open to this ambiguity.

Although Serres mainly starts from examples about communication, this perspective can easily be applied to technology. For instance, this is the case when Latour uses Serres's ideas to make the distinction between intermediaries and mediators (Latour 2005b, 37–42).[4] While we often think of technical instruments as unproblematic intermediaries, which transport a force without any distortion in a perfectly transparent way, we forget that the smoothness of this translation has to be produced. This is exactly the difficulty of technical interventions concerning climate change. The ideal is changing one thing for the better and keeping the rest stable. However, often unforeseen consequences will pop up. The smoothness of a certain technology is never a given fact, but the product of the mediator's optimisation.

Every intermediary is an imperfectly disciplined mediator. Again, practically, one can assume that there will always be imperfections, noise. Logically, one can point to the paradoxical nature of every relation: "If the relation succeeds, if it is

perfect, optimum, and immediate; it disappears as a relation. If it is there, if it exists, that means that it failed. It is only mediation. Relation is nonrelation. And that is what the parasite is. . . . The best relation would be no relation. By definition it does not exist; if it exists, it is not observable" (Serres 2007, 79).

Although this might sound very abstract, it can be illustrated by Latour's study on Pasteur in which he often refers to Serres (Latour 1984). The book's starting point is the relationship between people and their daily routines. These relations, however, can be disturbed by the noise of diseases, which parasitizes on human interactions, but often destroy them as well. Subsequently, physicians such as Louis Pasteur will present themselves as a way to 'smooth communication,' namely by eliminating the germs through vaccination and pasteurization so that people can get back to their daily affairs. Although presented as such, this will not result in interactions free from any interference, but only in the exchange of one parasite (the germs) for another (the doctors). The doctors will introduce new distortions in human interactions, such as rules of hygiene or visits to the hospital. These are also alterations of the daily affairs, although not recognized as harmful.

The creation of order is thus never neutral, but always presupposes certain parasitic power relationships and norms that produce them (Serres 1977, 12). In this sense, the replacement of one parasite for another does not necessarily imply better communication or a more stable technology, but can serve the surviving parasite itself. If it can convince the messenger and the receiver that it is the optimal medium, it will survive. Inspired by this, Serres has a great distrust of order, representation, language, and consciousness, for they all are potentially driven by such parasitic power relations. They mutilate the original noise of the world for their own survival, not for the greater good. Science is often reduced to a mere tool for hiding parasites beneath promises of smoother communication. "Power wants order, knowledge offers it" (Serres 1977, 12). Serres himself wants to get back to the things themselves: to give room to their multiplicity and their noise. The task of the philosopher is to protect this multiplicity, this inherent potential of all things (Serres 2007, 46). This means that a philosopher should be the voice of this forgotten disorder beneath all constructed order.

Serres has the ambition to go beyond language and culture to the things themselves, because language is merely an imposed order on the multiplicity of things. "Can we step outside our language?" (Serres 2008, 89). Serres wants to restore the speech of things. However, it is not the case that things are silent, despite having the potential to speak. Things do always already speak, they always emit noise and thus potential information. This is the starting point of Serres's philosophy.

Here the excluded third is seen as a positive figure, i.e., noise that always breaks through our cages of language: "the third person provides a foundation for the whole of the external real, for objectivity in its totality, unique and universal, outside any first- or second-person subject" (Serres 1997, 48). However, this noise of the world is not recognized. This is the real issue for Serres: somehow everything always speaks, but we ignore this fact. As we will see, this is also the case in the Anthropocene: we silenced nature and forced it to play a passive role without ever realising the violence our relations inflicted on the world. Serres attempts to go back to this moment of noise, before things are being silenced, by introducing the concept of the 'quasi-object.'

2.2. The Omnipresence of the Quasi-Object

For Serres, a quasi-object is something that predates the subject-object distinction. It is neither an active subject nor a passive object, but instead the ground for both of them. It creates a network around itself that makes agency and structure possible. The most famous example he gives is that of the ball within a game. The ball is not a passive object, but the whole game moves around it, and even creates the collective:

> Let us consider the one who holds [the ball]. If he makes it move around him, he is awkward, a bad player. The ball isn't there for the body; the exact contrary is true: the body is the object of the ball; the subject moves around this sun. Skill with the ball is recognized in the player who follows the ball and serves it instead of making it follow him and using it. . . . Playing is nothing else but making oneself the attribute of the ball as a substance. The laws are written for it, defined relative to it, and we bend to these laws. Skill with the ball supposes a Ptolemaic revolution of which few theoreticians are capable, since they are accustomed to being subjects in a Copernican world where objects are slaves. (Serres 2007, 226)

This quasi-object must not necessarily be an 'object,' such as a ball or a piece of money (Serres 1982, 148–49), but can also be a quasi-subject: a leader, a king, a celebrity (Serres 1987, 181–82). However, and this is crucial, the quasi-object is nothing without its relations to the things around it, its conditions of possibility. Its existence depends on the things around itself, it is itself nothing more than a node of these relations. In this sense, it is an object of which the relations to other things and persons cannot be forgotten; or a subject of which the necessity of the things around it to make him or her speak, move, or think is recognized. "A ball is not an ordinary object, for it is what it is only if a subject holds it. Over there, on the

ground, it is nothing; it is stupid" (Serres 2007, 225). The ball is nothing without the players. The king is naked without its clothes.

These quasi-objects are the ground for the collective of subjects and objects, for our relationships. In fact, reality consists mainly of quasi-objects, rather than orderly subjects and objects, which are the exception.[5] Serres's ambition is to give them a rightful place in the political scene. As we will see, the Anthropocene holds the promise to give them proper political representation. But, to get to the politics of quasi-objects, to a parliament of things, we first need to understand (a) what kind of technological relations are possible with quasi-objects and (b) why our modern approach ignored quasi-objects in the first place. For this, Latour's and Stengers's philosophy of science is crucial.

3. Technology as Negotiation

Latour's early work considers the sociology and anthropology of science: he studies the production of scientific facts within a laboratory (Latour and Woolgar 1986; Latour 1987b). This will form the basis for his analysis of modernity and the Anthropocene.

In his early work, Latour finds a general distinction between *ready-made science* and *science in the making*. Science will present itself to the outside world as if it was a pure rational representation of an independent nature. During the construction of facts, however, science is a messy and hybrid activity, which involves numerous humans and non-humans working together (Latour and Woolgar 1986, 64). Echoing Serres, in later work he will describe this duality as the *translation* and the *purification* of quasi-objects (Latour 1993, 11).[6] According to Latour, the reason why modern science is so successful is not an a priori scientific method, but depends on its abilities (a) to recruit and connect a high number of relevant allies, both humans and non-humans, who will affirm the theory and (b) to make this whole construction and recruitment process invisible as if one was merely describing a passive nature (Latour 1987b, 106; 1993, 108).

Although again mainly concerned with science, the role of technology is crucial here because for Latour science often, if not always, boils down to technoscience.[7] However, in this modern view of science, technology is approached in a very specific way. For instance, in (b) the role of technical instruments is reduced to a mere purification of facts that were already present beforehand, waiting to be discovered, while in practice we are faced with numerous quasi-objects. On the other hand, (a) echoes Serres's idea that all relations imply parasites and that mediators have to be translated into intermediaries. The art of science seems to lie

in its practices to successfully translate phenomena into scientific facts, without creating any relevant distortions. It will be able to claim that the scientist has not been a parasite, but only 'smoothed the communication' between object and subject, although, in practice, the scientist has distorted the phenomena in some way. For this, technology is crucial, but a specific technology whose role is not recognized from the moment the translation is finished.

3.1. From a Quasi-Object to a Witness

To understand the precise role of technology in this model, the work of Stengers can be very helpful. For her, every scientific claim starts as a *fiction*, i.e., a claim about reality that does not distinguish itself from other claims about that same reality. This is what the linguistic turn implies: every claim is always open to the accusation of being merely a representation. "*Normally*, any phenomenon that we observe can 'be saved' in multiple ways, each way referring to a human author, his projects, his convictions, and his whims" (Stengers 1997, 156). However, the construction of scientific facts implies the abnormal case, which is the creation of a *difference*, a *non-equivalence*. The scientist has to construct a case in which she can claim that she is not speaking in her own name, but in the name of things, in the name of nature. This is being done by introducing technological interventions in the phenomena one is studying. However, the scientist also has to make her own mediation between nature and our understanding as invisible as possible, and thus, as Serres remarked, make the relation itself (and thus all technological interventions) disappear. "What does matter is that [her] colleagues be constrained to recognize that they cannot turn this title of author into an argument against [her], that they cannot localize the flaw that would allow them to affirm that the one who claims 'to have made nature speak' has in fact spoken in its place" (Stengers 1997, 160).

How does the scientist do this? By constructing the most reliable *witness* possible in the laboratory, a phenomenon that can testify for her theory:

> The singularity of scientific arguments is that they involve *third parties*. Whether they be human or nonhuman is not essential: What is essential is that it is *with respect to them* that scientists have discussions and that, if they can only intervene in the discussion as represented by a scientist, the arguments of the scientists themselves only have influence if they act as representatives for the third party. With the notion of third party, it is obviously the 'phenomenon studied' that makes an appearance, but in the guise of a *problem*. For scientists, it is actually a matter of constituting phenom-

> ena as *actors* in the discussion, that is, not only of letting them speak, but of letting them speak in a way that all other scientists recognize as reliable. (Stengers 1997, 85)

The scientist, thus, has "to produce a testimony that cannot be disqualified by being attributed to his or her own 'subjectivity,' to his biased reading, a testimony that others must accept, a testimony for which he or she will be recognized as a faithful representative and that will not betray him or her to the first colleague who comes along" (Stengers 1997, 88). She has to present herself as the perfect parasite that merely transports reality to our discussions. The scientist transcends the mere linguistic stance by constructing a third party, using technological interventions, who will be recognized as a reliable witness. It vouches for her, that she does not distort reality, but translates its information without transformation. She "has to succeed in making one admit that the reality [s]he has fabricated is capable of supporting a faithful witness, that is to say, that [her] fabrication can claim the title of a simple purification, an elimination of parasites, a practical staging of the categories with which it is legitimate to interrogate the object. The artifact must be recognized as being irreducible to an artifact" (Stengers 2000, 167).

The role of these technical instruments and laboratories is that they constitute this difference, they 'discipline' the quasi-object, the phenomena, to be the best possible witness, which only affirms the theory of the scientist and thus appears as a mere passive but affirming object. The third is excluded, noise becomes information; it will only say one thing and nothing else. This is according to Stengers, the core of the modern experimental practice: "*the invention of the power to confer on things the power of conferring on the experimenter the power to speak in their name*" (Stengers 1997, 165). The core of the scientific practice lies not in a specific form of rationality or sceptical way of thinking, but rather in its technical potential to translate ambiguous noise into reliable witnesses.

3.2. How to Negotiate with Things

However, and this is crucial here, this does not imply that scientists merely impose their will on the phenomena. This is not a submission of objects (Stengers 2013, 189–90). This leads us back to the claim of Serres. He claimed that all representations are problematic, but this might be a step too far. Serres is ambiguous whether all order is violence that should be avoided or that some specific forms of order, namely those in function of specific power relations, are the real problem. Latour and Stengers, for instance, are more open to the more moderate claim that some

constructions are indeed acceptable while others are not, because the submission of things is not the whole story.

The impression of submission is only created after the whole construction process is over. The technology being used by science might give the impression that it enslaved the phenomena, but this is only half of the picture. During the construction of these facts, technology plays a different role, namely that of the order of *negotiation*: one has to listen to the quasi-objects and their relations and try to persuade them to follow your theory, while at the same time you are being persuaded by them. To get to the reliable witnesses, the scientist has to go through a process of carefully and accurately putting her research object into question, and at the same time *being put into question by it*. For Stengers, good science is able to put itself *at risk*, i.e., to give the object in question the power to put the subjectivity of the scientist and her categories into question (Stengers 1997, 126; 2000, 134). Bad science, on the other hand, is defined by Stengers as the mutilation or forgetting of the object by a science. So bad science starts with passive objects, rather than ends with them.[8] But during genuine negotiations the phenomenon can dismiss the scientist's questions as irrelevant. Things can respond and show themselves to disagree with the questions asked, they too can take the lead, similar to the quasi-objects of Serres. If this is recognized, good scientific facts can be constructed.

Stengers herself illustrates this by a discussion between Diderot and D'Alembert: while D'Alembert is a follower of a very rigid form of mechanic materialism inspired by Newton, Diderot presents him with the case of an egg, a complex chemical-biological entity. In this case the materialism of Diderot is described by Stengers as a *demanding* materialism and not a reductionist one: "What Diderot asks D'Alembert is that he *give* to the egg the *power to challenge* his well-defined categories" (Stengers 2011b, 373). A good scientist will let the egg be a *risk* which can challenge her own ideas of materialism.

Another good example is given by Vinciane Despret (2015), a student of Stengers. At a certain moment behaviourists tried to use the Skinner Box on a different organism than the eternal pigeon, namely the raven. The raven, however, refused to pull the levers and instead destroyed the box. The disappointed behaviourists returned to studying pigeons, but, with this decision, started to do bad science. Instead, they could have seen the reply of the raven as a lesson that the technology and categories they used to study organisms are inadequate and should be changed. Good science would in this case be open to the answer of the raven.

From this perspective, another use of technology comes forward, namely one based on negation. Good science can only occur if the proper technologies are in place. The role of technology here is not to enforce itself on the phenomena and reduce them to passive objects. Rather, technologies are being mobilized to allow the phenomena to articulate themselves as quasi-objects, by being sensitive to its feedback.

The two faces of science thus imply two roles of technology: on the one hand technologies are introduced to create the possibilities to listen to things, to create a feedback loop between the scientist and the quasi-object, both posing their own questions. The power of the sciences, to go beyond the linguistic turn, consists of their ability to incorporate *both humans and non-humans* into their networks. On the other hand there is the purification of the quasi-object once the negotiation is over: it is silenced by being disciplined into a witness with predictable behaviour. Science will present itself as if its rational subjects spoke in the name of a silent nature and technology, as if it had the power to impose one's will onto this nature. This is what Latour calls our modern condition: quasi-objects are forgotten and reduced to active subjects and passive objects (Latour 1993, 139).

4. What Is a Parliament of Things?

If this purification and translation is the essence of science, and it seems to work, then what is wrong with disciplining quasi-objects into objects? Why do these quasi-objects need to be heard as quasi-objects? As stated above, the problem is not that quasi-objects are being disciplined into objects per se, but rather that this is being done in a problematic way. This is often the ground of a deep misunderstanding of the work of Latour. Yves Gingras, for example, criticizes Latour's perspective because "it is impossible to write or even think without making distinctions" (Gingras 1995, 125). In a similar vein Latour has been criticized for first claiming that all subjects and objects are constructions but then "glibly employ[ing] all such [objects and subjects] without going into ontological *Angst*" (Zammito 2004, 201).

Latour's aim is not to bring us back into an endless limbo of letting quasi-objects speak in their multiplicity, in contrast with Serres's view. In his concept of the 'parliament of things' the stress is too often placed on *things* while ignoring the *parliament*. The goal is not to end up in a world with no objects or subjects, but rather in one where there are only well-constructed objects and subjects, i.e., objects and subjects that are the result of adequate negotiations between all relevant

actors involved in the network. For this we need to revaluate our institutions, and therefore we need to construct and adequate *parliament* of things.

It is therefore not a plea for less technology or less reduction, but rather for more technology and more reduction, yet thoughtful use of technology and deliberative reduction. Or as Latour states: "The moderns were not mistaken in seeking objective nonhumans and free societies. They were mistaken only in their certainty that that double production required an absolute distinction between the two terms and the continual repression of the work of mediation" (Latour 1993, 140).[9] Or, since quasi-objects cooperate in networks that support our current collective, the problem is that the *current* composition of our collective is inadequate. According to authors such as Serres and Latour, the main issue is that this purification of quasi-objects is (a) not always successful and (b) has become more problematic in the age of the Anthropocene.

(a) First, it is not always successful because quasi-objects can be adequately transformed into objects within the laboratory settings, but these settings have their limits. Furthermore, as Stengers demonstrates, not all sciences succeed in creating such a legitimate witnesses out of quasi-objects, even if they claim to do so (Stengers 1997, 88). Some sciences, such as biology or political science, would do better 'to follow' their study objects, and recognize them as quasi-objects (Stengers 2000, 144–45). The experimental sciences should be seen as an exceptional event, rather than the rule. By taking the purified object of laboratory physics as the paradigm, one is unable to understand what is going in within more complex fields such as biology or economics. By being aware that we are initially always dealing with quasi-objects, we can recognize, as for instance ethology argues, the blind spots that follow from manipulating birds only in a very one-sidedly purified skinner box (see Despret 2015). This can finally allow us to work to an adequate purification of these objects, that take all relations of the quasi-object into account, or even recognize that we are unable to purify certain quasi-objects we are faced with.

(b) Secondly, it has also become more problematic to ignore quasi-objects due to global problems such as the ecological crisis (Serres 1995; Latour 2004b). As Latour states, the class of quasi-objects "ends up being too numerous to feel that it is faithfully represented either by the order of objects or by the order of subjects" (Latour 1993, 49). Latour describes this event paradoxically as the 'end of nature.' According to him, we always have had an idea of nature, but saw it as something merely passively out there without any agency—a pure collection of means to our ends. Now, however, such an idea has become untenable: "the

repressed has returned" (Latour 1993, 77). Nature does seem to respond, react, and reply in many unpredictable but devastating ways to our behaviour. Our collective is inadequate, in the sense that the current proposed purifications of quasi-objects are unable to assign a place to all relations and actions of the objects. The unaccounted actions of the objects therefore build up, until finally they are too immense to ignore and in fact threaten the stability of the rest of the collective. The objects show themselves as quasi-objects again. We enter a 'crisis of objectivity': "Political ecology thus does not reveal itself owing to a crisis of ecological objects, but through a generalized constitutional crisis that bears upon *all objects*" (Latour 2004b, 20).

Latour repeats and radicalises this message in his recent work on the Anthropocene, for instance in his book *Face à Gaïa*. For Latour the term Anthropocene shows what a notion such as 'ecological crisis' did not, namely that it is not a temporary state that will pass by. "[T]hat which would possibly be nothing but a passing crisis is being transformed in a profound alteration of our relation to the world" (Latour 2015, 17). While in earlier work Latour was mainly describing how we have never been modern, he uses the notion of the Anthropocene to define us in an affirmative way. In fact, the Anthropocene means that the insight that we have never been modern and that we are actually dealing with quasi-objects, have become a collective experience: "everything is happening as if we have indeed stopped being modern and this time, on a collective level" (Latour 2015, 99).

The new condition in the Anthropocene implies several things for Latour. As stated at the beginning of this article, the traditional view is that the Anthropocene implies that humanity has become the most significant factor of influence on the planet. Latour's view deviates from this perspective in several ways. For him the Anthropocene does not imply some kind of radical break, a fundamental revolution in earth's history. For Latour, we do not live in another world, but the Anthropcene implies first and foremost the obligation to relate to the old world in a fundamentally different way. In this new view, the traditional players disappear (nature, humanity, science, technology) or rather we realize that they have never existed in the first place.

As Latour already described above, nature has ceased to play the passive role that our modern science and technology forced upon it. Latour and Stengers rather speak of Gaia, a term introduced by James Lovelock in 1969. But Lovelock, according to Latour, is often misunderstood. Gaia does not mean that the earth has become a living organism or that it is a fixed and closed system, but rather that it must be seen as "the name proposed for all the interwoven and unpredict-

able consequences of the acting powers, each of which pursues its own interest in manipulating its own environment" (Latour 2015, 187). Gaia has no fixed identity nor can serve as a transcendent judge of our conflicts, showing the objectivity behind our subjective claims. Rather she is the third in the sense of which Serres speaks, namely of a parasite or quasi-object constantly intervening and changing our relations. "Gaia is a third party in all our conflicts—especially since the Anthropocene—but she never plays the role of third party *superior* to situations and able to *command* them" (Latour 2015, 307). In the Anthropocene we are faced with Gaia, which is a whole range of actors that are not unified in a system or organism, but that react in a complex and capricious way to whatever we do. This is not a temporary state, but rather it must be seen as our permanent condition. Or as Stengers states: "no future can be foreseen in which [Gaia] will give back to us the liberty of ignoring her" (Stengers 2015, 47).

The Anthropocene not only implies the end of nature, but also that of humans. The idea that humanity has become the most influential factor in the Anthropocene is thus easily misunderstood, according to Latour. First of all, it is misunderstood on an empirical level because it is misleading to speak about humanity, as if we are now faced with a unified collective. In fact, no such unification exists and not all of humanity is equally responsible for the Anthropocene: native tribes in the Amazonian rainforests are not influencing the planet in the same way as western industries are. "The Anthropos of the Anthropocene? That is Babel *after* the fall of the giant tower" (Latour 2015, 189).

Secondly, the Anthropocene is also misunderstood on a more conceptual level since the opposition does not consist of active humans versus passive nature anymore. The traditional picture of the human is that of the subject, i.e., someone who possesses all the agency and the unbounded capacity to do with the planet what (s)he wants. But being a subject in this age "is not acting autonomously in relation to an objective framework but sharing the power to act with other subjects who also lose their autonomy" (Latour 2015, 84). To influence means not that one has all the power over something, but rather that all those being influenced have part of the agency, namely to react and to respond. The Anthropocene forces us to become full-blown quasi-subjects again, and thus depend on the sensitive networks of Gaia.

Finally, the players of science and technology change also. Science cannot be an ultimate referee anymore, but must recognize its dependence on its own networks. We enter an era, the Anthropocene, where science is never certain, but where uncertainty has become one of its main characteristics.[10] Technology, in a

similar vein, cannot see itself as a tool in the hand of the active subject, but must play a quite different role in the negotiation with the quasi-objects, with Gaia, as we will see in the next section.

As already indicated in the introduction, Latour is inspired by the book *Le contrat naturel* by Serres, in which he claimed that our modern social contract is insufficient, because it always excluded things although we necessarily relate to them. Within the Anthropocene, this has become problematic. We are faced with the "*generalized revolts of the means*: no entity—whale, river, climate, earthworm, tree, calf, cow, pig, brood—agrees any longer to be treated 'simply as a means' but insists on being treated 'always also as an end'" (Latour 2004b, 155–56). The Anthropocene is nothing more than a general intrusion of quasi-objects in our current political collective: it demands us to reopen the negotiations with the quasi-objects we relate to, for otherwise the world will change and opt for a new political collective without humans.

We are in need of a peace treaty, or what Serres calls, a natural contract: "a contract of symbiosis, for a symbiont recognizes the host's rights, whereas a parasite—which is what we are now—condemns to death the one he pillages and inhabits, not realizing that in the long run he's condemning himself to death too" (Serres 1995, 38). This means a contract in which quasi-objects are recognized. But how can we achieve this?

4.1. The Counterclaims of Quasi-Objects

As stated above, the often proposed prelinguistic position seems implausible: it would imply that we somehow know what nature wants. This is exactly not the case, and even the problem, of the Anthropocene. Also, a linguistic position seems to be rather puzzled with the situation, and unable to give a good analysis, since it is never able to get out of the discourse of a 'social construction of nature.' Here we have to take a postlinguistic stance: we should open up a space so things can give feedback to our current collective in order to reopen negotiations and propose reforms for a better political collective. This is possible because the world is always connected with us, since non-humans always emit noise, and thus possible information. Or as Serres states: "In fact, the Earth speaks to us in terms of forces, bonds, and interactions, and that's enough to make a contract" (Serres 1995, 39).

To become more sensitive to the noise of the world we need different technologies. Otherwise the quasi-objects would keep revolting against our current collective, which is exclusively focused on humans. This is what Latour means when he speaks about a 'parliament of things' (Latour 1993, 142; 2004b) and Serres

when he calls for a natural contract: to let things re-enter politics by allowing them room to articulate their habits, behaviours, and claims. How is this possible? Well, to get a grasp on how they would be able to articulate their claims, in fact we can learn a lot from the sciences, not *ready-made science*, but *science in the making*. We need to return to the position of the scientist-at-risk, i.e., someone who is aware she is dealing with a quasiobject that can speak, and put her own categories into question. The Anthropocene requires a specific type of technology, namely not the *technologies of control* that geoengineers have in mind, but rather *technologies of negotiation*: technologies which enable us to become more sensitive to the reactions and relations of the quasi-objects. Technology in the Anthropocene is not only about trying to control environmental factors such as rising temperatures, but first and foremost has the goal to detect the way these quasi-objects respond to our actions. We make constant claims about how Gaia will respond to our policies, for instance, by claiming the CO_2 level will decrease by a certain policy. Technologies of negotiation are there to give quasi-objects such as CO_2 room to respond. Following our policy CO_2 will either accept our claim (by decreasing) or will make a *counterclaim* (by doing something else, such as increasing). Of course, the politician or the scientist can make a new claim to cope with this resistance, but the ideal (both in political democracy and in scientific practice) is that *a feedback mechanism* is respected: those who are represented should always be able to make a counterclaim and be heard.

In this manner we must understand the aim of the parliament of things, for which Latour's *Politiques de la nature* (2004b) already attempted to write a first constitution, or what Stengers called *cosmopolitics* (2005; 2010; 2011a): do not define beforehand what things are, but offer them the opportunity to put your own questions and perspectives into doubt. We can define what the objects are only after these proper negotiations, although some may never be well-defined, such as GMO's or climate change. There is no guarantee that it will work, but neither that it will fail. The political aim is mainly not to go too fast: every relevant association has to be taken into account, even if that means that the decision will be as difficult as possible: "We may agree with your arguments, but we have to make sure that you are fully exposed to their consequences." (Stengers 2005, 997) Or as Latour states:

> The deliberations of the collective must no longer be suspended or short-circuited by some definitive knowledge, since nature no longer gives any right that would be contrary to the exercise of public life. The collective

> does not claim to know, but it has to experiment in such a way that it can learn in the course of the trial. Its entire normative capacity depends henceforth on the difference that it is going to be able to register between t_0 and $t + 1$ while entrusting its fate to the small transcendence of external realities. (Latour 2004b, 196)

This is precisely the role of technologies in the Anthropocene, namely by making us as sensitive as possible to the differences and changes that occur when we introduce a certain intervention. In this sense, the parliament of things itself can be understood as a technology of the Anthropocene, namely one not aimed to help us to fully control nature, but first and foremost help us to negotiate to remain part of a collective with as many possible quasi-objects taken into account. This is a never ending process, simply because there will always be elements that have not been taken into account yet. Precisely because our collective will always change, we need constant monitoring.

However, the initial interpretation of the parliament of things evoked some criticism by Stengers, which must be taken into account. According to Stengers, the early Latour (1993) tended to be rather optimistic about the fact that all quasi-objects could become part of the parliament of things. The essential underlying assumption of Latour here was that everything can be an object of negotiation, but this implied a form of exclusion, namely of those things that refuse to cooperate.[11] "No one can introduce themselves by establishing conditions—take it or leave it—from which the possibility or impossibility of agreement would follow." (Stengers 2011a, 347) However, the construction of certain elements cannot be the object of negotiation, even in such an open parliament of things. There are things such as gods, values, practices that we do not want to give up because they constitute our fundamental identity. Such claims are definitely not without ground. For instance, without the specific experimental practices of the scientists, they cannot do science; but similar claims can be made about religions or ethical values. In this sense, Stengers proposes a corrected "Cosmopolitical Parliament" (Stengers 2011a, 395) where there is room for these excluded elements, that refuse to take part, but cannot be ignored.

In his later work, this also made Latour revise his initial conception of the parliament of things. Negotiation is never by definition successful, and therefore one has to obtain the model of the diplomat, rather than the expert (see Latour 2004b, 209–17). Diplomacy means that one is fully aware that one is taking risks in the negotiations, that one does not have nature on one's side as *ready-made*

science once claimed, nor that negotiations will always succeed. We cannot start from a given world, but we have the political task of "the progressive composition of the common world" (Latour 2004b, 18). "Diplomacy . . . celebrates another, quite artificial, conception of truth—what is true is what succeeds in producing a communication between diverging parties, without anything in common being discovered or advanced" (Stengers 2013, 194).

In a similar vein, this might explain some recent criticisms of Serres's original proposal, found in the work of both Latour and Stengers. For Latour, a natural contract has become impossible "because in a quarter of a century, things have become so urgent and violent that the somewhat pacific project of a contract among parties seems unreachable. War is infinitely more likely than contract" (Latour 2014, 5). Related to that, Stengers talks about the "intrusion of Gaia," which does not ask a response of us, but rather obliges us to find means to protect ourselves from this new condition, this new history, the Anthropocene (Stengers 2015). The necessity of negotiation, presupposed by Serres and the early Latour, is no guarantee anymore. We cannot be certain that we will find a new natural contract.

However, Latour and Stengers tend to make the stronger claim: such a contract has become impossible. Similar to the criticism of the necessity of noise or that of quasi-objects, however, one can state that this claim mixes up two different notions, namely the *certainty of the impossibility* of a contract and the *uncertainty of its possibility*. Their claims seem only to support the second claim and not the first claim. In the Anthropocene a natural contract might still be a possibility, although we cannot even be certain of that.

5. Conclusion

For authors such as Latour, the problems of the Anthropocene require new technologies to deal with it, namely a parliament of things, which is neither a parliament of subjects nor a parliament of objects. Rather it aims to be a parliament of quasi-objects, i.e., a place where both objects and subjects are represented, but together with their relations, their scientists, their uncertainties, etc. The problem was never that nonhumans did not speak, but that they were forced to speak only in one way, namely as mere passive objects. Once again, the conclusion is not that we should just let the original chaos of the world speak, although Serres seems to point in that direction. In the case of technology, the message is not the abandon all technologies since they imply this violence. Instead, the task is to listen to things as things, to create new technologies in which quasi-objects can express themselves in their complexity and multiplicity; to articulate and differentiate their habits and their

associations (Latour 2004a). Otherwise, "we shall remain barbarians besieged by inhumans—and before Gaia we shall remain without a voice" (Latour 2013, 288).

Subsequently, we do not need to stop constructing objects, but rather construct them better by consciously involving the quasi-objects in the construction process, by constructing an adequate parliament of things. Nevertheless, as the critique of Stengers shows, there is no guarantee that such a parliament of things will work. But also, and contrary to the recent pessimism of Stengers and Latour, none that it will fail.

Notes

This work was supported by the Research Foundation—Flanders (FWO).

Previous versions of this paper have been presented at the 'Nonhumans & Politics: International Conference on Non-anthropocentric Perspectives on Politics' in Hannover (January, 2016) and at the '2nd Cologne Summer School of Interdisciplinary Anthropology' in Köln (September, 2016). Besides the participants at these conferences, I would also like to thank Justus Hillebrand and Jonas Rutgeerts, and the anonymous reviewers for their many useful comments on earlier drafts.

1. Nevertheless, there are also some clear criticisms of the term (e.g., Baskin 2015, Bonneuil and Fressoz 2016).

2. From the 1980s his admiration of structuralism weakens: Serres questions the possibility of such a metanarrative, although he remains faithful to his focus on relations rather than subjects of objects. He opens up his perspective to more mixed, mingled relationships and networks that have no clear boundaries, but are multiplicities (Serres 1982, 17–18). Serres's style becomes more literary in his later work, and he focuses often on myths, fables or art, trying to let the relations within the text speak for themselves rather than speak in their name based on some kind of metanarrative (see Latour 1987a).

3. Quotations are translated by the author, unless when using existing translations.

4. Latour explicitly acknowledges the link between these concepts and Serres's philosophy of translation, for instance, in his book on Gaia where he states that these concepts are "another way of translating the argument of Serres concerning translation" (Latour 2015, 95n63).

5. The image he also uses is that of the discovery of irrational numbers, for instance in the diagonal of a square with sides of length one. For Greek philosophers, there were only rational numbers, but this diagonal confronted them with a new world:

> From this contradiction, the third should have been excluded. But if that were the case, the said diagonal wouldn't exist; . . . From then on, the dis-

> covery of real numbers, spurting like a geyser from this absent fault line, insists that all other known numbers, at least in those days, be reduced to limit cases of this new form. . . . Soon one will not find anything but this third, as soon as its exclusion is pronounced. It was nothing, see how it becomes everything-or almost. (Serres 1997, 45)

In the same way, quasi-objects will become the rule, rather the exception once we recognize their existence.

6. Latour uses the notion of quasi-object, although he will occasionally replace it with his own terms. For instance Stengers and Latour speak of 'factishes' in opposition to fetishes (Latour 2010; Stengers 2010, 18–24). Latour also uses the term of 'thing' in contrast with object, pointing at the etymology of the word which referred in languages as diverse as Icelandic, German and Nordic (but also in the Roman notion *res publica*) to an assembly, a political discussion or a gathering (see Latour 2004b, 232–37; 2005a). That is why he speaks of the necessity of a *Dingpolitik* as well as a parliament of *things*. In his more recent work, Latour reaffirms that "we are actually dealing here with quasi-objects, to borrow a term from Michel Serres" (Latour 2013, 288).

7. This is in fact a presupposition on which Latour can be criticized. Stengers, for instance, in her work tries to make a more subtle distinction between technoscience and other forms of science (see Stengers, 2011a).

8. She mainly refers to behavioral psychology or mathematical economics: "The behavioral psychologist does not risk anything in accumulating facts about the rat trapped in its labyrinth, but the facts he or she accumulates do not interests many people, and do not generate any *problem* for them" (Stengers 1997, 88).

9. In his recent project on the modes of existence, he links this with the mode of existence of 'habit' [hab], which he calls "the most important, the most widespread, the most indispensable of the modes of existence, the one that takes up 99 percent of our lives, the one without which we could not exist" (Latour 2013, 264). Habit implies that in our daily practices we veil the translations we make in getting from one point to the other, without really omitting them. This works for the scientific practices as well, "so that one can *first* study the mediations and *then* bracket them because they are aligned thanks to the play of constants maintained from one form to the next" (Latour 2013, 276). For Latour, the problem is not this *veiling* of these translations, but rather the risk of omitting them: forgetting that they exist at all, and becoming unable (in contrast to habit) in making them explicit once the chain breaks down (when a technology fails, a scientific fact is debunked, etc.).

10. This claim is in fact too strong, as I have argued elsewhere (see Simons 2016). Similar to Serres's confusion, Latour mixes up two possible conclusions: stating that we are *certain that we are uncertain*, which does not follow, the real conclusion is that

we are *uncertain that we are certain*. We can never be certain again that we can reduce particular quasi-objects to objects, although it might work for some cases.

11. This also shows itself in the strange paradox that Latour is a critic of geoengineering, but at the same time, for instance, has published an article in a book that is full of these geoengineering solutions (see Latour 2011). Here Latour refers to the story of Dr. Frankenstein: his mistake was not the creation of the monster, but rather abandoning it and by this making it into a monster. Nothing is by definition a monster, but becomes so if one does not take their consequences into account. However and against Latour, it seems likely that there are cases where monsters cannot be adopted, regardless of our care. One could contrast Latour's story with that of *The Fly* (1986), a movie by David Cronenberg, in which the protagonist mixes his DNA with that of a fly. Slowly, he transforms into a fly, escalating dramatically and resulting in his wife being obliged to shoot him. Obviously, taking care of our monsters might be a good cause, but this does not exclude that some monsters cannot be treated for and optimistic attempts to do so (rather than dismissing the technologies as being too dangerous) can be very problematic. As Timothy Morton states, "making something conscious doesn't mean it's nice. We have always been murdering people. How is deliberate murder more moral?" (Morton 2014, 262–63).

References

Baskin, Jeremy. 2015. "Paradigm Dressed as Epoch: The Ideology of the Anthropocene." *Environmental Values* 24(1): 9–29. https://doi.org/10.3197/096327115X14183182353746

Bonneuil, Christophe, and Jean-Baptiste Fressoz. 2016. *The Shock of the Anthropocene: The Earth, History and Us*. London: Verso.

Crutzen, Paul. 2002. "Geology of Mankind." *Nature* 415(6867): 23.

Despret, Vinciane. 2015. "The Engima of the Raven." *Angelaki* 20(2): 57–72. https://doi.org/10.1080/0969725X.2015.1039842

Gingras, Yves. 1995. "Following Scientists through Society? Yes, but at Arm's Length!" In *Scientific Practice: Theories and Stories of Doing Physics*, ed. Jed Z. Buchwald, 123–48. Chicago: University of Chicago Press.

Latour, Bruno. 1984. *Les microbes: guerre et paix suivi de Irréductions*. Paris: Métaillié.

Latour, Bruno. 1987a. "The Enlightenment without the Critique: A Word on Michel Serres' Philosophy." *Royal Institute of Philosophy Lecture Series* 21: 83–97.

Latour, Bruno. 1987b. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.

Latour, Bruno. 1993. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2004a. "How to Talk About the Body? The Normative Dimension of Science Studies." *Body & Society* 10(2–3): 205–29. https://doi.org/10.1177/1357034X04042943

Latour, Bruno. 2004b. *Politics of Nature: How to Bring the Sciences into Democracy*. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2004c. "Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern." *Critical Inquiry* 30(2): 225–48. https://doi.org/10.1086/421123

Latour, Bruno. 2005a. "From *Realpolitik* to *Dingpolitik* or How to Make Things Public in Making Things Public." In *Making Things Public: Atmospheres of Democracy*, ed. Bruno Latour and Peter Weibel, 14–41. Karlsruhe: ZKM Center for Art and Media.

Latour, Bruno. 2005b. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.

Latour, Bruno. 2010. *On the Modern Cult of the Factish Gods*. Durham, NC: Duke University Press.

Latour, Bruno. 2011. "Love Your Monsters: Why We Must Care for Our Technologies as We Do Our Children." In *Love Your Monsters: Postenvironmentalism and the Anthropocene*, ed. Michael Shellenberger and Ted Nordhaus, 17–21. Oakland, CA: Breakthrough Institute.

Latour, Bruno. 2013. *An Inquiry into Modes of Existence: An Anthropology of the Moderns*. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2014. "Agency at the Time of the Anthropocene." *New Literary History: A Journal of Theory and Interpretation* 45(1): 1–18. https://doi.org/10.1353/nlh.2014.0003

Latour, Bruno. 2015. *Face à Gaïa*. Paris: La Découverte.

Latour, Bruno, and Michel Serres. 1995. *Conversations on Science, Culture, and Time*. Ann Arbor: University of Michigan Press.

Latour, Bruno, and Steve Woolgar. 1986. *Laboratory Life: The Construction of Scientific Facts*. Princeton, NJ: Princeton University Press.

Morton, Timothy. 2014. "How I Learned to Stop Worrying and Love the Term *Anthropocene*." *Cambridge Journal of Postcolonial Literary Inquiry* 1(2): 257–64. https://doi.org/10.1017/pli.2014.15

Serres, Michel. 1969. *Hermès I, La communication*. Paris: Éditions de Minuit.

Serres, Michel. 1972. *Hermès II, L'interférence*. Paris: Éditions de Minuit.

Serres, Michel. 1977. *Hermès IV, La distribution*. Paris: Éditions de Minuit.

Serres, Michel. 1982. *Genèse*. Paris: Grasset.

Serres, Michel. 1987. *Statues*. Paris: Flammarion.

Serres, Michel. 1995. *The Natural Contract*. Ann Arbor: University of Michigan Press. https://doi.org/10.3998/mpub.9725

Serres, Michel. 1997. *The Troubadour of Knowledge*. Ann Arbor: University of Michigan Press.

Serres, Michel. 2003. "The Science of Relations: An Interview." *Angelaki* 8(2): 227–38. https://doi.org/10.1080/0969725032000162675

Serres, Michel. 2007. *The Parasite*. Trans. Lawrence R. Schehr. Baltimore: The John Hopkins University Press.

Serres, Michel. 2008. *The Five Senses: A Philosophy of Mingled Bodies*. London: Continuum.

Simons, Massimiliano. 2016. "The End and Rebirth of Nature? From Politics of Nature to Synthetic Biology." *Philosophica* 47: 109–24.

Stengers, Isabelle. 1997. *Power and Invention: Situating Science*. Minneapolis: University of Minnesota Press.

Stengers, Isabelle. 2000. *The Invention of Modern Science*. Minneapolis: University of Minnesota Press.

Stengers, Isabelle. 2005. "The Cosmopolitical Proposal." In *Making Things Public: Atmospheres of Democracy*, ed. Bruno Latour and Peter Weibel, 994–1003. Karlsruhe: ZKM Center for Art and Media.

Stengers, Isabelle. 2010. *Cosmopolitics I*. Minneapolis: University of Minnesota Press.

Stengers, Isabelle. 2011a. *Cosmopolitics II*. Minneapolis: University of Minnesota Press.

Stengers, Isabelle. 2011b. "Wondering about Materialism." In *The Speculative Turn: Continental Materialism and Realism*, ed. Levi Bryant, Nick Srnicek, and Graham Harman, 368–80. Melbourne: re.press.

Stengers, Isabelle. 2013. "Introductory Notes on an Ecology of Practices." *Cultural Studies Review* 11(1): 183–96. https://doi.org/10.5130/csr.v11i1.3459

Stengers, Isabelle. 2015. *In Catastrophic Times: Resisting the Coming Barbarism*. Lüneburg: Open Humanities Press.

Stiegler, Bernard. 2015. "Exiting the Anthropocene." *Multitudes* 60: 137–46. https://doi.org/10.3917/mult.060.0137

Zalasiewicz, Jan, Colin N. Waters, Mark Williams, Anthony D. Barnosky, Alejandro Cearreta, Paul Crutzen, Erle Ellis, Michael A. Ellis, Ian J. Fairchild, Jacques Grinevald, Peter K. Haff, Irka Hajdas, Reinhold Leinfelder, John McNeill, Eric O. Odada, Clément Poirier, Daniel Richter, Will Steffen, Colin Summerhayes, James P. M. Syvitski, Davor Vidas, Michael Wagreich, Scott L. Wing, Alexander P. Wolfe, Zhisheng An, and Naomi Oreskes. 2015. "When Did the Anthropocene Begin? A Mid-Twentieth Century Boundary Level Is Stratigraphically Optimal." *Quaternary International* 383: 196–203. https://doi.org/10.1016/j.quaint.2014.11.045

Zammito, John. 2004. *A Nice Derangement of Epistemes: Post-Positivism in the Study of Science from Quine to Latour*. Chicago: University of Chicago Press.

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 175–198 DOI: 10.5840/techne20176565

From the Nadir of Negativity towards the Cusp of Reconciliation: A Dialectical (Hegelian-Teilhardian) Assessment of the Anthropocenic Challenge

Hub Zwart

Abstract: This contribution addresses the anthropocenic challenge from a dialectical perspective, combining a diagnostics of the present with a prognostic of the emerging future. It builds on the oeuvres of two prominent dialectical thinkers, namely Georg Wilhelm Friedrich Hegel (1770–1831) and Pierre Teilhard de Chardin (1881–1955). Hegel himself was a pre-anthropocenic thinker who did not yet thematise the anthropocenic challenge as such, but whose work allows us to emphasise the unprecedented newness of the current crisis. I will especially focus on his views on Earth as a planetary process, emphasising that (in the current situation) the "spirit" of technoscience is basically monitoring the impacts of its own activities on geochemistry and evolution. Subsequently, I will turn attention to Teilhard de Chardin, a palaeontologist and philosopher rightfully acknowledged as one of the first thinkers of the Anthropocene whose oeuvre provides a mediating middle term between Hegel's conceptual groundwork and the anthropocenic present. Notably, I will discuss his views on self-directed evolution, on the on-going absorption of the biosphere by the noosphere, and on emerging options for "sublating" the current crisis into a synthetic convergence towards (what Teilhard refers to as) the Omega point. I will conclude that (a), after disclosing the biomolecular essence of life, biotechnology must now take a radical biomimetic turn (a shift from domesticating nature to the domestication of domestication, i.e., of technology); that (b) reflection itself must become distributed and collective; and (c), that the anthropocenic crisis must be sublated into the *noocene*.

Key words: dialectics, Anthropocene, Hegel, Teilhard de Chardin, self-directed evolution, noosphere, noocene

H. A. E. (Hub) Zwart, Faculty of Science, Institute for Science, Innovation and Society, Dept. of Philosophy and Science Studies, Radboud University Nijmegen, P.O. Box 9010, 6500 GL Nijmegen, the Netherlands; h.zwart@science.ru.nl.

1. Introduction

Our geophysical impact as a planetary species on planet Earth has become omnipresent, irreversible and disruptive to such an extent that both geologists and philosophers have announced the birth of the *Anthropocene* as a *new* (καινός) and decidedly *human* (ἄνθρωπος) era (Crutzen 2002; Steffen et al. 2011; Schwägerl 2014; Hamilton, Bonneuil and Gemenne 2015; Lemmens 2015; Lemmens and Hui 2017). As a linguistic polymer, the term "Anthropocene" refers to a moment of global crisis, but also to the possibility of a metaphysical mutation or new beginning. In this contribution, the anthropocenic challenge will be addressed from a dialectical perspective and envisioned as a pivotal moment in a dialectical unfolding. Dialectics refers to a ("continental") philosophical method which was inaugurated by Hegel, but inspired by ancient (Socratic) and medieval (scholastic) traditions and further developed by more recent authors such as Jacques Lacan (1991), Slavoj Žižek (2009; 2010), Catherine Malabou (2005) and John Bellamy Foster (2000). Dialectics builds on the conviction that a dialectical logic (or λόγος) can be discerned in nature, history and human thinking, which not only allows us to come to terms with and understand the present, but also to anticipate (and actively contribute to the unfolding of) the emerging future. In other words, dialectics combines intellectual with practical ambitions: it not only entails reflection and self-reflection, but also praxis (options for action).

Dialectics strives to capture the present in thoughts, to conceptualise the *truth* of the current era, i.e., the most radical dimension of contemporary existence, spurring us to come to terms with it. Hegel posits the zeitgeist of an epoch as a universal principle which expresses itself in all domains of socio-cultural existence. The modern principle of subjectivity, for example, realised itself in Protestantism, in the autonomous subject of Kantian ethics, in the concept of citizenship of the French revolution and in liberal democracy (Žižek (2009, 31), but also in egocentric conceptions of intellectual property, authorship and art. In the current era, however, a more global, less egocentric, more ecocentric assessment seems required to capture the fundamental challenge of the time,—and this is what the Anthropocene-concept purports to do. As Žižek (2009, 65) phrases it, in contrast to the pseudo-Hegelian cliché of a mega-spirit controlling history, Hegel was fully aware that self-consciousness arises in finite minds, and that any efforts to come to terms with the basic challenge of the time are bound to generate criticisms and contradictions. Yet, on this intellectual and practical battlefield (which *enables* rather than constrains individual articulations) a supra-individual coherence (*Sit-*

tlichkeit) may nonetheless emerge, eventually allowing us to collectively address the challenge. Dialectics offers a methodology that allows thinking and acting individuals to discern and read the dialectical logic at work in the heterogenic present. Dialectics represents a dynamical research program which engaged scholars are invited to join and further elaborate. Contrary to the position of the "beautiful soul," bemoaning the current crisis while overlooking how we always already are *involved* in what we deplore (Žižek 2010, 399), Hegelian dialectics spurs self-reflection, raising awareness of how we ourselves are deeply immersed in the current process, but also outlining emerging options to actively contribute to and become part of the inevitable turn. Therefore, this paper is neither a philosophical exegesis of Hegel's oeuvre (although the current crisis decidedly requires us to seriously reread his deep philosophy), nor a rebuttal of the countless instances of critique and deflection which his ambitious program continues to provoke. Rather the focus is on outlining the dialectical method, the methodological core of the dialectical research program, emphasising its potential for assessing and addressing the anthropocenic challenge.

The logic of dialectics builds on series of trichotomies, on triadic patterns of positions, triadic sequences of moments, which will be referred to in this paper in short-hand as M_1, M_2 and M_3. This concise, compact dynamics can be illustrated with the help of the human-nature relationship (cf. Zwart 2017). Initially, humans must have been in awe of nature, and nature must have invoked in us a sense of admiration and respect (M_1). Nature was "observed" by us, in the original sense of the Latin verb *observare*, which means: to *heed*, to *serve* and to *respect* nature. But precisely because of this devoted interest in nature, human observation became increasingly systematic and precise. And this inevitably resulted in a traumatic experience (M_2), namely that nature is not as perfect as was initially expected. Anomalies and inconsistencies began to accumulate, and respect for (the perfection of) nature was increasingly subverted by a growing inability to actually confirm the initial view. And this experience (of tension, contradiction or frustration; the second moment: M_2) forced us to realise that, apparently, our starting point was one-sided and naïve (so that this initial position was "negated"). In dialectical logic, contradiction is inevitable and necessary, and the moment of negation or contradiction entails an important *truth*. Somehow, fascination on the one hand and actual discovery on the other must be reconciled again, but on a higher level of complexity, by elaborating a more comprehensive understanding or nature: a "negation of the negation," a position which *picks up* (or *takes up*), but at the same time overcomes, the unsettling, disturbing truth of negativity ($\rightarrow M_3$).

To develop a dialectical diagnostics of the anthropocenic present, I will notably rely on the oeuvres of two prominent dialectical thinkers, namely Georg Wilhelm Friedrich Hegel (1770–1831), the founding father of modern continental dialectics, and Pierre Teilhard de Chardin (1881–1955). Hegel himself was a pre-anthropocenic thinker who did not yet thematise or acknowledge the anthropocenic challenge, but whose work (precisely for that reason) allows us to emphasise the unprecedented newness of the current crisis. After explaining Hegel's dialectical views on the human-nature relationship more generally (a), I will especially focus on his views on Earth as a planetary process or system (b) and on evolution (c). Subsequently, I will turn attention to Teilhard de Chardin, a palaeontologist and philosopher with a dialectical signature who is rightfully acknowledged—by Crutzen (2002) for example—as one of the first thinkers of the Anthropocene (albeit *avant la lettre*), so that his oeuvre provides a mediating middle term between Hegel's conceptual groundwork and the anthropocenic present. Notably, I will discuss his views on (a) self-directed evolution, on (b) the on-going absorption of the biosphere by the noosphere, and (c) on emerging options for "sublating" the current crisis into a synthetic convergence towards what Teilhard refers to as the Omega point.

My position vis-à-vis dialectics in general and Hegel in particular may seem at odds with prominent voices in the current Anthropocene debate, such as Nick Mansfield and Timothy Morton, who discard Hegelian dialectics as fatally outdated. Whereas Morton (2012) for instance criticises Hegel for seeing history as a "purely human" and even Eurocentric affair (so that the connectedness with the broader planetary environment is allegedly lacking), Mansfield argues that the "hauntology" of climate change confronts us with forms of unpredictability and otherness that can no longer be incorporated within Hegelian parameters. For him, climate change represents "the limit of a tradition of philosophy epitomised by Hegel where what can be called the natural can be overcome" (2008, 6). But such views underestimate the potentials of dialectics as a program. The strength of dialectics precisely resides in the awareness of the *inevitability* of the experience of being haunted, challenged and offended by forms of otherness which, initially, may seem impossible to incorporate. Indeed, established parameters (such as Eurocentrism and anthropocentrism, for instance) are destabilised and opened up by painful or even traumatic experiences of negativity, but this is the essence of the dialectical logic (its second moment). Moreover, by speaking about "limits" and "parameters" that are challenged by "otherness," Mansfield and Morton de facto admit that their reasoning is unconsciously imbued with the dialectical logic, to

a much greater extent than they (apparently) are aware of, or willing to acknowledge, so that, notwithstanding their explicit disavowals, dialectics still contributes decisively to the intellectual horizon or thought-scape of the Anthropocene discourse in which they participate. My line of reasoning is that, although dialectics is evidently challenged by the anthropocenic trauma in a very profound way, and must therefore be thoroughly worked-through and updated, it is precisely because of its fundamental susceptibility to the experience of being challenged that the dialectical method allows us to come to terms with the current predicament. Also, Hegel's controversial claim that the "end" of the dialectical process (the final sublation of negativity) is imminent acquires a new relevance under anthropocenic conditions, as the Anthropocene implies that the current crisis / transition may open up a socio-cultural constellation which is quite unlike the conditions of productivity and development which guided the modern epoch,—but I will return to this issue in the final section.

2. Hegel's Philosophy of Nature

At the dawn of human history, primordial nature must indeed have presented itself to us as what Aristotle (1980) refers to as φύσις, i.e.: that which emerges, comes forward on its own accord, that which has its own inherent principles of movement and change, that which is simply there without our doing: the first "moment" (dialectically speaking) of the human-nature relationship (M_1). In the course of history, however, most notably since the Neolithic era, human cunning developed a plethora of tools and methods bent on mastering nature (Hegel 1970, § 245), as was lucidly articulated in Sophocles' famous chorus in *Antigone*,[1] and this practical intelligence notably enabled humans to use nature's forces *against herself*, so that technology basically represents "negativity" against nature: the second moment (M_2). Under the sway of negativity, nature became a resource for human self-preservation. As natural beings, humans continuously experience instances of lack, such as hunger or thirst, Hegel argues, representing a threat to our self-preservation: a potential "negation" of ourselves by something (the continuous loss of energy and bio-matter) which threatens to consume us. This negation can only be (temporarily) abolished by sacrificing and consuming ("negating") other natural entities; for this allows us to temporarily restore our wholeness. Thus, humans are increasingly able to effectively safeguard their own well-being, at the expense of nature as "other." Yet, as Hegel argues, this negative view entails a rather shallow and utilitarian understanding of our relatedness to nature. Notably, it fails to capture nature *as such*, nature on a grander scale: nature as self-sufficient

and goal-directed, as something which works *through* us and in which we remain firmly embedded. But this recognition (of acting both against *and* in accordance with nature) requires a "sublation" of the (negative) utilitarian understanding into a more comprehensive view, which enables us to comprehend nature as a *process*, and as the self-sustaining ground and soil of our existence. Eventually, the spirit (*Geist*, i.e., the intellectual dynamical force driving human thinking) discerns and recognises itself in the dialectical dynamics at work in nature herself (the "third" moment: M_3), so that science, technology and nature can become reconciled again.

But precisely here, at this third moment, one could argue, a radical shift has taken place since Hegel developed his dialectics. In a pre-anthropocenic situation (notably in agricultural society), nature and technology could perhaps still be reconciled, so that, although particular natural *entities* become damaged, consumed, affected, disrupted, etc. by human activity, nature *as such* remains more or less intact. The Anthropocene challenge, however, addresses a situation in which planetary nature *as such* (life on earth *as such*) has become affected. Nature *as a whole* is being consumed by human consumption; nature *as such* is facing "negation" (a dynamics which will eventually result in human self-negation as well). In other words, the third moment (M_3, the "negation of the negation") now seems unattainable, as the second moment (negation: persistence in sheer negativity) becomes rampant and runs adrift ($M_2 \rightarrow | M_3$). The challenge of the Anthropocene therefore is (dialectically speaking) to once again accomplish the envisioned "negation of the negation" (M_3), but now under drastically altered conditions. Somehow, the negative sway of technoscience over nature must be "sublated,"[2] so that nature and technology can be reconciled again, on a higher level of societal and technological integration and complexity (allowing us to reach a new plateau as it were).

In other words, whereas the second moment (from the Neolithic revolution onwards) focussed on the *domestication* of nature, the anthropocenic present must rather focus on the domestication of technology itself, on the "domestication of domestication" (the negation of the negation) because, rather than nature, technoscience itself must now somehow be "tamed," so that nature and technologies can indeed become "reconnected" (Blok 2014). This will require advanced forms of practical cunning, bent on using the forces and dynamics of *technology itself* in order to effectively *subdue* technology (the basic ambition, one could argue, of biomimesis or biomimicry: cf. Zwart, Krabbenborg and Zwier 2015; Blok and Gremmen 2016), but in combination with a philosophical understanding which allows us to envision both technoscience and nature as overarching, interactive, dynamical systems or complex, intimately entangled wholes.

This dialectical pattern can be represented by the following scheme:

M_1: nature as φύσις, basically invulnerable and beyond our grasp	M_2: the era of technology, i.e., the domestication of nature, where human understanding of the basic dynamics of nature is used *against* nature (technology as the *negation* of nature) and human interests and nature are increasingly in conflict with one another	M_3: the negation of the negation (the domestication of domestication), i.e., the *sublation* of technoscience into a bio-compatible ("nature-friendly," sustainable) endeavour: the basic challenge of the Anthropocene

Although (as I will argue) this form of dialectical thinking will help us to conceptually address the challenges of the Anthropocene, and although Hegel must be credited with developing this dialectical method for assessing the present (capturing it in thoughts), it is at the same time clear that Hegel himself was not yet a thinker of the Anthropocene, so that his diagnostics of the present must be updated (guided by his own method). This notably becomes clear when we focus on two key issues of Hegel's philosophy of nature which are highly relevant to our topic: (a) the necessity to see planet Earth as a systemic whole and (b) Hegel's views on the "end" of natural evolution.

3. Hegel's (Pre-Anthropocenic) Understanding of Planet Earth

In his *Philosophy of Nature* (the second part of the *Encyclopaedia of the Philosophical Sciences*), Hegel addresses the planetary environment as an "elementary, meteorological process" (1970, § 286), a view which results from his critical assessment of the discrepancies between the insights produced by experimental laboratory research and the real, large-scale meteorological processes of outdoors nature, which seem far too complex to be comprehended in laboratory settings. Initially, modern scientists see nature as a deterministic realm (M_1), a conception which allows them to study water, air, pressure, temperature etc. with the help of laboratory devices (barometers, hygrometers, etc.: M_2) and to establish various causal relationships. Yet, in the real atmosphere, such laboratory equipment is absent, Hegel argues, and laboratory knowledge cannot be meaningfully extrapolated into free nature. It is the conviction of modern experimental science that what happens outdoors in the open should also occur under controlled laboratory circumstances and vice versa, but that is a mistake, as laboratory science consistently fails to replicate meteorological processes. According to Hegel, this is due to the fact that these research practices do not really regard atmospheric phenomena as moments *of a whole*, as aspects of a comprehensive planetary pro-

cess, in which planet Earth as such is involved as the "universal individual" (*das allgemeine Individuum*, 1970, 155), with a comprehensive metabolism of its own. Science aims to reduce real nature into a limited set of causal relationships, but by so doing it proves unable to realise its goal. Yet this reductionist obsession is nonetheless important because all these (finite, particular) experiments eventually culminate in one crucial *experience* (which is the ultimate *truth* of laboratory science), namely that planet Earth must be regarded as a complex, infinite *process*, a terrestrial *whole*,—an insight which reveals the one-sidedness of the reductionist premises from which laboratory research initially started (M_1). In order to really *understand* nature, science must develop a much more holistic meteorological approach (M_3). In schema:

M_1: nature as a causal, deterministic realm	M_2: nature disclosed by laboratory science; reductionism as a negation of nature. But this gives rise to chronic anomalies and frustrations: the inability of laboratory science to really comprehend *real* (outdoors) nature	M_3: The "truth" of this reductionism (the negation of the negation): the awareness that planetary nature must be regarded as a whole, a terrestrial system; in Hegel's terminology: a "meteorological" process.

One could argue that, in present-day meteorology, relying on big data, big computers and climate modelling, this "holism" (M_3) already promoted by Hegel, has finally been achieved. Researchers are now studying the metabolism of Earth as such. In *in silico* experiments and climate modelling programs, the complex and apparently capricious dynamics of climate and weather is finally opened-up by technoscience. At the same time it is clear that, *precisely at this point*, something has dramatically changed. It is precisely here, in the context of these new and powerful research practices, that a disconcerting truth is revealed, namely the awareness that, when it comes to weather and climate, we are no longer facing a purely "elementary" process, as envisioned by Hegel (as a pre-anthropocentric thinker), but rather a geochemistry (a "meteorology) which has become dramatically and irrevocably tainted by human influence, so that human activity *itself* has now become a decisive, "elementary" factor. Indeed, in contemporary climate research, (the spirit of) technoscience is basically monitoring *itself*: technoscience is monitoring the impact of (the spirit of) technoscience.

Moreover, although Hegel decidedly urges us to see planet Earth as an individual, that is: as a whole, he is not a precursor of Gaia theory. For Hegel, planet Earth is essentially a petrified being, a gigantic, gleaming, spheroid amalgam of crystals and brittle, not *really* a living organism. Rather, as he phrases it, planet

Earth is *implicitly* alive: as the ground and soil of life as such. On the planetary level, the general terrestrial process remains a meteorological process (1970, 289), the dynamical and comprehensive end-result of a plethora of (finite, local, chemical) micro-processes. Whereas other substances are dissolved in these processes, the Earth as such cannot itself become consumed or dissolved, but continues to persist. Therefore, the chemistry of planet Earth (of terrestrial nature) is "meteorology" (291), the inorganic geochemistry of nature as a whole. Hegel sees the earth decidedly as a frame of life, even as an "individual," but not yet a "subject," for the earthly super-individual lacks self-awareness. It is a paralysed, frozen, petrified form of life (§ 337). Still, the Earth must be conceived as a totality, and its global process is perennial.

In the countless chemical processes that are actually taking place on this planet, Hegel discerns a "semblance" of life (§ 335). An *implicit* vivacity is at work in planetary existence, but it realises itself in something else, namely in the life forms, the living organisms which are sustained by the earthly system. In contrast to the (finite, inorganic) chemical processes, organisms are described by Hegel as self-sustaining processes (§ 336). Whereas inorganic substances are continuously exposed to transformative pressures, living beings (although exposed to similar external dangers, to "negating otherness") prove able to endure the tension, so that they persevere, and even reproduce themselves. Planet Earth on the other hand is not an organism, and does not reproduce herself, but nonetheless sustains herself (§ 339).

Again, one could argue that, although Hegel himself was not yet a thinker of the Anthropocene, his dialectics allows us to articulate what is currently at stake. First of all, under anthropocenic conditions, the earthly process *as such* can no longer be regarded as infinite or self-contained. The ground and soil of life can no longer be taken for granted and may even be made uninhabitable. This awareness, one could argue, has become a planetary form of self-awareness, taking shape in the form of the Anthropocene-debate. As if, in the face of the possibility of annihilation, the Earth becomes a planetary "subject" (capable of reflection and concerted action) after all. And precisely at this moment, the option of planetary self-reproduction emerges as well, namely the idea of transporting terrestrial life to other planets, whose surfaces and atmospheres may now become infected or fertilised with life (as Earth has become exhausted and "consumed"); for instance in the form of *terraforming Mars*.

4. Hegel's and the End of Evolution

A similar revivification may apply to Hegel's highly controversial (Wandschneider 2002; Houlgate 2005) views on evolution. On the one hand, Hegel sees the successive geological formations disclosed by modern research as evidence of the "massive changes" and "tremendous revolutions" that must have occurred in a distant geological past (1970, § 339). Yet, for Hegel, these processes have now come to a stand-still more or less and he explicitly rejects the idea of an on-going evolution of species. Indeed, he even regards fossils (notably shells discovered in older geological stratums) as petrified remnants of faltered experiments: the debris of previous efforts of nature to forge organic forms (359). Elsewhere (§ 367), however, Hegel explicitly acknowledges that organisms (both as individuals and as species) adapt themselves to external environmental circumstances (both biotic and abiotic), so that the original type may become modified in various directions. In other words, he acknowledges the plasticity of life (cf. Malabou 2005) in response to environmental pressures.

Although Hegel's views on evolution (here and elsewhere) may be regarded as fairly ambivalent or even self-contradictory (endorsing geological change and adaptation on the one hand while explicitly denying the idea of evolution on the other), his arguments gain an unexpected coherence when reconsidered backwards in time, from an anthropocenic perspective, namely by arguing that, whereas (extremely slow) geological (abiotic) and Darwinian (biotic) evolution has taken place in the past, in the present situation these processes are eclipsed and overtaken by technoscience. Darwinian evolution continues no doubt, on its own timescale and in its own super-indolent pace, but will increasingly be overshadowed by the rapid and dramatic transformations unleashed (directly and indirectly) by modern technology, so that Darwinian evolution de facto becomes increasingly irrelevant. Compared to the extremely high pace of self-directed, technology-driven processes of selection, extinction, migration, adaptation and even creation (the production of neo-life by synthetic biology, fuelled by the anthropocenic transition), natural random evolution becomes something marginal (with the exception of viral evolution). In other words, the anthropocenic present basically represents the "end" of (Darwinian) evolution: the end of *natural* history, not in the sense that this type of change no longer happens at all, but in the sense that it is bound to become marginal and irrelevant, because its impact is dwarfed and eclipsed by the much more immediate and dramatic impact of anthropocenic processes unleashed by technoscience,—ranging from pollution, climate change and ecological dis-

ruption up to synthetic biology, biological enhancement and the production of neo-life –, which irrevocably affect the present conditions and future prospects of life on Earth.

This also concurs with the finale of Hegel's philosophy of nature, where he states that the spirit increasingly recognises itself in nature (1970, § 376). Via technoscience the spirit incessantly absorbs the processes of nature it uncovers, sublating them into something which is rational, technological and artificial (denaturalising the technologies and processes of nature, resulting in processes of bio-technical or techno-natural hybridisation). Moreover, while there is recalcitrance at work in nature when it comes to realising its own possibilities and concepts, the spirit (in the form of technoscience) may now attempt to break this cycle of natural "inadequacies" (the violence, suffering, waste, etc. entailed in natural existence) by self-consciously bringing forth what is implicitly inherent, but not actually realised by nature: by drastically enhancing (or as Hegel phrases it: "sublating") nature.

By developing such an argument, however, we are not "applying" Hegel, but rather extrapolating Hegelian dialects into the present. To further extend this bridge, leading from early nineteenth century dialectics into the current debate, I now will shift attention to the work of a dialectical thinker who explicitly reflected on (the past, present and future of) evolution in the era of technoscience, namely Teilhard de Chardin.

5. Teilhard de Chardin's Palaeontology of the Future

Allow me to begin this section on an autobiographical note. In the 1970s, when I was a high-school student (in the most southern and therefore most Catholic part of the Netherlands), Teilhard de Chardin was a very prominent name. My father (a technical engineer) insisted I should read him, but I preferred to expose myself to Jean-Paul Sartre, Karl Marx and Hegel instead. For many years, some of his books were patiently waiting for me on a bookshelf, and occasionally I did glance through *Le Phénomène Humain*. When I finally started reading him in earnest, in the summer of 2015, I was dumbfounded. Not only because Teilhard is one of those rare authors whose oeuvre opens up a universe of its own, but first and foremost because I realised that I had hardly ever encountered an author whose thinking is so radically *up to date*, and so decidedly focussed on the topic of this special issue: the challenge of the Anthropocene. It is dialectics on the individual micro-level as it were: the experience of finally addressing a different, haunting voice (ignored for too long) spurring us to broaden our perspective and work our

way towards a new plateau. Although Teilhard does not literally use the term (and would have preferred the term "noocene," but I will come to that) his thinking was clearly moving in this direction, as indicated by sentences such as: "The future will decide what is the best name to describe the era we are entering. The word matters little. What does matter is that we should be told that life is taking a decisive step, in us…" (1959b, 214). Being much less famous than Hegel, however, some words of introduction may be in order.

Teilhard de Chardin came from a Catholic aristocratic background (he was actually born in a French castle), was ordained a priest in 1911, joined the Jesuit Order, survived World War I (as a stretcher-bearer, distinguished with the Legion of Honour for bravery), was involved in the discovery of "Peking Man" (Homo erectus) in China in the 1920s, became entangled in a conflict with his Jesuit superiors (over pantheism and the concept of original sin), and died in New York (in exile more or less). Although Teilhard de Chardin was first of all a paleoanthropologist, he was a highly trained philosopher and theologian as well. When his writings were published (shortly after his death, because his Jesuit superiors forbade him to do so himself during his lifetime), he quickly became an intellectual celebrity. Currently, he is not only credited with having anticipated Gaia theory (King 2006), the global village concept (McLuhan 1962), Internet (Barlow 1992; Cobb 1998), the WWW (Garreau 2005, 256; Greenfield 2014, 9), transhumanism (Steinhart 2008; Delio 2014) and the "global brain" (Stock 1993), but he is also widely regarded as a thinker of the Anthropocene (e.g., Crutzen 2002; Steffen et al. 2011; although Hamilton and Grinevald (2015) challenge this claim).

6. Self-Directed Evolution and Its Discontents

In *The Phenomenon of Man* (and elsewhere) Teilhard (1959b) argues that a direction, an orientation, an axis, a line of progress can be discerned in evolution, namely towards increased complexity and interiority (8), towards integration and sublimation (180), towards self-consciousness and self-directedness. Teilhard was aware, of course, that such claims are bound to trigger disavowal among scientists (notably biologists), as well as among (analytically inclined) philosophers;—as is reflected in the symptomatic review of Teilhard's *The Phenomenon of Man* by Medawar (1961), who basically accuses the author of siding with "German Naturphilosophie," which apparently is considered a perpetration.[3] And yet, Teilhard convincingly argues that human beings represent the moment in time when evolution is becoming "conscious of itself," and therefore increasingly self-directed (20, 126). Indeed, humans are able to consciously reorganise the conditions of

their own evolutionary development on an unprecedented scale. Whereas animals adapt to environmental challenges via learning (Baldwin 1896), humans, Teilhard argues (1959b, 168) not only learn, but *know* that they learn, and *how* they learn, and how they may *improve* their capacity for learning. This has brought us on the verge of a crucial moment in the history of life, Teilhard claims, as humanity has entered an era of planetisation (Zwart 2016). Dialectically speaking, current humanity represents the final transition from a more or less implicit awareness of the mechanisms of evolution in animals and other life forms (M_1), via a self-conscious manipulative understanding of these mechanisms (putting them to work on behalf of anthropocentric self-interest: M_2), up to assuming full responsibility over the future course of evolution as such, thereby radically sublating the boundaries between the "natural" and the "artificial" (M_3), giving rise to synthetic hybridisation.

But it is precisely here that relentless acceleration suddenly gives way to hesitation and reflection, to a sense of disquiet or even terror, Teilhard argues, for we seem definitely unable to live up to the daunting challenges and responsibilities entailed in the present situation, which is without precedent in the history of life ($M_2 \rightarrow | M_3$). We suffer from collective psychic disorientation and, more than at any other moment of history, from a fundamental anguish of being. Something terrible is confronting us, and we are taken aback by the enormous responsibilities which are opening up in front of us. Something seems "more than ever lacking" (1959b, 227) as we wake up to the fact that the biosphere itself is now becoming thoroughly humanised. Somehow, however, we must reconcile ourselves with our assignment, and our uneasiness (1959b, 228) must be transformed into thinking and foresight. Building on a solid diagnostics of the current crisis and its key symptoms (1959a, 329), the palaeontology of the past must change its focus and become a prognostic palaeontology of the future (1959a, 82), using our ability to discern the basic dialectical pattern in past events to understand what is ahead of us, so that dialectics may become our guide.

7. Emergence of the Noosphere

3.5 billion years ago, planet Earth (the primordial geosphere) gave rise to a diffuse super-organism, a living film: the biosphere, a green layer covering the abiotic geosphere (1959b, 94). And currently, Teilhard argues, we are on the verge of another decisive turn. Via global human activity, a new layer is added, over and above the other spheres (i.e., the abiotic, inorganic geosphere and the biotic, organic biosphere), namely the noosphere, the "thinking layer" (derived from the Greek term νοῦς: i.e., "mind" or "intellect") which, besides noetic processes and

activities (thinking, calculating, modelling, communicating, deliberating, etc.), also involves noetic products (technologies, devices, cultures, infrastructures, computers, industrial plants, airplanes, and so on). It is distributed intelligence: a technological materialisation of Hegel's objective spirit, conceived as an extended, externalised and institutionalised structure on which individual intelligence, autonomy and creativity to a large degree depend (Boldyrev and Herrmann-Pillath 2013). The noosphere evolves into a quasi-autonomous planetary network of advanced technologies and global circuits.[4] Humans are obviously animals, and yet we represent a discontinuity, a leap, a crisis, a metamorphosis, an awakening, giving rise to the emergence of the noosphere, the thinking layer, relentlessly transforming and absorbing the geosphere and the biosphere, and one day (perhaps sooner than we think) we will be able to create artificial life (1959b, 249). Thus, the noosphere represents a conscious reshaping of the world, an epochal transformation affecting the entire planet. Indeed, it may even amount to an exhaustion of the earth and a frantic desire to invade other planets.

Evolution and selection, for instance, are being transposed from the biosphere into the noosphere, leading to the emergence of neo-life (1959b, 250). In laboratories, life is becoming technologically reproducible. For Teilhard, all this is not *due to* us, and his views should not be considered as anthropocentric. Rather, something has come *over* us, realising itself *through* us, something akin to Hegel's spirit, of which technoscience is the final culmination. What we currently experience is not a situation of human autonomy or mastery, but rather of "excentration," as Teilhard phrases it (1959a, 30), and the unfolding of the noosphere entails the destruction of human egoism and self-centredness (1957, 93). Rather than being the centre of the universe, humans act as carriers or vectors, pointing towards a future which is predictable in outline (1959b, 224). Heredity is now transplanted from the biosphere into the noosphere. Molecular "characters" (such as A, C, G and T, etc.: 226) are entering a new, technological milieu, as passive heredity is assuming a noospheric form. Life is transformed into concepts, and (in vivo) biomolecules transmute into (in silico) symbols (247), so that heredity itself becomes hominised. Again, contemporary humanity represents the point in time when evolution and heredity become conscious of themselves, due to our ability to decipher, transform and rewrite the "characters" of life. Or, as Hegel already phrased it, the spirit is now able to recognise (read, discern, etc.) its own logic in the "noumenal" essence of living nature disclosed by technoscience. Passive, slow and natural evolution is sublated into a conscious, accelerated and systematic global endeavour. The artificial is now carrying on the work of the natural, and the transmission

techniques of a literate culture (i.e., techniques for reading, editing and rewriting libraries of symbolic materials) are superimposed on genetic heredity. Conscious biomedical and moral considerations replace the randomness of natural selection. Life itself has brought into the world a power capable of criticising and improving it, and we are now awakening to the idea of a proactive, synthetic, humanised idea of evolution. And collective practical intelligence may now use these very technologies of disruption in order to transform technology itself, so that the "laboratories" (1959a, 128, 129) of nature and those of technoscience become reconciled, and technoscience becomes bio-compatible (in dialectical terms: $M_2 \rightarrow M_3$).

Precisely at this point, Teilhard has been criticised for giving in to techno-euphoria. And these critics include another prominent dialectician (a contemporary more or less), namely Jacques Lacan. In his *Écrits*, while explicitly referring to Teilhard, Lacan argues that humankind has indeed "hominised" the Earth, but first and foremost by *polluting* it (1966, 684). We humans left behind a vast trail of waste and garbage, of high-tech excrements, everywhere we went. How could Teilhard, a palaeontologist, in his optimism forget this? Moreover, now that the tiny symbols, the little characters and equations of quantum physics and molecular biology indeed allow us to manipulate nature, and even to enter the wider universe (via spacecraft), its Pascal-like immensity and silence no longer frighten us, seeing that we have begun to drop our garbage (our *noo-debris*) there as well. Indeed, the ability to ruin the earth, to destroy all life forms, including human life itself, would be a real "triumph," a real testimony of human "superiority" over other life forms (Lacan 2005, 75).

But Teilhard's response to this type of criticism is that, precisely in order to move away from the disruptive negativity of technology (M_2), we must develop a form of "hyper-consciousness" and "hyper-technology" (M_3). Without collective, concerted, planetary action, the negativity of rampant, unleashed technology will indeed increasingly disrupt both the geosphere ("climate") and the biosphere ("biodiversity"), so that planet earth will run aground in tensions, contradictions and frustrations (M_2), a situation which must definitely be sublated. But this requires significant transitions on the side of the "spirit," the "noosphere" as well. Research and reflection must become organised on a planetary and, indeed, industrial scale (where laboratories become factories and vice versa), via processes of global super-organisation (1959b, 283; 1959a, 145, 152) and collectivisation (1959a, 218, 290), or even "collective cerebralisation" (1965, 202), involving networks (e.g., the Internet) which turn abiotic matter into thinking systems (1959b, 251) and in which human brains (the final product of evolution) become increas-

ingly entangled (1959a, 105). The noosphere must evolve into a global network, a collective memory and intelligence of humankind, a spherical thinking circuit, a "brain composed of brains" (1959a, 134), enabling distributed, transdisciplinary forms of analysis and synthesis, in order to live up to the requirements of the future. We are pushing and pushed forward, towards a superior, collective form of intelligence, a new conceptual reality of pan-human discovery, reflection and intervention, bent on reconciling technoscience and nature on a higher level of complexity, and involving global humanity as a whole: a truly *opus humanum* (1959a, 31). The noosphere, Teilhard predicts, will converge into a single system, a collective, planetary, electronic "super-consciousness" (1959a, 95; 1959b, 251).

There will be new risks involved in this no doubt, such as the risk of being overwhelmed by a superabundance of knowledge, by an explosive acceleration of noogenesis, which relentlessly moves in a direction which is juxtaposed to entropy (1959a, 93) and is now curving upwards towards "hyper-reflection" (1959b, 259). And here, Teilhard's vision again takes a Hegelian turn, arguing that, instead of being at the mercy of our limited anthropocentric resources, the "spirit" will provide guidance to our irreversible ascent (1959b, 273) towards illumination and convergence (of research and thinking). In the "nadir" of the crisis, we sense a possibility of escape. Under the sway of the spirit, we may proceed, spiralling towards the Omega point, the "supreme synthesis" (1959a, 140), the final moment of convergence, reconciliation and unification (i.e., Teilhard's version of the Hegelian dialectics of the spirit), where God and evolution no longer constitute two antagonistic centres of attraction (M_2), but rather enter into conjunction (M_3) (1959a, 94). In other words, towards the final act of the global drama, Teilhard's thinking becomes increasingly theo-compatible and theo-logical. Let us have a closer look.

8. The Omega Point and the Wager

How to understand (and make) this final leap towards convergence, planetary reflection and action ($\rightarrow M_3$)? Teilhard, the veteran from the trenches, refuses to put his faith in human politics alone. He sees existing political ideologies as inadequate or even disruptive (M_2). They either focus excessively on individual self-interest (liberalism), or endorse a top-down statist understanding of collective action (reducing human beings to human resources, as in capitalism and communism), while the third alternative (fascism) is guided by Neolithic-agricultural ideals (albeit blending its nostalgia with hyper-technological futurism: 1965, 82). Teilhard was a strong supporter of bodies such as the United Nations and UNES-

CO (1959a, 292) as exemplifications of post-political politics, taking us beyond national and ideological divides: a "negation" of politics in the traditional sense, and a "sublation" of politics towards action and reflection on a planetary scale. But again, even such global, "Areopagus-like" councils are in need of spiritual guidance from elsewhere, in order to avoid becoming mere instruments in the hands of particular ideologies, interest groups or blocs. For Teilhard, politics as such is destined to remain imprisoned within a constrained horizon. Or, as Heidegger once phrases it (his final words more or less): only a God can save us. Compared to Hegel, Teilhard's thinking reflects the era of existentialism, emphasising the chaos: the absurdism of the real, which also infects human activity, thereby articulating a loss of self-confidence, engendered by the trauma of the trenches and similar collective experiences. Therefore, for Teilhard, the leap into a post-traumatic socio-cultural constellation would be unthinkable without the support and guidance of the Other, *drawing* us into this future, and for the catholic thinker Teilhard this Other is Christ.

Like Hegel's dialectics, Teilhard's conic topology (seeing history as a cone-shaped structure spiralling towards the Omega point, in a direction juxtaposed to entropic dissipation, 1957, 136) is decidedly religious. After pre-modern geocentrism (M_1) and modern anthropocentrism (M_2) we now recognise, Teilhard argues, that the dynamics of life and history displays a conic structure (M_3) (1959a, 101). But in order to be able to make the final leap and steer away from the "abys" (1957, 188) of catastrophic destruction, this "cone" of history (1965, 56, 62) must be *pulled* in the right direction ($M_2 \rightarrow M_3$), towards the Omega point: the "end," the fulfilment (πλήρωμα) of evolutionary history and the beginning of a new era (καινός) of convergence, with the unsettling (anthropocenic) present as a critical transition stage. Whereas modern science focussed on "analysis" (i.e., breaking down natural entities into elementary particles of life and matter), faith is basically about "synthesis" (1965, 45), eventually giving rise to a veritable "synthesis of the spirit" (1965, 59). But this requires guidance provided by Something or rather: Someone.

In a secular, postmodern, neoliberal ambiance, most readers (notably academic readers) will feel uncomfortable with the decidedly religious fervour of Teilhard's thinking. Science and philosophy claim to have emancipated themselves from religious creeds (even if the vast majority of the six billion human inhabitants of planet Earth consider themselves as religious). But here again, Teilhard argues that, also where science and religion are concerned, integration or reconciliation must be strived for. While in the past we have indeed moved from a theocentric

worldview (M_1) towards a techno-scientific one (M_2), seeing science and religion as opposites, the Omega point involves a sublation of the science-religion divide as well ($M_2 \rightarrow M_3$), so that science and religion increasingly absorb one another. During the second moment of this dialectical process, modernism and Enlightenment evolved (or degraded if you like) into neo-liberalism, postmodernism and technocracy: the symptomatic ideological "super-structure" of the current crisis. But when it comes to moving away from the Anthropocene towards the Omega point,[5] a radically different constellation is needed. And here Teilhard invokes one of the highlights of the debate between religious faith and scientific rationality, namely Pascal's famous "wager."

On the one hand, Teilhard argues, we see scepticism, pessimism, alarmism and defeatism among those who refuse to believe in sublation as an option, and who continue to see progress as a myth (1959b, 232). But for Teilhard, this is unacceptable because it would mean that all spiritual momentum would virtually be brought to a stop. The impetus of culture would disintegrate into nausea and revolt. On the other side, there are those who, while having experienced "the sickness that disquiets us" (232), nonetheless believe in the possibility of transformation. For them, a way out, an opening exists, the sublation of solitary thinking into the emergence of a trans-personal "super-soul" (233). Between these two alternatives (of "absolute optimism" versus "absolute pessimism") there is no middle way. There are only two directions, one upward and one downward, like in Pascal's wager: all or nothing. We *must* choose, we cannot refrain from choosing, for we are already in the game.[6] What will we decide? Although a turn for the better may seem highly improbable in the current situation of disruption, it becomes a probability once we consider the possibility of spiritual guidance. For Teilhard, moreover, the leap forward, out of the current crisis, would not be the first "improbable event" in the history of life (1959a,86; cf. De Duve 2002, 173). What is more, we cannot afford *not* to move in this direction. While the negative option will certainly lead to failure, the positive option (improbable as it may seem) may nonetheless succeed, and therefore must be waged. This means that Teilhard would definitely support climate summits for instance, such as the 2015 Paris climate conference, as efforts to build a global consensus, and as moments of convergence of politics and research, but at the same time he would argue that such initiatives must be regarded as preparatory exercises, for the drastic transitions that are required of us (to stop world-wide ecological disruption and sublate current practices into the radically sustainable future of "neo-time": 1959a, 103), will involve a collective experience of global conversion,[7] the emergence of a new form of consciousness, a trans-

mutation of the general structure of the "spirit" (1965, 170). Not coincidentally, Pope Francis (a significant voice in the current discursive landscape) endorses and conveys a Teilhardian view in his campaign against the destruction of the global environment, which has turned the planet into a "polluted wasteland full of debris, desolation and filth" (*The Guardian*, September 1 2016). Only re-spiritualisation on a global scale (as a final sublation or synthesis) can overcome human deficiency and lack (1959b, 253). This cannot be brought about by rationality, diplomacy and (enlightened) self-interest alone.

9. Conclusion

According to Hegel, laboratory science (emerging around 1800) failed to comprehend planet Earth as a holistic process, a metabolic, geophysical system. In the current era, the drive towards reductionism seems sublated into scientific appreciations of complexity. But precisely now, we realise that a new factor has pervaded the outdoors mega-laboratories of global nature. The radicalisation of techno-scientific negativity has unleashed a global process of disruption. And in its efforts to monitor the evolving cataclysm (climate change, loss of biodiversity, ecological disruption, etc.), the spirit of technoscience is actually monitoring (the impacts of) its own activities. Now that we are heading towards the nadir of negativity (in terms of socio-ecological devastation and mass extinction), the possibility of a spiritual turn or pull towards synthesis and sublation may seem more inconceivable than ever. But rather than bemoaning the present or seeing ourselves (misanthropically and self-derogatorily) as a barrier to change, dialectics spurs us to play an active and dialectically-informed role, in a post-egocentric fashion. In terms of Kant's third question, this is what we may hope.

The *United Nations Climate Change Conference* (aptly referred to as climate "summit") held in Paris in 2015 (two centuries after Waterloo), exemplifies this dynamics, as a moment of convergence and gathering on the international political level which inevitably provoked its 'negative,' its counter-acting contradiction, notably in the form of the recent Executive Order issued by President Trump (on March 29, 2017), which was subsequently countered by the State of California, using this Presidential pass as an occasion to position itself as the fifth economy in the world, but primarily as *the* place on the planet where climate hope materialises into technoscience, to paraphrase Friedrich Engels (1880; cf. Zwart 2009): the negation of the negation. It is the ambition of dialectics to discern the deeper logic spiralling in this game of contradictions.

In order to break the cycle of negativity and inadequacy, we must sublate destruction and contradiction (between technology and nature, ego-centricity and globalisation, science and religion: M_2) and work towards reconciliation, on three levels. First of all (a), after disclosing the noumenal, biomolecular essence of life, technology must now become decidedly bio-mimetic and biocompatible (Zwart, Krabbenborg and Zwier 2015; Blok and Gremmen 2016). Subsequently (b), reflection itself must become increasingly distributed and collective (rather than solitary, as in the Hegel era), building on electronic networks (the Internet, for instance, as a global Areopagus). And finally (c), both Hegel and Teilhard argue that a reconciliation of rationalism and spirituality must be part of this endeavour as well. From a dialectical perspective, the Anthropocene constitutes a transitory crisis which must be sublated into the *noocene*, i.e., the era of the intellect or spirit, transcending the inadequacies and biases of restricted, anthropocentric strategies, seeing human activities and experiences as part of a broader global movement of life itself towards a new plateau, and regarding the Anthropocene as the *end* rather than as the hubristic *climax* of anthropocentrism.

This is the new "spirit" of history, emerging in the present socio-cultural and ecological constellation. Like the concept of "autonomy" (coined for the first time in the tragedy *Antigone*) had to *realise* itself in history, the concept of "responsibility" (articulated by Jonas and others) must actively realise itself as well, notably on the collective and global level. And whereas the modern human striving for autonomy became increasingly haunted by the alterity of nature (revealing the ecological constraints imposed on human emancipation), responsibility purports to reconcile both dimensions by advocating forms of progress which promote sensitivity to and compatibility with natural dynamics. But dialectics does not imply the complete absorption of the biosphere by the noosphere. Remember that also the biosphere itself far from entails a complete absorption of the abiotic geosphere either. Life is not completely able to sublate or incorporate the chemical mayhem of its surrounding (the abiotic real) into the web of life. Rather the geosphere (albeit affected by the biosphere) continues to persist, and the same goes for the (partial) absorption of biosphere and geosphere by the noosphere. This is for instance reflected in the well-known mind-body problem: while becoming a noospheric species (thereby representing a transition, a leap: a moment of awakening as Teilhard phrases it) we nonetheless remain a biological species as well, so that alterity, otherness, recalcitrance, entropic brittle, debris, frictions, etc. continue to exist. The noosphere likewise emerges as a web-like constellation, and otherness will never be completely incorporation and transformed by it. The nooscene does

not imply a complete *Aufhebung* of alterity, and they will continue to co-evolve. The term responsibility implies the ability to *respond* to a critical situation that is *addressing* us, probing our readiness to respond to the summons (coming from the Other) to become part of the future, or part of the debris. In the latter case our role in the dialectical process would be "finished." And indeed, if we fail to become part of the turn we may eventually subtract ourselves from the moral equation, so that biosphere and noosphere evolve in the absence of humans.

Notes

1. οὐδὲν ἀνθρώπου δεινότερον πέλει ("Nothing more unsettling than humankind"; Antigone V. 334; Hegel 1970, 13).

2. "Sublation" is the usual translation of the Hegelian concept *Aufhebung* (= to take up, to reconcile, to abolishing the contradiction).

3. Medawar's polemical review (1961) notably tries to ridicule Teilhard's "tipsy-euphoric prose-poetry," written "in the tradition of German Natur-philosophie" which, according to Medawar, "failed to contribute anything of permanent value to the storehouse of human thought" (99).

4. Compared to Hegel's objective spirit, the noosphere concept emphasises the technicity, materiality and globalism of the emerging networks. Compared to the *technosphere* concept (the non-anthropocentric view that technology is a quasi-autonomous global phenomenon that follows its own dynamics and represents a new paradigm of Earth history: technology as the next biology, Haff 2013), the noosphere puts more emphasis on thinking and spirituality.

5. Representing human individuals as *i* results in a Teilhardian dialectical matheme: $i \rightarrow \Omega$ (1959a, 83).

6. Or as Teilhard phrases it elsewhere: no one can afford to remain indifferent towards the changes which are already taking place in the apparent calm of our laboratories (1965, 170).

7. Cf. Peter Sloterdijk who, in the final lines of *You must change your life*, advocates the development of a global, planetary, incorporating, network-like macro-structure, so that the current helpless planetary amalgam becomes a robust unity, taking over the role previously played by world religions, while humanity becomes a political concept (2009, 713).

References

Aristotle. 1980. *Physics*. The Loeb Classical Library. Cambridge, MA: Harvard University Press.

Baldwin, James Mark. 1896. "A New Factor in Evolution." *The American Naturalist* 30(354): 441–51. https://doi.org/10.1086/276408

Barlow, John. 1992. "The Great Work." *Electronic Frontier Column in Communications of the ACM*. https://w2.eff.org/Misc/Publications/John_Perry_Barlow/HTML/complete_acm_columns.html.

Blok, Vincent. 2014. "Reconnecting with Nature in the Age of Technology: The Heidegger and Radical Environmentalism Debate Revisited." *Environmental Philosophy* 11(2): 307–32. https//:doi.org/10.5840/envirophil20149913

Blok, Vincent, and Bart Gremmen. 2016. "Ecological Innovation: Biomimicry as a New Way of Thinking and Acting Ecologically." *Journal of Agricultural and Environmental Ethics* 29: 203–17. https//:doi.org/10.1007/s10806-015-9596-1

Boldyrev, Ivan, and Carsten Herrmann-Pillath. 2013. "Hegel's Objective Spirit, Extended Mind, and the Institutional Nature of Economic Action." *Mind and Society* 12(2): 177–202. https//:doi.org/10.1007/s11299-012-0111-3

Cobb, Jennifer. 1998. *Cybergrace: the Search for God in the Digital World*. New York: Crown.

Crutzen, Paul. 2002. "Geology of Mankind." *Nature* 415: 23. https://doi.org/10.1038/415023a

Delio, Ilia. 2014. "Teilhard de Chardin's Ultrahumanist Worldview." In *Humanity on the Threshold: Religious Perspectives on Transhumanism*. Christian Philosophical Studies VI, ed. John C. Haughey, 77–96. Washington, DC: The Council for Research in Values and Philosophy.

Duve, Christian de. 2002. *Life Evolving: Molecules, Mind and Meaning*. Oxford: Oxford University Press.

Engels, Friedrich. 1880. "Die Entwicklung des Sozialismus von der Utopie zur Wissenschaft." In Karls Marx and Friedrich Engels. *Werke*, Band 19 (1875–1883), 177–228. Berlin: Dietz Verlag.

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

Garreau, Joel. 2005. *Radical Evolution: The Promise and Peril of Enhancing our Minds, our Bodies—and What It Means to be Human*. New York: Broadway Books.

Greenfield, Susan. 2014. *Mind Change: How Digital Technologies are Leaving Their Mark on our Brains*. London: Rider.

Haff, Peter K. 2013. "Technology as a Geological Phenomenon: Implications for Human Well-Being." In *A Strati-graphical Basis for the Anthropocene*, ed. C. N. Waters, J. A. Zalasiewicz, M. Williams, M. A. Ellis, and A. Snelling. Special Publications, 395. London: Geological Society. https://doi.org/10.1144/SP395.4

Hamilton, Clive, Christophe Bonneuil, and François Gemenne, eds. 2015. *The Anthropocene and the Global Environmental Crisis*. London: Routledge.

Hamilton, Clive, and Jacques Grinevald. 2015. "Was the Anthropocene Anticipated?" *The Anthropocene Review* 2(1): 59–72. https://doi.org/10.1177/2053019614567155

Hegel, Georg Wilhelm Friedrich. (1830) 1970. *Enzyklopädie der philosophischen Wissenschaften im Grundrisse II: Die Naturphilosophie mit den mündlichen Zusätzen*. Werke 9. Frankfurt am Main: Suhrkamp.

Houlgate, Stephen. 2005. *An Introduction to Hegel: Freedom, Truth and History*. Oxford: Blackwell.

King, Ursula. 2006. "One Planet, One Spirit: Searching for an Ecologically Balanced Spirituality." In *Pierre Teilhard de Chardin on People and Planet*, ed. Celia Deane-Drummond, 74–95. London: Equinox.

Lacan, Jacques. 1966. *Écrits*. Paris: Éditions du Seuil.

Lacan, Jacques. (1969–1970) 1991. *Le séminaire XVII: L'envers de la psychanalyse*. Paris: Éditions du Seuil.

Lacan, Jacques. (1974) 2005. *Le triomphe de la religion. Précédé de discours aux catholiques*. Paris: Éditions du Seuil.

Lemmens, Pieter. 2015. "Philosophy of Technology in the Age of the Anthropocene. Theorizing and Imagining the Emerging Geo-Technological Condition." https://radboud.academia.edu/PieterLemmens.

Lemmens, Pieter, and Yuk Hui. 2017. "Apocalypse Now! Peter Sloterdijk and Bernard Stiegler on the Anthropocene." *Boundary* 2 (16 January 2017). http://www.boundary2.org/2017/01/pieter-lemmens-and-yuk-hui-apocalypse-now-peter-sloterdijk-and-bernard-stiegler-on-the-Anthropocene/.

McLuhan, Marshall. 1962. *The Gutenberg Galaxy: The Making of Typographic Man*. Toronto: University of Toronto Press.

Malabou, Catherine. 2005. *The Future of Hegel: Plasticity, Temporality and Dialectic*, trans. Lisabeth During. New York: Routledge.

Mansfield, Nick. 2008. "'There Is a Spectre Haunting . . .': Ghosts, Their Bodies, Some Philosophers, a Novel and the Cultural Politics of Climate Change." *Borderlands* 7(1). http://www.borderlands.net.au/vol7no1_2008/mansfield_climate.htm.

Medawar, Peter. 1961. "Review of Teilhard de Chardin's *The Phenomenon of Man*." *Mind* 70: 99–105. https://doi.org/10.1093/mind/LXX.277.99

Morton, Timothy. 2012. "The Oedipal Logic of Ecological Awareness." *Environmental Humanities* 1: 7–21. https://doi.org/10.1215/22011919-3609949

Schwägerl, Christian. 2014. *Anthropocene: A New Planet Shaped by Humans*. Santa Fe, NM: Synergetic Press.

Sloterdijk, Peter. 2009. *Du mußt dein Leben ändern: Über Anthropotechnik*. Frankfurt am Main: Suhrkamp.

Steffen Will, Jacques Grinevald, Paul Crutzen, and John McNeill. 2011. "The Anthropocene: Conceptual and Historical Perspectives." *Philosophical Transactions of the Royal Society A* 369: 842–67. https://doi.org/10.1098/rsta.2010.0327

Steinhart, Eric. 2008. "Teilhard de Chardin and Transhumanism." *Journal of Evolution and Technology* 20(1): 22.

Stock, Gregory. 1993. *Metaman: The Merging of Humans and Machines into a Global Superorganism*. New York: Simon & Schuster.

Teilhard de Chardin, Pierre. 1957. *Le Milieu Divin: Essai de Vie Intérieure*. Œuvres 4. Paris: Editions du Seuil.

Teilhard de Chardin, Pierre. 1959a. *L'avenir de l'homme*. Paris: Éditions du Seuil.

Teilhard de Chardin, Pierre. (1955) 1959b. *The Phenomenon of Man*, trans. Bernard Wall. New York: Harper.

Teilhard de Chardin, Pierre. 1965. *Science et Christ*. Œuvres 9. Paris: Éditions du Seuil.

Wandschneider, Dieter. 2002. "Hegel und die Evolution." In *Hegel und die Lebenswissenschaften*, ed. Olaf Breidbach and Dietrich von Engelhardt, 225–40. Berlin: VWB.

Žižek, Slavoj. (2006) 2009. *The Parallax View*. Cambridge, MA: MIT Press.

Žižek, Slavoj. 2010. *Living in the End Times*. London: Verso.

Zwart, Hub. 2009. "From Utopia to Science: Challenges of Personalised Genomics Information for Health Management and Health Enhancement." *Medicine Studies* 1(2): 155–66. https://doi.org/10.1007/s12376-009-0013-9

Zwart, Hub. 2016. "What Comes Next? A Teilhardian View on Cosmogenesis." In *Evolution and Transitions in Complexity: The Science of Hierarchical Organisation in Nature*, ed. Gerard Jagers, 253–58. Dordrecht: Springer. https://doi.org/10.1007/978-3-319-43802-3_17

Zwart, Hub. 2017. "The Oblique Perspective: Philosophical Diagnostics of Contemporary Life Sciences Research." *Life Sciences, Society and Policy* 13(4). https://lsspjournal.springeropen.com/articles/10.1186/s40504-017-0047-9. https://doi.org/10.1186/s40504-017-0047-9

Zwart, Hub, Lotte Krabbenborg, and Jochem Zwier. 2015. "Is Dandelion Rubber More Natural? Naturalness, Biotechnology and the Transition towards a Bio-Based Society." *Journal of Environmental and Agricultural Ethics* 28: 313–34. https//:doi.org/10.1007/s10806-015-9536-0

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 199–221 DOI: 10.5840/techne201772166

The Question Concerning Geo-Engineering

Byron Williston

Abstract: The Anthropocene, as we encounter it now, is the age in which we can no longer avoid postnaturalism, that is, a view of the 'environment' as largely 'built.' This means that we exist in a highly technologically mediated relationship to the rest of the earth system. But because the Anthropocene has barely emerged this time is best thought of as a transition phase between two epochs, i.e., it is 'the end-Holocene.' The end-Holocene is essentially a period of ecological crisis, the most salient manifestation of which is anthropogenic climate change. Given our political inertia, some have suggested that we should we respond to the climate crisis through technological manipulation of the global climate: geoengineering. The proposal raises many questions. The one I am interested in here is whether or not geoengineering represents an objectionable species-level narcissism. Will deployment of these technologies effectively cut us off from contact with anything non-human? This is what I'm calling 'the question concerning geoengineering.' I show how Heidegger's philosophy of technology, especially his concept of 'enframing,' can help us think about the issue with the seriousness it demands.

Key words: geoengineering, end-Holocene, Anthropocene, Heidegger, postnatural, enframing

1. Introduction

Almost all the attention paid by philosophers to geoengineering has concerned its ethical status: is it morally permissible or not to deploy these technologies? This—the problem of justice—is crucial but in this paper I will examine a different, though no less important, question. The very idea of geoengineering—intentional technological manipulation of the global climate—frightens many people because it is plausible to view these schemes as the quintessential expression of

Byron Williston, Department of Philosophy, Wilfrid Laurier University, 75 University Avenue, Waterloo, Ontario, Canada, N2L 3C5; bwilliston@wlu.ca.

our domineering attitude towards nature. Is it really wise to seek control over the entire earth system in this fashion? Will anything non-human be left for us to encounter and wonder at after imposing ourselves on the planet in so imperious a fashion? This is what I'm calling 'the question concerning geoengineering.' As the title indicates, I will address it through the lens of Heidegger's analysis of modern technology. Although it might appear as though Heidegger provides comfort to opponents of geoengineering, I show that there is a more subtle way of interpreting him, a way that might allow for a geoengineering that does not enclose us in a world entirely of our making.

First, however, we need to situate the discussion in the context of debates about the Anthropocene. I do this by analyzing various 'narratives of the Anthropocene' proffered (mainly) by social scientists (section 2). Next, I examine the nature of geoengineering, why some have thought recourse to these technologies will be required in the years to come, and why the debate between boosters and detractors is superficial (section 3). This brings us to Heidegger. Here, I show that in his philosophy of technology, Heidegger anticipates the worries many are now expressing about the Anthropocene. Specifically, he highlights the process by which we are enclosing ourselves in a made world and thus shutting ourselves off to genuine alterity. Heidegger, I claim, both explains what there is to worry about here—namely, that we are reducing how Being is revealed to what can serve our narrowly defined interests, which is one way of forgetting the ontological difference between Being and beings—and provides grounds for hope that geoengineering technologies might avoid this outcome (section 4). I close by addressing a potential objection to my account (section 5).

2. Narratives of the Anthropocene

Even though there are virtually no book length treatments of the Anthropocene by philosophers,[1] there is a distinctly philosophical issue in the burgeoning social scientific literature about it. The issue has to do with competing visions of what the Anthropocene *is*, many of which take the form of 'narratives' of the new epoch. Christophe Bonneuil for example argues that there are at least four dominant narratives of the Anthropocene. The first is the Naturalist, which focuses on the specific groupings of humans over the ages, from hunter-gatherer to "global geological force" (Bonneuil 2015, 19).[2] The key here is that the species is viewed homogeneously, a point picked up by critics who insist that this type of species-level thinking is "conducive to mystification and political paralysis." (Bonneuil 2015, 21).

The second narrative involves the claim that we have come to the end of nature, a way of thinking which allegedly "shares the Promethean tropes" of the first narrative (Bonneuil 2015, 24). This has sometimes been characterized as 'The Good Anthropocene' because its proponents tend to be quite optimistic about technology's promise to get us through the various storms we are likely to face in the near future.[3] This is thus a view that is held to both deny "alterity" in nature and "intensif[y] and accelerates modernity" (Bonneuil 2015, 26). Third, there is the narrative of eco-catastrophe, according to which we are moving towards "tipping points, collapse, violence, and wars" (Bonneuil 2015, 27). Although he is difficult to pin down, at times Timothy Morton seems to fit this description (see, for example, Morton 2013). The fourth narrative is the eco-Marxist. Here, capitalism is exposed as waging a kind of 'war' on nature (Foster, York, and Clark 2011). The eco-Marxist narrative is often set in direct opposition to the homogenizing tendencies of the Naturalist. The Anthropocene is thus a misnomer: the new epoch should be called the Capitalocene or the Technocene because, as Alf Hornborg puts the point, "the uneven distribution of modern, fossil fuel technology is in fact a condition for its very existence" (Hornborg 2015, 60; see also Foster, York, and Clark 2011; Moore 2015.).

Bonneuil's explicit point in putting together this catalogue of narratives, which is not meant to be exhaustive,[4] has been to remind us of the "black boxes of the Anthropocene discourse," an intervention that he hopes will ultimately "re-politicise" our discussions of this issue (Bonneuil 2015, 29). He leaves it to others to choose among the options.[5] In my view, it is crucial at this stage precisely to resist this temptation, at least with respect to the proffered alternatives. The narrative approach to the Anthropocene is itself probably unavoidable.[6] This is because we are now being asked to think in deep time, to somehow place our present selves in an immensely expansive chronological order. For instance, we can now say that looking in one temporal direction the climate we are in the process of creating has not been seen on earth for tens of millions of years, while looking in the other temporal direction this very fact will alter the earthsystem for at least the next 100,000 years (Stager 2011).

What could it even mean to choose *an* appropriate narrative here? Because it is a way of structuring a whole—an individual life, a family's or nation's history, etc.—constructing a narrative demands that we possess a relatively well-circumscribed understanding both of the temporal boundaries in which we are interested and the salient facts or data points within those boundaries. This means that prior to the formal construction of the narrative, we have reasonably reliable epistemic

access to a coherent picture of the relevant temporal whole even if the construction of the narrative itself is required to bring the detail perspicuously to the light.

Given the various forms they can take, we can be ecumenical here about what counts as a narrative. To take a few examples, a thorough historical narrative of a past economic recession will need access to records of specific policy decisions, economic analyses and testimonials; a convincing fictional narrative may need to draw on plausible psycho-causal claims about how certain events in early childhood played a decisive role in, say, the formation of a character's adult neuroses; a genuinely inspiring political manifesto must make connections between the way the world is now and the way it both should be and will be given the right sort of social push. And so on.

I don't think we have anything analogous to these kinds of structures in the case at hand, *the* narrative of the Anthropocene. Bonneuil's options are all, in their ways, surely correct. It is true to say that the Anthropocene forces species-level thinking on us, that our way through the crises we face will involve a more determined engagement with technology, that if we persist in our political inertia we will invite catastrophe, and that the whole thing would not have taken the form it has without the mediation of neoliberal capitalism in the age of fossil fuels.

The Anthropocene is, so far, too amorphous a phenomenon to answer to any one of these descriptions. We need all of them and more besides and, again, this is chiefly because we have no satisfyingly bounded concept with which to work here. To clarify, the claim is *not* that we should be skeptical about the discoveries that much of the stock of greenhouse gases we are placing in the atmosphere will still be wreaking havoc on the climate in 100,000 years, or that the average temperature increases with which we are flirting will take the planet back to the Eocene. Rather, what I am claiming is that we currently have no idea how *we* fit into this newly proposed chronological order. That's the main point of contrast between the three examples of narrative just sketched on the one hand and the fully-fledged phenomenon of the Anthropocene on the other.[7]

Insofar as it emphasizes the need to simply live patiently with a diversity of competing interpretations, the suggestion just offered can inspire philosophical frustration. But there's a way out of this impasse. In his recent history of the Anthropocene, Jeremy Davies has argued that it is best to think of the new epoch, as we encounter it now, not as something fully formed but rather as a transitional phase (Davies 2016). This is why his book is called *The Birth of the Anthropocene*. He is telling the history of the very beginning of this phenomenon. But of course any such history is bound to involve substantive reflection on that from which the

new is emerging, the thing that is in its death throes as it were. With respect to *that* thing—the expiring thing, in this case the climatically stable Holocene—it is surely appropriate to invite the Owl of Minerva's flight.

In my view it makes little sense at this point to attempt to pick out the essential properties of the Anthropocene, and if a large part of philosophy's task just is the attempt to pick out essential properties of entities then we must conclude that it is too early to philosophize about the Anthropocene. But it is entirely appropriate to philosophize about what Davies calls the 'end-Holocene' because we know quite a bit about the Holocene itself.[8] After all, we have been thinking about the nature of Agricultural/Industrial civilization for some time. And so we can now see some of the problems we face precisely as intensifications or culminations of forces that have been operating for centuries or even millennia. The end Holocene has at least three features that advocates of the various narratives just canvassed should all really agree on. Indeed, I would suggest that consent to these three features is something of a litmus test for reasonable views about the Anthropocene qua end-Holocene.

First, the end-Holocene is an age of crisis, at least in its present manifestation or stage. Announcing that we are in the Anthropocene amounts to noticing that the earth system has been destabilized anthropogenically, in a way or to a degree that will pose profound challenges for humanity as well as many non-human species. Second, the signal epistemic mark of the times is uncertainty about how the future will go. Two features of this uncertainty stand out: it is deep and risky, to the point—often—that the key decisions we and, especially, our successors must make will be best characterized as tragic or even absurd choices; and it is theoretically pervasive, affecting science and economics no less than philosophy.[9] Third, we humans are, I will urge, essentially technological entities whose environment is already largely built. In other words, my understanding of the end-Holocene is meant to align with the recent 'postnatural' environmental philosophies—which together encompass ontology, ethics and politics—of thinkers like Bruno Latour (1993), Braden Allenby and Daniel Sarewitz (2011), Andrew Biro (2005), Steven Vogel (2015), Simon Hailwood (2015), and Jedediah Purdy (2015).

This third claim requires more analysis. It has been said that crisis phenomena like climate change and the sixth mass extinction have effectively killed 'nature.' The 'death of nature' thesis was first put forward by Bill McKibben (1989) and has been philosophically elaborated and defended most recently by Vogel (2015). A prominent way of conceiving of 'nature' in contemporary philosophy and culture is that it is something 'external' to humans, that it functions 'independently'

of our aims and interests, that it is 'untouched' by humans, that it is 'separate' from human society, and so on (Katz 1997). McKibben for example says that we have come, rightly, to *define* nature as that which is independent of us (quoted in Vogel 2015, 9). Of course, these are also, and perhaps more frequently, the ways in which we refer to 'wilderness,' which is often simply equated with 'nature' (or we get the pleonasm, 'wild nature'). And the invocation usually comes positively charged: nature or the wild is seen as that which is unspoiled and which is, as such, supposed to provide some sort of normative standard for us.[10]

Let's note three points about this conception. First, the crisis phenomena make it difficult to see how there could any longer *be* something independent of the human. For instance, because anthropogenic climate change has already raised average global temperatures by about 1° C relative to the pre-industrial baseline, there is now not a single square centimeter of the planet that has not been affected by the changes this has wrought, however subtle such changes may be in many cases. So a *comprehensive* explanation of why anything in the biosphere behaves the way it does—minute adjustments in the migratory paths of Arctic warblers, small increases in the beetle populations of temperate conifer forests, the barely perceptible thinning of the calcified exoskeleton of coccolithophores in the Indian Ocean, and so on—must make reference to anthropogenic causes.

Second, Vogel argues that the concept of nature is ambiguous in writers like McKibben. The concept has two possible meanings, which Vogel labels 'Nature' and 'nature.' Nature (upper case) refers to everything that is, while nature (lower case) refers to that which is independent of the human. The opposite of 'Natural' is 'supernatural' and the opposite of 'natural' is 'artificial.' Think of this in terms of the positive charge I was just talking about. Sometimes it is said that the problem with contemporary humanity is that we are 'estranged' from nature or the wild and this estrangement is what has allowed for such widespread environmental devastation (note the phenomenon of 'nature deficit disorder,' for instance).

But what could this mean? We cannot be estranged from Nature because what we do, even the environmentally destructive stuff, is part of everything that is (Vogel 2015, 12). Nor, however, does it make much sense to *complain* about our estrangement from nature if the latter is defined as the nonhuman. For Vogel it follows that when we do environmental politics, we need to clarify our relationship to our environment with a single category of being: *the built environment*. This is an ontologically undifferentiated field encompassing the insides of our bodies, our urban architectural forms, the Eastern Siberian taiga, the stratosphere, and all

points in between. In the end-Holocene humanity is effectively everywhere and this means that our technology is effectively everywhere.

This brings me to the third point, best taken as a caveat to what has just been argued. I have been saying that according to the postnaturalist the environment is 'largely' built, not 'entirely' built. From the fact that a *comprehensive explanation* of natural phenomena must make some reference to anthropogenic forces it does not follow that only such forces are explanatorily important, or even that they are always going to be relevant to our understanding of some natural phenomenon. The fact that the migratory patterns of the Artic warbler have been perturbed by global warming is irrelevant to a whole array of interesting micro-questions about the way this species goes about its business: how it metabolizes food, keeps itself warm, protects its young, and so on. A plausible post-naturalism will deny none of this. It will be crucial to bear this point in mind in the context of our discussion of auto-poeisis, in section 4.

We need to ask some very basic questions about what it means to be human in such a postnatural landscape. This task sounds daunting but perhaps we can approach it more confidently by narrowing our critical gaze. If the signature crisis event of the end-Holocene is climate change—and together with the sixth mass extinction (which is itself in large part an effect of climate change) it surely *is*—then its signature 'ameliorative' technology is geoengineering. So far, this is a claim only about how this technology is understood among a broad swath of engineers and policy makers. Before endorsing it we must examine it more critically.

3. Geoengineering in the end-Holocene

According to the influential Royal Society Report on the topic, geoengineering can be defined as "the deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change" (Shepard et al. 2009, 1). The idea has gained considerable traction in policy circles recently. Indeed, in its most recent (2014) report the Intergovernmental Panel on Climate Change (IPCC) has, for the first time, provided a synthesis and assessment of the current literature on this topic.

Geoengineering comes in two broad forms. The first aims to remove carbon from the atmosphere. This includes enhanced biochar production, reforestation, iron filings in the oceans, direct removal of carbon from the atmosphere, and so on. The second is solar radiation management, or albedo modification, the attempt to increase the planet's capacity to reflect sunlight. This category includes mirrors in space, injection of sulfate particles in the stratosphere and cloud seeding. How

we assess geoengineering as a practice will depend on which of these technologies we are talking about. As the U.S. Academy of Sciences points out, in general carbon removal techniques are less risky than albedo modification techniques (see Romm 2016, 165). However, they are problematic for other reasons. For example, to reforest the planet on the scale required would put acute pressure on agricultural land use. Meanwhile, the idea of sucking carbon out of the air is pure fantasy at this stage and it is hard to see how the biochar option—itself quite benign—can be scaled-up adequately.

By contrast, albedo modification appears to be a relatively cheap and technically feasible set of options, so in this paper I will assume that this is the sort of intervention—especially stratospheric sulfate injection—that is most likely to be adopted if any is. But surely there are alternatives to this sort of large-scale manipulation of planetary systems.[11] Biomimicry, for example, seeks to learn lessons from nature at the micro-scale and apply them to our own problems.[12] For example, we might better learn how to keep our buildings cool by studying the way termite colonies keep internal temperatures relatively low for the structure's inhabitants. This way of seeing things might encourage us to seek out lots of small solutions to our problems rather than just a few big ones. It might, for instance, encourage us to develop distributed energy systems based on renewables.

There are two issues here. First, it is important to note that some geoengineering techniques are themselves examples of biomimicry. The idea of loading the stratosphere with sulphates, for example, was inspired to some degree by noticing that average global temperatures dropped after the eruption of Mount Pinatubo in 1991, so that it is now common to think of this technique as creating 'artificial volcanoes.' The same is true of artificially enhancing biochar production or marine photosynthesis, both of which are aimed at mimicking processes we have noticed going on all by themselves in nature. If some geoengineering schemes are forms of biomimicry, then the latter is not an *alternative* to the former.

The second and more pivotal issue concerns scale. Can small-scale technologies help us avoid climate catastrophe? In my view, although we should be devoting far more of our resources into developing them, renewable energy sources are unlikely to be scaled up in time to avert disaster. At the scale required to meet the world's energy demands these are technologies for the middle and farther futures. We should begin switching aggressively to them now (on the model of Germany), but also recognize that the relevant data here are daunting. Almost all of our energy—about 87 percent—still comes from fossil fuels, the remaining 13 percent split among nuclear, hydroelectric, solar and wind (Gardiner and Weis-

bach 2016, 182). This means that we are in the very early stages of the required energy transition.

The best way to estimate how long it will take to complete it is to compare it to previous transitions from one dominant energy source to another. According to David Weisbach, the transition from biomass to coal took approximately 130 years while the transition from coal to oil and gas took about eighty years. (Gardiner and Weisbach 2016, 183). The reason we should not be naïve about improving on these timeframes is that we continue to build fossil fuel infrastructure, effectively locking in the present regime for generations.[13] But a recent study shows that if we are to remain below 2° C, 80 percent of the world's coal, 35 percent of its oil, and 50 percent of its gas need to remain in the ground (McGlade and Ekins 2015).[14]

There is therefore nothing at all hyperbolic in saying that we are currently sleepwalking into a situation of civilization-threatening social and political chaos and that we need to think hard about how to ameliorate the worst impacts of climate change. This stark set of facts is what has prompted many people to consider the possibility of geoengineering.[15] The way Oliver Morton puts the point is typical of the bluntness one finds in these discussions. Morton argues that there are just two questions to be asked about our current situation. First, "do the risks of climate change merit serious action aimed at lessening them?" Second, is reducing the global economy's reliance on fossil fuels to near zero, as is required to avoid climate catastrophe, going to be "very hard?" (Morton 2015, 1). We are assured that the only rational response to both questions is 'yes.' If we want to avoid climate change-induced disaster, and given our inertia on mitigation, geoengineering is then presented as the only "serious action" remaining to us.

Gardiner has labeled this the "lesser evil" approach to geoengineering (Gardiner 2010; 2011, chap. 10). Obviously geoengineering is risky, but not as risky as the only other alternative—climate disaster brought on by our lingering political inertia—so it is rational to develop and deploy it as required. The policy-driven consequentialist approach to geoengineering rests, however implicitly, on our ability to calculate the likely effects of competing possible outcomes with some confidence.[16] But what is the basis of this confidence? Morton does not neglect to discuss the many dangers of geoengineering: the moral hazard problem, the potential for weaponization, the problem of creeping ocean acidification (if we create a stratospheric veil of sulphates we can continue to burn fossil fuels, which means that the amount of carbon dioxide going into the oceans is increasing), and profound governance issues.

And yet, he appears positively dewy-eyed about the capacity this technology affords us to extend our control of the earth. Indeed, he thinks that it will provide an opportunity "for justice and sympathy to spread out through the human world and into the earthsystem beyond" (Morton 2015, 31). This is surely Prometheanism run amok. Indeed, on this understanding of the issue it is difficult to see why we would refrain from geoengineering the planet even if there were *no* climate crisis. After all, as Morton tells it, "there is a particular appreciation of wonder of the earthsystem that can be gained only by imagining how it could be changed" (Morton 2015, 31). Why wait for a catastrophe if the intellectual gains to be had from this sort of manipulation don't require it?

But if geoengineering were in truth *the* rational response to the climate crisis its defenders make it out to be, then the 'sums'—the tally of harms avoided through the implementation of this or that geoengineering scheme—should show this clearly to be the case. But boosters like Morton never give us the sums. The reason for this omission is simple: although both climate catastrophe and large-scale geoengineering are likely to result in widespread human suffering and damage to the biosphere, we have no precise idea which option will be worse and no idea therefore which of the two is the 'lesser' evil.

But those who are categorically opposed to geoengineering have a similar argumentative burden, which is rarely discharged. Thus Bonneuil and Fressoz, citing the "hundreds of thousands of premature deaths" likely to result from the creation of a cooling veil (while ignoring all the death that climate change will cause), argue that geoengineering is to be rejected as a form of "geopower" that "reifies" the earth as "an object of experimentation and control" (Bonneuil and Fressoz 2015, 91). Similarly, Clive Hamilton (2013) argues that geoengineering is hubristic and dangerous and ought to be abandoned on those grounds. Again, these descriptions of geoengineering are not necessarily false, but they do not present *arguments* for rejecting geoengineering out of hand. Perhaps it is, for instance, just a regrettable fact of the human condition in the end-Holocene that some 'reification' of the earth system is unavoidable and that this will manifest as a possibly dangerous flirtation with 'geopower.' The revulsion or horror this causes in us must be faced squarely, in my view.

We are tending to a dying patient—the Holocene—and are forced to consider whatever measures will keep it alive the longest so that we have time to reorganize our societies in accordance with what awaits us on the other side, the Anthropocene proper. The first way to put the question concerning geoengineering, therefore, is whether or not it might provide the *bridge* we need from the end-Holocene

to the Anthropocene (I will refine this question in the next section). If not, then detractors need to tell us what other bridge is available to us in the short time we have to figure out a way forward; if so, we need to think hard about how to deploy these technologies in a way that also allows us to constrain them in specific ways.

We might say that while the problem with geoengineering's boosters is that they focus on our superhuman possibilities, the problem with its detractors is that they fix on our inhuman possibilities. Geoengineering will either help us fulfill the Enlightenment dream of establishing control over the earth system or it will be used as a weapon against whole continents. These are oversimplifications of the challenges we face. Because we live in a postnatural age, in the qualified sense argued for in this section, what we require is a philosophical conception of geoengineering technology that is neither moralistically or nostalgically dismissive of it, nor blindly submissive towards it. Since I think Heidegger's views on technology stake out this middle ground with unmatched philosophical depth and richness, it is time to turn to a consideration of his views.

4. Enframing and Autopoietic Alterity

My goal in this section is by no means to provide an exhaustive account of Heidegger's understanding of modern technology, but only to show how the notion of enframing (*Gestell*) and its cousin concepts can help illuminate the human condition in the end-Holocene and more particularly the philosophical meaning of geoengineering. Enframing, for Heidegger, is a historically specific mode of technological development, one that "challenges" nature to reveal itself as "standing-reserve" (*Bestand*).

Enframing the real makes it available through the process of ordering it in a specific manner: by "[u]nlocking, transforming, storing, distributing, and switching about." Most importantly, enframing the standing-reserve is a way of "regulating and securing" its forces (Heidegger 1977, 16–17) for human purposes. There is nothing narrowly artificial about this process. For Heidegger, it is a mode of revealing or unconcealment. A fruitful way to put this is in terms of Heidegger's concept of the metaphysics of 'presence' (*Anwesenheit*), the manner in which beings become manifest within a world. As John Richardson interprets the concept, it has principally to do with "proximity" to a viewpoint, securing entities in a durable manner. And this notion pivots on the idea of *controlling* entities (Richardson 2012, 218–19).

The tendency to bring beings into presence so that they may be more durably controlled—theoretically and/or practically—has been a persistent feature

of Western metaphyscis ever since Plato, but the key point here is that it intensifies historically (this, for example, is why Heidegger can speak of Nietzsche as 'consummating' the tradition). As Richardson puts it, "the tendency towards a maximal control culminates in our own current opening to being, technology" (Richardson 2012, 233). Enframing "drives out every other possibility of revealing," and in particular it "blocks *poeisis*" (Heidegger 1977, 30). This is a key point for my purposes. How does enframing, expressed most perspicuously in modern technology, effect this blocking? Heidegger says that "what presences by means of *physis* has the irruption belonging to bringing-forth" (Heidegger 1977, 31). This is usefully parsed by Henry Dicks as referring to "the causally circular, self-referential bringing-forth characteristic of living beings [which] is essentially the same as what Maturana and Varela call autopoiesis" (Dicks 2011, 49).

Enframing has a tendency to block *physis* considered as *autopoiesis*. By way of elucidation of this concept, think of Heidegger's analysis of the poetic fragment of Angelus Silesius, "the rose is without a why: it blooms because it blooms." For Heidegger, "the blooming is grounded in itself, it has its ground with and in itself" (quoted in Dicks 2011, 49).

> *Physis* . . . the arising of something from out of itself, is a bringing-forth, *poeisis*. *Physis* is indeed poeisis in the highest sense. For what presences by means of *physis* has the bursting open belonging to bringing-forth, e.g., the bursting of a blossom into bloom, in itself. (Heidegger 1977, 10)

The way we are enjoined to think about the rose here is in defiance of the metaphysics of presence which, as we have seen, secures entities in place by relating them to an external viewpoint: a causal network, theoretical framework, practical scheme, etc. Of course, we can generalize beyond the rose: to encounter nature autopoietically is to experience it as self-emerging, where the ground of its being is not related to that which is other than it. This is in its essence an encounter with natural alterity. It is a special sort of way to dwell among other beings. Insofar as we seek out experiences of the 'wild,' experience biophilia in nature, philosophize about the 'intrinsic value' of the living, and so on, this is, I suggest, what we are trying to capture. In any case, it is the sort of possible encounter with which I am principally interested in this section.

But for Heidegger this experience with beings cannot happen until we are capable of noticing something more primordial: presencing itself. We cannot escape presencing altogether for it is simply the way revealing occurs in any historical epoch. The key issue is whether we can resist the *metaphysics* of presencing that

is peculiar to our age. According to Heidegger, we have forgotten *that* Being presences and so have closed ourselves off to other ways in which it might do so, in the process confusing beings with Being. Are we any longer capable, as the pre-Socratics allegedly were, of experiencing "what is present *as* what is present."[17] According to Richardson, genuine thinking "needs not only to notice presence but to see it *as* an interpretation of Being" (Richardson 2012, 252).

In other words, coming to grips with the nature of presencing is equivalent to thinking the difference between Being and beings. Full discussion of the 'ontological difference' is beyond the scope of this analysis but we cannot ignore the fact that our oblivion to this difference is, for Heidegger, what has allowed for the dominion of enframing in our times.[18] Thinking the ontological difference can facilitate encountering nature with wonder and reverence rather than a desire to control and order.[19] Here, wonder and reverence are products of noticing the radical alterity of that which is, its self-emerging ownness. It is to be content to watch and marvel at auto-poietic presencing. But the more fundamental thinking of Being—grasping presencing *as* presencing—must precede this encounter with beings. This is the only way to loosen the grip of enframing. Enframing, recall, is a 'culmination' of metaphysics because it is the most thorough expression of the urge to capture reality in a totalizing picture.

So another way to frame my concern in this paper is to ask whether the attitudes of reverence and wonder are still possible vis-à-vis the natural world in the crisis-ridden end-Holocene, precisely to the extent that we are evidently seeking large-scale technological ways of dealing with these crises. Heidegger thinks that the culminating phase of enframing involves the way we capture energy: "[t]he revealing that rules in modern technology is a challenging, which puts to nature the unreasonable demand that it supply energy that can be extracted and stored as such" (Heidegger 1977, 14). Clive Spash has claimed recently that responding intelligently to climate change should be seen as a way of "managing the carbon cycle" (quoted in Jamieson 2014, 136). Spash is talking about the carbon cycle as a regulator of the planet's store of thermal energy.

If we control *this*, we have apparently reduced an entire planetary system to our demands. I take Heidegger's talk of 'challenging' in this context to indicate a reduction of precisely this sort, so Spash's ambition reveals the prescience of Heidegger's way of understanding modern technology. If we understand geoengineering as part of this project of planetary control, we can see it as a key manifestation of the problematic 'challenging' Heidegger is talking about. My suggestion has been that enframing can close us off to the sort of mystery that is involved in our

encounters with genuine otherness or alterity. And when the earth has become an object of manipulation on the scale required to geoengineer it, it *seems* as though nature loses its alterity altogether. In this case, we are presented with a world in which it appears as though "man everywhere and always encounters only himself" (Heidegger 1977, 27).[20]

This is surely something to eschew if we can and yet the question always resurfaces: what about climate change? Let's remember how fondly Heidegger thought of his Black Forest idyll, a place in whose natural beauty he reveled. According to the latest IPCC report this region of Europe, tucked away in Germany's southwest corner, will experience profound effects from climate change in the coming decades. Of particular concern, the forest fire risk for the region containing the Black Forest moves from "low" in the baseline climate (1961–1990) to "high" in the climate scenario analyzed (a non-extreme scenario, it should be emphasized) (IPCC 2014 23.4.4, 1287). Further, the projected increase in forest fires will increase GHG emissions from this area because of the burning biomass it will create, a positive feedback that may increase the likelihood of more forest fires. An *additional* 8 percent to19 percent of German forests will be lost due to increased storm activity caused by a reduction in the time the soil is frozen, an effect that will be most pronounced in mountainous regions such as the Black Forest (ibid., 1288).

Knowing the profound value he placed on this piece of Holocene landscape, we might therefore wonder what Heidegger himself would have made of the threat it faces. More particularly, we might wonder whether or not he would have welcomed a technological intervention into the earth system whose goal was to preserve places like this in much the same state as he encountered them. This is not to romanticize Heidegger. In my view it is a mistake to think of him as seeking contact with a natural world that is fully unmediated by technology. Indeed, that is the point of suggesting that he himself might accept a technological intervention on the scale of geoengineering, if the only alternative was the destruction of a part of the natural world he clearly valued.[21] These are purely speculative questions, of course, but the point is to see if there is purchase for these kinds of ideas in Heidegger's philosophy of technology. I think there is.

Geoengineering is a form of enframing technology. After all it does—especially when it takes the form of albedo modification—seek to *order* the planet's supply of solar energy. But it does not follow that even as bold an enframing project as this converts everything it touches into a fully *controlled* bit of standing reserve, and this is the essential point. It is crucial to separate these two processes: bringing order and controlling. If it works, geoengineering can bring some order

to the climate in the simple sense that it will keep average temperatures relatively stable. Here, 'order' just means rough alignment with established purposes, for example those expressed in the way our agricultural system is set up. Control of nature, by contrast, implies full reduction of natural processes to our purposes. To relinquish the dream of control over nature—even as we order it in fairly ambitious ways—is to allow space for the emergence of alterity. Thus geoengineering need not *determine* the permanent presencing of being.[22]

Here's another way to put these points. Speaking of what needs to be done to reform the "device paradigm" of technology, Albert Borgmann says that the latter must be restricted to its "proper sphere," namely the "background of focal things and practices" (Borgmann 2014, 343). Borgmann himself is not very precise about what background technologies are. He seems to think that so long as an array of traditional practices are allowed to flourish—things like running, fly fishing, the family meal, etc.—then we can allow the rest of our lives to be made easier and more efficient with modern technologies (transportation technologies, for example).

The purpose of geoengineering technologies is *preservationist*. That is, they would be deployed only in order to keep our planet in something like its Holocene state for as long as it takes to transition to a safer planet powered by renewables. This would, ideally, allow time for the collection of our foreground practices—think again of the global agricultural system —to adapt to the new reality. Moreover, from the standpoint of this paper's focus on accessing the natural world, it is telling that Borgmann identifies "the wilderness" as a focal thing (Borgmann 2014, 343), one that presumably could be experienced with satisfaction against a technologized background. Borgmann does not tell us what he means here, so let's extrapolate.

Imagine a hypothetical future in which you, an avid hiker, are vacationing in the Rocky Mountains, a region whose climate has been manipulated by some form of geoengineering. Suppose, in addition, that the place has been rewilded so that it contains most of the flora and fauna it had before climate change reduced its biodiversity dramatically. In other words, the area has been extensively *designed* to make the experience of 'wilderness' indistinguishable from one unmediated by humans, partly in order to cater to nature enthusiasts like you. What exactly is objectionable about this? It is difficult to say so long as the foreground experiences of the 'wild'—from the lush trees of the Boreal Forest to the trout in the rivers—is more or less what it was at some past Holocene baseline. These thoughts finally allow us to crystallize the question concerning geoengineering: can this technol-

ogy be confined to the background of our focal concerns in this manner? Surely the answer is yes. Properly construed, geoengineering seeks only to preserve the world in much the same condition as we already experience it. Qua background technology it does not give us full control over postnature. This means that even in deploying it we might effectively resist enframing's totalizing tendency.

The view I'm advocating here implies a kind of humility about the technological enterprise that is missing in some of geoengineering's more ardent boosters. Morton, as we have seen, seems to think that geoengineering ought to be pursued as an end in itself because it expresses the sort of control over the earth system to which we have always (putatively) aspired. Borgmann is at pains to emphasize that background technologies must always be "recognized" as means and never be mistaken for ends (Borgmann 2014, 343–44). This could be one way of keeping in view presencing *as* presencing in the age of enframing. As such, it could make it easier to abandon this technology when it is no longer required for the ends to which it had originally been fitted. This is crucial if we are to treat this technology as a mere bridge between the end-Holocene and the Anthropocene rather than a self-justifying extension of our control over the earth system.

If a stratospheric veil were imposed successfully the Black Forest would at least stand a chance of avoiding the scorched and battered fate that otherwise awaits it. And all the auto-poietic processes that unfold in that landscape—and many others, like my re-imagined Rocky Mountain biome—could still be encountered with due reverence and wonder. Here we would not be self-deceptively experiencing human-made things as though they were something else. We would, on the contrary, be experiencing nature-as-*physis* even as its emergence in this or that form was made possible, in part, by an engineered climate. This is one expression of the paradoxical task of remaining open to alterity in the age of the postnatural.

5. Conclusion

My purpose in this paper has been to blunt a particular challenge to geoengineering: the one emanating from concerns about making nature over entirely in our (technologized) image, such that we render ourselves permanently closed off to Being's possibilities. For Heidegger this danger is inherent in the consummation of Western metaphysics achieved in the modern era. But I have also argued that Heidegger's philosophy of technology does not necessarily provide warrant for a wholesale condemnation of geoengineering.[23] Insofar as large-scale technological interventions into nature are unavoidable in the Anthropocene, so is the danger they bring. Because he understands this basic reality better than any other thinker

Heidegger is, we might say, the first great philosopher of the new epoch (albeit *avant la lettre*).

Now, it might be suggested that even if certain autopoietic processes could flourish in the geoengineered world I have imagined—the micro-behaviours of the Arctic warbler, and so on—surely the system *itself* is no longer capable of doing so. In other words, does 'successful' geoengineering not put an end to what Dicks calls "Gaian autopoiesis"?[24] In response, consider again the distinction between ordering and controlling. Although geoengineering is sometimes characterized as affecting *the* earth system—a convention I have been following in this paper—in truth it aims at *ordering* it, by regulating one of its sub-systems. Managing the atmosphere in this sense does not give us full *control* over the earth system. This could happen only if we were also intentionally manipulating the geosphere, the biosphere and the hydrosphere.

These systems are not hermetically sealed, of course, and so manipulation of the atmosphere will have knock-on effects in the other sub-systems. So we will sometimes need to find ways of ordering those systems too. This is just another way of talking about the multi-faceted challenges of adapting to climate change. But with respect to all these subsystems we can stop short of full control, and this matters immensely. Thus if Gaia is the totality of these systems, then much of its processes can persist relatively undisturbed throughout a regime of geoengineering. Indeed, one of the reasons it makes sense to say that micro autopoietic processes can continue in this context is precisely because the climate system is *not* the whole earth system.

We can see why the temptation of geoengineering goes to the heart of what we understand as the human condition in the new epoch. For it forces us to confront a question that has been lurking in our culture since the advent of technoscience. Are we the lords and masters of the planet, finally presented with the technological means of realizing our ambitions? Or are we willing instead to live with and even cultivate our access to alterity, seeing ourselves as what Aldo Leopold called "plain members and citizens" of the biosphere (Leopold 1989, 238)? I hope we adopt the latter self-understanding because it expresses a commitment to live gracefully in this mostly non-human place, even as we render it more dangerous—and not just for our species—by geoengineering it. If what I have argued here is sound there is a way of keeping this technology from becoming a full interruption of "the higher-order autopoiesis of Gaia" (Dicks 2011, 55), and this might be the best we can do for now.

If we conceive of geoengineering as a mere bridge, the partially engineered background that still enables encounters with autopoietic unfolding, if we refuse to lose sight of the fact that it is only a means to a better future, if we refuse to allow technicians to set our ends for us, and if we can think enframing's presencing *as* presencing in the Anthropocene, then we might learn to dwell more responsibly on this planet in these parlous times.

Notes

1. The exception is Williston 2015.
2. The key figure here is Dipesh Chakrabarty. See especially Chakrabarty 2009; 2015.
3. This is a large group, comprising figures like Stewart Brand, Ted Nordhaus, James Lovelock, Earl Ellis, and others. A full statement of the position can be found in Asafu-Adjaye et al. 2015.
4. The four narratives just sketched are meant as a survey of the relevant literature. Bonneuil and Jean-Baptiste Fressoz, both historians, in fact provide us with more such narratives: the Thermocene, the Thanatocene, the Phagocene, the Phronocene, the Agnotocene and the Polemocene. I think this is exactly the sort of thing we need from social scientists. See Bonneuil and Fressoz 2015.
5. For an altogether different way of drawing the boundaries among these narratives, see Dalby 2016.
6. I have contributed to it myself. See Williston 2015.
7. It might be objected that we do have a clear idea of at least the beginning of the Anthropocene even if we cannot foresee what shape it will take in the future or how long it will last. But, first, there is still plenty of dispute about when to date this beginning. Candidates include: the Agricultural Revolution (Ruddiman 2013); the Industrial Revolution (Crutzen and Stoermer 2000); and the Great Acceleration (post-1945) (Steffen et al. 2015; Williston 2016). Secondly, even if there were consensus on the starting date, the point I am making here is that such a dating does not fully circumscribe the new epoch theoretically. The fact that we have resorted to deep-time comparative paleoclimatology in order to *understand* what we are doing to the earth system is evidence of this.
8. Since I'm going to be talking about Heidegger at length below, it is tempting to relate this notion of the end-Holocene to Heidegger's thinking about the 'end' (*Vollendung*) of modernity or metaphysics, where 'end' is understood as 'consummation.' The notion is emphasized strongly in Heidegger's Nietzsche lectures from the late 1930s. There are indeed some intriguing connections between the two concepts, and I do make some reference to the notion of consummation below, but a full examination of the issues here would take us too far afield.

9. Thus Stephen Gardiner has argued that the age of climate change is best characterized as the confluence of three 'storms': the global, the intergenerational, and the theoretical. The last of these three is what I have in mind here. See Gardiner 2011.

10. Excellent critical discussions of these ideas can be found in Cronon 1998 and Vogel 2015, chaps. 1–2.

11. I thank an anonymous reviewer for this journal for raising this point.

12. An accessible account of biomimicry can be found in Benyus 1997. An excellent philosophical discussion of the concept can be found in Blok 2016.

13. For example, the Canadian government—the same one that led the charge in Paris 2015 for a 1.5° C limit on global warming—has approved the construction of three pipelines carrying tar sands oil from Alberta to tidewater for export.

14. Obviously the 1.5° C target puts even more strain on the supply of these reserves.

15. Paul Crutzen first got people talking about geoengineering in a serious way. In what follows in this section I focus on the recent book by Morton, which is really an elaboration of Crutzen's main ideas. See Crutzen 2006; Morton 2015.

16. It is worth emphasizing that the subtitle of Crutzen's original intervention is, "A Contribution to Resolve a Policy Dilemma." In my view, it is the rush to make policy before we fully grasp the full complexity of the issues involved that has distorted our thinking about geoengineering.

17. Heidegger put the point this way in a seminar held in Le Thor in 1969. See Capobianco 2010, 18.

18. Tracing the connections between the concepts of the ontological difference and presencing in Heidegger's philosophy would require a paper unto itself. And though there is some dispute about the role played by *Anwesen* in the early philosophy it is indisputably central to Heidegger's later thought. Juan Pablo Hernández has argued that *Anwesen* becomes a key term in Heidegger's philosophy in the early years of the 1940s, and he makes the connection to the ontological difference explicit: "the necessity to pay heed to the ontological difference—central to Heidegger's philosophy since the early period—is formulated in terms of the necessity to fully grasp the understanding of Being as *Anwesen*" (Hernández 2011, 230).

19. Capobianco argues that for Heidegger "the Greeks experienced the 'overabundance' and 'excess' of the appearance or presence of beings. The resided generally 'in the midst of phenomena and philosophy . . . was born of the overwhelming wonder about this overwhelming thrust of presencing" (Capobianco 2010, 18).

20. It is crucial to note the language of *appearance* in this passage, however. For Heidegger goes on to say, "in truth, however, precisely nowhere does man today any longer encounter himself, i.e., his essence. Man stands so decisively in attendance on the challenging-forth of enframing that he does not apprehend enframing as a claim, that he fails to see himself as the pone spoken to, and hence also fails in every way to

hear in what respect he ex-sists, from out of his essence, in the realm of an exhortation or address, and thus *can never* encounter only himself" (Heidegger 1977, 27).

21. A good discussion of related issues can be found in Blok 2014.

22. I owe this felicitous phrase to an anonymous reviewer at *Techné*.

23. To be clear, these arguments are not sufficient to establish the permissibility of geoengineering. In my view, the bar for success with respect to sulphate injection, for example, must be set very high. Consider the problem of moral hazard, the idea that people behave recklessly when they feel themselves to be 'insured' against some danger. In our case, the belief that we have an effective cooling veil might cause us to think there is no danger from further greenhouse gas pollution. We might even be emboldened to increase our emissions in this case. For many reasons—most prominently the specter of increased ocean acidification—this would be a disaster. Although I don't have the space to argue for it here, my view is that we should therefore adopt a so-called 'portfolio' approach to geoengineering: a policy that combines targeted geoengineering schemes with aggressive spending on mitigation and adaptation.

24. There are too many complexities surrounding the concept of Gaia for me to analyze here. I am using the notion only in the deflated sense of the whole earth system. I thank an anonymous reviewer for this journal for challenging me on this point.

References

Allenby, Braden R., and Daniel Sarewitz. 2011. *The Techno-Human Condition*. Cambridge, MA: The MIT Press.

Asafu-Adjaye, John, Linus Blomqvist, Steward Brand, Barry Brook, Ruth Defries, Erle Ellis, Christopher Foreman, David Keith, Martin Lewis, Mark Lynas, Ted Nordhaus, Roger Pielke, Jr., Rachel Pritzker, Joyashree Roy, Mark Sagoff, Michael Shellenberger, Robert Stone, and Peter Teage. 2015. *An Ecomodernist Manifesto*. Available at https://static1.squarespace.com/static/5515d9f9e4b04d5c3198b7bb/t/552d37bbe4b07a7dd69fcdbb/1429026747046/An+Ecomodernist+Manifesto.pdf.

Benyus, Janine M. 1997. *Biomimcry: Innovation Inspired by Nature*. Toronto: Harper-Collins.

Biro, Andrew. 2005. *Denaturalizing Ecological Politics: Alienation from Nature from Rousseau to the Frankfurt School and Beyond*. Toronto: University of Toronto Press. https://doi.org/10.3138/9781442673830

Blok, Vincent. 2014. "Reconnecting with Nature in the Age of Technology: The Heidegger and Radical Environmentalism Debate Revisited." *Environmental Philosophy* 11(2): 307–32. https://doi.org/10.5840/envirophil20149913

Blok, Vincent. 2016. "Biomimicry and the Materiality of Ecological Technology and Innovation." *Environmental Philosophy* 13(2): 195–214. https://doi.org/10.5840/envirophil201692035

Bonneuil, Christophe. 2015. "The Geological Turn: Narratives of the Anthropocene." In *The Anthropocene and the Global Environmental Crisis*, eds. Clive Hamilton, Christophe Bonneuil, and Francoise Gemmene, 17–31. London: Routledge.

Bonneuil, Christophe, and Jean-Baptiste Fressoz. 2015. *The Shock of the Anthropocene*. London: Verso.

Borgmann, Albert. 2014. "Focal Things and Practices." In *Philosophy of Technology: The Technological Condition; An Anthology*, ed. Robert Scharff and Val Dusek, 329–49. London: Wiley-Blackwell.

Chakrabarty, Dipesh. 2009. "The Climate of History: Four Theses." *Critical Inquiry* 35: 197–222. https://doi.org/10.1086/596640

Chakrabarty, Dipesh. 2015. "The Anthropocene and the Convergence of Histories." In *The Anthropocene and the Global Environmental Crisis*, ed. Clive Hamilton, Christophe Bonneuil, and Francoise Gemmene, 44–56. London: Routledge.

Capobianco, Richard. 2010. *Engaging Heidegger*. Toronto: University of Toronto Press.

Cronon, William. 1998. "The Trouble with Wilderness, or Getting Back to the Wrong Nature." In *The Great New Wilderness Debate*, ed. J. Baird Callicott and Michael P. Nelson, 471–99. Athens: University of Georgia Press.

Crutzen, Paul. 2006. "Albedo Enhancement by Stratsopheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma." *Climatic Change* 77: 211–19. https://doi.org/10.1007/s10584-006-9101-y

Crutzen, Paul, and Eugene F. Stoermer. 2000. "The 'Anthropocene.'" *IGBP Newsletter* 41: 12.

Dalby, Simon. 2016. "Framing the Anthropocene: The Good, the Bad and the Ugly." *The Anthropocene Review* 3(1): 33–51. https://doi.org/10.1177/2053019615618681

Davies, Jeremy. 2016. *The Birth of the Anthropocene*. Berkeley: University of California Press.

Dicks, Henry. 2011. "The Self-Poietizing earth: Heidegger, Santiago Theory, and Gaia Theory." *Environmental Philosophy* 8(1): 41–61. https://doi.org/10.5840/envirophil2011813

Foster, John Bellamy, Richard York, and Brett Clark. 2011. *Ecological Rift: Capitalism's War on the Earth*. New York: Monthly Review Press.

Gardiner, Stephen. 2010. "Is 'Arming the Future' with Geoengineering Really the Lesser Evil?: Some Doubts about Intentionally Manipulating the Climate System." In *Climate Ethics: Essential Readings*, ed. Stephen M. Gardiner, Simon

Caney, Dale Jamieson, and Henry Shue, 284–315. Oxford: Oxford University Press.

Gardiner, Stephen. 2011. *A Perfect Moral Storm: The Ethical Tragedy of Climate Change*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195379440.001.0001

Gardiner, Stephen, and David Weisbach. 2016. *Debating Climate Ethics*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199996476.001.0001

Hailwood, Simon. 2015. *Alienation and Nature in Environmental Philosophy*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139976749

Hamilton, Clive. 2013. *Earthmasters: The Dawn of the Age of Climate Engineering*. New Haven: Yale University Press.

Heidegger, Martin. 1977. "The Question Concerning Technology." In *The Question Concerning Technology and Other Essays*, trans. William Lovitt, 3–35. New York: Harper and Row.

Hernández, Juan Pablo. 2011. "How Presencing (*Anwesen*) Became Heidegger's Concept of Being." *Universitas Philosophica* 57(28): 213–40.

Hornborg, Alf. 2015. "The Political Ecology of the Technocene: Uncovering Ecologically Unequal Exchange in the World-System." In *The Anthropocene and the Global Environmental Crisis*, ed. Clive Hamilton, Christophe Bonneuil, and Francoise Gemmene, 57–69. London: Routledge.

Intergovernmental Panel on Climate Change (IPCC). 2014. *Global and Sectoral Aspects*. Cambridge: Cambridge University Press.

Jamieson, Dale. 2014. *Reason in a Dark Time: Why the Struggle Against Climate Change Failed and What it Says About our Future*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199337668.001.0001

Katz, Eric. 1997. *Nature as Subject: Human Obligation and natural Community*. Lanham, MD: Roman and Littlefield.

Latour, Bruno. 1993. *We Have Never Been Modern*. Cambridge MA: Harvard University Press.

Leopold, Aldo. 1989. "The Land Ethic." In *A Sand County Almanac*, 237–64. Oxford: Oxford University Press.

McGlade, Cristophe, and Paul Ekins. 2015. "The Geographical Distribution of Fossil Fuels Unused When Limiting Global Warming to 2° C." *Nature* 517 (January), 187–90. https://doi.org/10.1038/nature14016

McKibben, Bill. 1989. *The End of Nature*. New York: Random House.

Moore, Jason. 2015. *Capitalism in the Web of Life*. London: Verso.

Morton, Oliver. 2015. *The Planet Remade: How Geoengineering Could Change the World*. Princeton, NJ: Princeton University Press.

Morton, Timothy. 2013. *Hyperobjects: Philosophy After the End of the World*. Minneapolis: University of Minnesota Press.

Purdy, Jedediah. 2015. *After Nature: A Politics for the Anthropocene*. Cambridge, MA: Harvard University Press. https://doi.org/10.4159/9780674915671

Richardson, John. 2012. *Heidegger*. London: Routledge.

Romm, Joseph. 2016. *Climate Change: What Everyone Needs to Know*. Oxford: Oxford University Press.

Ruddiman, William F. 2013. "The Anthropocene." *The Annual Review of Earth and Planetary Sciences* 41(4): 1–24. https://doi.org/10.1146/annurev-earth-050212-123944

Shepard, John, Ken Caldeira, Peter Cox, Joanna Haigh, David Keith, Brian Launder, Georgina Mace, Gordon MacKerron, John Pyle, Steve Rayner, Catherines Redgwell, and Andrew Watson. 2009. *Geoengineering the Climate: Science, Governance and Uncertainty*. London: Royal Society.

Stager, Curt. 2011. *Deep Future: The Next 100,000 Years of Life on Earth*. Toronto: Harper Collins.

Steffen, Will, Wendy Broadgate, Lisa Deutsch, Owen Gaffney, and Cornelia Ludwig. 2015. "The Trajectory of the Anthropocene: The Great Acceleration." *The Anthropocene Review* 2(1): 81–98. https://doi.org/10.1177/2053019614564785

Vogel, Steven. 2015. *Thinking Like a Mall: Environmental Philosophy After the End of Nature*. Cambridge MA: The MIT Press. https://doi.org/10.7551/mitpress/9780262029100.001.0001

Williston, Byron. 2015. *The Anthropocene Project: Virtue in the Age of Climate Change*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198746713.001.0001

Williston, Byron. 2016. "The Sublime Anthropocene." *Environmental Philosophy* 13(2): 155–74. https://doi.org/10.5840/envirophil201610338

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 222–242 DOI: 10.5840/techne201772167

Saving Earth: Encountering Heidegger's Philosophy of Technology in the Anthropocene

Jochem Zwier and Vincent Blok

Abstract: In this paper, we argue that the Anthropocene is relevant for philosophy of technology because it makes us sensitive to the ontological dimension of contemporary technology. In §1, we show how the Anthropocene has ontological status insofar as the Anthropocenic world appears as managerial resource to us as managers of our planetary *oikos*. Next, we confront this interpretation of the Anthropocene with Heidegger's notion of "Enframing" to suggest that the former offers a concrete experience of Heidegger's abstract, notoriously difficult, and allegedly totalitarian concept (§2). In consequence, technology in the Anthropocene cannot be limited to the ontic domain of artefacts, but must be acknowledged to concern the whole of Being. This also indicates how the Anthropocene has a technical origin in an ontological sense, which is taken to imply that the issue of human responsibility must be primarily understood in terms of responsivity. In the final section (§3), we show how the Anthropocene is ambiguous insofar as it both accords and discords with what Heidegger calls the "danger" of technology. In light of this ambiguity, the Earth gains ontic-ontological status, and we therefore argue that Heidegger's unidirectional consideration concerning the relation between being and beings must be reoriented. We conclude that the Anthropocene entails that Heidegger's consideration of the "saving power" of technology as well as the comportment of "releasement" must become Earthbound, thereby introducing us to a saving Earth.

Key words: Anthropocene, technology, Enframing, Earth, Heidegger

Jochem Zwier, Faculty of Science, Institute for Science, Innovation and Society, Dept. of Philosophy and Science Studies, Radboud University Nijmegen, P.O. Box 9010, 6500 GL Nijmegen, the Netherlands; j.zwier@science.ru.nl.
Vincent Blok, Management Studies Group and Philosophy Group, Wageningen University, Hollandseweg 1, 6706 KN Wageningen, the Netherlands; www.vincentblok.nl; Vincent.blok@wur.nl.

1. The Anthropocene Is at Hand

Although the concept of the Anthropocene was first developed in the scientific fields of geology and Earth-system science, it was never a purely disinterested, descriptive account, but included an explicit prescriptive dimension. Descriptively, the Anthropocene indicates the geological epoch in which the activity of industrialized humanity becomes the dominant factor in shaping the Earth and its life-supporting systems (Steffen, Crutzen, and McNeill 2007). Supplementing the Holocene, in which the (relatively warm) climate was considered to be the central geological factor (Crutzen 2002), the Anthropocene places human activity in the centre, and thus marks the time in which "natural forces and human forces [are] intertwined, so that the fate of one determines the fate of the other" (Zalasiewicz et al. 2010, 2231). Prescriptively, the Anthropocene takes account of how humanity faces the perilous situation in which the ecological aftermath of Earth-shaping threatens the very existence of our species (cf. Baskin 2015, 13). Issues like global warming, deforestation, pollution, reduction of biodiversity etc. appear to us both as consequences of our activity qua geoforce and as an urgent and inescapable demand to take responsibility for the faltering sustainability of the planet as life-support system. We call this the ecological demand of the Anthropocene, since it concerns the *oikos* of the anthropic geoforce which will become uninhabitable unless we manage it differently.

In his review of the concept of the Anthropocene in geology and Earth-system science, Jeremy Baskin recognizes the pairing of descriptive and prescriptive dimensions (2015, 22) and shows how responses to the ecological demand follow a paradigm of management:

> In almost all of the major accounts of the concept it is assumed that [the Anthropocene] requires a trinity of techniques: clear *management* of the Earth and Earth-systems, guided by *experts* (and scientists/engineers in particular), using the most advanced *technology* possible (including large-scale technology). (Baskin 2015, 20)

Examples of this paradigm of management include Paul Crutzen and Christian Schwägerl, according to whom "we should shift our mission from crusade to management, so we can steer nature's course symbiotically" (2011; cf. Crutzen 2002) or Erle Ellis who states that "in moving toward a better Anthropocene, the environment will be what we make it" (2013; cf. Baskin 2015, 14).

This paradigm can also be witnessed in various (critical) discussions of the Anthropocene in social science and the humanities. For instance, the concept of the Anthropocene has been criticized for its hidden normative agenda. The general "anthropos" not only excludes non-humans, but is modelled after a particular group of humans, namely the western, rich, excessively carbon-footprinted specimen (Baskin 2015, 16; cf. Latour 2014, 5). As a result, it appears that decisions regarding how to deal with the Anthropocene's ecological demand (e.g., via large-scale geoengineering projects) are also limited to this select group of humans and exclude other humans and non-humans. Such a critique is oriented towards management insofar as it criticizes one form of management whilst calling for a more democratic way of managing the Earth—where the associated "demos" is not necessarily anthropocentrically limited (cf. Harraway 2015; cf. Lorimer 2016).

A similarly oriented critique holds that the Anthropocene should not have been named after humans, since "humans as such" are not responsible for the state of the Earth, but that it is primarily capitalism that first connects humanity, fossil fuels, and technologies in a way that now shows its geological and ecological ramifications. Accordingly, the name capitalocene is deemed more appropriate (Moore 2016; cf. Latour 2014, 7; cf. Morton 2016, 3–61). This can be understood as a variation on Marxist "suspicion of ideology," where an abstract idea (e.g., Reality is the result of anthropos in general) is brought back to a material substrate, i.e., a particular politico-economical force field. Such a critique is (unquestioningly) oriented towards management insofar as it calls for a reconfiguration of this force field in dealing with the ecological demand.

As a final example, various ethicists have developed ways to deal with the ecological demand of the Anthropocene in a normative way, for example by arguing for a less anthropocentric and more ecological way of dealing with other species, by laying bare the normative dimension of carbon footprints (Shue 2010), or by making a case for demographic management (Collings 2014, 173–88). Such contributions are oriented towards management insofar as they sketch out new ways of managing our existence on the planet, including its normative dimension.

The coupling of descriptive and prescriptive dimensions in both the natural scientific account of the Anthropocene (geology, Earth-system science) as well as in the humanities (social science, political science, economy, ethics) brings to light the following philosophically relevant characteristic of the Anthropocene: humanity now appears as a geoforce intertwined with other natural forces, and reality conversely appears as a configuration of geoforces (including the anthropic geoforce) that, due to the ecological demand, urgently needs to be managed by us

in order to safeguard our habitat. This managerial orientation envelops the whole planet and the identities of all its inhabitants, whereby these identities appear in a remarkable way due the pre-eminent Anthropocenic phenomenon of global warming. Timothy Morton makes this clear by interpreting global warming as a "hyperobject" (2013), which is to say as something that inescapably environs and permeates all Earthlings.[1] His observation that in any routine conversation about the weather today, "the presence of global warming looms into the conversation like a shadow" (2013, 99) explicates this inescapability.[2] With respect to the identities of Earthlings, this means that whereas a tree was formerly understood as a perishable instance of an eternal and fixed idea or form (Plato, Aristotle), or as *ens creatum* in a divinely instituted natural order of things (medieval philosophy), it is now inescapably environed by global warming and therefore appears as resource that must be managed, e.g., as carbon-source or carbon-sink.[3]

Similarly, whereas humans were formerly identified as terrestrial beings equipped with extra-terrestrial, viz., transcendent qualities, e.g., the rationality of the animal rationale, such rationality now appears telluric, which is to say as an expression of the anthropic geoforce, immanent to the collective geo-forcefield.[4] In other words, rationality no longer merely appears *on* Earth as a manifestation of a transcendent essence, but decidedly appears *as* Earth (cf. Blok 2017, 5). It is thereby inescapably bound up with global warming, both as its source and potential remedy, thus revealing the human identity as anthropic geoforce and planetary manager.

These shifts in identity bring the managerial dimension of the Anthropocene under consideration in a way that is not primarily situated on the level of things (whether subjective or objective, human or non-human), but first concerns the way in which things appear to us, whilst we are included in this mode of appearance. The Anthropocene is therefore not merely a description of a planetary condition, nor a prescription on how to deal with the (implications of the) ecological demand, but has ontological status insofar as it concerns a mode of appearance according to which the world appears as managerial resource for human beings as planetary managers. We can therefore say that *the Anthropocene is at hand:* it marks our contemporary encounter with things under the demand of "handling" or managing them.

If "the Anthropocene is at hand," how does technology relate to this? The answer takes the form of a triptych. *First*, there is little doubt that the Anthropocene is a consequence of the technological exploitation of Earthly materials and processes: if the industrial revolution constitutes the bedrock of the Anthro-

pocene,[5] this revolution was only possible due to the vigorous technological and exploitative management of natural resources such as coal and oil, capital, etc. *Secondly*, the Anthropocene can be said to be an epistemological consequence of technology insofar as it only appears to us through the (computative) management of large amounts of collected scientific data. Global warming cannot be directly seen, but can be inferred and computed (cf. Morton 2013, 3, 73, 153). Put in terms of philosophy of technology, our knowledge of the Anthropocene is technically mediated inasmuch as epistemological access is solely possible via technologies (satellites, laboratory equipment, carbon-measurements, etc.).[6] Thirdly, as we have argued in this section, the Anthropocene further involves technology in a way that is neither limited to the objective domain (e.g., material beings such as fossil fuels) nor to the subjective domain (e.g., our techno-scientific knowledge of global warming), but as concerning the ontological dimension, where reality appears to us "at hand" as resource, and we correspondingly appear as planetary manager or handler of these resources. In the next section, we further elucidate the ontological dimension of the Anthropocene via a confrontation with Heidegger's consideration of the essence of technology as Enframing.

2. The Anthropocene Enframed: Totality, Origin, and Response

In this section, the hypothesis is that the Anthropocene offers an indication of Martin Heidegger's philosophical questioning of the *whole of Being* on the one hand, and a concrete experience of his notoriously abstract and allegedly totalitarian consideration of the essence of technology as *Enframing* on the other. We argue that the Anthropocene implies that critiques about the totalitarian character of Enframing must now acknowledge its "total"[7] character inasmuch as it concerns the whole of Being. Further, the concretisation of Enframing gives rise to a re-examination of the origin of the Anthropocene, which is usually understood in terms of particular (industrial) technologies, but is ontologically situated in our interpretation. Understanding the origin in this way will subsequently be shown to necessitate a reinterpretation of human responsibility for (and in) the Anthropocene.

2.1 The Whole of Being, Concretely Enframed

When Heidegger asks about the *whole of Being*, this implies the inclusivity of the questioner in the question (1998b, 82). Philosophical inquiry is inclusive, meaning that it is not principally about a domain of beings that stand over against me as isolated objects (which is the case in scientific inquiry; cf. Heidegger 1998b, 83), but concerns the mode of appearance according to which I discover such beings.

This mode is not itself a being, i.e., ontic, but ontological inasmuch as I cannot isolate myself from it to consider it objectively, but find myself included in it insofar as my encounter with the world is already structured so that things appear as objects (cf. Zwier, Blok, and Lemmens 2016). Whereas this rendition remains rather abstract, the Anthropocene offers a concrete indication of the inclusivity in the whole of Being. As indicated in §1, the Earth now no longer simply appears as an object for our rational scrutiny and technological interventions. Rather, reversely, our rationality, objective science, and technological activity appear as expressions of the anthropic geoforce, which is to say *inclusive* to the Earth. As Crutzen and Schwägerl put it: "in this new era, nature is us" (2011). The Earth is thereby not primarily understood as the objective *totality* of Earthly things, but as an indication of the *whole*, i.e., the inclusive mode of appearance according to which we encounter things.

Further, and more specifically, in its managerial orientation, the Anthropocene offers a concrete experience of what Heidegger calls the essence of technology. Heidegger asks about the essence, i.e., the *being* of technology and calls this essence Enframing (1977, 19–20). Given the ontological direction of questioning, Enframing is not theoretically investigated as an objective domain, but comes under consideration as a whole, i.e., as the mode of encountering the world. For Heidegger, technology as Enframing structures our encounter with things in such a way that beings appear as resources which are "challenged-forth" (1977, 16) to "stand in reserve" as potential resources for human needs, whilst humans are included in this structuring as the managers of these resources or "standing-reserve" (1977, 17; cf. Blok 2014). Again, whereas this remains abstract, the Anthropocene offers a concrete experience of Enframing. Returning to our example from §1, in light of Heidegger's notion of standing-reserve, a tree does not have intrinsic value, but its value derives from its identity as resource, e.g., for the paper industry or enjoyment of nature, whilst humans are included in this structuring as the consumers of newspapers or the ones who appreciate nature after office hours (Heidegger 1977, 18).[8] Now, in the Anthropocene and due to global warming, the ecological demand structures our encounter with a tree in such a way that it appears inescapably environed by a managerial horizon (e.g., as carbon sink), and—recalling Morton's emphasis on the pervasiveness of global warming—the same goes for all our encounters taking place on a warming globe. What follows is that whereas Heidegger must make a strong appeal on our willingness to follow his abstractions when he suggests that a stationary airliner offers an experience of

Enframing (1977, 17), the Anthropocenic ecological demand assuredly compels this experience by rendering planetary management inevitable.[9]

2.2 Managerial Totality, Managerial Whole

If the Anthropocene involves a concretization of Enframing, this necessitates a reconsideration of its alleged totalitarianism. Heidegger explicitly relinquishes considerations of specific technological objects via the argument that "rods, pistons, and chassis . . . never [comprise] Enframing itself" (1977, 20–21), since "the essence of technology is by no means anything technological" (1977, 4; cf. 2012, 58). In consequence to this orientation, the notion of Enframing has regularly been criticized for its totalitarian and bloated character, and has conversely been interpreted as a regional ontology. To take two examples from philosophy of technology, Andrew Feenberg has responded to how Heidegger infers from Enframing that "Agriculture is now the mechanized food industry, in essence the same . . . as the production of hydrogen bombs" (Heidegger 2012, 27). For Feenberg, this account is far too abstract and totalizing, since it fails to discriminate between technologies associated with electricity, atom bombs, and agriculture (1999, 187). He therefore explores alternative, more democratic or democratizing technologies that exceed the totalizing region of Enframing: "Technology can deliver more than one type of technological civilization. We have not yet exhausted its democratic potential" (2010, 29).

Secondly, in postphenomenology, Peter-Paul Verbeek has argued that whereas Enframing may be a condition of possibility for modern technologies, it does not follow that all dimensions of such technologies can be reduced to this condition (2005, 66). Don Ihde has similarly argued that Heidegger's depiction is "insightful and penetrating" insofar as it elucidates "gigantist industrial technologies" (2010, 119), but cannot simply be scaled up to cover all technologies. Verbeek and Ihde thus take issue with the totalitarian aspect of Enframing, and in arguing that it depicts a region of beings at most, they emphasise a less reductionist and more expansive perspective on the rich intricacy of various human-technology relations (cf. Zwier, Blok, and Lemmens 2016).

Both perspectives thus reject Heidegger's contention that Enframing "rules the whole Earth" (Heidegger 1969, 50), and instead aim to show how its resource-oriented mode of appearance only covers a limited region of technologies and their uses. However, the very concreteness of inescapable managerialism in the Anthropocene indicates that Enframing can no longer be reduced to a limited region, but must be acknowledged to encompass the whole Earth. This has implications

for, on the one hand, artefact-oriented philosophical approaches that result from a critique of Enframing, and on the other hand for Heidegger's unidirectional consideration of the relation between the ontic and the ontological. In what follows, we first elucidate the former, thereby working our way toward a discussion of the latter in §3.

In philosophy of technology, the critiques concerning the totalitarianism of Enframing have given rise to an alternative, less reductionist method of questioning technology, which empirically analyzes specific technological artefacts and their implications.[10] It is noteworthy, first of all, that these approaches have taken surprisingly little consideration of the (unsustainable) planetary *oikos* housing these technologies, leading Langdon Winner to critically wonder "upon what planet . . . today's philosophers of technology think they are living?" (2013).[11] Furthermore, a methodical focus on specific technologies cannot take full consideration of the planetary situation because it overlooks its ontological dimension. Recalling the triptych presented in the conclusion of §1, one can imagine how artefact-oriented approaches may respond to Winner's remark by focussing on both material and epistemological dimensions of the Anthropocene, e.g., democratic questions concerned with geo-engineering for Feenberg, or questions pertaining to the technological mediation of our knowledge of global warming for post-phenomenology. This would take the Earth as the meta-region housing all the technological regions in question, viz., as a thing housing many technological things. However, such an orientation overlooks the third aspect of the triptych, i.e., the ontological dimension according to which the Earth is not merely an objective thing or (meta)region upon which technologies take place, but concretely marks the inclusivity of the mode of appearance of Enframing according to which we discover things in the first place. Accordingly, if the Anthropocene offers a concrete experience of the mode of appearance according to which we appear as managers of the planetary *oikos* (which jointly appears as managerial resource), this additionally makes clear how Enframing cannot be understood as categorical concept under which the *totality* of technological things is (inappropriately) subsumed, but concerns the *whole of Being* qua mode of appearance (cf. Heidegger 1977, 29). The implication for philosophy of technology is that rejecting Enframing as a bloated category and conversely turning to specific technological things concurrently turns a blind eye to the ontological dimension, which in the Anthropocene is not only experienced concretely, but is philosophically relevant and urgent.[12]

2.3 Origin and Response

An ontological questioning of the Anthropocene is philosophically relevant because it gives rise to a reflection on the origin of the Anthropocene, which in turn leads to the question of human responsibility. In Earth-system science and geology, the origin of the Anthropocene is situated in the industrial revolution, where humanity taps into a vast well of fossil fuels on an unprecedented scale, and accordingly becomes the dominant Earth-shaper (Crutzen 2002; cf. Lorimer 2016). This origin is thereby interpreted on the ontic level, i.e., of beings (e.g., humans in a specific social organisation) who happen to come across other beings (fossil fuels) and as such radically change the face of the being called planet Earth.

Via Heidegger's interpretation of technology and its concretisation in the Anthropocene, however, we can situate this origin ontologically. The encounter between beings engendering the Anthropocene (the anthropic geoforce, fossil fuels, etc.) is already structured in a resource-oriented way according to which anthropic beings encounter other Earthly beings as standing-reserve: factories can only exhume the large amounts of products (prompting swift multiplication of humans on Earth) and associated greenhouse gasses (rendering the Earth an unsustainable *oikos* for humans) if the Earth is encountered as raw material that can be exploited and managed by humans. Hence, following the Heideggerian dictum that "that which is primally early shows itself only ultimately to men" (1977, 22), we can see how the Anthropocene may come into view in the wake of the industrial revolution, but understood as the concretisation of the mode of appearance of Enframing, the Anthropocene is ontologically prior to the revolutions of industrial machinery.

Understanding origin in this way sheds light on the question of human responsibility. As Latour recognizes: "to claim that human agency has become the main geological force shaping the face of the Earth, is to immediately raise the question of 'responsibility'" (2014, 4). This immediacy is evident in the Anthropocenic sciences, where the fact of the anthropos as dominant Earth-shaper immediately translates into the task of taking responsibility for the planet according to a managerial paradigm: "it's we who decide what nature is and what it will be" (Crutzen and Schwägerl 2011; cf. §1). When seen in light of the above asserted ontological origin of the Anthropocene, however, the issue of responsibility must be primarily understood in terms of responsiveness. If the Anthropocene has ontological status qua concretization of Enframing, this mode of appearance cannot itself be anthropogenic, since it concerns the whole of Being and thus already includes us. Parallel to Heidegger, for whom Enframing is "no merely human doing," but

a mode of appearance by which "man . . . has already been claimed" (1977, 19), our managerially oriented encounter with the Earth is not of our own making, but consists in our responsiveness to what "calls man forth into the modes of revealing allotted to him" (1977, 19). Hence, taking responsibility for Earthly beings on the ontic level is already responsive to this call on the ontological level. What follows is that although humans are now responsible for managing the planet, they cannot be held responsible for bringing about the situation in which taking responsibility becomes imperative. This does not diminish the role of humanity in favour of some absolute determinism but, on the contrary, takes heed of how the ecological demand compels us to concretely hear and respond to the "call" *as* the "challenging forth" that Heidegger associates with Enframing, since the challenge now resounds as the imminent and urgent call for sustainable planetary management (cf. Blok 2015, 936–37).

What follows is that because human responsiveness to the ecological demand is situated at an ontological level, humans cannot be irreducibly listed as one geoforce amongst many (cf. Heidegger 2012: 66). Yet far from returning us to some auto-congratulatory celebration of humanity as the "crown of creation" or "masters of the universe," we will show how this irreducibility instead brings into view how the anthropos in the Anthropocene is essentially *in danger*. In the next section, we explore this danger by confronting Heidegger's consideration of the danger of technology with the danger of the Anthropocene.

3. Anthropocene in Danger

In this final section, we ask whether the Anthropocene accords to what Heidegger calls the danger of Enframing, as well as its saving power. We will argue that the answer is radically ambiguous, meaning that the Anthropocene can be said to accord *and* discord with the danger of Enframing. We subsequently confront the radical ambiguity of the Anthropocene with Heidegger's consideration of the "saving power" of Enframing and associated comportment of "releasement," thereby developing the claim that Heidegger's thought concerning the relation between beings and being must be reoriented. We elaborate on this by showing how in the Anthropocene, the Earth comes under consideration as having ontic-ontological status. We conclude by suggesting that Heidegger's thought on the saving power of Enframing and associated comportment of releasement must become Earth-bound, which entails the opportunity of thinking a saving Earth.

3.1 Danger and Ambiguity

Heidegger conceives of Enframing as "the supreme danger" (1977, 26). Rather than consisting in ontic dangers affiliated with technology, e.g., the destruction of nature (cf. 1969, 55–66), the danger of Enframing is ontological and pertains to human existence as responsive to the claim of Enframing. As the supreme danger, Enframing tends to exclusively structure our encounter with the world in terms of standing-reserve, whilst we jointly exclusively appear as its "orderer" or manager (1977, 27). This exclusivity is dangerous because "[man] stands so decisively in attendance on the challenging-forth of Enframing that he does not apprehend Enframing as a claim, that he fails to see himself as the one spoken to" (1977, 27). Hence, the danger concerns our self-evident understanding of ourselves as manager of the planetary standing-reserve, meaning the failure to recognize Enframing as *a* mode of appearance, which entails that we forget how our managerial encounter with the world is already responsive to the claiming call of Enframing. In this way, Enframing becomes dangerously indifferent in "driving out every other possibility of revealing" (1977, 27).

Undergirding Heidegger's consideration of the danger is the idea of ontological epochality, i.e., the thought that different modes of appearance have held sway throughout the western tradition.[13] In his questioning of technology, Heidegger articulates this epochality via the example of an old windmill. He interprets the windmill to still bear the traces of a now subsided mode of appearance, arguing that it does not challenge-forth the wind to unlock and store its energy as does a modern wind turbine, but that its sails "are left entirely to the wind's blowing" (1977, 14). At first glance, this perspective may seem nostalgic, since we can also regard the old windmill to challenge the wind to deliver energy, but simply to a different end, e.g., milling grain as opposed to generating electricity. It is worth considering, however, that such a critique, albeit theoretically correct, begs the question of whether it does not itself accord with the danger of Enframing insofar as it indifferently and apriori encounters both windmill and turbine as standing-reserve (energy resource).[14] But more important for the present discussion is that the Anthropocene not only demonstrates the danger of Enframing, it concurrently epitomizes Heidegger's consideration of ontological epochality.

To address the former point first, in what sense can the Anthropocene be said to demonstrate the danger of Enframing? In the Anthropocene, the exclusivity of the standing-reserve is cemented insofar as we now cannot encounter the Earth otherwise than as managerial resource (cf. §2.1). Since there is no Earthly place

left untouched by global warming, no-thing can be left unmanaged, which both demonstrates how we are included in the whole of being as Enframing and corroborates Heidegger's assertion that Enframing dangerously "banishes man into that kind of revealing which is an ordering" (1977, 27).

Be that as it may, while the Anthropocene is dangerously monolithic in how the Earth concretely appears as managerial resource (standing-reserve) for human beings as manager of these resources, it simultaneously—and likewise concretely—conveys the epochal character of this situation. On the one hand, the Anthropocene by definition is a geological epoch, implying that it has a geological origin and will have a geological termination. On the other hand, following the argument put forth in §2, the epochal character in question is not merely geological—which is to say ontic insofar as geology deals with the Earth as objective being—but ontological because it concerns the whole of Being as the inclusive mode of appearance according to which we, as planetary managers, encounter the Earth in terms of managerial resources. The Anthropocene can then be seen to epitomize Heidegger's consideration of ontological epochality, because it demonstrates that its specific (managerial) mode of appearance arises at some point in time to find concrete expression from the industrial revolution onwards. Our previously discussed tree offers further clarification: although it would be theoretically correct to state that a tree also functioned as a carbon-sink during medieval times, we must also apprehend that it was not encountered as such during that epoch. This is to say that the identity of the tree has changed, and its current appearance as resource in light of global warming (i.e., as carbon source or sink) specifically belongs to the epoch of the Anthropocene, thus epitomizing ontological epochality.

The implication for the question regarding the danger of Enframing is that the Anthropocene accords *and* discords with it. The Anthropocene accords with the danger insofar as it cements the exclusivity of encountering the Earth qua managerial resource (standing-reserve) for human existence qua manager of these resources. At the same time, the Anthropocene discords with the danger insofar as it offers the opportunity to concretely experience the epochality of the hegemony of Enframing. This then constitutes a countertendency to the danger of Enframing by explicitly manifesting how human existence as planetary manager is embedded in a responsiveness to a specific call arising in the epoch of the Anthropocene (cf. §2.3). The danger of the Anthropocene is therefore radically ambiguous.

3.2 Saving the Earth—The saving Earth

If the Anthropocene is radically ambiguous with respect to the danger of Enframing, this implies that Heidegger's consideration of the "saving power" associated with Enframing (1977, 28) must be reoriented. How does Heidegger understand the saving power? Like the essence and danger of technology, the saving power is ontological. It therefore neither consists in renouncing technology (cf. Heidegger, 1969, 53), nor in the production of "safer" or better technologies (e.g., greener, smarter, more democratic etc.). Rather, the saving power concerns the awareness of human existence *as* responsive to the call of being, meaning that Enframing is perceived as *an* epochal mode of appearance to which our managerial encounter with the world is already responsive.

In citing Hölderlin's words "But where the danger is, grows the saving power also" (1977, 28), Heidegger considers the two in concert, which is to say that in the dangerous "frenzied-ness" and "irresistibility of ordering" (1977, 33), we are offered a chance to experience Enframing *as* the epochal mode of appearance that tends to hide its own epochality in indifference. In recognizing this, we can become perceptive to how the mode of appearance of Enframing involves a withdrawal insofar as the possibility of a different mode of revealing remains hidden. We can experience this withdrawal, for instance, in our contemporary tendency towards indifferent responsiveness when we find ourselves disposed to regard both the old windmill and modern turbine indifferently as energy resources (cf. §3.1). Or, with specific regard to the Anthropocene, we can experience this withdrawal in our self-evident notion of human existence as planetary manager when we recognize how both "conservative" reactions to the ecological demand (e.g., mitigation) as well as "progressive" reactions (e.g., geoengineering) are already and self-evidently disposed towards management (cf. Baskin 2015, 21; cf. §1). The saving power then means that we become perceptive of this withdrawal, which entails resistance to being indifferently absorbed in managerially attending to the standing-reserve, thus gaining a glimpse at the possibility of a wholly different mode of revealing (cf. Heidegger 1977, 31–33). In other words, the saving power consists in being responsive to the call of being as the "challenging forth" belonging to Enframing (cf. §2.3) whilst remaining attentive to the presently withdrawn possibility of a different call.

Now, for Heidegger, the danger and saving power of Enframing solely involve the ontological level, meaning that the rise of a different mode of appearance is not dependent on human interactions with ontic things (e.g., producing greener

technologies), but depends on the call of being (Heidegger 1969, 52; cf. 1977, 28). Since our interactions with things on the ontic level are already responsive to a call on the ontological level (cf. §2.3), human made solutions to the ecological demand of the Anthropocene (e.g., sequestering carbon) indifferently adhere to Enframing insofar as they remain oriented towards planetary management (cf. §1). Accordingly, when Heidegger considers the saving power, he turns away from solutions pertaining to ontic dangers and instead calls for an attitude of "releasement" (1969, 54). Releasement means, first, not viewing things "only in a technical way" (1969, 54), which we can understand as resisting indifferent myopism with respect to the standing-reserve. Secondly, releasement acknowledges the importance of technologies into our life, whilst simultaneously leaving them outside. This offers a glimpse at how technologies are "dependent on something higher" (1969, 54), which is to say dependent on an epochal mode of appearance that already structures our encounter with technologies (cf. §2.1). Thirdly, rather than denouncing technologies as meaningless instruments, releasement takes heed of how "*the meaning pervading the technological world hides itself*" (1969, 55, translation modified), where this meaning can be understood as the withdrawn possibility of a different world or different way of revealing.[15] In this way, Heidegger's thinking concerning releasement is consistent with his relinquishing of the ontic in favor of the ontological (cf. §2.2) and also demonstrates his unidirectional relating of the two, meaning that occurrences at the ontic level (e.g., developing greener technologies) never carry over to the ontological level (which already structures our managerial encounter with such technologies).

However, the Anthropocene compels a reorientation of Heidegger's unidirectional relating of the ontic and ontological, because it brings into view the Earth as ontic-ontological condition of possibility for responsiveness to the call of being. In order to develop this point, we must first understand how responsiveness is always eco-logical: whether indifferent or attentive, we are always responsive to the whole of being in which we are already inescapably included or at home (*oikos*), whilst this whole is structured according to a specific *logic* or mode of appearance.[16] More pointedly, if the Anthropocene can be understood as the concretization of Enframing (§2.1), it can correspondingly be understood as our *oikos* inasmuch as it concerns our inclusion in a world that appears according to the *logic* of management. In this sense, the *oikos* is prerequisite for human responsiveness. Next, the Anthropocene can be understood as the coalescence of ecology and geology, meaning that the Anthropocenic *oikos* belongs to a specific geological epoch, and as such appears as the latest chapter originating out of the vastly elongated, deep

timely drama of the evolution of the Earth, which itself clearly exceeds its present appearance as the managerial ecology called the Anthropocene (cf. Clark 2011; cf. Szerszynski 2012). This offers a first characterization of the Earth as ontic condition of possibility for the Anthropocene. But further, as we have argued in §3.1, the epochal character of the Anthropocene is not merely geological insofar as it concerns the Earth as geological object, but is ontological insofar as it concerns the whole of being in which we are included, which is to say the *oikos* (qua managerial resource) in which we (qua managers) are at home. We can experience our inclusivity in this *oikos* most concretely via the Anthropocenic ecological demand, as it alarmingly signals the counterpart of the epochal origin of the Anthropocene, namely its end: the massive experience of global warming and associated urgent demand of planetary mangement are indubitably oriented towards (avoiding) the becoming uninhabitable of our *oikos*. In this way, the ecological demand of the Anthropocene not only compels an experience of our inescapable inclusion in an *oikos* that we must manage (cf. §1), it simultaneously allows us to concretely experience that this *oikos* has originated from the Earth at some point in time(cf. §2.3), and appears to be on the verge of collapsing back into it. This then offers a further characterization of the Earth as condition of possibility for the Anthropocenic *oikos* in which we are included. Now, provided that this *oikos* is prerequisite for our responsiveness, and provided that the Earth is prerequisite for the emergence and decline of this *oikos*, it follows that the Earth is neither merely a geological object, nor a being that is encountered according to a unidirectional, ontological mode of appearing. Rather, the Earth is itself the ontic-ontological condition of possibility for responsiveness to the call of being, and by implication for the Anthropocene as concretization of Enframing.[17] In thus revealing the Earth to have ontic-ontological status, the Anthropocene entails a reorientation of Heidegger's unidirectional relating of the ontic and ontological.

The implication for the question of the danger and saving power of Enframing, as well as for the associated comportment of releasement is that these must become Earthbound. At this juncture, it is worth considering that while Heidegger alludes to the threat of a nuclear world war and accordingly discusses the possibility of the "complete annihilation of humanity and the destruction of the Earth" (1969, 55–56), he resolutely refuses to associate these ontic dangers with ontological responsiveness, arguing that the ontological danger of Enframing remains, "precisely when the danger of a third world war has been removed" (1969, 56). However, if the Earth is the ontic-ontological condition of possibility of human responsiveness, then Heidegger's refusal must be refused. The Anthropocenic eco-

logical demand means that the destruction of the Earth and annihilation of humanity must be understood as our *oikos* collapsing back into the Earth, and since this *oikos* is prerequisite for responsiveness, such destruction and annihilation are not merely ontic dangers, but have ontological stature.

At the same time, with respect to the saving power, considering the Earth as ontic-ontological condition of possibility for our Anthropocenic *oikos* and associated identity as managerial geoforce implies that the ontic-ontological Earth can be observed to withhold the possibility of a wholly different eco-logy and human identity. Paraphrasing Heidegger, we might say that the Earth has granted a temporarily stable basis for the various anthropic ecologies—with the Anthropocene being the most recent—whilst withholding the possibility of a wholly different ecological structuring. Since we then become perceptive to how the present appearance of the Earth as managerial resource for us as planetary managers is not all-encompassing and does not exhaust what the Earth has to offer, the Earth itself can be taken to indicate the possibility for a different Earthly encounter. Parallel to Heidegger, for whom the danger of Enframing appears in concert with its saving power, the Anthropocenic Earth as Enframed whole appears in concert with its withheld ecological possibilities. Accordingly, and in contrast to Heidegger, neither the danger nor saving power is ontologically isolated, but becomes Earth-bound by way of the ontic-ontological Earth.

Hence, while the Anthropocene compels a concrete experience of our (dangerous) inclusion in the whole of Being characterized as Enframing, this very concreteness also demonstrates how the ontic-ontological Earth conditions this experience, thereby offering a glimpse at how it withholds a different ecological possibility. The Anthropocene can therefore be said to introduce us to the saving Earth.

4. Conclusion

In this paper, we have argued that the Anthropocene neither merely involves a geological or historical description of the Earth, nor a normative prescription regarding how to manage the Earth, but has ontological status insofar as the Earth appears to be managerially "at hand" (§1). We subsequently argued that the Anthropocene involves a concretization of Heidegger's notoriously difficult and abstract notion of Enframing (§2). We put forth the implication that questioning technology in the Anthropocene cannot be limited to the ontic domain of technological artifacts, but must address the essence of technology in terms of the whole of Being (§2.1, §2.2). Further, we considered the Anthropocene to have an ontological origin, which in turn implied that the question of responsibility with respect to the Anthropocenic

ecological demand at the ontic level already involves the question of responsiveness on the ontological level (§2.3). This in turn gave rise to a reconsideration of the danger and saving power of Enframing. We showed how with respect to the danger, the Anthropocene is radically ambiguous (§3.1). We subsequently argued that as a result of this ambiguity, Heidegger's thought concerning the saving power and comportment of releasement must be reoriented to become Earthbound. On the one hand, this brought the Earth under consideration as having ontic-ontological status. On the other hand, it implied the saving Earth.

The consideration thus offered neither saves us from the ecological threat witnessed in the Anthropocene, nor does it provide managerial means for practically dealing with the ecological demand. It does, however, offer a reflection on the horizon that orients both these ecological questions and managerial answers. Above all, it gives rise to a question concerning the human condition. In accordance with Heidegger, we have argued that due to the issue of human responsiveness, the anthropos in the Anthropocene cannot be reduced to the ontic level, i.e., listed as one geoforce amongst many (§2.3). Yet against Heidegger, we have argued that this responsiveness can no longer be isolated to the ontological level of being, but must in light of the Anthropocene be reconsidered in a telluric way, which is to say as deeply associated and coalesced with the Earth. The question then becomes how we should think the relation between technological humanity and the Earth. The arguments presented in this paper serve to guide this path of questioning by indicating two cul-de-sacs, as it neither suffices to equate the anthropos with Earth as geoforce and planetary manager, nor to completely unearth it as the "shepherd of Being" (Heidegger 1998a, 260). This then points to a future task for reflection in the Anthropocene: to examine the human as Earthling.

Notes

We would like to thank the anonymous reviewers for their fruitful comments on an earlier draft of this article.

1. Within the limits of this paper, we neither can nor need to elaborate on Morton's (object oriented) ontology to appreciate this observation. For his discussion of hyperobjects, see Morton 2013.
2. For an analysis of the Anthropocene and the weather, see Szerszynski 2010.
3. To clarify, the identity as managerial resource does not imply that a tree can no longer be impressive or beautiful to us, but rather means that such experience of beauty is inescapably bound up with the threat of global warming—thereby potentially inciting us manage the preservation of trees, or manage their multiplication as carbon-sink.

4. Given this immanence and "naturalisation" of rationality, the Anthropocene can be said to herald the arrival of Friedrich Nietzsche's program to "translate man back into nature" (1989, 161) via the famous transvaluation of all values.

5. Although it remains up for debate whether the industrial revolution can be seen as the origin of the Anthropocene, most authors agree that it is of decisive importance (cf. Steffen et al. 2011; cf. Lorimer 2016).

6. Don Ihde extensively discusses the technical embedding of science, see, for example, Ihde 2011.

7. Anticipating §2.1, we write "total" to accentuate the difference between the German "Totalität" and "Ganze." The former is ontic and concerns beings, the latter is ontological and concerns Being.

8. Compare Heidegger's example of the Rhine appearing as "water power supplier" *or* as resource for the "vacation industry" (1977, 16).

9. This additionally makes clear that rather than criticizing or disparaging such management, we interpret its inescapability as an indication for an ontological consideration of the Anthropocene.

10. This has become known as "The Empirical Turn" in philosophy of technology, i.e., a turn away from overarching analyses of technology in general, towards an artefact-oriented philosophical approach (cf. Achterhuis 2001).

11. A notable exception can be found in Mark Coeckelbergh's (2015) "Environmental Skill," which explicitly connects philosophy of technology with environmental thought. Coeckelbergh's analysis of modernity and its alienation serve to explain Winner's astonishment to a certain extent, but because of its different aims, Coeckelbergh's study does not elaborately question what we here discuss as the ontological dimension of technology (cf. Zwier and Gammon 2015).

12. For an elaborate discussion on Heidegger's philosophical method and the postphenomenological method of studying technologies, see Zwier, Blok, and Lemmens (2016).

13. Heidegger calls this the "history of Being" [Seinsgeschichte] (Heidegger, 1999). Given the scope of this paper, we cannot elaborate on the various "stages" of this history and the way they are interrelated, and solely focus on the epochal character of Being and how this is forgotten in the epoch of Enframing.

14. See, for example, Ihde 2010, 74–86. We have elsewhere argued that Enframing cannot be understood as a theory about technological objects (cf. Zwier, Blok, and Lemmens 2016).

15. Heidegger's questioning of technology can therefore itself be interpreted as an exercise in releasement, since he acknowledges the obvious importance of technological instrumentality (1977, 6), whilst also analyzing instrumentality to belong "to something higher" in retracing instrumentality to causality, bringing-forth, and ultimately truth (cf. Heidegger 1977, 5–12).

16. The language of Being And Time famously articulates this as "being-in-the-world," where our responsiveness to such being, whether authentic or inauthentic, is considered as a way of being-in-the-world (cf. Heidegger 2008).

17. Two remarks are in order here: First, it should be noted that this argument is indebted to a similar argument that Vincent Blok recently put forth in a discussion about Heidegger and Meillassoux concerning the Earth as uncorrelated being and as ancestral (cf. Blok 2016). Secondly, we should note that our present discussion of the Earth is primarily informed by our discussion of the Anthropocene, and cannot enter into elaborate exegesis of Heidegger's conceptualization of the Earth (e.g., in its strife with "World," or with respect to "the fourfold"). For an elaborate analysis of these points, see Blok 2016.

References

Achterhuis, Hans, ed. 2001. *American Philosophy of Technology: The Empirical Turn*, trans. Robert Crease. Bloomington: Indiana University Press.

Baskin, Jeremy. 2015. "Paradigm Dressed as Epoch: The Ideology of the Anthropocene." *Environmental Values* 24: 9–29. https://doi.org/10.3197/096327115X14183182353746

Blok, Vincent. 2014. "Reconnecting with Nature in the Age of Technology: The Heidegger and Radical Environmentalism Debate Revisited." *Envrionmental Philosophy* 11(2): 307–32. https://doi.org/10.5840/envirophil20149913

Blok, Vincent. 2015. "The Human Glance, the Experience of Environmental Distress and the 'Affordance' of Nature: Towards a Phenomenology of the Ecological Crisis." *Journal of Agricultural and Environmental Ethics* 28(5): 925–38. https://doi.org/10.1007/s10806-015-9565-8

Blok, Vincent. 2016. "Thinking the Earth: Critical Reflections on Quentin Meillassoux's and Heidegger's Concept of the Earth." *Environmental Ethics* 38(4): 441–62. https://doi.org/10.5840/enviroethics201638437

Blok, Vincent. 2017. "Earthing Technology: Towards an Eco-centric Concept of Biomimetic Technologies in the Anthropocene." *Techné: Research in Philosophy and Technology* 21(2–3). https://doi.org/10.5840/techne201752363

Clark, Nigel. 2011. *Inhuman Nature: Sociable Life on a Dynamic Planet*. London: Sage Publications.

Coeckelbergh, Mark. 2015. *Environmental Skill: Motivation, Knowledge, and the Possibility of a Non-romantic Environmental Ethics*. New York: Routledge.

Collings, David. 2014. *Stolen Future, Broken Present: The Human Significance of Climate Change*. Ann Arbor, MI: Open Humanities Press. https://doi.org/10.3998/ohp.12832550.0001.001

Crutzen, Paul. 2002. "Geology of Mankind: The Anthropocene." *Nature* 415: 23. https://doi.org/10.1038/415023a

Crutzen, Paul, and Christian Schwägerl. 2011. "Living in the Anthropocene: Toward a New Global Ethos." *Yale Environment* 360. http://e360.yale.edu/feature/living_in_the_Anthropocene_toward_a_new_global_ethos/2363/. Accessed 20 October 2016.

Ellis, Erle. 2013. "Overpopulation Is Not the problem." *New York Times*, 13 September. http://www.nytimes.com/2013/09/14/opinion/overpopulation-is-not-the-problem.html. Accessed 20 October 2016.

Feenberg, Andrew. 1999. *Questioning Technology*. London: Routledge.

Feenberg, Andrew. 2010. *Between Reason and Experience*. Cambridge, MA: MIT Press.

Harraway, Donna. 2015. "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin." *Environmental Humanities* 6: 159–65.

Heidegger, Martin. 1969. *Discourse on Thinking*, trans. John. M. Anderson and Hans Freund. New York: Harper & Row.

Heidegger, Martin. 1977. *The Question concerning Technology and Other Essays*, trans. William Lovitt. New York: Harper and Row.

Heidegger, Martin. 1998a. "Letter on 'Humanism,'" trans. Frank A. Capuzzi. In *Pathmarks*, ed. William McNeill, 239–76. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511812637

Heidegger, Martin. 1998b. "What Is Metaphysics?," trans. David. F. Krell. In *Pathmarks*, ed. William McNeill, 82–96. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511812637

Heidegger, Martin. 1999. *Contributions to Philosophy (From Enowning)*, trans. Parvis Emad and Kenneth Maly. Bloomington: Indiana University Press.

Heidegger, Martin. 2008. *Being and Time*, trans. John Macquarrie and Edward Robinson. New York: Harper & Row.

Heidegger, Martin. 2012. *Bremen and Freiburg Lectures: Insight Into That Which Is and Basic Principles of Thinking*, trans. Andrew J. Mitchell. Bloomington: Indiana University Press.

Ihde, Don. 2010. *Heidegger's Technologies: Postphenomenological Perspectives*. New York: Fordham University Press.

Ihde, Don. 2011. "Husserl's Galileo Needed a Telescope!" *Philosophy and Technology* 24: 69–82.

Latour, Bruno. 2014. "Anthropology at the Time of the Anthropocene: A Personal View of What Is to be Studied." http://www.bruno-latour.fr/sites/default/files/139-AAA-Washington.pdf. Accessed 20 October 2016.

Lorimer, Jamie. 2016. "The Anthropo-scene: A Guide for the Perplexed." *Social Studies of Science* 47(1). https://doi.org/10.1177/0306312716671039

Moore, Jason, ed. 2016. *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*. Oakland, CA: PM Press.

Morton, Timothy. 2013. *Hyperobjects: Philosophy and Ecology after the End of the World*. Minneapolis: University of Minnesota Press.

Morton, Timothy. 2016. *Dark Ecology: For a Future of Coexistence*. New York: Columbia University Press. https://doi.org/10.7312/mort17752

Nietzsche, Friedrich. 1989. *Beyond Good and Evil*, trans. Walter Kaufmann. New York: Vintage.

Shue, Henry. 2010. "Subsistence Emissions and Luxury Emissions." In *Climate Ethics: Essential Readings*, ed. Stephen Gardiner, Simon Caney, Dale Jamieson, and Henry Shue. New York: Oxford University Press.

Steffen, Will, Paul Crutzen, and John McNeill. 2007. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Ambio* 36(8): 614–21. https://doi.org/10.1579/0044-7447(2007)36[614:TAAHNO]2.0.CO;2

Steffen, Will, Jacques Grinevald, Paul Crutzen, and John McNeill. 2011. "The Anthropocene: Conceptual and Historical Perspectives." *Philosophical Transactions of the Royal Society A*, 369: 842–67. https://doi.org/10.1098/rsta.2010.0327

Szerszynski, Bronislaw. 2010. "Reading and Writing the Weather. Climate Technics and the Moment of Responsibility." *Theory, Culture & Society* 27(2–3): 9–30. https://doi.org/10.1177/0263276409361915

Szerszynski, Bronislaw. 2012. "The End of the End of Nature: The Anthropocene and the Fate of the Human." *Oxford Literary Review* 34(2): 165–184. https://doi.org/10.3366/olr.2012.0040

Verbeek, Peter-Paul. 2005. *What Things Do: Philosophical Reflections on Technology, Agency, and Design*, trans. Robert P. Crease. State College: Penn State University Press.

Winner, Langdon. 2013. "A Future for Philosophy of Technology—Yes, but on which Planet?" Keynote lecture at SPT biannual meeting, Lisbon, Portugal.

Zalasiewicz, Jan, Mark Williams, Will Steffen, and Paul Crutzen. 2010. "The New World of the Anthropocene." *Environmental Science & Technology* 44: 2228–31. https://doi.org/10.1021/es903118j

Zwier, Jochem, Vincent Blok, and Pieter Lemmens. 2016. "Phenomenology and the Empirical Turn: A Phenomenological Analysis of Postphenomenology." *Philosophy & Technology* 29(4): 313–33. https://doi.org/10.1007/s13347-016-0221-7

Zwier, Jochem, and Andrea Gammon. 2015. "Mark Coeckelbergh: *Environmental Skill: Motivation, Knowledge, and the Possibility of a Non-romantic Environmental Ethics*" (book review). *Human Studies* 38(3): 439–44. https://doi.org/10.1007/s10746-015-9355-3

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 243–281 DOI: 10.5840/techne201710472

The Technocene or Technology as (Neo)environment

Agostino Cera

Abstract: While putting forward the proposal of a "philosophy of technology in the nominative case," grounded on the concept of *Neoenvironmentality*, this paper intends to argue that the best definition of our current age is not "Anthropocene." Rather, it is "*Technocene*," since *technology* represents here and now the real "subject of history" and of (a de-natured) nature, i.e., the (neo)environment where man has to live.

This proposal culminates in a new definition of *man's humanity* and of *technology*. Switching from *natura hominis* to *conditio humana*, the peculiarity of man can be defined on the basis of an *anthropic perimeter*, the core of which consists of man's *worldhood*: man is that being that has a world (*Welt*), while animal has a mere environment (*Umwelt*). Both man's worldhood and animal's environmentality are derived from a *pathic premise*, namely the *fundamental moods* (*Grundstimmungen*) that refer them to their respective findingness (*Befindlichkeit*).

From this anthropological premise, technology emerges as *the oikos of contemporary humanity*. Technology becomes the current form of the world—and so gives birth to a Technocene—insofar as it introduces in any human context its *ratio operandi* and so assimilates man to an animal condition, i.e., an environmental one. Technocene corresponds on the one side to the emergence of technology as (Neo)environment and on the other to the *feralization of man*. The spirit of Technocene turns out to be the *complete redefinition of the anthropic perimeter*.

While providing a non-ideological characterization of the current age, this paper proposes the strategy of an '*anthropological conservatism*,' that is to say a *pathic desertion* understood as a possible (pre)condition for the beginning of an authentic Anthropocene, i.e., *the age of an-at-last-entirely-human-man*.

Key words: Technocene (vs. Anthropocene), neoenvironmentality, feralization (of man), anthropic perimeter, philosophy of technology in the nominative case, anthropological conservatism

Agostino Cera, Department of Human Sciences (DISU), University of Basilicata, via Nazario Sauro 85, 85100 Potenza, Italy; moonwatch1@libero.it.

Nicht: „Unser täglich Brot gib uns heute“
. . . würden wir, wenn wir ehrlich wären, heute beten, sondern:
„Unseren täglichen Hunger gib uns heute“
—damit die Brotfabrikation täglich gesichert bleibe.
Günther Anders[1]

1. Introduction

The thesis of this paper is that the definition “Anthropocene” describes only the surface character of an *epochal phenomenon* which, in its true sense, should be named “Technocene,” since *technology* represents here and now the only possible “subject of history” and the same goes for nature. That is to say, the *(neo)environment* where man has to live. This aspirant new geological epoch—put forward by Paul Crutzen at the beginning of the twenty-first century—in no way corresponds to “the Age of Man,” “Human era,” “*Menschenzeit*” (Schwägerl 2015) or the age of the “Human Turn” (Raffnsøe 2016), but rather to the age of the eclipse of the *anthropos*, of a gradual de-humanization of man.

I am aware that this attempt to rename the Anthropocene is not a novelty in the debate on this subject. Quite the contrary; the proliferation of similar attempts in very recent years—from “Capitalocene” (Moore 2014; 2016), to “Thanatocene,” “Thermocene,” “Phagocene” (Bonneuil and Fressoz 2016), to “Econocene” (Norgaard 2013), to “Chthulucene” (Haraway 2016) and “Entropocene” (Stiegler 2017)—is confirmation of the wide philosophical appeal of Crutzen’s proposal.[2] The definition “Technocene” can be taken neither as a synonym nor as a specification of “Anthropocene.” In other terms: insofar as technology affirms itself as the current epochal subjectivity, it acquires an autotelic character and therefore can be no more understood as a human function (that of an ‘instrumental action’). It becomes an ideology, a *totality*, namely “presents itself as a vast inaccessible positivity that can never be questioned” (Debord 1983, 9) and in this form it carries out the function as a secularized surrogate of by now useless “hinterwordly” (theological-metaphysical) principles.

On the basis of an *ad hoc* theoretical hypothesis that relates both to the technological as well as to the anthropological question—a “philosophy of technology in the nominative case,” i.e., a *philosophical anthropology of technology*, grounded on the concept of *Neoenvironmentality* (*neoambientalità*)—I shall argue that the above-mentioned de-humanization of man consists of his *feralization* (*ferinizzazione*).

The emergence of the Technocene coincides with a fundamental alteration of the *anthropic perimeter* (*perimetro antropico*): that set of conditions (*worldhood*, *ek-staticity*, and *historicity*) which define the *conditio humana*, namely which establish the *oikological* horizon (the perimeter) within which human being is able to recognize itself *as such*. Given that among these conditions stands out *worldhood*—the *barycentre of the anthropic perimeter*, which is dialectically opposed to the *environmentality* that characterizes the animal condition as such—this alteration transforms man's constitutive *worldhood* into a (neo)environmentality, which determines his subsequent feralization. This means that the Technocene (i.e., the Anthropocene understood in its authentic meaning), equates to the *Age of Neoenvironmentality and of the feralized man*.

In practice, I shall proceed by setting out the reasons for the lexical change from "Anthropocene" to "Technocene," by explaining certain basic unexpressed conditions which define this "ideology dressed as epoch" (Baskin 2015)[3] (§2). I shall then go on to clarify the meaning of the formula "philosophy of technology in the nominative case" (*filosofia della tecnica al nominativo*), since it functions as a theoretical premise for the idea of the Technocene (§3). I will proceed by providing the new characterizations of *man's humanity* and *technology* as they emerge from this approach, then I will highlight the structural connection between the establishment of a Technocene (the age of the technology as neoenvironment) and the resulting consequences for the human condition (§§4 and 5). I shall conclude by suggesting the direction for a possible *countermovement* (in the Nietszchean sense), based on the idea of an 'anthropological conservatism.' This suggestion is put forward as a philosophical act of sabotage, a 'pathic desertion' against the ideology of the Technocene, calling on 'human resilience' as a (pre)condition of a possible "other beginning." That of an authentic Anthropocene, i.e., the *age of an-at-last-entirely-human-man* (§6).

Before developing the argument itself, however, it is useful to offer a preliminary reply to a 'natural' objection that seems to be reasonable to some extent, but proves to be ineffective with regards to the real question at stake here. This objection is the following: there is no necessary connection between 'animality'—granted that such a thing really exists—and so-called 'environmentality.' It must be clear that the theory I am proposing does not state such an equation. In other words, it is in no way claimed that environmentality represents the special way of being of that set of living beings that we conventionally define as 'animals.'[4] This paper does not intend to propose an ontology or a phenomenology of animality as

such. On the contrary, the notions of 'animal' and 'animality' as used here are seen essentially as cultural constructs (as "discourses" in the Foucaultean sense), or as anthropological projections.

So, even where the hypothesis of animal environmentality turned out to be a mere 'human transfer,' what would really matter for my argument is the capability of such a transfer to establish *ab intra* (i.e., from within the human condition) a criterion of recognisability for man, namely its capability to mark a boundary beyond which the human being would fail to recognize itself as such. Therefore, the equation between environmentality and animality, here merely stipulated, functions only as a necessary term of comparison to indicate that an 'environmentalized man'—namely, a man inhibited in his worldhood; namely, the human type produced by the Technocene—would be unrecognisable to the man himself.

2. *Prologue*: From a (Supposed) Anthropocene to a (Real) Technocene

> "In February of that year [2000] our then sixty-seven year-old scientist went to Cuernavaca, Mexico, to take part in an International Geosphere-Biosphere (IGBP) conference. . . . Crutzen remembers the moment thus: "The chairman mentioned the Holocene again and again as our current geological epoch. After hearing that term many times, I lost my temper, interrupted the speaker and remarked that we are no longer in the Holocene. I said that we were already in the Anthropocene." (Schwägerl 2015, 9)

> "Anthropocene, the current epoch in which humans and our societies have become a global geophysical force." (Steffen, Crutzen, and McNeill 2007, 614)

> "Underlying global change . . . are human-driven alterations of i) the biological fabric of the Earth; ii) the stocks and flows of major elements in the planetary machinery . . . and iii) the energy balance at the Earth's surface. The term Anthropocene . . . suggests that the Earth has now left its natural geological epoch, the present interglacial state called the Holocene. Human activities have become so pervasive and profound that they rival the great forces of Nature and are pushing the Earth into planetary *terra incognita*. The Earth is rapidly moving into a less biologically diverse, less forested, much warmer, and probably wetter and stormier state." (Steffen, Crutzen, and McNeill 2007, 614)

In the face of these and many other general definitions of the Anthropocene, the first philosophical observation to be made is that they are far less neutral or 'objec-

tive' than they appear to be. In fact they imply, more or less consciously, some crucial hermeneutic and ontological premises which are useful and interesting to look at and make explicit. Such work of deconstruction/disambiguation represents the specific and still unique contribution that philosophical thought has to offer in the debate on this topic. In my view, it is in such a contribution that there exists the present-day sense of an authentic *philosophy* of technology, or rather that of a philosophy of technology *in the nominative case* which does not restrict itself to the management (in terms of problem-solving) of the single critical issues that at times emerge from *technisches Zeitalter*.

As regards unexpressed premises in the idea of the Anthropocene, the basic position of Jeremy Baskin that it is "less a scientific concept than the ideational underpinning for a particular worldview," even an ideology or "a paradigm dressed as epoch" (Baskin 2015, 9)[5] seems to me one which is entirely acceptable. In particular, it represents a fundamentally ambiguous idea which insinuates ideological elements (i.e., valutative and prescriptive), making them appear to be neutral (descriptive) statements, thanks in part to their scientific matrix. Regarding this, the present paper attributes the ideological character of the Anthropocene to the fact that, quite unquestioningly, it expresses the accepted meaning of an epochal fact, i.e., the complete and definitive *naturalization of technology*. The normative/prescriptive element of this aspirant geological epoch lies in its unquestioning, 'natural' acceptance of the *metamorphosis of techne in physis*.[6] In other words: within the present-day historical configuration, technology has taken on such a pervasive role that the only way it can be properly perceived is to think of it and interpret it as being nature itself, as *physis*. Or as *holon* (totality). The epoch of the triumph of *homo faber* can be described and understood only as being a geological epoch: as a natural, cosmic time. That is, as an absolute time which can be referenced only to itself.

However, looking at it more closely, this metamorphosis turns out to be the effect of a further cause. *Techne* can be thought of as *physis* only because it has previously and surreptitiously taken over the place of *physis*, because it has replaced *physis* in both meaning and function. This means that that *physis* which relates *techne* to it, was in fact already totally converted according to technologiical parameters. "Nature and Culture [Technology] are unified, but under the rule of Culture [Technology]" (Baskin 2015, 18). Therefore, the metamorphosis of *techne* in *physis* turns out to be an epiphenomenon in relation to the main phenomenon, consisting of the *preliminary metamorphosis of physis in techne*, namely in that long process of the 'de-physization,' 'de-cosmization' of the nature which char-

acterizes the whole of modernity and which in the epoch called Anthropocene is wholly realized. The vision that comes to us—or rather, the only vision our eyes are yet able to see—is that of a "Technature" (Schwägerl 2015, 127–49),[7] i.e., a "physics without *physis* and a nature without *logos*" (Löwith 1986, 62).[8]

In the context of the Anthropocene, nature is conceived, perceived and made use of in entirely technological terms. Its meaning as a resource becomes an irreducible givenness, a *positum*; it acquires an obvious, 'natural' value. Compared with this fundamental givenness, the fact that nowadays we are concerned about the limits of sustainability (or rather 'challengeability') of this resource makes little difference. The fundamental meaning of our relationship with nature does not change: it remains a reservoir of resources which we feel we have a right, or even duty, to draw from indefinitely. The same present-day need to 'adjust (limit) ourselves' seems to be subjected to the concern about 'impoverishing the store of our resources'; that is, reaching the point when we can no longer exploit those resources. Not infrequently, this is the unexpressed reason behind certain ostentatious ecological or environmental convictions. Therefore it is no coincidence that within this hermeneutic context the two main effects of the pervasivity of human action in the Anthropocene—"peak oil" and "climate change"—can be interpreted as the "twin challenges" of the planet's steward (Steffen et al. 2011, 739). On this basis, evoking the image of the "world organism" (Crutzen and Schwägerl 2011) by Alexander von Humboldt—author of one of the last attempts to conceive nature as *physis* (Humboldt 1845–1862)—sounds rather paradoxical, a kind of *excusatio non petita*. The attempt to bring together such discordant matters in the end produces an image of nature that is similar to a kind of pet. That is, a living being, but completely dependent on us as well as being entirely available.

Concrete proof that here we are dealing with "de-natured" nature lies in attempts to construct a periodization of the Anthropocene. I refer in particular to the proposal suggested by Steffen, Crutzen, and McNeill (2007) into three stages: 1) "The Industrial Era" (ca. 1800–1945); 2) "The Great Acceleration" (1945–ca. 2015); 3) a hypothetical stage (ca. 2015–?) when we shall (or must) become the "Stewards of the Earth System."[9]

It is interesting to note that in this periodization the natural (cosmic) time is completely absorbed by the human (technological) time. Such a result can partly explain, among other things, the resistance of the scientific community to acceptance the candidature of the Anthropocene as the geological epoch following the Holocene. Here there is no longer any distinction between natural time and his-

torical time, no cosmological difference between world (*Welt*) and human world (*Menschenwelt*), between *mundus rerum* and *mundus hominum*, in the sense that the latter totally eclipses the former, until it becomes its parameter and lastly its condition of possibility. As Crutzen himself says, in a statement which is a perfect synthesis of the ideological spirit at the basis of the Anthropocene: with the advent of this new epoch "it's no longer us against nature," but only since now "nature is us" (Crutzen and Schwägerl 2011).[10]

If, then, the real meaning of the Anthropocene is that it is the epoch of technology conceived and perceived as *physis*, which has, however, previously and entirely been technologized, it follows that it is the epoch when technology—and with it its (presumed) author: *homo faber*—comes face to face with none other than itself. By addressing itself to nature, *techne* does nothing other than mirror itself in one of its own masks. Its meeting with otherness turns out to be an act of recognition, even reflection (i.e., mirroring). The Anthropocene is the age of totalized technology, i.e., of *techne* as *holon* (technology as totality). More than half a century after they were written, the words of Werner Heisenberg have not lost their relevance:

> *[F]or the first time in the course of history modern man on this earth now confronts himself alone*. That is to say: Thus even in science the object of research is no longer nature itself, but man's investigation of nature. Here, again, man confronts himself alone. (Heisenberg 1958, 23, 24)

On the other hand, up to now the reinterpretation of the Anthropocene I am proposing does little to change the conviction that it corresponds to the "Age of Man" or "Menschenzeit." In fact, the transition of human being from 'ruler over nature' to "Steward of the Earth System"[11] makes the Anthropocene seems to be the age in which anthropocentrism loses its traditional negative connotation. Within this new context it ceases to be *hybris* and becomes *ananke*, namely necessity, responsibility and even moral duty. It corresponds to our duty to take care (= manage) the world organism for which we have become entirely responsible, since today "The Earth [is] in our Hands"[12] or "it's we who decide what nature is and what it will be" (Crutzen and Schwägerl 2011).

The fundamental ambiguity of such an approach is further confirmed by the way in which the Steward of nature[13] thinks of carrying out its ecological task/duty. Basically, management of the Earth System translates itself into a detailed *geo-engineering* programme (Steffen, Crutzen, and McNeill 2007; Steffen et al. 2011).[14] That is to say, an engineering that from the horizon of *bios*, stretches to

that of *zoè*, i.e., of *physis* (*kosmos*) itself. To all effects and purposes, what is being presumed here is a further ideology: a *pan-engineering*.

In my view, however, a critical dissection of the "discourse of the Anthropocene" (Crist 2016, 14) cannot stop at this level of analysis, but is in need of further argument. As follows. The osmotic fusion between *techne* and *physis* (the Technature) can be achieved only by virtue of a fundamental condition of possibility: *the ontological equation between 'being' and 'being makeable* (machbar sein).' The Anthropocene, the age of totalized technology, is first and foremost the epoch in which 'being' means 'being raw material (*Rohstoff*).' Everything that is, is makeable. More precisely: *everything that is, is in that it is makeable*. Here 'makeable' means 'challengeable (*herausforderbar*).'[15] Makeability/challengeability (*Machbarkeit*/*Herausforderbarkeit*) becomes universal *modus essendi*, absolute *criterium existendi*. In other words, the ontological characterization of that which is entirely determined by its makeability/challengeability is what Heidegger describes as "*Bestand* (standing-reserve)" (Heidegger 1977, 17). These observations recall one of the laws of our current age stated by Günther Anders, in particular the "second axiom of economic ontology," that reads: "what cannot be used (*Unverwertbares*) is not." Translated as an imperative: "make everything usable" (Anders 2002, 183–88). That is: 'make a *Bestand* of everything.'

Given this ontological equation as basic presupposition, it would be wrong to affirm that the epoch in which technology has become the subject not only of history, but of nature too (though of a de-naturated nature) equates to the anthropocentric, or at least anthropological, epoch *par excellence*. Even if man tries to claim for himself the central position of steward (or manager, or engineer) of nature. Paradoxically, the authentic anthropological cipher of the Anthropocene is not *homo faber*, the subject of *techne*, but *homo materia*, its object. It is Anders again who can help us to understand this argument. The absolutization of *Macht* in the form of *Machbarkeit* makes of *homo faber* a *homo creator*, he who does not limit himself to reproducing nature. *Homo creator* is the anthropological figure produced by the evolution of *techne* from *mimesis* to *poiesis*, a transition that takes place when *techne* becomes literally able to 'create,' that is to say 'produce *physis*.' The '*homo creator* condition' corresponds to that in which *homo faber* absolutizes his 'right/duty to make'; which is to say that he extends it to the totality of that which is, without exception. In order to become a *creator*, he must transform *everything* into what is usable/challengeable. Into raw material, a *Bestand*. "Everything," therefore also (and first and foremost) himself.

As a result, the paradoxical but completely consequent outcome of the anthropological metamorphosis from *homo faber* to *homo creator* is its simultaneous an complementary metamorphosis into *homo materia*. In order to fully become the 'subject' (steward, manager, engineer) of present reality, he must make himself the object of his own making. That is, he must make himself the means of that means (technology) through which he is able to give shape to the world. More precisely, he has to reify, de-humanize himself, i.e., subjugate himself to his own makeability (*Machbarkeit*), which as a result becomes a universal parameter of reference. A *metron tou holou*. Only in such a hypostatized form, technology can become an epochal subjectivity (Anders 1992, 21–25).[16]

In the age of totalized technology not even *anthropos* can escape from the ontological prescription of makeability/challengeability. Posthuman ideology and the anthropological imperative of enhancement represent pregnant examples at ontic, everyday level of this situation. This brand new commandment corresponds to the definitive implementation of the Andersian axiom mentioned above. If "make everything usable (makeable, challengeable)" essentially means "make a *Bestand* of everything," its absolutization says: "make a *Bestand* of everything, *including yourself*." Such an imperative represents the counterpart of a *Promethean shame*, which grows until it becomes *Promethean guilt*. It is a negative attitude, which in the end becomes bad conscience with respect to one's own '(still) being (only) men,' namely one's own humanity perceived exclusively as *obsolescence* (*Antiquiertheit*). From this premise derives the consequent commandment of 'no longer being human': the self-obligation to allow oneself to be systematically challenged, to make oneself entirely available to makeability. To make oneself *homo materia*, so that technology may *de*-humanize us, i.e., free us from the condemnation of being 'simply human.'

In brief, in the interpretation set out in the present pages, on the one hand so-called Anthropocene shows to be the epoch of technology as the subject of history and of a post-natural (de-natured) nature; on the other hand, technology becomes this only through a substantial mutation of the *conditio humana*. In other words, the paradoxical, but completely consistent outcome of the 'integrally human epoch'—the age in which man measures up exclusively to himself, namely to his technological capability, namely to his makeability—is a decisive alteration of the space within which the human being can be recognized as such. This space will here be defined *anthropic perimeter*.

The fundamental precondition of totalized technology, therefore, is the eclipse of *anthropos*, its *pauperization*, in the sense of an ontological *diminutio*.

Such an eclipse lies in the impossibility of still recognising himself as 'man.' The fact that the emergence of technology as epochal subjectivity cannot exist except at the price of the de-humanization of man is why I prefer the definition "Technocene" to "Anthropocene."

The choice of this definition, which until now I have broadly outlined, is the result of taking up a precise position with respect to the technological and anthropological question. I will elaborate on this position in what follows, illustrating the hypothesis of a *philosophical anthropology of technology* or rather a *philosophy of technology in the nominative case* which underlies it. This hypothesis identifies the fundamental peculiarity of human being in an *anthropic perimeter*: a set of conditions (*worldhood*, *ek-staticity*, and *historicity*) which define the limits of *conditio humana*, that is, which set up the *oikological* horizon (the perimeter)[17] within which man is able to recognize himself as such. Among these conditions, what stands out is *worldhood*—the barycentre of the anthropic perimeter—which is dialectically opposed to the *environmentality* that characterizes the animal condition as such. Seen from this perspective, the Technocene corresponds to the age in which the worldhood undergoes a decisive '(neo)environmental alteration,' or the age of the *feralization of man*.

To avoid all possible misinterpretations, it should be pointed out straight away that the expressions 'environmentalization' and 'feralization' of man, though more rigorously formalized, refer to the same phenomenon I have named "metamorphosis of man into *homo materia*, or *Bestand*-man." That is, into a being which is entirely challengeable/makeable.

In outline:

—As basic premise, *I shall state as constitutive need and character of identity of the human being (i.e., 'the humanity of man') his capability to recognize himself as such*. In other words, I shall assume that we are that particular living being, whose beginning is "in knowing it [i.e., in knowing such a beginning]" (Mazzarella 2004, 13).

—*I shall identify the nucleus of such character of identity in the anthropic perimeter*: that set of conditions (worldhood, ek-staticity, and historicity) that define the horizon within which the self-recognition of man can occur.

—*My hypothesis is that in the Technocene* (the contemporary epoch disclosed in its true *ratio essendi*) *the antropic perimeter*—and in particular its barycentre: worldhood—*undergoes an (neo)environmental (that is, feral) alteration*. More precisely: the present age, that of technology as the subject of history, is defined

by virtue of this alteration. It corresponds essentially to the age of environmentalization/feralization of man.

I intend the proposal of a philosophy of technology in the nominative case as a possible answer to what Landgon Winner considers the most urgent question that philosophers of technology today need to ask themselves: "in what period of human history they imagine themselves to be involved" (Winner 2013). To this question, in my view, one should add that concerning 'what anthropological figure is produced by such a period of human history.'

The exposition of the basic traits of this theoretical paradigm represents my small contribution to the effort of "thinking about the unthinkable." The view held here argues that this unthinkable has already taken on the traits of a concrete reality in the form of Neoenvironmentality. The fact that philosophy, once again, finds that the unthinkable (i.e., the unthought) is already a reality in no way demeans its function and meaning. On the contrary, it confirms its true nature and its innate inclination. Which is to be like "The Owl of Minerva . . . that spreads its wings only in the falling of the dusk" (Hegel 1991, 23).

3. *Intermezzo*: Philosophy of Technology in the Nominative Case

The following proposal of a philosophy of technology in the nominative case—the theoretical basis of the idea of the Technocene—grounded on the concept of *Neoenvironmentality*, is the outcome of several years research work. For obvious reasons, this paper will present a synthetic version of such a work, which consequently presupposes, as its natural integration, a reference to the main steps in its development (Cera 2007; 2012; 2013).

The explanation of formula "philosophy of technology in the nominative case" will make reference to the words of Franco Volpi, who inspired it. Volpi writes:

> There is a risk: that yet another genitive philosophy will be produced. I mean, a reflection whose only function is ancillary and subordinate . . . the risk of numerous genitive philosophies . . . is to reduce philosophical thought to a noble *anabasis*, to a strategy withdrawn from the great questions to take refuge in problems of detail. . . . So one asks oneself: is philosophy of technology in the nominative case (*filosofia della tecnica al nominativo*) possible? (Volpi 2004, 146–47)

In my view such a philosophy is possible and these are the reasons for this response.

1) The philosophy of technology in the nominative case defines itself by rejecting all those 'in the genitive case' approaches, which debase the philosophical idea of technology by fragmenting it into a plethora of single items (*techniques* or *technologies*), each of which presents its own special issues.[18] So the *philosophy of technology in the nominative case is first and foremost that kind of approach which opts for 'technology' against 'techniques' (or 'technologies')*, since it recognizes its own object as the actual form of the world and "subject of history" (Anders 1992, 271–98) and nature. Its task is 'simply' "to present, by means of a comprehensive analysis, a concrete and basic interpretation of the *technological phenomenon*" (Ellul 1964, xxxvi, my italics).

2) However, the philosophy of technology in the nominative case pretends to be *neither a system nor a method*. It cannot, otherwise it would be reduced within a context which would be organic within the technological *ratio* of its effects.[19] Instead, such an approach should be defined a *habitus*, a style. It has an innate phenomenological and impressionistic attitude, which trusts in its diagnostic capability but avoids pronouncing epochal judgments. A concrete example of this unsystematic *habitus* is Günther Anders's "*philosophical anthropology in the epoch of technocracy*," which while claiming an analytical strictness at the same time intends to remain an "*occasional philosophy*," i.e., a philosophy which, starting from the consideration of precise phenomena, arrives at a "systematic *après coup*" (Anders 1992, 9, 10). On the basis of its refusal to be put in the cage of a method, the philosophy of technology in the nominative case refers to the example of those who have been shown such a diagnostic talent on the ground. A talent which, in the last resort, corresponds to nothing but an authentic historical sense. Among these 'masters of style' we can count Martin Heidegger, Günther Anders, Jacques Ellul, Arnold Gehlen, Ernst Jünger, Friedrich Georg Jünger, Ernst Kapp, Lewis Mumford, Gilbert Simondon, and Bernard Stiegler.[20]

3) Although technology is not an anthropological matter *tout court*, it always involves the question of man. As a consequence, the philosophy of technology in the nominative case opts for a conscious *anthropological involvement*. Such an involvement expresses the awareness of the inextricable connection between man and technology, because within any position regarding technology there is concealed an anthropological and cosmological assumption. The philosophy of technology in the nominative case is at the same time a "philosophical *anthropology* of technology" and therefore, though strongly inspired by Heidegger, rejects his '*anthropological interdict'* (only presumed, by the way).[21] It attempts to go beyond such an interdition by appealing to that *non anthropocentric neohuman-*

ism, which represents the center of the reflections about technology by Günther Anders and Jacques Ellul.

This means that the philosophy of technology in the nominative case will choose to occupy a hybrid context, an "ontico-ontological" space (Lemmens 2015) which lies between two poles of Heidegger's work on technology. On one hand it shares its premise according to which "the essence of technology is by no means anything technological" (Heidegger 1977, 4); on the other, it avoids affirming that "technology is a way of revealing" (12). More precisely, my approach lies between two extreme positions, while refuting both. On the one side, philosophical *Naivität*, which trivializes technology by considering it a mere ontical matter, namely a means that man can use and manage at his pleasure;[22] on the other, it distances itself from the '*geschicktlich*' (*Geschichte* + *Geschick*) drift of Heidegger's thinking, i.e., from an historical-destinal characterization of technology. Such a radically ontological approach risks becoming a mysticism of being, which takes away from man all space to manoeuvre and to take on responsibility, so depriving the question about technology of any ethical dimension. In other words, starting from a recognition of the "technological phenomenon" as an epochal event, this paper will not restrict itself to a mere descriptive horizon. Without conforming to sterile normativism (which so often becomes nothing else but a list of good intentions), it takes on the responsibility of an evaluative commitment. The philosophy of technology in the nominative case has no intention of concealing itself in the alibi of "free from value judgements" ('scientific') neutrality, but recognizes the fact that it is always a concerned party. Consequently, it choose to take up a position, in particular by taking on the task of safeguarding man's need and possibility for his self-recognition. Because, as Feuerbach teaches, the philosopher too (the philosopher of technology in this case) is, and cannot not be, "a man in togetherness with men" (Feuerbach 1966, 73).

4) As a consequence of its conscious non-neutrality, the philosophy of technology in the nominative case chooses an *interstitial position*, so removing itself from two complementary temptations. The first, the avoidance of the paradoxical outcome of those approaches characterized by a too much disenchanted rationalism that, while refusing to recognize the epochal meaning of technology, end up by making it an irrefutable *positum* and therefore an *idolum*.[23] The second, the avoidance of that divinatory determinism, which involves even some of the most meaningful attempts to ask philosophical questions about technology. While recognizing its intrinsic historicity, the philosophy of technology in the nominative

case does not intend to present itself as a new philosophy of history. It takes up its diagnostic attitude to the full without pretending to become a historical mantic.

4. A Definition of Man (and Animal)

Now that the formula "philosophy of technology in the nominative case" has been explained, I can move on to the "*anthropic perimeter*," a definition which synthesizes the attempt to propose here and now a plausible response to the philosophical question about man.

The premise of my anthropological consideration is the epochal awareness that the 'essence (*ousia*, *substantia*, *Substanzbegriff*) of man' can no longer be predicated. This awareness, however, does not mean that we must give up identifying some set of elements that can characterise man properly. In this regard, definitions such as 'human essence' or 'human nature' are here replaced by that of *anthropic perimeter*: the set of conditions (*worldhood*, *ek-staticity*, and *historicity*) which define the *oikological* horizon within which man is able to recognize himself as such. The anthropic perimeter represents what remains of the human once its essentialist/substantialist interpretation is set aside.

Such a formula has to be considered a fundamental legacy of those philosophical-anthropological considerations that, from Johann Gottfried Herder to Arnold Gehlen, gave birth to the paradigm of *Mängelwesen* (deficient being). This paradigm summarizes the definitive passage of philosophy to an 'anthropological modernity,' its recognition of the human phenomenon as '*ens somaticus.*' That is to say, the image of man lies finally outside any dualism; now he is no more a "cogital" (Nietzsche 1997, 119) because is entirely planted in his somatic guise, which in the meantime has ceased to be mere *Körper* (*res extensa*) and has become *Leib*.[24] Together with the overcoming anthropological dualism, what has also been set aside is a centuries-old tradition based on the idea of the *superiority* of man sanctioned *a priori* and *ex autoritate* by theological and/or metaphysical pronouncements. In its place we have now the *a posteriori*, *in medias res* (i.e., in a comparative analysis with other living forms) ascertainment of man's indisputable *Besonderheit* (peculiarity). A *Besonderheit* based, in its turn, on the initial recognition of 'biological negativity,' namely, *Mangel*. In this respect, Gehlen writes:

> In terms of morphology, man is, in contrast to all other higher mammal, primarily characterized by deficiencies, which, in an exact, biological sense, qualify as lack of adaptation, lack of specialization, primitive states, and

> failure to develop, and which are therefore essentially negative features. (Gehlen 1988, 26)

A list of some important anthropological formulae of the past century suggests that the idea of *Mängelwesen* can legitimately represent the underlying principle of the *anthropological turn* in philosophy. In fact, the various "*Askete des Lebens*" or "*Neinsagenkönner*" (Scheler), "*exzentrische Positionalität*" or "*homo absconditus*" (Plessner), "*Wesen der Ferne*" (Heidegger), "*Wesen der Zucht*" (Gehlen), "*animal symbolicum*" (Cassirer) . . . presuppose this basic idea, or rather all of them (each in its own way) express the fundamental "*Unergründlichkeit des Menschen* (*ungroundability of man*)" (Plessner 1981, 160–65). In other words, all those formulae agree on the basic fact that he is "*das noch nicht festgestellte Thier* (*the still undetermined animal*)" (Nietzsche 2002, 56), or that "man does not have a nature of his own in the sense that animals and plants have a nature: his 'nature' lies in the fact of his not having one" (Guardini 1993, 7).

Such a new anthropological paradigm is characterized by a destructive and a constructive side. The former dismisses the substantialist/essentialist interpretations, producing as its outcome an *anthropology of negativity* expressed in the ratification of that structural deficiency (*Mangel*)—first of all biological—with which the human being is naturally equipped. This dismissal, however, is affirmatively counterpointed, so it culminates by becoming a relational-oikological approach in which the human deficit acquires a paradoxical, because indeterminate, fullness. The human being is no longer thought of as being substance, but as function, or rather a *term of relation*. The human phenomenon can be understood only in its irreducible *Faktizität*, i.e., in a *topological*, *oikological* context. It is defined on the basis of the particular relationships it has with its own *Lebensraum*. Man's authenticity is all about his unique way of 'placing himself.'

Expressed as a formula, this means that the anthropological question now becomes an '*anthro(to)pological* question.' It is no coincidence, then, that the *incipit* of the *Renaissance* of philosophical anthropology in the last century is the question asked by Max Scheler about the "*Place* (Stellung) of Man in the Cosmos" (Scheler 2009). Or rather that the key concept of Helmuth Plessner's *Philosophical Anthropology* is "Eccentric *Positionality*." Or, again, that two of the most influential contemporary thinkers, Peter Sloterdijk and Bernard Stiegler, state, as a premise to their debate on the Anthropocene, that the question of man has become a "topological" question, a problem of "localization." We no longer

try to determine "Who" or "What" Man is, but "Where is he" (Sloterdijk and Stiegler 2016).[25]

With the transition from the anthropological substance to the anthropological function (relation), namely from *natura hominis* to *conditio humana*, man's way of being emerges as a constellation. As a perimeter. *He is characterized on the basis of the relation he establishes with the Where of his* Dasein. In other words: man's way of being corresponds to the special way in which he *is within (in-sistere)* the framework (*Umgebung*) that surrounds him. Just because he appears to be lacking in the biological endowment that would allow him to be immediately and completely integrated into a specific part of the natural world 'intended specifically for him,' his 'being-within' (*in-sistere*) his own vital space is always already a 'being at a distance.' This *in-sistere* always and already corresponds to an *ex-sistere*. Man's *Dasein* is *ek-sistence* and this *ek-staticity* emerges as his distinguishing characteristic, or the first element of the anthropic perimeter.

Compared to that of other living beings, man's *position* is *peculiar* (*Sonderstellung*) in that it is characterized as a *positioning*, since he himself contributes in a decisive way to the building of his own *oikos*. Due to his lacking biological endowment, the deficient being is bound by nature to mould his own *vital space*. Only in this way, can the initial setting or *milieu* (*Umgebung*)[26] become *world*. From this it follows that the world "is not a *datum*, but a *dandum*" (Accarino 1991, 30). Lacking in *materia a priori*, "tributary of a non-existent reality and which it is up to him to realize" (Anders 1935, 69), the human being is *naturaliter* obliged to shape (through action, technology) his own oikological niche in order to make it inhabitable, that is, to *compensate*[27] his initial condition of strangeness, of non-belonging. This natural human feature, the obliged compensation of his original ek-staticity, is here called *worldhood*, by reference to Jakob von Uexküll's *Umweltlehre*, in the re-interpretation given by Arnold Gehlen and Martin Heidegger (Uexküll 1921; 2010; Gehlen 1988; Heidegger 1995),[28] and by reference to its distinction between man and animal, where the former emerges as a 'worldly being' (*Weltwesen*) because he has a world (*Welt*), and the latter as an 'environmental being' (*Umweltwesen*) because he has a mere environment (*Umwelt*).[29] The worldhood represents the second element, and the most important (the barycentre), of the anthropic perimeter.

On these bases it is possible to agree with Heidegger when he affirms that the fundamental peculiarity of man is his "*world-forming*" (*weltbildend*) ability (Heidegger 1995, 274–366). Being world-forming, he is naturally a technological/cultural being, i.e., he has an intrinsic demiurgic vocation. To paraphrase Gehlen,

we can state that "'Culture' [technology] is an anthropo-biological concept and man in his natural state is a cultural [technological] being" (Gehlen 1988, 72). *Anthropogenesis and technogenesis are synonyms*.

On the contrary, the oikological niche of the animal is 'environment': a natural mould with which it corresponds completely and immediately. In the case of the animal, the environment expresses itself as absolute selfgivenness. As Günther Anders states, it "is there ready for the animal as the breast is there for the baby . . . the animal does not come into the world but its world comes with it" (Anders 1935, 66). The animal's demand and the environment's supply coincide. Therefore, the environment emerges as "a *materia* given *a priori*" (66), the animal's condition of existence. This means that the animal is not able to experience any *Umgebung*, namely that framework functioning as an indeterminate background for its concrete vital space. The peculiarity of the animal consists in its *environmentality*, in its being "*poor in world*" (*weltarm*) as Heidegger affirms (Heidegger 1995, 186–267).

Given such a premise, the distinction between man and animal cannot be entirely ascribed to a biological perspective, but it will be at least necessary to place it within an oikological context, since what differs is their relationship with their corresponding *oikos*. As a consequence, the difference between world and environment is not a simple difference of extension, but a *dimensional* difference. The animal's *Bauplan* (structure plan) enables it to insert itself immediately into a specific oikological niche, in which the animal is fully absorbed until it disappears. In the perfect mixture of *Merkwelt* (perception world) and *Wirkwelt* (effect world), the vital circle of the animal expresses itself in a circuit-like modality.[30] The animal and its oikological niche form an inseparable unity, i.e., an individual or even a monad. This means that the animal experiences neither its own *as such* nor that of its environment. As an environmental being, it is denied such an ability and therefore the possibility to grasp, i.e., *letting-be* (*Seinlassen*), the beings:

> The possibility of apprehending something is *withheld* from the animal . . . in the sense that such a possibility is 'not given at all.' . . . *The animal as such does not stand within a manifestness of beings. Neither its so-called environment nor the animal itself are manifest as beings.* (Heidegger 1995, 247–48)[31]

This also involves a structural diversity concerning human and animal *adaptive performances*. *The animal is apt insofar as it is adapted*, its adaptation being *energheiai*, *in actu*: from the very beginning, it is ready for its *oikos*. On the contrary,

man is apt insofar as he is adaptable, his adaptation expresses itself *dynamei*, *in potentia*: in other words, through his technological-demiurgic ability, he is able to *compensate* the initial distance between himself and his own setting.

Since man's world corresponds to a *materia a posteriori*—that is, an indeterminate background (*Umgebung*) that must be shaped by him—the initial condition for the human being is not to be found in its proximity to its own oikological niche, rather, as said, in its distance (*ek-staticity*) from it. As a result, the essential directionality of man's worldforming (technological) ability can be defined as "*de-severance* (*Ent-fernung*)" (Heidegger 2001, 139),[32] as approximation. In other words: as the passing of the original condition of "world-strangeness (*Weltfremdheit*)" (Anders 1937) or "world-openness (*Weltoffenheit*)" (Scheler 2009). Activity, and technological activity in the first place, is essentially de-severant since man is by nature a "creature of distance (*Wesen der Ferne*)" (Heidegger 1998a, 135). Only through "originary distances that he forms for himself in his transcendence with respect to all beings does a true nearness to things begin to arise in him" (135). Seen in this perspective, the world as such corresponds to the first and fundamental 'de-severed,' i.e., the first and essential result of man's de-severant action.

However, in order to make the notion of de-severance really functional, it has to be placed in an appropriate framework, freeing the concept of 'world' from any merely biologistic perspective, namely without restricting it to a physical-biological correlate. Man's oikological niche consists also of all those elements that constitute the so-called 'cultural sphere.' The world has a plurality of dimensions which is precluded to the animal's environment. Therefore, as said, the difference between world and environment is not a simple difference of extension, but a *dimensional* difference. The world corresponds to the establishment of an undivided natural-cultural framework of stabilization for that very special being, who counts among its vital needs the question of making sense. Like a metronome, the world founds and scans the concrete rhythmics of the human *ex-sistere*. "By the opening of a world, all things gain their lingering and hastening, their distance and proximity, their breadth and their limits" (Heidegger 2002b, 23). Each specific world that is concretely shaped by man equates with that particular type of framework that we call 'epoch.' It follows that man's worldhood corresponds *ipso facto* to his *historicity*, that is, the third element of the anthropic perimeter. The salient trait of the *koinonia* (indissoluble relationship) between man and world is the *Geschehen* of *Geschichte*: the historical happening in its authenticity. Therefore, only insofar as

man is also an historical being, he can reveal himself as a worldly and not merely as an environmental being.

With this step, we now have the three elements—*ek-staticity*, *worldhood* and *historicity*—which make up the anthropic perimeter. The latter, as we have said, establishes the oikological horizon within which human being can localize himself, that is, recognize himself as such.

At this point, following Heidegger's suggestion in *The Fundamental Concepts of Metaphysics*, I will interpret both man's worldhood and animal's environmentality according to a *pathic presupposition*: namely, those *fundamental moods* (*Grundstimmungen*) that refer each of them to their respective findingness (*Befindlichkeit*). As a formula: given that the anthropic perimeter has its barycentre in worldhood, the latter, in its turn, possesses a *pathic rootedness*. In other words, the *pathos*, the *affectio*, represents the stigma of the ontological condition of a specific living being, i.e., the trace from which one can identify its characteristic way of being.[33] In the case of the animal, such a pathos corresponds to the *captivation* (*Benommenheit*), i.e., the "absorption (*Eingenommenheit*) in itself" which upholds its (con)fusion with its respective vital space (Heidegger 1995, 236–57). *Benommenheit* is structurally circular: it falls back on itself, so the fundamental animal pathos corresponds to *apatheia*, namely, to a sensitivity, which is incapable of self-perception.

On the contrary, man possesses a totally explicit findingness because his self-awareness is completely evident. His particular *Grundstimmung* enables him to transcend his own within-the-world rootedness, i.e., to perceive that unreachable background—the initial setting or *milieu*, *Umgebung*—which is the condition of possibility for every world, and so also to experience the world itself as such. This basic mood is *thaumazein*, that uncanny/unhomely (*unheimlich*) original pathos, which confirms man's congenital worldstrangeness (ek-staticity) and which later becomes the well-known *theorein* (contemplation), when it is ordered by *logos*.

5. A Definition of Technology (and Technocene)

Given the anthropological hypothesis up to now expressed as premise, technology emerges as a *possible* oikos *for today's humanity* and it is only in this form that a 'Technocene' becomes possible. This means that in this context the term 'technology' does not indicate the sum or addition of single technologies, rather it outlines the worldview and ideology that has made these possible and that manifests itself as a particular historical circumstance. That is, the synthesis between *disenchant-*

ment (*Entzauberung*) and *rationalization* (*Rationalisierung*), under the imperative of *makeability* (*Machbarkeit*) (Cera 2007, 98–101).

Jacques Ellul provides an incisive summary of this process. Moving from the presupposition that "there is no common denominator between the *technique* of today and that of yesterday" (Ellul 1964, 146), Ellul distinguishes among *technical operation, technical phenomenon and technical system*. "The technical operation includes every operation carried out in accordance with a certain method in order to attain a particular end" (19). The technical phenomenon stands out from the background of technical operations and it introduces the technological *ratio operandi* in any human context, that is, "in every field men seek to find the most efficient method" (21). Afterwards, the synthesis between technical phenomenon and technical progress generates "the technical system": "having become a *universum* of means and media, technology is in fact the environment (*milieu*) of man" (Ellul 1980, 38),[34] the framework in which modern man is required to live. And as environment it requires nothing but adaptation. Just as the natural environment does for the animal.

Therefore, in the time frame of several centuries, technology frees itself from its original ancillary status, transforming into a completely unprecedented historical event.[35] It rises to the status of a *kingdom or universe of means* (*Mittel-Universum*) namely a framework "in which *there is no longer any act or object that is not a means or that does not have to be a means*" (Anders 1992, 364). This happens when man tries to achieve *thoroughly* one of his innate inclinations: that is, the compensatory countermovement (Gehlen 1988, 351–64; Marquard 2000a) regarding his own ek-static tension, the drive of the deficient being that wants to stabilize/immunize[36] the totality of being completely. Such an inclination was already expressed by Plato in *Cratylus* (386a 3–4) with the definition "*bebaiotes tes ousias*" (Plato 1995, 192–93).

The age of technology—i.e., the presumed Anthropocene, that which in this paper I have renamed Technocene—begins when it becomes *really* (i.e., effectively, *wirklich*) *possible* (i.e., makeable, *machbar*) to universalize this compensatory and immunizing *pharmakon*.[37] And as soon as this universalization occurs, then *possibilitas* becomes *potestas*, *Möglichkeit* becomes *Macht*. The possibility—which is now reduced only to 'the possibility of making (something)'—turns into cogency and destiny: "*what can be made, must be made*" (Anders 1992, 17).[38] Inexorably. More precisely, the possibility (*Können*) of making (something) becomes necessity (*Sollen*) of making (something) and at last obligation (*Müssen*) not to refrain from making (something). The reality is no more *Realität*, nor *Wirklichkeit*, but

Machbarkeit. "Raw-material-being is *criterium existendi*. Being is being raw material" (33). 'Made-less' means 'made-ness.' Expressed as a postulate (imperative), this argument would sound like: "You must not refrain from using that which can be used (*Verwendbare*)!" (16). However, since the ontological premise of such a postulate is: 'all that is, is only in that it is useable (makeable, challengeable),' it follows that 'one can use (make, challenge) everything' and therefore that 'nothing must be left unused (unmade, unchallenged).' Including he who uses (who makes, challenges), who in this way becomes both subject and object of the use/challenge (makeability). This is the anthropological metamorphosis, I discussed in the prologue, of *homo creator* into *homo materia* and finally into *Bestand-man*.

Grounded on these presuppositions, the Technocene corresponds to the eclipse of the cosmological difference between *Welt* and *Menschenwelt* (Löwith 1981), namely to the concealment of the *mundus rerum* performed by the *mundus hominum*. The movement triggered by making *technology a world*—"technocosm," technosphere, "*technium*"[39]—equates to the accomplished "de-worldification of the world"[40] or the metamorphosis of *physis* into *techne*. Nevertheless, the anthropological premise of this discourse has established that without the *Welt* (world as such) no *Menschenwelt* (human world) is possible—i.e., without *Umgebung* no human *oikos* is possible—consequently *the totalized technology* (conceived as a 'universalized human world') *can achieve a wordly status* (and so becoming an epoch) *only while being a non-world, that is an environment*. On the other side, because of its genesis—which unlike the animal's environment is not a *materia a priori* (immediate and natural), but a *materia a posteriori* (mediated, cultural, artificial)—this 'technological non-world' represents a new type of environment and thus it has to be called *Neo*-environment.

Since both man's worldhood and animal's environmentality have a pathic rootedness—namely, both can be inferred only thanks to those fundamental moods which attune them to their respective findingness—technology has to state its environmental (epochal) characterization on a pathic level, namely by altering specific human pathicity and so compromising the stability of the anthropic perimeter towards a post-human condition, which is potentially ferine. In its systemic (i.e., totalized and totalitarian) version, technology demands that man must adapt completely and, in order to achieve this, it inhibits his fundamental pathos (*thaumazein*/*theorein*), by replacing it with an artificial captivation (*Benommenheit*). So, given that captivation represents the animal's *Grundstimmung*, *it follows that the main outcome of technological Neoenvironmentality involves the feralization*

of man. *Ipso facto*, this feralization amounts to a post-human threshold, because if (Neo)environmentalization was accomplished, man would stop being what he authentically is: a *Weltwesen* (worldly being).

Previously, the basic directionality of man's worldforming action was attributed to de-severance (*Ent-fernung*): an original distance which prevents him from falling into a complete fusion with his oikological niche. This means that an eventual human captivation (i.e., the cipher of his feralization) will have a different genesis from the animal one: it will not correspond to an immediate fact of nature, rather to an effect induced by technology, which has achieved the rank of a totality. In other words: it will be a creation of technology, namely a product: an artifact. This unique artifact—the neoenvironmental captivation—is produced by a systematic "*challenging* (*Herausforderung*)" (Heidegger 1977, 14) of which man is the object and whose "*supraliminal* (überschwellig)" (Anders 2002, 262–63; Anders 1979, 47–48) burden becomes unbearable for him. The world becomes "*overmanned*" (Anders 2002, 26–31) and its challenging can only be tolerated by man at the cost of insensivity. That is, in a state of *apatheia* (captivation). To distance from oneself this type of world, which imposes that integral adaption existing only in the animal *milieu*, becomes impossible. The practice of de-severance—the clearest evidence of the constitutive ek-staticity of man—is completely inhibited. Unable to carry out his ek-static tension, man finds himself involved in a 'forced proximity *a priori*' with the world, mixed with it and thus enmeshed in it, i.e., captivated.

The neo-environmental (con)fusion between man and world happens in a deceitful way that as early as the 1930s Ernst Jünger called "total mobilization (*totale Mobilmachung*)" (Jünger 1998),[41] that is the hysterical dynamism of an endless and purposeless iteration: an epochal framework in which everything moves, but nothing happens. The 'anthropocenical' translation of this formula is "global change," namely "both the biophysical and the socioeconomic changes that are altering the structure and the functioning of the Earth System" (Steffen, Crutzen, and McNeill 2007, 615). Both expressions (Jünger's more consciously, Crutzen's much less so) describe a world without history—a world in which technology becomes the subject of history and of nature (even if a de-natured nature)—in which man plays the "*co-historical*" role of a mere background actor. That is, of a "ruled" or "proletarian."[42] Anders writes:

> '[W]e' . . . have renounced (or have allowed ourselves to be influenced by this renunciation) considering ourselves (as nations, classes, or as human-

> ity) as the subjects of history; we have abdicated (or we have allowed ourselves to be deposed) and we have replaced ourselves with other subjects of history or, more accurately, with a single subject: technology, whose history . . . has become *the* history over the course of recent history. (Anders 1992, 279)

As a result, as soon as man reaches the maximum expression of himself as *Kulturwesen* (cultural being), he finds himself in a completely unprecedented position. The authentic evolution of *homo faber* moves in the direction of the *homo creator*, which however—as we have seen—necessarily implies that towards *homo materia:* a being which *has to be made entirely available* to technology. That is to say, a wholly makeable being, a *Bestand-man*, a feralized/environmentalized man. Insofar as he is environmentalized (though artificially, i.e., *a posteriori*), the inhabitant of technosphere will find himself "poor in world," exactly as animals are (though naturally, i.e., *a priori*). Deprived of his fundamental ability to desever the beings—which is the necessary condition to enter in some relationship with them—he impoverishes himself. *It follows that the crucial premise of the feralization process consists of an ontological Pauperismus* (Jünger 1956, 13).[43]

Coherently with the patent non-neutrality of philosophy of technology in the nominative case, the formula 'ontological Pauperismus' expresses an attitude, i.e., the verification of a regression of the human being, its *diminutio*. The same as that of Anders and, more recently, Stiegler describe in terms of "*proletarianization*." While Stiegler defines it as a "losing" or a "destruction of knowledge" (Stiegler 2010, 38; Sloterdijk and Stiegler 2016),[44] Anders characterizes it as the main consequence of a "heteronymous life." Hence,

> we will all be or, more accurately, we have all become proletarians. Compared with the new opposition 'technology-humanity' . . . the class struggle in the traditional sense has become irrelevant. (Anders 1992, 297)

In the neoenvironmental cosmos of Technocene human being is reduced to a completely deficient condition. The *Mangel* of *Mängelwesen* (the deficiency of the deficient being) does not correspond anymore to that ontological richness, which is the pure possibility as such, rather it amounts only to shortage, defect and at last, guilt. It becomes ontological debt. If technology reveals itself not only as "the organization" but also as the production and finally the creation "of a lack (*Mangel*)" (Heidegger 1998b, 87), then the Technocene—the age of technology—proves to be 'the age of the poor-in-world-man': in all respects a *dürftige Zeit* (time of need).

The logic of *Neoenvironmentality* as epochal phenomenon—i.e., as the distinctive character of the Technocene—corresponds to the secularized version of a theological dialectics. Being prey of soteriological anxiety, which is not merely psychological but somatic, the feralized man gives birth to a *technodicy*.[45] Within the framework of the "megamachine" (Mumford 1967, Latouche 1995), he perceives himself as an always defective gear because he is never apt to the functions he has been assigned: as in the field of action (production) as in that of passion (consumption). As some acute interpreters of our time have noticed—Guy Debord and Jean Baudrillard in addition to Anders—the driving force of the present reality is not to be found in the production but in the consumption, or rather in the production of consumption, that is in the production of need. Hence its *phantasmatic*, *spectacular* and *simulacral* matrix. "The model exists only in function of reproduction" and so the reality becomes the effect of its own projection, the production of its own production and thus a reproduction, namely, an image. "The reality becomes the reproduction of its images" (Anders 2002, 179–83).[46] The age of technology is "*The Age of the World Picture* (*Weltbild*)" (Heidegger 2002a), the epoch of the world reduced to an image. Technocosm is a laboratory of desires, a factory of needs.

Seduced by the phantoms of the "sirenic world (*sirenische Welt*)" (Anders 1992, 308–15), compared with which he behaves and by now conceives himself only as a "spectator,"[47] the human being commits to an everlasting attempt to redeem itself from its defectivity, perceived already as guilt, or as a disease in its secularized version. While aspiring to the 'neoenvironmental emendation' of his intolerable inefficiency, he decrees full technological authority and his corresponding minority state. As a result, in the presumed Age of Man technology emerges as 'the Steward of the steward of the earth system.'

The paradoxical introjection of this imperative according to which we let ourselves be enhanced, corrected, healed (saved) from what we ourselves produced, is what Anders defines "*Promethean shame*," which is the result of the "*Promethean gap*" that marks "the inability of our soul to be 'up to date' with our production" (Anders 2002, 16). In exponential progression, the Promethean gap, which is originally

> the gap that exists between the maximum that we can produce and the maximum (shamefully small) that we can imagine . . . has now become a gap between what we produce and what we can use. And finally we can now provide a third version to our Promethean gap . . . between the maximum

> that we can produce and the maximum (shamefully small) that we can need (Anders 1992, 19).

The main consequence of this progression is that "our actual finitude no longer consists in the fact that we are *animalia indigentia*, needy beings, but quite the contrary: it consists in the fact that . . . we can need too little; in short: in our lack of lacking (*Mangel an Mangel*)" (Anders 1992, 19).

To sum up: *The ontological Pauperismus (Proletarianization), which is the fundamental cipher of the feralization process—namely of the anthropological metamorphosis underpinning the phenomenon of Neoenvironmentality (Technocene)—is grounded in the defective dogma which produces the complete having-to-be-made-available of the total mobilization as* homo materia (Bestand-man).

Technology, the new *archè kineseos*, represents the essential *pharmakon* for this 'permanently-in-debt living being.' If the Promethean gap generates the Promethean shame, which later becomes *Promethean guilt*, then the invocation of technodicy gives rise to the soteriological anxiety of a *Promethean redemption* from the only mortal sin still present in the Eden of total mobilization/global change: the "*obsolescence*" (*Antiquiertheit*). The aspiration to achieve the condition of a possible post-humanity represents the other side of the coin of obsolescence. Rather than reforming the world to meet genuine human needs, it has been chosen to modify man so that he can measure up to a measure-less (overmanned) world.

Given such a premise, the human type, which is selected by the technological neoenvironment, will not be a 'simple' *Übermensch*, but a real *Superman*, namely a post-human subject. That is to say: '*a-no-longer-only-man.*' He is who overcomes the somatic bond expanding it beyond its limits. While breaking the somatic chain used to be the purpose in the past, now the new duty is to extend it (enhance it) indefinitely. The peak, reached by the totalitarian impulse of neoenvironment, corresponds to the growth of bad conscience inside man, which will later become Promethean guilt for being 'still only men.' Hence, the following attempt 'to stop being (simply) human.' *The obsolescence is therefore "man's negative attitude towards his being human."* His *voluptas* for becoming, at last, "sicut machinae" (Anders 1992, 292).

In the age of totalized technology, Superman and *Bestand-man* become the same person. *The actual telos of techne—the authentic spirit of Technocene—turns out to be the complete redefinition of the anthropic perimeter.*

6. *Epilogue*: From the (Real) Technocene to a (Possible) Anthropocene

In the pages of this paper, I have set out the reasons why, in my view, the real name for the Anthropocene is Technocene; namely, why '*Techno*-cene' reveals the authentic character of this aspirant epoch. This came about by means of a *pars destruens*, which showed the ideological character at the basis of the idea of the Anthropocene. It was followed by a *pars construens*, i.e., the presentation of a new paradigm of the philosophy (anthropology) of technology grounded on the concept of Neoenvironmentality, that is the characterization of man based on his fundamental worldhood (the barycentre of the anthropic perimeter), compared with the environmentality typical of the animal's condition.

In line with the claim of non-neutrality of this philosophy of technology in the nominative case, I should like, in conclusion, to present what cannot and does not pretend to be an 'answer' or a 'solution' to the issue of technology, but only a *suggestion* (or also and simply a wish) for the construction of an authentic Anthropocene: the *age of an-at-last-entirely-human-man*.

The anthropological hypothesis put forward in these pages defines man as a worldly being (*Weltwesen*), insofar as he is *able* (potentially) to be affected by that fundamental pathos (*thaumazein/theorein*, contemplation), through which he can experience the cosmological difference between world and human world, i.e., between *Umgebung* and his own oikological niche. The worldhood—the barycentre of the anthropic perimeter—grounds itself precisely on this fundamental pathos.

Technology emerges as the possible oikos *for today's humanity*, insofar as it undermines this pathic presupposition by transforming it into a product or artifact. At that point, contemplation (*Betrachtung*) is downgraded into circumspection (*Umsicht*) and thus becomes functionally alike to the typical pathos of animality: the captivation (*Benommenheit*). When technology is able to dictate this pseudo-captivation to man, it becomes what the environment is for the animal: an oikological niche, a *materia a priori* which demands a complete and immediate adaption. The birth of the Technocene—that is to say, the transformation of technology into an epochal phenomenon, namely into a historical subjectivity—is therefore the result (product) of two complementary movements: the transformation of the world into environment and the feralization of man.

The potential character of the human fundamental pathos—the fact, as said, that man's adaptation expresses itself *dynamei*, *in potentia*—is such that it can be referred at least partly to his free responsibility. Differently from 'being animal,' which corresponds to an immediate and total givenness, 'being human' means also

'becoming human' and 'staying as such.' As Helmuth Plessner stated, *hominitas* is not yet *humanitas* (Plessner 1983). The fulfilment of our *Bestimmung* (determination and destination) involves an obligation and a duty. This means that also the possibility of failure is included. In such a situation, which has been outlined in this paper, there would be the absurd outcome of a 'conditio post-humana' entirely pauperistic/proletarianized, i.e., entirely identical to the animal one. That is to say, a condition in which man would become unrecognizable to his own eyes. As a result, the post-human subject—namely, a man completely adapted to the technological neoenvironment—will correspond to the thoroughly rationalised man ('the integral rational agent'), who is totally (con)fused with his vital space because he is enmeshed in it, that is, captivated. Just like the animal.

In the age of fulfilled secularization, the duty of determining ourselves is really our responsibility. Paradoxically, the real *hybris* of the current technolatry is such not because it is too much, rather it is too little, namely, it is an insatiable will to delegate. So the real definition of the Technocene as the age of technology is to be found not in "Wille zur Macht" (Will to power), but in unmentionably '*Wille zum Gemacht'* (Will to be made) or, as previously said, in "*man's negative attitude towards his being human*." Despite its ostentatious claims to activism, the spirit of the Technocene promotes a *de facto* abdication of the basic directives that our condition has always imposed on us. This brand new epoch encourages a 'depreciated *Gelassenheit*': a kind of *regressus ad hominitatem*, a downgrading from *humanitas* to *hominitas* (namely, to *animalitas*, *ferinitas*) with its blind commitment to the *idolum* 'technology,' letting us be manipulated by it *ad libitum*. All this is accompanied by the naïve soteriological hope that what technology 'wants' will be necessarily our own good.

The fact that humanity is always the outcome of a never-ending historical process and not an atemporal datum does not make it unworthy of defence and safeguard. Waiting and seeing what will happen to us, would be a legitimate conduct within a fideistic and creationist context, but certainly not at the peak of the *secular age*.

In the midst of the third industrial revolution, which "put humanity in the position of *producing its own destruction*," the risk of atomic war made the eventuality of a 'world without man' dramatically concrete. Faced with this danger, Günther Anders promoted what was only in appearance paradoxical "*ontological conservatism*" (Anders 1979, 49). Nowadays, we are obliged to run a just-as-concrete risk: a situation in which we are confronted with a 'no-longer-man' (the feralized man, *Bestand-man*) and a 'no-longer-world' (the technological neoenvi-

ronment, de-natured nature). Within such a context it may be worthwhile to appeal to *anthropological conservatism*, inspired by a non-anthropocentic neohumanism. In practice, this would be an act of sabotage—a countermovement in the Nietzschean sense—against the imperative of obsolescence and its implementations through posthuman ideology and the enhancement obligation. This would be an exhortation to a *pathic* (and therefore inner) *desertion* against Promethean shame and guilt, that is, the basic premises of that imperative. This would be a refusal to feel our humanity as being an obstacle, a handicap, a ballast to be got rid of. This would be, shall we say, *challenging* (*herausfordern*) *in ourselves a human resilience*.

The actual neoenvironmental arrogance consists of its pretension that it can release us from the burden that we ourselves are. Instead, what our age urgently requires is that we really take on the responsibility to ourselves, by addressing now our future condition, since what we will be depends mostly on what we will choose to be.

Heidegger taught that the most active dimension of thinking (*Denken*) can be expressed as thanking (*Danken*), that is, as remembrance (*Andenken*) (Heidegger 1968, 142). On this basis, the first step in such pathic desertion and philosophical sabotage should be a 'simple' *memento*, namely in keeping in mind that nowadays as always the authentic dignity of our *Bestimmung* and so the related possibility to initiate an authentic Anthropocene (i.e., the age of an-entirely-human-man) does not only consist in becoming 'what we have not been yet,' but in our capability to recognize and safeguard 'what we can worthily continue being.'

The task of that being that can recognize itself as such also consists in defending its own self-recognition. The dignity of that living being, whose beginning is "in knowing it [i.e., in knowing such a beginning]" is in always wanting and being able to know it.

Notes

The author wishes to thank Royston James Boardman for translating this paper from Italian and the anonymous reviewers for their fruitful comments.

1. "*If we were honest our prayer would not take the form of, 'Give us this day our daily bread,' but 'Give us this day our daily hunger,' so that the daily manufacture of bread should be assured*."

2. When discussing versions of the Anthropocene, Jeremy Davies suggests these further alternative names: "Sustainocene," "Cosmocene," "Homogenocene" (Davies

2016, 52). On the topic of a definition of the Anthropocene: Szerszynski 2012; Clark 2015, 1–28; Crist 2016.

3. In relation to its *pars destruens* (the ideological deconstruction of the Anthropocene), the present paper is in agreement with Baskin's approach.

4. Assuming, with respect to the question of animality and anthropological difference, a position which relates to Jakob von Uexküll's reflections, I also take into account Jacques Derrida's criticism in his attempt (unfortunately unfinished) to rethink animal and animality on the basis of its being renamed "*animot*" (Derrida 2008).

5. On the same critical line, Bonneuil and Fressoz 2016; Crist 2016; Dibley 2012; Malm and Hornborg 2014, Stiegler 2014, 2017; Visconti 2014; Zylinska 2014.

6. In the context of a critical reading of the Anthropocene, Peter Haff has suggested interpreting technology as *physis*, in particular as a "geological phenomenon" (Haff 2014).

7. However, Schwägerl's position is firmly optimistic (ideological) with respect to the idea of the Anthropocene, in which he recognizes the undoubted advent of an authentic *Menschenzeit*. A similar view can be found in Lynas 2011.

8. Jeremy Baskin identifies in the Anthropocene "a dual movement" in relation to nature. First, "deprived of exteriority, agency and otherness, nature is de-natured and we are held . . . to be after or beyond nature." Second, humanity is "re-inserted into 'nature' only to simultaneously be elevated within and above it" (Baskin 2015, 19).

9. It would be interesting to apply to the Anthropocene, once it is seen in its own basic logic (namely, as the Technocene), the philosophical periodization of the "three industrial revolutions" proposed by Günther Anders. The first begins when "the principle of 'machinery' began to be *iterated*; that is, *by producing machines . . . by way of machines*"; the second coincides with the (obligatory) production of our needs; the third "put humanity in the position of *producing its own destruction*" (Anders 1992, 15, 19).

10. It is possible to note a kind of 'ideological evolution' in Crutzen's work. His initial impartial characterizations of the Anthropocene (Crutzen and Stoermer 2000; Crutzen 2002) are gradually replaced by a more participatory attitude, that is to say, a more and more optimistic approach to the possibility/duty of man becoming the Steward of the Earth System and therefore to the use of the means necessary to this end (i.e., geo-engineering) (Steffen, Crutzen, and McNeill 2007; Steffen et al. 2011; and especially Crutzen and Schwägerl 2011).

11. Will Steffen and Paul Crutzen define the "Earth System" as "the suite of interacting physical, chemical and biological global-scale cycles and energy fluxes that provide the life-support system for life at the surface of the planet . . . the Earth System includes humans, our societies, and our activities; thus, humans are not an outside force perturbing an otherwise natural system but rather an integral and interacting part of the Earth System itself" (Steffen, Crutzen, and McNeill 2007, 615).

12. *Welcome to the Anthropocene: The Earth in Our Hands* is the title of a special exhibition held at the Deutsches Museum of München, from December 2014 through January 2016.

13. Here the same comment made earlier on the idea of nature applies. If concern for the depletion of natural resources does not mean we should stop thinking of nature as resource or standing-reserve, in the same way, thinking of man as a steward and not as a lord of the Earth does not change the substance of a hierarchical vision which underlies an ontological primacy of man with respect to the world.

14. Mark Lynas speaks of "managing the planet" (Lynas 2011, 229–43).

15. For the concept of *challengeability* (*Herausforderbarkeit*) I refer to Heidegger's "challenging (*Herausforderung*)" (Heidegger 1977, 14).

16. In Anders's view this anthropological paradox becomes *ipso facto* a moral paradox, since he interprets the reality of Auschwitz as concrete proof of the metamorphosis to *homo materia*.

17. I use 'oikological/oikology' and not 'ecological/ecology' because in this paper the term 'oikos' and its derivatives are conceived in their literal sense as 'dwelling,' 'vital space.' It does not refer, therefore, to 'ecological thought' in all its possible variations. It is the same for 'environment,' which is used here without its Darwinian and ecological sense. In this paper the term is conceived in the sense of the German 'Umwelt' and therefore—in connection with 'world' (*Welt*)—with the meaning it acquires in von Uexküll's *Umweltlehre*, reinterpreted by Gehlen and Heidegger. In such a context the two terms—'environment' and 'world'—refer respectively to the vital space/*oikos* of the animal and of man.

18. The structural defect of these approaches lies in inadequate understanding of what still nowadays has to be considered the epigraphs of *technisches Zeitalter*, namely that "the essence of technology is by no means anything technological" (Heidegger 1977, 4).

19. About the antisystematic vocation of philosophy of technology, Jacques Ellul affirms: "I refuse to present my thinking in the form of a theory or in a systematic fashion. I am making a dialectical ensemble that is open and not closed and I am making sure not to present solutions of the ensemble. . . . If I did do these things, I too would be contributing to the technological totalization" (Ellul 1980, 204n).

20. Many other names could be added. For example: the first exponents of the Frankfurt School, then Oswald Spengler, Ernst Cassirer and, more recently, Gilbert Hottois, Carl Mitcham, Emanuele Severino, Andrew Feenberg, Don Ihde. For a brief historical *excursus* of the philosophy of technology, see Hottois 2003 and Cera 2007, 44–67.

21. On this point, I share Vincent Blok's position, that of a "hidden humanism" in Heidegger (Blok 2014, 325n).

On Heidegger's *anthropological interdict*—a constant in the whole of his *Denkweg*—two emblematic examples, of many possible ones, can be noted (Heidegger 1998b, 78–79; 2002a, 84n).

22. Such an attitude is the ideal premise for a "benevolent technological determinism" (Winner 2013).

23. On this topic, Cera 2007, 52–56, 63–67.

24. Foucault writes: "No doubt, on the level of appearances, modernity begins when the human being begins to exist within his organism, inside the shell of his head, inside the armature of his limbs, and in the whole structure of his physiology" (Foucault 1989, 346).

25. A useful commentary on and in-depth analysis of dialogue between Sloterdijk and Stiegler is Lemmens and Hui 2017.

26. For the concept of 'Umgebung' (*milieu*) I refer to Arnold Gehlen, who writes: "The 'milieu' (*Umbegung*) is the set of those elements in a vital space, connected to each other by the laws of nature, the space in which we observe the organism . . . 'environment' (*Umwelt*) is the set of those conditions contained in the whole complex of a milieu which allow a certain organism to survive thanks to its specific organisation . . . the concept of environment so defined is difficult to apply to man . . . we cannot point to a specific environment or a *milieu* to which he could be assigned in the sense of the preceding definition" (Gehlen 1983, 79–80).

27. On the idea of "compensation" (*Kompensation*), a key concept of twentieth-century philosophical anthropology, I refer to Odo Marquard, who defines it as "the levelling of deficient situations (*Mangellagen*) by substitutive or re-substitutive means" (Marquard 2000b, 36).

28. The concept of 'worldhood' put forward here presents some analogies with the "worldhood" (*Weltlichkeit*) of *Being and Time* (Heidegger 2001, 91–123).

29. Giorgio Agamben starts from a comparison between the animal condition (environmental) and the human (worldly), this too inspired by Heidegger's reflections, in order to develop a hypothesis which presents objective analogies with that of *Neoenvironmentality* (Agamben 2004).

30. With reference to animal Uexküll writes: "everything a subject perceives belongs to its *perception world* (Merkwelt), and everything it produces, to its *effect world* (Wirkwelt). These two worlds, of perception and production of effects, form one closed unit, the *environment* (Umwelt)" (Uexküll 2010, 42).

31. In order to confirm a difference of condition (which doesn't mean hierarchy) between man and animal, Heidegger affirms: "As far as the animal is concerned we cannot say that beings are closed off from it. Beings could only be closed off if there were some possibility of disclosure at all . . . the captivation of the animal places the animal essentially outside of the possibility that beings could be either disclosed to it or closed off from it" (Heidegger 1995, 247–48).

32. Heidegger writes: "'*De-severing*' amounts to making the *farness* vanish—that is, making the *remoteness* of something disappear, bringing it close. Dasein is essentially *de-severant*" (Heidegger 2001, 139; cf. Cera 2013, 167–81).

33. For this topic, I also make reference to the work of Viktor von Weizsäcker, which from 1930 introduced the term "pathisch" to describe the antilogical character of life *tout court*. Starting from this assumption, animal and human are first and foremost 'living patiens beings.' On this basis, von Weizsäcker develops a theory of the affections, i.e., a classification of basic emotions based on the so-called "pathisches Pentagramm": *Können* (be able to), *Wollen* (will), *Müssen* (must), *Dürfen* (be allowed to), and *Sollen* (have to). The specific human element compared to other living beings is *Sollen* (moral obligation). (Weizsäcker 2005).

34. In order to explain the expression "universum of means" the following passage by Umberto Galimberti can be useful: "if the technological means is the necessary condition to achieve any aim which cannot be achieved without technological means, the achievement of the means becomes the real aim which subordinates everything to itself" (Galimberti 2004, 37).

35. As a conventional date for the beginning of the Technocene, I accept that which most interpreters adopt for the beginning of the Anthropocene, that is the passage from the eighteenth to the nineteenth century, with the invention of the steam engine and the birth of industrialization.

36. On the concept of immunization, I make reference to the work of Roberto Esposito, in particular Esposito 2011.

37. In the present paper the term *pharmakon* is used with its lexical meaning of 'remedy,' and therefore without reference to the meaning it has in Derrida or Stiegler.

38. "*Nicht nur ist das Gekonnte das Gesollte, sondern auch das Gesollte das Unvermeidliche*" (Anders 1992, 17). This is the interpretation by Anders of the so-called "law of Gabor," formulated by the Hungarian physicist Dennis Gabor in Gabor 1972.

39. Sharing Ellul's idea of a systemic interpretation of technology, Gilbert Hottois speaks of "technocosme" or "règne technique" (Hottois 1984). Taking recourse to the neologism "technium," also Kevin Kelly recognizes the systemic characterization of contemporary technology, but in a totally apologetic way. He prepares a catechetical handbook in order to facilitate adaptation (conversion) to the neoenviroment (Kelly 2010).

40. Using the formula "Entweltlichung der Welt," Löwith describes the complete trajectory of *Neuzeit* (modernity), which in his reconstruction entirely coincides with Christian metaphysics (Löwith 1986, 10).

41. The *telos* of *techne* pointed to by Jünger—the idea of "Erdvergeisterung"—corresponds to what in this paper is described as the de-worldification (that is, environmentalization) of the world. On the issue of technology in Ernst Jünger and Friedrich Georg Jünger see Strack 2000 and Blok 2017.

42. In the context of a general "a-historicity" (*Ungeschichtlichkeit*), decreed by the rise of technology as "subject of history" (*Subjekt der Geschichte*), Günther Anders speaks of a man's regression to a "co-historical" (*mit-geschichtlich*) condition, that is to a dominated proletarian condition. In fact, in so far as they are dominated, and in spite of being a part of history, the proletarians have always been *co-historical* (Anders 1992, 9, 271–78).

43. Jünger explains his idea of pauperismus as follows: "Every rationalization is the consequence of scarcity. The expansion and constant perfection of the technical apparatus are not merely the result of the technician's urge for power; they are just as much the result of want. This is why the human situation characteristic of our machine world is poverty (*Pauperismus*). And this poverty cannot be overcome by any technological efforts" (Jünger 1956, 13).

44. More precisely, *prolétarisation* is "ce qui consiste à priver un sujet (producteur, consommateur, concepteur) de ses savoirs (savoir-faire, savoir-vivre, savoir concevoir et théoriser)" http://arsindustrialis.org/prolétarisation.

45. The neologism 'technodicy' (*techne* + *dike*) is conceived on the basis of a traditional term in theology and philosophy: 'theodicy' (*theos* + *dike*). More precisely, technodicy corresponds to a wholly secularized version of theodicy. Baskin means something similar when he speaks of "the promise of technology . . . as the basis of action and 'salvation'" (Baskin 2015, 22). I use this neologism in order to reiterate the idea, expressed in the introduction, that in its systemic (totalized) version technology takes on the soteriological function of a surrogate for now useless "hinterwordly" principles.

46. This is the sense of the "first axiom of economic ontology" formulated by Anders, which reads: "reality is produced by reproduction; 'being' is only plural, in that it is a series" (Anders 2002, 179–83).

47. As is well known, "spectacle" is Guy Debord's way of referring to the ontological metamorphosis of reality into an "image." Or rather, "it is *capital* accumulated to the point that it becomes images" (consequently, Debord would probably have agreed with Moore's suggestion to rename the Anthropocene "Capitalocene").

The spectacle "is the historical moment in which we are caught," namely "It is the very heart of this real society's unreality. . . . It is the omnipresent affirmation of the choices that have *already been made* in the sphere of production and in the consumption implied by that production" (Debord 1983, 8, 9, 17). In the form of "spectator" (the natural evolution of 'consumer'), the human being reaches the peak of his alienation, which is the triumph of "separation."

References

Accarino, Bruno. 1991. "Tra libertà e decisione: alle origini dell'antropologia filosofica." In *Ratio Imaginis. Uomo e mondo nell'antropologia filosofica*, ed. Bruno Accarino, 7–63. Firenze: Ponte alle Grazie.

Agamben, Giorgio. (2002) 2004. *The Open: Man and Animal*, trans. Kevin Attell. Stanford, CA: Stanford University Press.

Anders, Günther. 1935. "Une interprétation de l'a posteriori." *Recherches philosophiques* 4: 65–80. Available at http://tinyurl.com/kctesea.

Anders, Günther. 1937. "Pathologie de la libérte." *Recherches philosophiques* 6: 22–54. Available at http://tinyurl.com/n94x3db.

Anders, Günther. 1979. "Wenn ich verzweifelt bin, was geht's mich an? Gespräch mit Günther Anders." In *Die Zerstörung einer Zukunft. Gespräche mit emigrierten Sozialwissenschaftlern*, ed. Mathias Greffrath, 19–57. Hamburg: Rowohlt.

Anders, Günther. (1980) 1992. *Die Antiquiertheit des Menschen 2. Über die Zerstörung des Lebens im Zeitalter der dritten industriellen Revolution*, München: Beck.

Anders, Günther. (1956) 2002. *Die Antiquiertheit des Menschen 1. Über die Seele im Zeitalter der zweiten industriellen Revolution*. München: Beck.

Baskin, Jeremy. 2015. "Paradigm Dressed as Epoch: The Ideology of the Anthropocene." *Environmental Values* 24: 9–29. https://doi.org/10.3197/096327115X14183182353746

Blok, Vincent. 2014. "Reconnecting with Nature in the Age of Technology: The Heidegger and Radical Environmentalism Debate Rivisited." *Environmental Philosophy* 11(2): 307–32. https://doi.org/10.5840/envirophil20149913

Blok, Vincent. 2017. *Ernst Jünger's Philosophy of Technology: Heidegger and the Poetics of the Anthropocene*. New York: Routledge.

Bonneuil, Christophe, and Jean-Baptiste Fressoz. 2016. *The Shock of the Anthropocene: The Earth, History and Us*, trans. David Fernbach. London: Verso.

Cera, Agostino. 2007. "Sulla questione di una filosofia della tecnica." In *L'uomo e le macchine. Per un'antropologia della tecnica*, ed. Nicola Russo, 41–115. Napoli: Guida.

Cera, Agostino. 2012. "Il metron della techne. Apologia della diserzione." *Etica & Politica* 14(1): 27–45.

Cera, Agostino. 2013. *Tra differenza cosmologica e neoambientalità. Sulla possibilità di un'antropologia filosofica oggi*. Napoli: Giannini.

Clark, Timothy. 2015. *Ecocriticism on the Edge: The Anthropocene as a Threshold Concept*. London: Bloomsbury.

Crist, Eileen. 2016. "On the Poverty of our Nomenclature." In *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*, ed. Jason Moore, 14–33.

Oakland: PM Press. (First published in *Environmental Humanities* 3: 129–47, 2013.)
Crutzen, Paul J. 2002. "Geology of Mankind." *Nature* 415: 23. https://doi.org/10.1038/415023a
Crutzen, Paul, and Eugene F. Stoermer. 2000. "The Anthropocene." *Global Change Newsletter* 41: 17–18. Available at http://tiny.cc/7o6hgy.
Crutzen, Paul, and Christian Schwägerl. 2011. "Living in the Anthropocene: Toward a New Global Ethos." *Yale Environment 360*. Available at http://tinyurl.com/kcbjrgm.
Davies, Jeremy. 2016. *The Birth of the Anthropocene*. Oakland: University of California Press.
Debord, Guy. (1967) 1983. *Society of the Spectacle*, trans. Ken Knabb. London: Rebel.
Derrida, Jacques. (2006) 2008. *The Animal that therefore I Am*, trans. David Wills. New York: Fordham University Press.
Dibley, Ben. 2012. "The Shape of Things to Come: Seven Theses on the Anthropocene and Attachment." *Australian Humanities Review* 52: 139–53. Available at http://tinyurl.com/lvo47sc.
Ellul, Jacques. (1954) 1964. *The Technological Society*, trans. John Wilkinson. New York: Vintage Books.
Ellul, Jacques. (1977) 1980. *The Technological System*, trans. Joachim Neugroschel. New York: Continuum.
Esposito, Roberto. (2002) 2011. *Immunitas: The Protection and Negation of Life*, trans. Zakiya Hanafi. Cambridge: Polity.
Feuerbach, Ludwig. (1843) 1966. *Principles of the Philosophy of the Future*, trans. Manfred Vogel. Indianapolis: Hackett.
Foucault, Michel. (1966) 1989. *The Order of Things: An Archaeology of the Human Sciences*. London: Routledge.
Gabor, Dennis. 1972. *The Mature Society*, New York: Praeger.
Galimberti, Umberto. (1999) 2004. *Psiche e techne. L'uomo nell'età della tecnica*. Milano: Feltrinelli.
Gehlen, Arnold. 1983. "Zur Systematik der Anthropologie." In *Philosophische Anthropologie und Handlungslehre, Gesamtausgabe Band 4*, ed. Karl-Siegbert Rehberg, 63–112. Frankfurt am Main: Klostermann.
Gehlen, Arnold. (1940) 1988. *Man: His Nature and Place in the World*, trans. Clare McMillan and Karl Pillemer. New York: Columbia University Press.
Guardini, Romano. 1993. *Ethik. Vorlesungen an der Universität München Band I*, ed. Hans Mercker and Martin Marschall. Mainz und Paderborn: Grünewald.
Haff, Peter K. 2014. "Technology as a Geological Phenomenon: Implications for Human Well-being." *Geological Society Special Publications* 395(1): 301–09. https://doi.org/10.1144/SP395.4

Haraway, Donna J. 2016. "Staying with the Trouble: Anthropocene, Capitalocene, Chthulucene." In *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*, ed. Jason Moore, 34–76. Oakland: PM Press. https://doi.org/10.1215/9780822373780

Hegel, Georg Wilhelm Friedrich. (1820) 1991. *Elements of the Philosophy of Right*, trans. Hugh B. Nisbet. Cambridge: Cambridge University Press.

Heidegger, Martin. (1954) 1968. *What Is Called Thinking?*, trans. Fred D. Wieck and Jesse G. Gray. New York: Harper & Row.

Heidegger, Martin. (1953) 1977. "The Question Concerning Technology." In *The Question Concerning Technology and Other Essays*, trans. William Lovitt, 3–35. New York: Garland.

Heidegger, Martin. (1929–1930) 1995. *The Fundamental Concepts of Metaphysics. World, Finitude, Solitude*, trans. William McNeill and Nicholas Walker. Bloomington: Indiana University Press.

Heidegger, Martin. (1929) 1998a. "On the Essence of Ground." In *Pathmarks*, trans. William McNeill, 97–135. Cambridge: Cambridge University Press.

Heidegger, Martin. (1936–1946) 1998b. "Overcoming Metaphysics." In *The Heidegger Controversy: A Critical Reader*, ed. Richard Wolin, 67–90. Cambridge, MA: MIT Press.

Heidegger, Martin. (1927) 2001. *Being and Time*, trans. John Macquarrie and Edward Robinson. Oxford: Blackwell.

Heidegger, Martin. (1938) 2002a. "The Age of the World Picture." In *Off the Beaten Track*, trans. Julian Young and Kenneth Haynes, 57–85. Cambridge: Cambridge University Press.

Heidegger, Martin. (1935–1936) 2002b. "The Origin of the Work of Art." In *Off the Beaten Track*, trans. Julian Young and Kenneth Haynes, 1–56. Cambridge: Cambridge University Press.

Heisenberg, Werner. (1955) 1958. "The Idea of Nature in Contemporary Physics." In *The Physicist's Conception of Nature*, trans. Arnold J. Pomerans, 7–31. London: Hutchinson.

Hottois, Gilbert. 1984. *Le signe et la technique. La philosophie a l'épreuve de la technique*. Paris: Aubier.

Hottois, Gilbert. 2003. "Les philosophes et la technique. Les philosophes de la technique." In *Les philosophes et la technique*, ed. Gilbert Hottois and Pascal Chabot, 13–23. Paris: Vrin.

Humboldt, Alexander von. 1845–1862. *Kosmos. Entwurf einer physischen Weltbeschreibung* (fünf Bände). Stuttgart: Cotta.

Jünger, Ernst. (1930) 1998. "Total Mobilization." In *The Heidegger Controversy: A Critical Reader*, ed. Richard Wolin, 118–39. Cambridge, MA: MIT Press.

Jünger, Friedrich Georg. (1946) 1956. *The Failure of Technology: Perfection without Purpose*, trans. Frederick Wilhelmsen. Chicago: Regnery.

Kelly, Kevin. 2010. *What Technology Wants*. New York: Viking.

Latouche, Serge. 1995. *La mégamachine. Raison techno-scientifique, raison économique et mythe du progrès. Essais à la mémoire de Jacques Ellul*. Paris: La Découverte.

Lemmens, Pieter. 2015. "Philosophy of Technology in the Age of Anthropocene: Theorizing and Imagining the Emerging Geo-Techno-Logical Condition" (draft). Available at http://tiny.cc/gt5hgy.

Lemmens, Pieter, and Yuk Hui. 2017. "Apocalypse, Now! Peter Sloterdijk and Bernard Stiegler on the Anthropocene." *b2o: An Online Journal*. Available at http://tinyurl.com/m8v5msb.

Löwith, Karl. (1960) 1981. "Welt und Menschenwelt." In *Sämtliche Schriften Band 1*, ed. Klaus Stichweh, 295–328. Stuttgart: Metzler.

Löwith, Karl. (1967) 1986. "Gott, Mensch und Welt in der Metaphysik von Descartes bis zu Nietzsche." In *Sämtliche Schriften Band 9*, ed. Henning Ritter, 1–194. Stuttgart: Metzler.

Lynas, Mark. 2011. *The God Species: How the Planet can Survive the Age of Humans*. London: HarperCollins.

Malm, Andreas, and Alf Hornborg. 2014. "The Geology of Mankind? A Critique of the Anthropocene Narrative." *The Anthropocene Review* 1(1): 62–69. https://doi.org/10.1177/2053019613516291

Marquard, Odo. (1981–1983) 2000a. "Homo compensator. Zur anthropologischen Karriere eines metaphysischen Begriffs." In *Philosophie des Stattdessen*, 11–29. Stuttgart: Reclam.

Marquard, Odo. (1988–1989) 2000b. "Philosophie des Stattdessen. Einige Aspekte der Kompensationstheorie." In *Philosophie des Stattdessen*, 30–49. Stuttgart: Reclam.

Mazzarella, Eugenio. 2004. *Vie d'uscita. L'identità umana come programma stazionario metafisico*. Genova: il melangolo.

Moore, Jason W. 2014. *The Capitalocene: On the Nature and Origins of our Ecological Crisis*. Available at http://tinyurl.com/hmx3c5q.

Moore, Jason, ed. 2016. *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*. Oakland: PM Press.

Mumford, Lewis. 1967. *The Myth of the Machine 1: Technics and Human Development*. New York: Harcourt, Brace & World.

Nietzsche, Friedrich. (1873) 1997. "On the Uses and Disadvantages of History for Life." In *Untimely Meditations*, ed. Daniel Breazeale, 57–123. Cambridge: Cambridge University Press.

Nietzsche, Friedrich. (1886) 2002. *Beyond Good and Evil: Prelude to a Philosophy of the Future*, ed. Rolf-Peter Horstmann and Judith Norman. Cambridge: Cambridge University Press.

Norgaard, Richard B. 2013. "The Econocene and the Delta." *San Francisco Estuary and Watershed Science* 11(3): 1–5. https://doi.org/10.15447/sfews.2013v11iss3art9

Plato. 1995. "Cratylus." In *Platonis Opera Tomus I. Tetralogias I–II Continens*, ed. E. A. Duke, Winnifred Hicken, W. S. M Nicoll, D. B. Robinson, and J. C. G Strachan, 187–275. Oxford: Oxford University Press

Plessner, Helmuth. (1931) 1981. "Macht und menschliche Natur. Ein Versuch zur Anthropologie der geschichtlichen Weltansicht." In *Gesammelte Schriften V*, ed. Günther Dux, Odo Marquard, and Elisabeth Ströker, 135–234. Frankfurt am Main: Suhrkamp.

Plessner, Helmuth. (1956) 1983. "Über einige Motive der Philosophischen Anthropologie." In *Gesammelte Schriften VIII*, ed. Günther Dux, Odo Marquard, and Elisabeth Ströker, 117–35. Frankfurt am Main: Suhrkamp.

Raffnsøe, Sverre. 2016. *Philosophy of the Anthropocene: The Human Turn*. New York: Palgrave Macmillan.

Scheler, Max. (1928) 2009. *The Human Place in the Cosmos*, trans. Manfred Frings. Evanston, IL: Northwestern University Press.

Schwägerl, Christian. (2011) 2015. *The Anthropocene: The Human Era and How It Shapes Our Planet*, trans. Lucy Renner Jones. Santa Fe: Synergetic Press.

Sloterdijk, Peter, and Bernard Stiegler. 2016. "*Welcome to the Anthropocene*. Debate with Peter Sloterdijk and Bernard Stiegler. Radboud University, Nijmegen, The Netherlands, 27 Juni 2016." You Tube Video, Posted June 30, 2016. Available at http://tiny.cc/kf6hgy.

Steffen, Will, Paul J. Crutzen, and John R. McNeill. 2007. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Ambio* 36: 614–21. https://doi.org/10.1579/0044-7447(2007)36[614:TAAHNO]2.0.CO;2

Steffen, Will, Åsa Persson, Lisa Deutsch, Jan Zalasiewicz, Mark Williams, Katherine Richardson, Carole Crumley, Paul Crutzen, Carl Folke, Line Gordon, Mario Molina, Veerabhadran Ramanathan, Johan Rockström, Marten Scheffer, Hans Joachim Schellnhuber, and Uno Svedin. 2011. "The Anthropocene: From Global Change to Planetary Stewardship." *Ambio* 40: 739–61. https://doi.org/10.1007/s13280-011-0185-x

Stiegler, Bernard. 2010. *For a New Critique of Political Economy*, trans. Daniel Ross. Cambridge: Polity.

Stiegler, Bernard. 2014. "The Anthropocene and Neganthropology" (lecture at Canterbury, November). Available at http://tinyurl.com/kvo8dq5.

Stiegler, Bernard. 2017. "Escaping the Anthropocene." In *The Crisis Conundrum: How to Reconcile Economy and Society*, ed. Mauro Magatti, 149–63. New York: Palgrave Macmillan. https://doi.org/10.1007/978-3-319-47864-7_7

Strack, Friedrich, ed. 2000. *Titan Technik. Ernst und Friedrich Georg Jünger über das technische Zeitalter*. Würzburg: Königshausen & Neumann.

Szerszynski, Bronislaw. 2012. "The End of the End of Nature: The Anthropocene and the Fate of the Human." *The Oxford Literary Review* 34(2): 165–84. https://doi.org/10.3366/olr.2012.0040

Uexküll, Jakob von. 1921. *Umwelt und Innenwelt der Tiere* (zweite vermehrte und verbesserte Auflage). Berlin: Springer.

Uexküll, Jakob von. (1934) 2010. "A Foray into the World of Animals and Humans." In *A Foray into the World of Animals and Humans: With a Theory of Meaning*, trans. Joseph D. O'Neil, 41–135. Minneapolis: University of Minnesota Press.

Visconti, Guido. 2014. "Anthropocene: Another Academic Invention?" *Rendiconti Lincei: Scienze Fisiche e Naturali* 25(3): 381–92. https://doi.org/10.1007/s12210-014-0317-x

Volpi, Franco. 2004. *Il nichilismo*. Roma: Laterza.

Weizsäcker, Viktor von. (1956) 2005. *Gesammelte Schriften 10. Pathosophie*, ed. Walter Schindler, Dieter Janz, and Peter Achilles, Frankfurt am Main: Suhrkamp.

Winner, Langdon. 2013. "A Future for Philosophy of Technology—Yes, but on Which Planet?" (lecture at SPT biannual meeting, Lisbon. http://tinyurl.com/lsvpsl5).

Zylinska, Joanna. 2014. *Minimal Ethics for the Anthropocene*. Open Humanities Press. Available at https://quod.lib.umich.edu/o/ohp/12917741.0001.001.

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 282–294 DOI: 10.5840/techne2017111778

Rebranding the Anthropocene: A Rectification of Names

Langdon Winner

Abstract: Recent attempts to rename the geological epoch in which we live, now called the "Holocene," have produced a number of impressive suggestions. Among these the leading contender at present is the "Anthropocene." Despite its possible advantages, there are a number of reasons why this term is ultimately misleading and unhelpful in both philosophical and policy deliberations. Especially off-putting is the word's tendency to identify the human species as a whole as the culprit in controversial changes in Earth's biosphere whose proximate sources can be more accurately identified. The new candidate term echoes discussions of "Man and . . ." in countless twentieth-century publications, an outmoded conceit rightly overcome in more recent writings on science, technology and society.

Key words: Anthropocene, extinction, techno-triumphalism, narcissism

1. Introduction

Ongoing attempts to rebrand the geological epoch in which we live have produced a number of impressive suggestions. The conventional term, "Holocene," is admittedly fairly drab, perhaps in need of a colorful upgrade. Derived from the Greek *holos*, it simply means the "whole" or "entire period" beginning at about 11,700 years ago, a period of interglacial warming. Two appealing alternatives are "Homocene" and "Anthropocene," both of which evoke the planetary effects of human activity over the centuries. Another contender, "Capitalocene," advanced by sociologist Jason W. Moore, points to the formative influence of capital in modern times. Also on the candidate list are "Atomicocene," noting the arrival of nuclear weapons and nuclear technologies, and "Cthulucene," proposed by Donna

Langdon Winner, Department of Science and Technology Studies, Rensselaer Polytechnic Institute, Troy, NY 12180; winner@rpi.edu.

Harraway (2015), which pays homage to "Chthonic" entities, ancient spirits of the underworld.

Among these contenders, the term "Anthropocene," is by far the most popular at present (Zalasiewicz et al. 2011). And indeed, the label has some notable virtues. Sweeping in its implications, grandiose in it aspirations, it immediately evokes some of the most important scientific, ethical and political issues that confront world societies in our time. While there seem to be credible, even noble, reasons for adopting this designation, however, there is some cause for alarm, namely that the enthusiasm behind the campaign to adopt this marker smacks of an obvious, species-centric narcissism. Human beings naming a whole geological epoch for themselves? How marvelous! How fabulously egotistical! Indeed, how exquisitely Anthropocentric!

In my view, the proposed, updated brand name is actually not all that bad as a first draft, a label that Madison Avenue wordsmiths could likely propagate and glorify within flashy advertising campaigns. But given the gravity of the realization in question—the condition of Planet Earth under the influence of human projects—it is clear that there's a need something more specific, focused, rigorous, and concrete. Since we're changing a basic category within fundamental scientific nomenclature, it's important to proceed with perspicuous prudence.

2. A New Era Begins

In that light, my humble proposal for a suitable alternative to "The Holocene" would be: "Langdonpocene." It has a nice ring to it, don't you think? It's succinct, intelligible, and bound to appeal to a certain slice of the world's populace, namely, my friends and family. At the same, I realize that this suggestion will likely be greeted with howls of derision. "Can Professor Winner be so brash and distasteful as to name a several-centuries long period of history after himself? Why, it's absurd! There's no reasonable basis for that request whatsoever!"

I gladly admit that criticisms of this sort have a valid point. It is definitely beyond bizarre for anyone to name an era of time for him/herself. But before dismissing the idea altogether, please consider my reasoning. In important respects, based upon some highly credible data, it's likely that I deserve as much credit for overall geological impact as just about person who has ever lived on the planet, past or present. After all, I've spent more than seven decades here, living contentedly as an average, middle class American consumer with an active, well travelled professional lifestyle. In those roles I've probably burned as much fossil fuel, consumed as many tons of natural resources and defaced as much of

the natural landscape as any of the "anthropos" who've lived on Earth during the past twelve millennia. I would gladly pit my substantial but largely unintended geological defacements and excessive burning (about 303 million BTU per year) against any and all contenders (American Geosciences Institute). You see, I've been on the "cene" for quite a long while. In fact, it's likely that my most lasting contribution to the world's future will be the countless tons of greenhouse gases I've emitted into the atmosphere over the years. With any further longevity—if I'm lucky enough to live into my eighties, for example, I could be near the very top of the list of most environmentally destructive human beings ever to walk on Earth. If that doesn't qualify me for some kind of notice, I don't know what would.

Of course, I would leave open the possibility any that other participants dwelling in our newly rebranded era could share the billing on the marquee as well, for example some notable philosophers of technology—Donpocene, the Andrewpocene, Pieterpocene, etc.—just fill in the blanks. To be perfectly fair, perhaps it makes sense to split the ongoing geologic epoch into smaller segments, perhaps three months long or so, with each qualified individual receiving a name for their designated subdivision. Clearly, this would create the problem of exactly when the basic "cene" began. But that has not been a serious problem so far because thinkers who promote "Anthropocene" branding efforts have chosen several different starting points for the "Anthropocene"—the agricultural revolution, the onset of the industrial revolution, the first explosion of an atomic bomb, and so forth. Characteristic of the label has been a sliding time scale, something that in itself should raise doubts about the idea's validity. As a much needed corrective, my modest proposal would scrupulously individualize and democratize the whole process of cene-ification, a step that reflects another hallmark of the era of self-absorbed, consumerist egoism in which we live—the grand tradition of selling vanity plates for automobiles, a metal license embossed with your name on it or perhaps the name of the family cat.

By the same token, an enterprising organization, StarRegistry.org, now enables anyone to name a star in the universe after themselves or in honor of a friend or family member. For $20 you can purchase a name for a standard star and for $35 you own the rights to a very bright one. I understand there's also an enterprising outfit in Chile that will able you to buy a whole galaxy and name it for yourself. Hence, my own projected start-up CeneRegistry.com would fill an obvious market niche, a kind of geologic "selfie" not unlike the group photos that fill our smartphones these days.

3. Who's In This Cene Anyway?

Another reason that richly qualifies "Langdonpocene" over some other leading contenders, I would argue, is that "Anthropocene" includes literally billions of people who have little if any claim to this grandiose geologic title at all. Among them are human beings—"anthropos," if you will—who over many centuries and to the present day have lived modestly with minimal impact on the local or global environs or the Earth's climate systems. Much of the populace of Asia, Africa, South America, the world's island communities, northern Canada and the like, people in the so-called "developing countries" have little if any right to be identified as serious players in this new game of names. No, they should be regarded as mere fakers, pikers, con men, and frauds if ever they pretend to have a stake in labeling the momentous epoch upon which we've embarked. Unlike my own substantial claim, their names would not even appear on any list of plausible nominees for the prize, for their levels of wanton destruction are pathetically miniscule at best.

Outlined in an elegant, well-documented essay, Andreas Malm and Alf Hornborg have offered similar reasons for criticizing the presumptuous term "Anthropocene." "We find it deeply paradoxical and disturbing that the growing acknowledgement of the impact of societal forces on the biosphere should be couched in term of a narrative so completely dominated by natural science" (Malm and Hornborg 2014, 63). They note that the prevailing focus upon the human species as a unified whole tends to overlook the actual social and economic institutions and activities that are clearly the primary cause of the massive effects in the biosphere evident today.

> Capitalists in a small corner of the Western world invested in steam, laying the cornerstone for the fossil economy: at no moment did the species vote for it either with feet or ballots, or march in mechanical unison, or exercise any sort of shared authority over its own destiny and that of the Earth System. (Malm and Hornborg 2014, 64)

For example, if one takes into account quantitative measures of actual resource and energy consumption, the gravity of misjudgment about a unified "humanity" in "Anthropocene" discourse immediately becomes clear.

> A significant chunk of humanity is not party to the fossil fuel economy at all: hundreds of millions rely on charcoal, firewood or organic waste such

> as dung for all domestic purposes. . . . Their contribution is close to zero. (Malm and Hornborg 2014, 65)

The fundamental error in Anthropocenic reveries, Malm and Hornborg observe, is the very one that Karl Marx emphasized in his argument that production comes to be "encased in eternal natural laws independent of history, at which opportunity *bourgeois* relations are then quietly smuggled in as the inviolable natural laws on which society is founded" (Marx 1993, 87). In this case species homo sapiens as a whole is credited (or blamed) for the voracious enterprises of relatively few members of the group. As Malm and Hornborg argue, this mistake contributes to a misguided emphasis within national and global policies that seek to address the excesses of modern capitalist economies. The proximate agents of a biosphere in crisis are so vaguely identified that reasonable remedies are difficult to organize.

4. Revival of A Grand Literary Tradition

Today's penchant for linking the activities of modern techno-capitalism and their world altering consequences to the activities of humanity as a whole has a distant mirror in writings about technology, industry, economics, philosophy, and social change common in the mid-twentieth century. Featured in the titles of a great many books, essays and news stories of the period was a ponderous yet puzzling subject called "Man," a collective name for humanity within the broad sweep of history, especially as regards the accomplishments of modern industrial society. Among book titles, for example, one finds *Man and Nature*, *Man and the State*, *Man and Water*, *Man and Technology*, *Man and His Nature*, *Man and His Universe*, *Man and His Values*, and so forth. My search of the "World Cat" interlibrary catalog at my university turned up more than a hundred books published during that period with "Man" as the central character. What a guy!

Eventually this practice of naming ceased as it dawned on people that, lo and behold, there were also women, not just men, who had made and were making substantial contributions to developments within the domains of life and work under discussion. Imagine that! Hence, a standard anthology in Science and Technology Studies of the 1970s and 1980s, *Technology and Man's Future* (Teich 1972), eventually changed its title to *Technology and the Future* in its later editions (Teich 1993). Of course, much of the credit for this awakening is due to the increasing presence of women scholars and feminist perspectives in scholarship and publishing as the years moved on. "What were we thinking?" was a comment frequently heard in university corridors as this much needed correction took place.

Beyond its blatant sexism, another problem with the "Man and . . ." construction was that it implicitly—sometimes even explicitly—portrayed humanity from the point of view of the European and North American populace, a suggestion that such folks were at the very apex of all human creativity. The "Man" who had mastered the land and seas, conquered The New World, brought new kinds of knowledge and technology to prominence was transparently composed of people living in London, Paris, New York, and other hubs of Western industrial influence. Of course, a common underlying intention here was generously, inauspiciously to include the billions of other humans who live on Earth or who have ever lived here as parts, albeit lesser parts, of the populace in question. Writers in the "Man and . . ." tradition seemed to find it magnanimous to include all those other people beyond Europe and North American within the pronoun "we" employed throughout their books. But any knowledgeable, focused attention to the lives and contributions of other large and diverse cultures around the globe was seldom part of these univocal histories. A strong implication in the "Man and . . ." literature was that scattered others around the globe should be simply be gratified to learn that the powerful males in Western Civilization had now given them in a nice little tip of the hat, recognizing their otherwise insignificant offerings to the grand story of "Man-kind."

Looking at the rise and fall of the "Man and . . ." literature and its pungent underlying point of view, the rise of the "Anthropocene" appears as nostalgic revival of some deplorable habits. A good many geologists, philosophers, social scientists, journalists, and other prominent thinkers have—yet again!—taken it upon themselves to speak for the diverse populations of human beings who have lived over many generations, deploying ingenious labels and seldom questioned judgments about who it is that truly matters. In this case, blanket identification of those responsible for the widespread, often calamitous reengineering of the Earth's biosphere are placed in the lap of "anthopos," a category that includes literally billions of people, living and dead, many of whom have had an almost negligible effect upon the world gouging endeavors the new geologic label recognizes and (alternately) celebrates or bemoans.

5. The Sixth Extinction

Granted, there is no longer any doubt about the enormous scale and significance of the impacts upon Earth and its creatures that the activities and projects of some human groups have brought about. In fact, a truly welcome feature of today's vogue for the label "Anthropocene" is the light it sheds upon deteriorating condi-

tion of the biosphere and its life sustaining features. This includes growing awareness of a phenomenon known as the "Sixth Extinction." Scientists have identified five previous mass extinctions of plant and animal life, including the mass die-off at the end of the Cretaceous, sixty-five million years ago, the one that killed off the dinosaurs, evidently caused by the effects of one or more massive asteroids or comets striking the Earth. While estimates of the extent of today's death rate vary according to method and categories of analysis, most of them are starkly ominous. In its *Living Planet Report 2016* the World Wildlife Fund estimates that 0n average there has been a 58 percent drop in numbers of vertebrates—fish, mammals, birds and reptiles—around the globe between 1970 and 2012 (World Wildlife Fund 2016). This does not bode well for human settlements that depend upon biodiversity for their livelihood. According to researchers from the United Nations Environment Program and University College London,

> For 58.1% of the world's land surface, which is home to 71.4% of the global population, the level of biodiversity loss is substantial enough to question the ability of ecosystems to support human societies. The loss is due to changes in land use and puts levels of biodiversity beyond the 'safe limit' recently proposed by the planetary boundaries—an international framework that defines a safe operating space for humanity. (United Nations Environment Programme 2016)

Given the unhappy plight that evidently awaits countless non-human species in the years ahead, a section in print and online newspapers called "Anthropocene News" could well become a suitable replacement for the portion of the paper now called "Obituaries." Sticking with the convention of proposing names with Greek roots, however, a classy alternative label might be "Thanatopocene," the epoch of death, or perhaps "The Sixth Thanatopocence" to recognize its place in within a sequence of mass die offs. This would closely match a central theme in many of today's most popular movies and television series, that of apocalyptic and post-apocalyptic crises along with a profusion of zombie narratives. On my own university campus, a popular student organization at present is the Humans vs. Zombies Club, one that "prepares players for the impending zombie apocalypse." In their own fun loving ways, young people seem to be preparing for, perhaps even yearning for, Anthropocenic futures that include encounters with the walking dead. Playing one of the deceased creatures as opposed to a living human is actually a cherished role in these games.

Descriptions of the "Sixth Extinction" emphasize not only the pervasive effects of carbon emissions upon global warming, but also ambitious enterprises that involve transforming and exploiting of vast stretches of the natural landscape, projects often identified as signature accomplishments of the "Anthropocene" era. Tom Butler's astonishing photo essay *Overdevelopment, Overpopulation, Overshoot* offers vivid portraits of many of those affected (Butler 2012). Included on the list would certainly be the huge expanses in the Amazon rain forest now being cleared for lumbering, cattle raising and other kinds of profit-making enterprise. As an afterthought, one ingenious attempt to preserve some forested areas and the species of flora and fauna in them is the creation of "islands" of forest habitat within zones subject to commercial development, large patches of land in which the trees and plants are left intact. Proponents argue that policies of this kind will preserve the vitality of the forest and its creatures, while allowing economic enterprise to flourish. Despite what may initially seem to be good intensions, engineering fixes of this kind often compound the magnitude of damage. During her visit to an island of forest in the Manaus region of the Amazon, noted science writer Elizabeth Kolbert (2014) spoke with ornithologist Mario Cohn-Haft, who explained, "What happened when you cut down the surrounding forest is that the capture rate—just the number of birds you captured and the number of species sometimes, too—went up for about the first year" (Kolbert 2014, 174–75). Kolbert notes that, "Apparently, the birds from the deforested areas were seeking shelter in the fragments. But gradually as time went on, both the number and the variety of birds in the fragments started to drop. And then it kept on dropping" (175). "In other words," Cohn-Haft continued, "there wasn't just suddenly this new equilibrium with fewer species. There was this steady degradation in the diversity over time." Kolbert concludes, "And what went for birds went for other groups as well" (176).

Recognizing the devastation wrought upon many of the planet's ecosystems, some biologists and eco-philosophers have begun recommending immediate, large scale measures to shelter pieces of land and ocean from any further so called development and to set aside vast portions for recovery. Thus, E. O. Wilson has proposed what he calls "Half Earth," a plan to devote the space of half the planet as permanent shelters for the millions of non-human species that exist here. "The way it could done," he observes, "is to take the remaining wildernesses of the world, on both sea and land, and set those aside as inviolate, while we go on with our chaotic and unpredictable, destructive future. . . . The big task is to settle down before we wreck the planet" (Dvorsky 2014). Thus, the Half Earth proposal amounts to a

call to cease the massively destructive tendencies that have been characteristic of Anthropocene so far, the creation of an Anti-Anthropocene, if you will.

6. Beyond Narcissism

A hallmark of the discourse of renaming a geological epoch and imagining its astonishing features, is that it brashly reaffirms what the writings of many ecophilosophers and environmental activists have long called into question—the distinctly anthropocentric standpoint for human reflection about the world in which we live. Thus, the arguments in the philosophy of "deep ecology" offered by Arne Naess and others criticize the traditional, often unstated prejudice that humans ought to be the crucial point of reference in all our reflections (Naess 1993). Given the vast plurality of living creatures and habitats on Earth, wouldn't acknowledging their presence be a more reasonable starting point, a better way to launch our thinking? Philosophies that fundamentally recognize the situations other creatures and their needs would likely be far more revealing than one that merely restates, amplifies and tacitly celebrates the identification hubris of the past several centuries in the West.

In his provocative book, *The Age of Missing Information*, Bill McKibben (1992) zeroes in on the kinds of personal self-absorption that characterize our time. Based upon several months of a bizarre experiment in which he did nothing but watch a month of video tape recordings from more than a hundred television channels, McKibben argues that the underlying message content of television and other information technologies is predicated almost exclusively upon people's desires, longings and an obsession with personal identity. He writes, "The idea of standing under the stars and feeling how small you are—that's not a television idea. Everything on television tells you the opposite—that you're the most important person, and that people are all that matter" (McKibben 1992, 225).

"Anthropos" perhaps?

McKibben argues that hollowness of modern society suggests a need to shift focus and come to reacquaint ourselves with broader, deeper realities.

> Human beings—any one of us, and our species as a whole—are not important, not the center of the world. That is the one essential piece of information, the one great secret, offered by any encounter with the woods or the mountains or the ocean or any wilderness or chunk of nature or patch of the night sky. (McKibben 1992, 228)

In light of what Naess eloquently argued and what McKibben so painfully discovered, the unvarnished, breast thumping pride in the reassertion of humans as all that really matters on Planet Earth is the truly astonishing feature of the emerging vogue for Anthropocenism in our time. Yes, it is true that a number of serious thinkers have seized upon the category and its narrative as a way to express malaise for the excesses of modern civilization and to express their pleas for strong restraint grounded in an ecological vision (cf. Morton 2016). But another prominent group within the debate regard what is called the "good Anthropocene" as an occasion for high technology activism, a chance to extend the power of industrial civilization into exciting new dimensions (cf. Hamilton 2013).

A prominent advocate of this view is Erle Ellis, professor of Geography and Environmental Systems at the University of Maryland. He writes,

> Creating the future will mean going beyond fears of transgressing natural limits and nostalgic hopes of returning to some pastoral or pristine era. Most of all, we must not see the Anthropocene as a crisis, but as the beginning of a new geologic epoch with human directed opportunity. (Ellis 2012)

Along with a good number of others who've advanced this position, Ellis favors "geoengineering" as a promising response to climate crisis.

> Geoscientists are ever more actively involved in geoengineering to counter global warming by injecting sulfate aerosols into the stratosphere, industrial carbon sequestration, and other massive technological alterations of Earth's systems. (Ellis and Haff 2009)

His vision is that of ever expanding management of the workings of the planet with increasing recognition of "human responsibility," of course.

The basic sensibility that emerges from the notion "Anthropocene," I would argue, is one that blends a familiar, threadbare, human-centered worldview, often with lavish infusions of techno-triumphalism, the latest version of a narrative tradition that includes "progress," "development" and "innovation," this time enhanced with austere rituals of hand-wringing (cf. Winner 2017a, 2017b). Its terms are pungently expressed in Stewart Brand's (1968) famous maxim offered at the very beginning of *The Whole Earth Catalog*: "We are as gods and we might as well get good at it." Brand admits that he borrowed this idea from anthropologist Edmund Leach who was even more explicit in his embrace of a theological vision of modernity.

> Men have become like gods. Isn't it about time that we understood our divinity? Science offers us total mastery over our environment and over our destiny, yet instead of rejoicing we feel deeply afraid. Why should this be? (Leach 1968, 1)

Why, indeed? At this point why are ideas mastery needed at all? Why are they still so appealing? How in the world are they helpful and to whom?

7. Conclusion

My position here echoes a passage in *The Analects* of Confucius in which a conversation takes place between The Master and his companion Tsze-lu.

> Tsze-lu said, "The ruler of Wei has been waiting for you, in order to administer the government. What will you consider the first thing to be done?"
>
> The Master replied, "What is necessary is to rectify names." "So! Indeed!" said Tsze-lu. "You are wide of the mark! Why must there be such rectification?"
>
> The Master replied, "How uncultivated you are, Yu! A superior man in regard to what he does not know, shows a cautious reserve. If names be not correct, language is not in accordance with the truth of things. If language be not in accordance with the truth of things, affairs cannot be carried on to success." (Confucius 1901, chap. 16)

In short, in the interest of rectification of names, I would gladly relinquish the silliness of "Langdonpocene" if others ease up on their insistence upon the bombastic pomposity of "Anthropocene" along with its prideful, pedal-to-the-metal implications for planet Earth and all its living inhabitants. Perhaps simply returning to "Holocene" would be a good idea. It's a perfectly serviceable label and not freighted with the risible baggage of its triumphalist alternative.

References

American Geosciences Institute. 2017. "How Much Energy Does a Person Use in a Year?" http://www.americangeosciences.org/critical-issues/faq/how-much-energy-does-person-use-year.

Brand, Stewart. 1968. "We Are as Gods." In *The Whole Earth Catalog*. Menlo Park, CA: The Portola Institute.

Butler, Tom, ed. 2012, *Overdevelopment, Overpopulation, Overshoot*. San Francisco: Goff Books.

Confucius. 1901. *The Analects Attributed to Confucius*, trans. James Legge. Available at http://china.usc.edu/confucius-analects-13.

Dvorsky, George. 2014. "E. O. Wilson's Radical Plan to Save the Planet." http://io9.gizmodo.com/e-o-wilsons-radical-plan-to-save-the-planet-1654447315.

Ellis, Erle C. 2012. "Planet of No Return: Human Resilience on an Artificial Earth." *The Breakthrough*. Winter 2012. https://thebreakthrough.org/index.php/journal/past-issues/issue-2/the-planet-of-no-return.

Ellis, Erle C., and Peter K. Haff. 2009. "Earth Science in the Anthropocene: New Epoch, New Paradigm, New Responsibilities." *EOS Forum* 90(49): 473. https://doi.org/10.1029/2009EO490006

Hamilton, Clive. 2013. *Earthmasters: The Dawn of the Age of Climate Engineering*. New Haven, CT: Yale University Press.

Harraway, Donna. 2015. "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin." *Environmental Humanities* 6: 159–65. https://doi.org/10.1215/22011919-3615934

Kolbert, Elizabeth. 2014. *The Sixth Extinction: An Unnatural History*. New York: Henry Holt and Co.

Leach, Edmund R. 1968. *A Runaway World?* Essex: The Anchor Press.

Malm, Andreas, and Alf Hornborg. 2014. "The Geology of Mankind? A Critique of the Anthropocene Narrative." *The Anthropocene Review* 1(1): 62–69.

Marx, Karl. 1993. *Grundrisse*. London: Penguin Books.

McKibben, Bill. 1992. *The Age of Missing Information*. New York: Random House.

Morton, Timothy B. 2016. *Dark Ecology: For a Logic of Future Coexistence*. New York: Columbia University Press. https://doi.org/10.7312/mort17752

Naess, Arne. 1993. *Ecology, Community and Lifestyle: Outline of an Ecosophy*. Cambridge: Cambridge University Press.

Teich, Albert H., ed. 1972. *Technology and Man's Future*. New York: St. Martin's Press.

Teich, Albert .H., ed. 1993. *Technology and the Future*, 6th ed. New York: St. Martin's Press.

United Nations Environment Programme. 2016. "Biodiversity Falls below Safe Levels Globally." https://www.unep-wcmc.org/news/biodiversity-falls-below-safe-levels-globally.

Winner, Langdon. 2017a. "The Cult of Innovation: Its Colorful Myths and Rituals." *Resilience*. http://www.resilience.org/stories/2017-06-15/the-cult-of-innovation-its-colorful-myths-and-rituals/.

Winner, Langdon. 2017b. "Decadencia y Caida Del Technotriunfalismo." *Redes* 22(43): 122–47.

World Wildlife Fund. 2016. "Living Planet Report 2016: Risk and Resilience in a New Era." Gland, Switzerland: World Wildlife Fund International. Available at http://awsassets.panda.org/downloads/lpr_living_planet_report_2016.pdf.

Zalasiewicz, Jan, Mark Williams, Alan Haywood, and Michael Ellis. 2011. "The Anthropocene: A New Epoch of Geological Time?" *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 369: 835–41. https://doi.org/10.1098/rsta.2010.0339

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 295–318 DOI: 10.5840/techne2017102473

How to Differentiate a Macintosh from a Mongoose: Technological and Political Agency in the Age of the Anthropocene

Arianne Conty

Abstract: Many scholars have understood the Anthropocene as confirming the patient work in the social sciences to deconstruct the nature/culture divide, for the human being is now present in the entire eco-system, from deet-resistant mosquitoes to the ozone hole in the heavens. Scholars like Bruno Latour have claimed that nature and culture have always been co-determined and thus that their separation was a case of modern bad faith with disastrous consequences. Because Latour blames this divide on the human exceptionalism that pitted a human subject against a world of objects, and thus denied agency to other living and nonliving actants, the solution for Latour lies in recognizing their agency in an 'enlarged democracy.' Such scholarship has inspired many scholars to adopt a 'flat ontology' that treats all forms of agency, whether animate or inanimate, as equivalent and autonomous material forces. This article will elucidate Latour's 'democracy of things' and explore the beneficial consequences for the Anthropocene of attributing autonomous agency to non-human actants, while at the same time discussing the negative repercussions of reifying the agency of technological tools as separate from human agency. Due to such widespread reification of technological agency, it will be shown that causal analysis that traces such agency back to its source in human political organization is required in order to adequately respond to the Anthropocene.

Key words: Anthropocene, Bruno Latour, flat ontology, political agency, technological agency

Arianne Conty, Department of International Studies, College of Arts and Sciences, American University of Sharjah, 26666, Sharjah, UAE; aconty@aus.edu.

1. Introduction

It is somewhat ironic that when scholars seem to be reaching an academic consensus critiquing the human exceptionalism of modern humanism, and to be replacing such an exceptionalism with a contextual and processual understanding of the human species, we are suddenly told that we are living in a new geological era named The Anthropocene. Just when we had begun to overthrow such anthropocentric tendencies in philosophy and the social sciences, we are faced with the undeniable presence of the human in the entire eco-system, from deet-resistant mosquitoes to the ozone hole in the heavens. From the Greek *anthropos*, human, and *kainos*, new, the term Anthropocene was coined by atmospheric chemist Paul Crutzen in light of the research on the ozone layer that earned him a Nobel Prize. Following upon the Holocene, the Anthropocene is the name given to a new geological epoch to indicate the fact that the strata of the Earth have been indelibly marked by the presence of the *anthropos*, the human species:

> The Anthropocene represents a new phase in the history of the Earth, when natural forces and human forces became intertwined, so that the fate of one determines the fate of the other. Geologically, this is a remarkable episode in the history of the planet. (Zalasiewicz et al. 2010, 2231)

The term has now been adopted by many geologists and environmental scientists, and the International Commission on Stratigraphy has organized an Anthropocene Working Group to decide upon the geological relevance of the human-wrought changes to the eco-sphere, as well as the best date for the end of the Holocene and the beginning of this new geological era. Crutzen himself has favored the Industrial Revolution as the major shifting point, focusing his research on the hole in the ozone layer humans have created over the Antarctic, the level of methane in the atmosphere and the 30 percent rise in carbon dioxide emissions (other scientists have since added the acidification of the oceans, the rise in global temperature, the rate of species extinction, the loss of soil fertility due to fertilizers, and the loss of arctic ice). Other scholars locate the start date for the Anthropocene with the atomic bomb at mid-century, since it left significant levels of plutonium in the Earth's strata, while others point to the period of Accelerationism, or the birth of capitalism in the sixteenth century, since it sets into place a strategy of "cheap nature" that was implemented by techno-industrial means.

Yet wherever the start date, the scientific version of the Anthropocene presupposes that before the industrial revolution, Accelerationism, the birth of capitalism

or wherever the Anthropocene date will finally be located, there was a wild nature that went about its own affairs, unbeknownst to human societies, and that it is only in this new epoch of modernity that such a nature was controlled and socialized, making the divide no longer tenable. Gary Tomlinson explains this well by distinguishing what he calls feed-forward from feedback elements. Where forces such as tectonic shifts, climate cycles and volcanism were untouched by human society, defining feedback cycles from outside human niche construction, they have now become what he calls 'feedback elements' within human society, the Anthropocene coming to signify that there simply is no outside anymore (cf. Tomlinson, forthcoming). According to such a view, while human society had little influence over the natural world during the Holocene, today there remains no species of plant or animal that has not been transformed by our species.

Though at first sight such a scientific interpretation may seem to confirm the patient deconstruction of the nature/culture divide in philosophy and the social sciences over the past thirty years, such a confirmation would be misleading. In what represents a direct reversal of the scientific position, such scholars claim that the nature/culture divide has never existed, and it was only during the period of modernity, representing the end of the divide for the scientific position, that the terms were invented in order to justify human treatment of the nonhuman world as passive resource to be exploited. For such scholars, nature and culture have always been intertwined, and it is only during the period of Western modernity that such relations were ignored in order to oppose an active human subject, endowed with consciousness and intentionality, over and against a passive world of nature that was controlled and manipulated by human agency in order to ensure human progress.

Such a dissolution of the nature/culture divide famously led Bruno Latour to claim that the nature/culture dichotomy is a case of modern Western bad faith since "we have never been modern" (Latour 1993). Just like all other peoples at all other times, moderns continued to depend upon nature-culture networks and interrelations that belie such divisions. If, according to the position of the natural sciences, nature used to exist and has only recently been engulfed by culture, for Latour nature has never existed as anything more than a modern fabulation, and, as he recently put it, "Thank God, nature is going to die" ("Dieu merci, la nature va mourir," 2004a, 42). For Latour and his Actor-Network Theory, the Anthropocene represents the end of modernity's exclusive claims to exceptionalism and its demotion to the ranks of other nature-cultures that had the courage to assume their interrelations with the agency of myriad other things and beings. Ignoring

capitalism as an ecological force to be reckoned with, and ridiculing the scientific discourse that claims that there was a period when an untouched nature was separate from human culture, Latour holds that the fault of human exceptionalism lies in denying agency to other living beings and nonliving things. For Latour, we have always relied on the agency of other actants to accomplish both the feats and the horrors of human history. If the Anthropocene is the product of ignoring these other actants, the solution for Latour lies in recognizing their agency in what he calls "an enlarged democracy" (1993, 141) where both animate and inanimate actants are represented and given a voice.

After developing Latour's more inclusive conception of agency and his replacement of interior intentions with exterior action, the first section of this article will elucidate how Latour has used such an a-modern understanding of agency to respond to the Anthropocene, or what he calls GAIA. If Actor-Network theory and scientific discourse understand the nature/culture divide in radically different ways, their solutions to the Anthropocene nonetheless coalesce, in that both camps treat all actions, whether human or nonhuman, as material forces, and both ignore causal reasoning that would implicate human ideology and politics in favor of effects that are best resolved with material solutions.

The following section will trace the influence of Latour's ideas on the philosophy of technology and the movement called 'flat ontology' in order to show how such scholars understand technological artifacts as autonomous actants, separate from human agency, and are thus unable to trace technological agency back to the social practices that build ecological solidarity or decline. Section two will elucidate the tendency amongst 'flat ontologists' to fetishize technological artifacts, and show how such fetishization leads to a form of nihilism, since once value is calculated in terms of material force as it is in Latour's theory, tools are given the same ethical value as living beings, and the ethical obligation to respond to suffering and extinction loses its meaning.

Finally, in section three, the political repercussions of such a conflation of agency will be interrogated, and the shortcomings of such a position will be discussed. In place of such a reduction of agency to external force and of morality to material obligation, section three will call for the need to use Latour's term 'techno-human hybrid' in reference to technological artefacts and human beings, in order to highlight the delegated nature of technological agency. When tied to a causal analysis that can trace material forces back to immaterial political negotiation, such a differentiation can open up the space for an ethical response to the Anthropocene, where we can address those actants that do indeed communicate,

suffer, and flourish in inter-dependent relations on a symbiotic planet. This article will defend the view that the dissolution of the nature/culture divide that has been brought to light in the Anthropocene should entail treating value and scale, meaning and matter, and politics and nature together, and thus that a response to the Anthropocene must entail understanding the role that immaterial political and symbolic engagements play in material and technological agency.

2. Bruno Latour's Democracy of Things

If the modern world developed the scientific method by differentiating between subject and object, nature and culture, mind and matter, these separate domains of knowledge have proven incapable of taking into account the mediated experience of our globalized and interconnected planet. We are, and indeed have always been, constantly confronted with entities that are both subject and object, nature and culture, political, scientific and social. From the AIDS virus to the ozone, the metro to whales fitted with radio-tracking devices, the entities we encounter on a daily basis are what Latour calls "imbroglios of science, politics, economy, law, religion, technology, fiction" (1993, 2). The a-modern world of Actor-Network Theory thus recognizes all entities as expressing agency, allowing objects to become integral and active threads of an intersecting scientific, social and discursive world. Instead of looking at ourselves asymmetrically, limited to culture, cut off from the objects of science, we must share our agency with the world of things. It is only in this way, Latour claims, that the human can be saved.

> Where are the Mounier of machines, the Levinases of animals, the Ricoeurs of facts? Yet the human, as we now understand, cannot be grasped and saved unless that other part of itself, the share of things, is restored to it. (Latour 1993, 136)

Objects, for Latour, have as much agency as human beings, such that, to use an example from his book *Reassembling the Social*, "Scallops *make* the fisherman *do* things just as nets placed in the ocean lure the scallops into attaching themselves to the nets and just as data collectors bring together fishermen and scallops in oceanography" (Latour 2007, 107). Likewise, in an example from his book *Pandora's Hope*, when a speed bump functions as a policeman, forcing us to slow down, can we claim that somehow the policeman has more agency than the speed bump (1999, 188)? Or again, can we readily differentiate a "citizen-weapon" from a "weapon-citizen" (1999, 179)? Thus, for instance, in an article written about his book *Modes of Inquiry*, he writes:

> I suddenly understood that the nonhuman characters had their own adventures that we could track, so long as we abandoned the illusion that they were ontologically different from the human characters. The only thing that counted was their *agency*, their power to act, and the diverse figurations they were given. (Latour 2013a, 291)

Though all of these actants have agency, none of them has an inherent essence because otherwise they become once more enmeshed in the modern constitution that he is seeking to overthrow. Rather, each actant, each individual form, is shaped by forces external to it, for form has no independent self-existence, and never stands alone. Because essences are interdependent, they "have no clear boundaries, no well-defined essences, no sharp separation between their own hard kernel and their environment" (Latour 2004a, 24). Instead of essence or substance, Latour will propose the term event—"each entity is an event" (1993, 81)—and more recently the term organism, which he defines as "the metaphysical alternative to the notion of substance" (2005, 227). Unlike substances, organisms constantly interact and risk disappearing or reproducing themselves in relation to the different forces of agency that are put into play.

Because "the share of things" in constituting the human lies without and not within the body, the philosophical tradition must relinquish the "black box" of intentional consciousness as a self-constituted and autonomous site. In order to avoid the subject/object duality of modernity that was founded on an understanding of action as the result of intentions taking place in the interiority of a subject, Latour will refuse to understand actions in relation to causes and effects (intentions and goals). Rather, it is actions that create actants. What makes our feelings or thoughts our own is simply the imposition of a separation between those thoughts and feelings located *in* the mind and body, and their sources *outside* the mind and body, without which these thoughts and feelings would simply not exist. A gait, a tone of voice, a gesture, and even inner feelings are determined by forces outside of us. Rather than being limited to the anthropomorphic, we are what Latour calls "weaver(s) of morphisms" (Latour 1993, 137). These forces function as what he calls psycho-morphs, or what, in *An Inquiry into Modes of Existence*, he will call psychotropes or psychogenics: "Here is a truly capital category mistake: if there were ever a case of one thing being mistaken for another, it is surely that of the psychogenic networks being mistaken for "a product of the human mind." How can one not be stunned by such a lack of self-understanding?" (Latour 2013c, 187–88). Rather than taking consciousness as the starting and end

point, and asking how subjects constitute objects, it is time to understand that we are *homo fabricatus*, not *homo faber*, for "nothing pertains to a subject that has not been given to it" (2007, 213). And in response to those defenders of the human soul as self-constituted, he writes:

> But what about me, the *ego?* Am I not in the depths of my heart, in the circumvolutions of my brain, in the inner sanctum of my soul, in the vivacity of my spirit, an 'individual'? Of course I am, but only as long as I have been individualized, spiritualized, interiorized. It is true that the circulation of these 'subjectifiers' is often more difficult to track. But if you search for them, you will find them all over the place: floods, rains, swarms of what could be called psycho-*morphs* because they literally lend you the shape of a psyche. (Latour 2007, 212–13)

Because actants are made up exclusively of these "subjectifiers" or "psycho-morphs," ethics, or what Latour calls morality, can no longer be understood as an intrinsic quality of the human being achieved in the inner recesses of a rational mind. Instead, morality is given its own "mode of existence" in his book *An Inquiry into Modes of Existence* (2013c, 443–72) and is described as a particular type of psycho-morph that Latour calls an etho-phore (2013c, 454). No longer understood as the fruit of rational deliberation or animal empathy, such an etho-phore floats in the world like a gas or what Latour calls a "particular emission" (2013c, 456) that simply requires the right instrument to capture it. Just as the Latin language has the same root for 'calculation' and for 'scruple' (2013c, 461) Latour will end up equating moral decision-making with material obligation. Latour borrows this conflation of values and material obligation from sociologist Gabriel Tarde, whom Latour describes as the "retrospective founder of Actor-Network Theory" (Latour and Lépinay 2008, 20). Tarde describes value as "a quality we attribute to things" and thus as quantifiable (cited in Latour and Lépinay 2008, 18). When Latour attempts to create a methodology for quantifying values as intrinsic to things and networks, he will also borrow Tarde's strategy of focusing on differential resistance, or what he calls "gradients of resistance" (cited in Latour and Lépinay 2008, 91).

In an essay entitled "Morality and Technology," Latour places morality in alliance with the law, claiming that because we are obliged to follow the law, the law is a moral obligation that impedes certain actions and begets others. But rather than choosing a human law and developing an analysis of the process leading to the elaboration of such a law, Latour chooses an inanimate object, and proceeds to

explain how this object imposes its moral law on him. Referring to his desk, which was designed to not let him open a drawer unless the other two drawers are closed, Latour claims that this design functions as a "moral law" that he is obliged to obey.

> 20 times a day for 10 years, I am 'obliged' to obey this meddlesome moral law since I am not 'authorized' to leave the three drawers open at the same time. I rail against it but I get on with it, and I have no shame in admitting that every day there is no other moral law that I apply with such inflexible severity. (Latour 2002, 253)

In this way, Latour equates both morality and the law with material obligation, transforming them from an evaluation and generalization of values to a relation of power. Thus not only is moral agency no longer an exclusively human property, but it is no longer a property of actants as such. Rather it becomes the property of networks, the result of interactions between many human and non-human actants.

It is in order to enable interaction between these human and non-human actants that Latour seeks to enlarge democracy to include other objects in what he has called "a democracy of things." Because each "thing" is made up of many other "things," each of which enters into alliances or collectivities to construct our world, Latour describes the goal of the social sciences as that of ascertaining "*how many participants* are gathered in a *thing* to make it exist and to maintain its existence" (2004b, 245). His recent research has been particularly devoted to conceptualizing what he calls GAIA,[1] the Earth as a "political object" or "thing" interpreted as an *agora*, a place where actants gather to express themselves. Because we are constantly interacting with non-human entities such as methane, wind currents, CO_2, diesel motor particles, desertification, etc., each of which plays an essential role in the equilibrium of our planet and its many inhabitants, these entities must be represented by specialists in a democratic assembly in order to ensure that the Anthropocene be associated with creative solutions rather than an apocalyptic end-time. For Latour, the future of our planet may very well depend upon such a shared assembly, where "there would be a Senator for each type of object: a forest senator, a migrating bird senator, a household garbage senator, a diesel particle senator, etc." (Latour 2008, 4).[2] For Latour, the democratic representation of all actants would thus come to mean the integration of all academic disciplines into the political sphere, where we can speak in the name of the objects of our expertise, so that all of the participants gathered on the "thing" that is the earth, can be heard. With agency distributed equally to all actants, whether human or not, and living or not, the moral agency of GAIA can be addressed, since de-

stroying rain forests and glaciers becomes not only an act of destruction, but the destruction of moral actants.

In order to treat technological tools, wind currents, and polar bears as political agents alongside human beings, Latour has chosen to interpret all agency as external material force. Giving agency to all participants of an ecosystem seemed like a promising way to develop an inclusive politics of nature that could perhaps prove itself capable of providing novel solutions to the Anthropocene founded in a shared vision of belonging to the Earth. Rather than extending human culture through the technological manipulation of nature, such a vision of shared agency could develop the many different living cultures that work and think together in symbiotic dependence. Yet however laudatory such an attribution of moral agency to GAIA may be, it is offset by Latour's interpretation of morality as material obligation. Though many non-human actants are indeed moral agents, such a reduction of morality to material obligation means that only forces strong enough to impose themselves on other actants are moral, since morality cannot be separated from the actions of agents that have themselves been reduced to material forces. So if rain forests and glaciers will eventually make their moral claims felt on the Earth as a whole, they have no moral status until they do so (when it will of course be too late), and those parts of the ecosystem that can go extinct and be destroyed without forcing the world to take them seriously by means of a material reaction have no moral value whatsoever. Such a materialistic reduction of agency disregards the desires, intentions and goals that inspire living animals to make political decisions, thereby reducing politics to a play of material power. Such an interpretation of politics ends up defending a vision of might makes right since it does not allow for decisions to be made that do not increment force, such as feeding the impoverished or protecting species from going extinct. Graham Harman has expressed this problem well in his book *Bruno Latour: Reassembling the Political*:

> Latourian actor-network theory has little place for right that fails to acquire might by linking up with allies and arranging other entities in efficacious fashion. By Latour's own admission, he has often been unfair to the losers of history; his philosophical commitment to immanence often verges on a commitment to victory, since he allows little room for a transcendent right that would console the losers on a rainy day. (Harman 2014, 13–14)

The dissolution of the nature/culture divide is very important in undermining Eurocentrism and coming to recognize that human cultures depend upon the agency of non-human entities. But in developing a politics of nature inspired by indig-

enous anthropology, Latour did not interpret the shared agency of modernity in line with indigenous peoples who attribute soul to all entities and thus an interiority capable of thought, volition and transformation. Where indigenous peoples cultivate the empathetic ability to understand the world from the viewpoint of the other participants of an ecosystem, all of whom believe themselves to be human in the sense of exceptional and at the center of the world (Viveiros de Castro 2015) Latour does not allow even the human to be human, instead reducing all actants to material forces vying for power. Instead of defending what Brian Massumi calls "reanimating life" (Massumi 2014, 87) or Jane Bennett calls "the vibrancy of matter" (Bennett 2010, xvii) as the goal of a politics of nature, Latour reduces all of life to the status of non-animate forces.

Furthermore, Latour's attribution of agency to non-living actants makes it difficult to differentiate between those beings that can suffer and die, and those that do not. Should we attribute the same agency to technological tools that we attribute to trees and polar bears? If the nature/culture divide led to the objectification of the material world, is such an objectification overcome or rather reinforced by reducing all actants to material force? If scholars like Isabelle Stengers (2002, 248) and Elisabeth Povinelli have shown that life depends upon non-life, and "life is merely a moment in the greater dynamic unfolding of Nonlife" (Povinelli 2016, 176), how are we to avoid indifference toward the destruction of the living Earth?[3] If we are to treat a rock with the same consideration as an ant-eater, and a technological artifact as equivalent to an indigenous Anuar, it is difficult to avoid a certain moral nihilism. Such nihilism has become most apparent in the growing 'flat ontology' movement, which affirms not only that technological artefacts are autonomous agents, but that they are also morally autonomous. It is to such a danger that we now turn.

3. Technological Agency

Latour's philosophy is one of the most influential of the twentieth century, and has proven essential in the patient deconstructing of the modern paradigm founded in dualistic values that pit mind over matter, human over non-human and culture over nature. The work of Latour and Actor-Network theory has thus had considerable influence in helping the social sciences to recognize the agency of things and the "entangled" ontologies of subjects and objects. We can now read about *How Things Shape the Mind*, *In Defense of Things*, *Vibrant Matter: A Political Ecology of Things*, *Evocative Objects: Things we Think With*, *Cognitive Life of Things*, *The Social Life of Things*, *The Moral Status of Technical Artefacts*, and

The Democracy of Objects, to name only the most catchy titles. This new focus should be celebrated, for it is helping us to reevaluate the embodied material world and to understand not only how science and technology function, but also how humans function.

But certain scholars are taking the gains of Actor-Network theory in a direction that not only contradicts Latour's clear dis-ontological stance regarding entities, but also, by attributing autonomous agency to technological tools, makes it impossible to trace such tools back to human agency. In what follows I will provide a critique of the posthumanist scholarship that heeds Latour's call to move beyond humanism and its anthropocentric bias, but then reduces what it means to be alive to the *res extensa* of a non-living thing. Though Latour cannot be held accountable for the multifarious offspring his theory has begotten, his understanding that "only agency counts" and hence that "nonhuman characters" are not "ontologically different from the human characters" (2013a, 291) does indeed make it all too facile to ignore causal relations that trace technological artifacts back to political social organizations. As we have seen, in order to avoid the subject/object duality of modernity that was founded on an understanding of action as the result of intentions taking place in the interiority of a subject, Latour will refuse to understand actions in relation to causes and effects (intentions and goals), and he will point to the "truly capital category mistake" of taking such "psychotropes" or "psychogenic networks" as the "product of the human mind" (Latour 2013c, 187–88). One of the results of such a refusal will be the fetishization of technological tools and the taking for granted of a historical determinism that aligns Actor-Network Theory with many scientific responses to the Anthropocene, focused as they are on material solutions to material problems because they do not have the methodological tools to question social organization and the unequal power relations at its heart.

In following Latour in fostering an enlarged democracy that would include things, certain scholars have incurred a further risk in seeking to develop an ethics based upon "the morality of things" (Verbeek 2011) in order to undermine the anthropocentric terms of political and ethical inclusion. Developing upon Latour's equivalency between moral agency and material obligation, such scholars will describe the moral agency of tools as autonomous of human agency. As scholar Lucas Introna puts it in his article "Ethics and the Speaking of Things," the reason why this anthropocentric ethic fails "is because it assumes that we can, both in principle and in practice, draw a definitive boundary between the objects (them) and us. Social studies of science and technology have thrown severe doubt on such a possibility" (Introna 2009, 404). If premodern cultures attributed interiority and

soul to all beings, such philosophers of technology instead reduce all conscious beings to *res extensa* with no interiority, to "functioning" things entangled in social and natural events with other things.

One might look at philosopher Peter-Paul Verbeek's attempt to defend transhuman actants and develop a "non-modern space to think about ethics" (Verbeek 2009, 251) outside of ontological foundations, as an example of this trend. In order to overcome the modern divide that placed active human subjects in control of a world of passive objects, Verbeek will seek to objectify the human in order to posit an equivalency between the *res extensa* of human embodiment and that of other material bodies.[4] The problem with such an approach is that such an objectification of the human simply reinforces the modern dichotomy between subject and object that Verbeek seeks to overthrow. If the problem lies in pitting subjects against objects, transferring human beings from being subjects to being objects does nothing to resolve the dilemma. Rather, overcoming metaphysical dualities will require that we understand ourselves and other living beings as subjects precisely *through* our embodiment.

In order to downplay the role of human intentionality in developing technological artifacts, Verbeek uses the passive voice to describe a world where tools *are used*, without anyone working and willing to achieve such an outcome. Returning to his signature example of obstetric ultrasound, he remarks that

> some moral mediations emerge without the explicit intention of any human agent. Obstetric ultrasound, again is a good illustration of this. The technology of ultrasound was not explicitly developed for medical diagnostic purposes, and certainly not to change abortion practices. But as soon as *it got to be used* to make visible the fetus in the womb, it dramatically changed moral practices and decisions regarding pregnancy. . . . The decision whether or not to have an abortion, therefore, is thoroughly mediated by obstetric ultrasound—*without anybody having explicitly wanted this situation to occur*. (Verbeek 2014, 82, italics are my own)

Though it is well known that technological developments for the military are often re-routed to serve other purposes, it is through expensive trial and error, teleological hypotheses, and scientific practices that are explicitly geared toward specific new usages that technological tools come into being to serve new ends. They never just get to be used without anybody having explicitly wanted this situation to occur. Making visible a fetus in the womb is a technological practice developed to respond to medical goals to ensure the health of a fetus. Obstetric

ultrasound allows parents to see the fetus as an individual being, to detect illnesses and thus to make ethical decisions to abort the fetus or raise a diseased child. The technology forces parents to make an ethical decision, but it does not make this decision for them.[5] Instead of understanding these technologies as externalizing and transforming human intentions to achieve certain results, Verbeek speaks of these technologies as "inducing" human intention, and, giving the agency to the tool rather than to what Latour calls the techno-human hybrid, he concludes by anthropomorphizing the tool, claiming that "technologies use human beings here to do their work" (Verbeek, 2014, 83).

Rather than understanding technology as prosthetically enlarging our perception and bodily agency so that we can study and recognize the agency of non-human forms of life, Verbeek's text goes on to celebrate only the flourishing of non-living tools that must be freed from the human agency that brought them into being and that they express. Because our bodies and other non-living things share an equal status as objects, he claims that they should also share an equal status as moral agents, since "moral agency should not be seen as an exclusively human property; it is distributed over human beings and nonhuman entities" (Verbeek 2009, 14). Yet instead of enlarging moral agency to include "nonhuman entities" that think, plan and suffer just as we do, Verbeek never mentions other living beings and writes exclusively about the non-living "things" that are technological tools. A posthuman ethics thus entails attributing autonomous moral agency to the tool itself.

Though Latour attributes morality to anything that enforces its law on anything else, and thus would have no trouble attributing morality to tools, he would of course take issue with the autonomy of the tool as defended by Verbeek. Latour and Verbeek are correct when they point to the ways that human intentions are transformed through technological mediation, for, in Latour's own words, "we have changed the end in changing the means" (Latour 2002, 252), but for Latour such influence points to the *lack* of autonomous agency of humans and tools, not to a supposed ontological separation. If Actor-Network Theory focused on the inanimate material mediations that were ignored by scholars seeking to separate human agency from material causes, scholars who are separating technological tools from the mediating agency of human beings simply reverse the same modern error. Latour himself is careful to avoid both of these extremes. He speaks of technological tools as autonomous actants, but is careful to specify that their actions are "delegated" to them by humans. To avoid reification he also speaks of "technological trajectories" (2012, 219) to emphasize that tools, just like human actants,

never act alone. They are constituted and aided by many external actants, all of which are entangled with human agency. Because differentiating technological tools from human actants leads to a misunderstanding of both, a return to Latour's early term "hybrid" to refer to both human and technological actants could go far in avoiding the reification of technological tools as separate from humans. Calling all technological and human actants "techno-human hybrids" would help to limit fetishization being done in the place of social science as well as luddite reactions that blame technology for human shortsightedness.

Such a tendency to reify technological morality as separate from human agency is magnified in "object-oriented ontology," which follows Latour in seeking to undermine anthropocentric bias by reducing all entities to their material status as objects but then parts paths with Latour in defining all objects as having an autonomous ontological status, and hence as resistant to being reduced to parts (prior causes) or effects (causal dependency). By treating technological tools as having autonomous agency, Object Oriented Ontologists fetishize the tool, leading to the interpretation of a particular human state of affairs as one written into the agency of the tool as autonomous entity.

In order to overcome the anthropocentric bias of the term 'object' which presupposes a 'subject' Object-oriented Ontologist Lévy Bryant calls all things "machines,"[6] whether they are animate or inanimate, made to perform a given function or evolved as part of the natural world. Instead of choosing to use Latour's term 'actants,' or the generic term 'entities,' both of which avoid these presuppositions, he sticks with 'machine,' although, as he himself points out in his book *Onto-Cartography: An Ontology of Machines and Media*,

> the term 'machine' carries its own peril in that it arouses associations to people who conceived and fabricated the machine. It would seem that we still face the danger of anthropocentrism in replacing the concept of objects with machines. (Bryant 2014, 18)[7]

For Bryant, bacteria, cars, human beings, paper-cutters, leaves and cats are all machines. By calling all entities machines, Bryant is seeking to downplay human thought and therefore human responsibility in making and carrying out plans and bringing projects to fruition. As he puts it, in building a house or a dam "the final outcome or product of the negotiation cannot be said to be the result of a pre-existent and well-defined plan" (2014, 19). Since we are machines, and machines as he puts it, merely "function," the role of thought in human projects is thereby denigrated. But if he were to actually enter into dialogue with architects and en-

gineers, they would let him know that thinking is not Platonic contemplation of abstract Forms, but rather an activity, or what anthropologist Tim Ingold calls a "skill" that takes into account the agency of other entities, the specificities of the ground one will build on, the particular incline and consistency of the riverbank, the seasonal force of the water flow that is to be dammed and its connection to the rain, soil degradation and the myriad forms of life living in its depths (cf. Ingold 2011). Indeed, as Latour has pointed out, science and technology are performative only to the extent that they *do* think about and take into account the agencies of other entities, and such skillful thought does indeed allow scientists to plan and carry out projects.

Eliding the difference between living entities with no teleological purpose written into their natures, and inanimate things that we design in order to reach specific outcomes, Bryant concludes that no machines should be defined in terms of their uses, and thus that inanimate things should be understood in identical terms to biological beings, since, as he puts it, "the history of the uses of a rigid machine, like artifacts made by humans, is thus better described in terms of the biological concept of exaptation than design" (Bryant 2014, 24). Animate and inanimate entities are machines, Bryant tells us, but machines are not really machines since they should be understood as biological entities. The idea that biological traits shift usages during evolutionary history and are co-opted to perform new skills was called exaptation in order to avoid any teleological connotations to the change, since it is unknown whether these changes are derived from natural selection or not. Transferring this idea to human artifacts, Bryant claims that machines made by humans should be understood outside of all human intentionality to achieve certain ends, which leads him to defend the contradictory position of treating living entities as machines, and inanimate objects as autonomous forms of life.

The lack of distinction between living and non-living entities that Object Oriented Ontologists share with Latour makes political and ethical considerations obsolete, since it leaves us unable to differentiate between sensate, conscious beings who suffer, intend and resist, and constructed entities devoid of sensation and consciousness who carry out the programs they were designed for (artificial emergence is still far too rudimentary to modify this claim). Under these conditions, it becomes impossible to protect animals and ecologies from torture and destruction, since they are determined only in terms of the changes they effect upon other "machines" and in this sense are no different from paper-cutters, computers and trains. But isn't a technological tool made of human social relations in a way that

a polar bear is not, and isn't such a distinction essential to understanding the nature of the tool and of the bear?

If Bryant will elide all differences between animate and inanimate entities by calling them all "machines," philosopher of information systems Lucas Introna will take the opposite approach, by calling for an ethics that respects the absolute alterity of the machinic other in order to move beyond the "will to power." Introna writes:

> Instead of creating value systems in our own image the absolute otherness of *every* other should be the only moral imperative. We need an ethics of things that is beyond the self-identical-ness of human beings. (Introna 2009, 405)

Though one may commend Introna's attempts at introducing a Levinasian ethics into the study of technology, technological tools are not absolutely other from us, the way anacondas and aphids may be. Thus he critiques moral criteria based upon "an ethics of those with whom we have something in common," and replaces such commonality with an absolute alterity that reifies technological tools as autonomous entities, instead of understanding that it is precisely technological tools that *are* made in our image. We use tools to extend our embodiment, to enter into contact with more of life, to transform and channel this life to serve our needs. Because they are made by us, technological tools evolve far more quickly than living organisms, and are constantly being revised and re-worked by our engineers, technicians, architects and designers not in order to interact with their environment, but to help us interact with ours. Though our tools can take on unexpected functions that were unforeseen by their inventors, tools have meaning to those who create them and use them. To attribute respect and autonomy to our tools as absolutely other, instead of using our tools to develop an ethics based in respect for other living entities who are indeed *not* made in our image, leads to commodity fetishism, not to a posthuman ethics capable of addressing the Anthropocene. Such an attribution of autonomous agency to technological tools reinforces anthropocentrism, rather than undermining it, for it extends and reifies human agency parading as absolute alterity.

It is one thing to agree with postmodern philosophers like Latour and Verbeek that our technologies shape us and that human identity is an anthropo-technological question. We should celebrate the techno-human hybrids that we are, and acknowledge that not only do we question the being of our tools, but we are also put into question by our tools, which modify not only our self-understanding and our

agency, but also our biology, such that biological evolution is being replaced by a technical evolution that is re-organizing our brain, and what it means to think.[8] This is indeed a form of agency, but it is not moral agency. Technology extends human embodiment and agency in the world, taming and defining us in the process, but if we attribute moral blame to the drone for killing innocent civilians, and to chlorofluorocarbons for destroying the ozone, we avoid taking responsibility for the actions we perpetrate through our tools. So if technology is a prosthetic organology[9] that now touches all of life, this does not mean that we celebrate the 'flourishing' of non-living 'tools' that must be freed from the human agency that brought them into being and that they express, but rather that we understand this delegated agency as our own hybrid means of transcendence, thanks to which we are able to understand and communicate with all of life, termites, types of soil, air currents and whales. But it is precisely because we now recognize ourselves in a Monsanto seedling, and a deet-resistant mosquito, that we must enlarge moral rights to include not our tools but all truly other subjects, because we inter-are with all of life through our tools.

4. Reclaiming Politics

Human beings and technological artifacts are not autonomous entities, but rather techno-human hybrids that can be separated only at the cost of fetishization or reification. If living beings have evolved over millions of years to sustain a form as part of an environment, this is not the case for technological tools, which were made by human beings not to integrate an inter-dependent eco-system, but to serve human ends and express human desires. Understanding technological artefacts thus involves understanding human goals and desires. A Macintosh computer is therefore not radically other the way a mongoose or a rainforest is. Rather, technology is bound up with social relations and functions as a political force.

By treating technological tools as having autonomous agency, flat ontologists fetishize the tool, elaborating an ethics to include the absolute alterity of the technological artifact instead of one that might take responsibility for the contingent economic, political and techno-scientific ways that we organize our world through our tools. Such a responsibility entails understanding that tools are owned and used by certain people to meet certain human ends. Some of these people use technologies to destroy the Earth in order to make a profit, exploiting "cheap nature" (Moore 2016) and cheap labor. Actor-Network Theory and flat ontologies ignore the unequal distribution of labor and resources necessary for the implementation of technological tools in a capitalist economic system. Such a fetishization of tech-

nological agency is blind to the role of politics in creating the Anthropocene, and thus to its role in enabling a solution.[10]

Such technological clarifications are necessary in order to propose more fruitful responses to the Anthropocene. Such a newfound responsibility for our planet will require a concerted, inter-disciplinary response, where moral issues can no longer be separated from biological concerns, and politics can no longer be separated from nature. Yet the most widespread response to the Anthropocene, the one that we find in both Actor-Network Theory and geo-engineering, is one that understands technological tools as autonomous of political power relations and economic inequalities. As Alf Hornborg has pointed out, had Latour been less indifferent to political and social justice, "his analyses of technological systems would have revealed not only social networks but exploitative social relations embodied in the artefacts" (Hornborg 2014, 126). Such a separation of technology from human agency hides from view the fact that only some peoples are to blame for the damage to the ecosystem, and only in very particular socio-economic conditions. Scholars such as Andreas Malm (2015), Jason Moore (2016), and Alf Hornborg (2015) have pointed out that it is only when certain technologies are harnessed to capitalist markets that the environment suffers irrevocable damage.

Because both ANT and scientific determinisms seek exclusively material causes, they are constrained to work within the normative political framework that is already in place and already dictated by established power relations. Instead of seeking the causes of material obligation in immaterial political decisions, economic policies and ethical judgments, such scholars seek only material solutions to fix material problems. Such a separation of matter from meaning, of scale from value, is unable to understand the symbolic relations that are at the heart of materiality, and thus ends up defending a form of modern objectivism and determinism that is unable to inspire social change.

By treating technological agency as autonomous, flat ontologists are unable to use causal analysis to trace such tools back to political deliberation. In order to respond to the Anthropocene, both causal analysis and foresight are needed, and both are made redundant by a flat ontology that cannot differentiate between a material obligation and an ethical imperative. By retaining the social obligation but ignoring the causes and repercussions of such obligations, such scholars cannot differentiate between the morality of an oil drill and that of the *zakat* tax, between the obligation to wear a seatbelt, and that of providing refuge for political refugees. Indeed, feeding the hungry or saving endangered species are not moral obligations at all, since neither the hungry nor endangered animals have the force

to make their needs count as obligations on others. Ignoring intentionality and purposive action entirely, such scholars are unable to account for values that might explain why certain moral and political actions become obligations and others not. Without such a distinction, they are constrained to equate ethics with obligation and politics with power. To understand such obligations as contingent rather than deterministic, causal analysis is necessary, and that analysis, which takes place prior to action, is called politics.

Because Latour and flat ontologists identify causal analysis exclusively with modernity's obsession with reducing nonhuman actors to human intentions, they are forced to identify morality with material obligation without considering the causes for such obligations.[11] Yet in accord with complex systems theory, for which "external causes are conceived as unchainers of inner processes" (Bunge 1979, 197), causal analysis is essential to all life forms in order to trace agency back to a form of interiority that is not expressed as inner intention, but rather as the ability to project a continuous form in conformity to an environment (Kohn 2013). Without such an ability to project ourselves into the future based upon causal analyses of the past, we will always arrive too late, once a nuclear plant or oil rig has leaked and contaminated an ecosystem, once there are no more bees to pollinate flowers, once we have run out of fossil fuel and can no longer sustain our economies.

By following Latour in flattening all agency to material obligation, we risk creating what sociologist Frédéric Vandenberghe calls "a machinic society" (2007), by which he means the transformation of life into merchandise. Just as many flat ontologists speak of machines as having moral agency and autonomy, we are told that the economy as well is an autonomous entity, so much so that governments feel obliged to meet its autonomous demands, and are willing to sacrifice the ideals of democracy to do so. This production of capital as the only good has been accepted as so inevitable, and the prohibition against questioning it and its democracy of things so widespread, that we may wonder if rather than the tool being anthropomorphized to serve human ends, as Lucas Introna would have it, it is not the human being that is being reified as a tool in the service of an autonomous economic system that seeks profit at the expense of political and ethical goods. The Anthropocene is the unfortunate 'side-effect' of attributing autonomy to our tools and our economic markets. In other words, the more we ignore the human causes of the material and technological obligations that we set in place and feel obliged to serve, the more the human will mysteriously appear in the material world that has been transformed by such autonomous obligations, in

the shrinking glaciers and the stranded polar bears, in the dying coral reefs, and the decimated clown fish. The repressed does indeed return. In order to take responsibility for our economies and our technologies, we must reject an understanding of ethical action in terms of material obligation; such obligations are not laws of nature but political decisions that we develop together using causal analysis and foresight, and that we are capable of changing.

Notes

1. See, for example, his GAIA Global Circus (Latour 2012) and his 2015 theatre production "Make it Work / Theatre of Negociations" (2015a); as well as his 2013 Gifford Lectures, "Facing Gaia" (2013b); his France Culture podcast, http://www.franceculture.fr/emission-la-suite-dans-les-idees-climat-la-grande-simulation-2015-05-30; and several articles, such as "Waiting for Gaia" (2011), "Agency at the time of the Anthropocene," (Latour 2014), and many conference presentations, such as "Ecologie et démocratie: pour une politique de la nature" (http://www.agorange.net/Conf_bruno-Latour.pdf). Latour published a collection of eight of these conference presentations devoted to climate change (2015b).

2. The theatrical enactment of Latour's theories by his students puts precisely this political assembly into play, where students from across the globe speak in the name of their field of specialization, wind currents, desertification, etc. (cf. Latour 2012; 2015a).

3. Such a position is quite common amongst transhumanists like Nick Bostrom (2005), and those seeking a future on the unliving star Mars. It is also fairly common amongst philosophers of technology like Lucas Introna (2009), who see no difference between stones and dogs, and claim that it is ontologically unfair to discriminate against the stone.

4. In his own words: "they (human beings) do not only appear as 'subjects' but also as 'objects,' not only as the *res cogitans* of their consciousness but also as the *res extensa* of their bodies with which they experience and act in the world" (Verbeek 2009, 14).

5. Of course, once we pass laws, we can enforce these laws by technological means, as is the case with the seat-belt and the speed bump, two examples of Bruno Latour that Verbeek often uses. In these cases, the technologies enforce the human moral agency that went into making the given law, not an autonomous moral agency.

6. As a Deleuze scholar, we may surmise that Levi Bryant is influenced here by Deleuze and Guattari's development of the machinic in *Anti-Oedipus* and *A Thousand Plateaus*. Such an influence is apparent when he defines the machine as follows: "being has never consisted of anything but machines. Nature or being consists of nothing but factories, micro- and macro-machines—often wrapped within one another—draw-

ing on flows of material from other machines and producing flows with new forms as their products in the course of their operations. In short, being is an ensemble or assemblage of machines" (2014, 15). Because this influence is neither developed nor even mentioned in this work, and because Deleuze and Guattari are clearly disontological, the confusion remains. Ian Bogost creates a similar confusion by using the word 'experience' to speak of the ontology of inanimate objects without ever defining the term (Bogost 2012, 9–11).

7. Bryant's choice becomes even more confusing when he tells his readers that he came to his understanding of 'machines' through playing the video game *SimCity*, where he claims that he learned that, "whether or not people begin to die or move away as a result of pollution produced by garbage, coal-burning power plants, and industrial waste is not . . . the result of a signifier, a text, a belief, or narrative alone. It is the result of the real properties of roads, power lines, pollution, and so on" (Bryant 2014, 5). Not only is Bryant learning about 'real' roads and 'real' pollution from pure virtual signifiers (1s and 0s that are configured to take on recognizable symbolic form) exchanged by exclusively human interlocuters, but he is obscuring the fact that even 'real' roads and 'real' pollution function as signifiers for the human beings that we are, in political discourse, ideology, art, and everyday discussion.

8. See, for example, the article by Daniel Levitin published in the *New York Times* on 9 August 2014: http://www.nytimes.com/2014/08/10/opinion/sunday/hit-the-reset-button-in-your-brain.html?_r=2. On the relationship between genetic and cellular transformation in relation to the environment, see the work of Francesco Vitale.

9. I am borrowing this term from Bernard Stiegler, who develops organ extension theories is very fruitful ways in his approach to digital studies. See, for instance, his *What Makes Life Worth Living: On Pharmacology* (2013). The idea of technology as an extension of human embodiment was first developed by Ernst Kapp at the end of the nineteenth century, and subsequently taken up by Father Florensky at the beginning of the twentieth century, before becoming more widespread in the technological theories of Marshall Mcluhan and then Bernard Stiegler.

10. On the political status of technology, see Jason Moore (2016), Daniel Hartley (2016), and Justin McBrian (2016). See also Eric Swyngedouw (2014), François Gemenne (2015) and Andreas Malm (2015).

11. Many sociologists have been quite critical of Latour's rejection of causal explanation. Stephen Shapin, for example, writes: "Latour reckons that we need a respite from causal explanations of science and technology. It makes no difference whether the causal items are, as it is usually put, 'cognitive,' 'natural,' or 'social': all such explanatory enterprises are fundamentally misconceived. Yet it is never made clear what sort of enterprise we are being invited to put in the place of explanation" (1988, 542). Olga Amsterdamska has a similar critique in her review of Latour. See Amsterdamska 1990, 502.

References

Amsterdamska, Olga. 1990. "Surely You're Joking, Monsieur Latour." *Science, Technology, & Human Values* 15(4): 495–504. https://doi.org/10.1177/016224399001500407

Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.

Bogost, Ian. 2012. *Alien Phenomenology, or What It Is Like to be a Thing*. Minneapolis: University of Minnesota Press. https://doi.org/10.5749/minnesota/9780816678976.001.0001

Bostrom, Nick. 2005. "In Defense of Posthuman Dignity." *Bioethics* 19(3): 202–14. https://doi.org/10.1111/j.1467-8519.2005.00437.x

Bryant, Levi R. 2014. *Onto-Cartography: An Ontology of Machines and Media*. Edinburgh: Edinburgh University Press

Bunge, Mario. 1979. *Causality and Modern Science*. Cambridge, MA: Harvard University Press.

Gemenne, François. 2015. "The Anthropocene and Its Victims." In *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*, ed. Clive Hamilton, Christophe Bonneuil, and François Gemenne, 168–74. London: Routledge.

Harman, Graham. 2014. *Bruno Latour: Reassembling the Political*. London: Pluto Press.

Hartley, Daniel. 2016. "Anthropocene, Capitalocene and the Problem of Culture." In *Anthropocene or Capitalocene? Nature, History and the Crisis of Capitalism*, ed. Jason Moore, 154–65. Oakland, CA: PM Press.

Hornborg, Alf. 2014. "Technology as Fetish: Marx, Latour and the Cultural Foundations of Capitalism." *Theory, Culture & Society* 31(4): 119–40. https://doi.org/10.1177/0263276413488960

Hornborg, Alf. 2015. "The Political Ecology of the Technocene: Uncovering Ecologically Unequal Exchange in the World-System." In *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*, ed. Clive Hamilton, Christophe Bonneuil, and François Gemenne, 57–69. London: Routledge.

Ingold, Tim. 2011. *Being Alive: Essays on Movement, Knowledge and Description*. New York: Routledge.

Introna, Lucas. 2009. "Ethics and the Speaking of Things." *Theory, Culture & Society* 26(4): 398–419. https://doi.org/10.1177/0263276409104967

Kohn, Eduardo. 2013. *How Forests Think: Toward an Anthropology beyond the Human*. Berkeley: University of California Press. https://doi.org/10.1525/california/9780520276109.001.0001

Latour, Bruno. 1993. *We Have Never Been Modern*, trans. Catherine Porter. Cambridge, MA: Harvard University Press.

Latour, Bruno. 1999. *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2002. "Morality and Technology: The End of the Means," trans. Couze Venn. *Theory, Culture & Society* 19(5–6): 247–60. https://doi.org/10.1177/026327602761899246

Latour, Bruno. 2004a. *Politics of Nature: How to Bring the Sciences into Democracy*, trans. Catherine Porter. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2004b. "Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern."*Critical Inquiry* 30: 225–48. https://doi.org/10.1086/421123

Latour, Bruno. 2005. "What is Given in Experience?" *Boundary* 32(1): 222–37. https://doi.org/10.1215/01903659-32-1-223

Latour, Bruno. 2007. *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford: Oxford University Press.

Latour, Bruno. 2008. "Ecologie et démocratie: pour une politique de la nature." Agora Conference (18 January). Available at http://www.agorange.net/Conf_bruno-Latour.pdf.

Latour, Bruno. 2011. "Waiting for Gaia." Available at http://www.bruno-latour.fr/sites/default/files/124-GAIA-LONDON-SPEAP_0.pdf.

Latour, Bruno. 2012. "GAIA Global Circus." Available at http://www.brunolatour.fr/sites/default/files/downloads/DOSSIER%20GAIA%20oct%202012_3.pdf.

Latour, Bruno. 2013a. "Biography of an Inquiry: On a Book about Modes of Existence." *Social Studies of Science* 43(2): 287–301. https://doi.org/10.1177/0306312712470751

Latour, Bruno. 2013b. "Facing Gaia." First Gifford Lecture. http://www.bruno-latour.fr/node/487.

Latour, Bruno. 2013c. *An Inquiry into Modes of Existence: An Anthropology of the Moderns*, trans. Catherine Porter. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2014. "Agency at the Time of the Anthropocene." *New Literary History* 45: 1–18. https://doi.org/10.1353/nlh.2014.0003

Latour, Bruno. 2015a. "Make it Work / Theatre of Negotiations." Available at http://www.bruno-latour.fr/sites/default/files/downloads/MIW-summary-GB.pdf.

Latour, Bruno. 2015b. *Face à Gaïa: huit conferences sur le nouveau régime climatique*. Paris: La Découverte.

Latour, Bruno, and Vincent Antonin Lépinay. 2008. *L'économie: Science des interest passionnés*. Paris: La Découverte.

Malm, Andreas. 2015. *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming*. London: Verso Books.

Massumi, Brian. 2014. *What Animals Teach us About Politics*. Durham, NC: Duke University Press.

McBrian, Justin. 2016. "Accumulating Extinction: Planetary Catastrophism in the Necrocene." In *Anthropocene or Capitalocene? Nature, History and the Crisis of Capitalism*, ed. Jason Moore. 116–37. Oakland, CA: PM Press.

Moore, Jason, ed. 2016. *Anthropocene or Capitalocene? Nature, History and the Crisis of Capitalism*. Oakland, CA: PM Press.

Povinelli, Elisabeth. 2016. *Geontologies: A Requiem to Late Liberalism*. Durham, NC: Duke University Press. https://doi.org/10.1215/9780822373810

Shapin, Stephen. 1988. "Following Scientists Around." *Social Studies of Science* 18(3): 533–50. https://doi.org/10.1177/030631288018003007

Stengers, Isabelle. 2002. *Penser avec Whitehead: Un libre et sauvage creation de concepts*. Paris: Seuil.

Stiegler, Bernard. 2013. *What Makes Life Worth Living: On Pharmacology*. Cambridge: Polity Press.

Swyngedouw, Eric. 2014. "Anthropocenic Promises: The End of Nature, Climate Change and the Process of Post-Politicization." Lecture at the ECRI, Sciences Po, Paris, France.

Tomlinson, Gary. Forthcoming. "Toward the Anthropocene: Deep-Historical Models of Continuity and Change." *South Atlantic Quarterly*.

Vandenberghe, Frédéric. 2007. *Complexités du posthumanisme: trois essais dialectiques sur la sociologie de Bruno Latour*. Paris: L'Harmattan.

Verbeek, Peter-Paul. 2009. "Cultivating Humanity: Toward a Non-Humanist Ethics of Technology." In *New Waves in Philosophy of Technology*, ed. Jan-Kyrre Berg Olsen, Evan Selinger, and Søren Riis, 241–65. New York: Palgrave Macmillan. https://doi.org/10.1057/9780230227279_12

Verbeek, Peter-Paul. 2011. *Moralizing Technology: Understanding and Designing the Morality of Things*. Chicago: University of Chicago Press. https://doi.org/10.7208/chicago/9780226852904.001.0001

Verbeek, Peter-Paul. 2014. "Some Misunderstandings about the Moral Significance of Technology." In *The Moral Status of Technical Artefacts*, ed. Peter Kroes and Peter-Paul Verbeek, 75–88. Dordrecht: Springer. https://doi.org/10.1007/978-94-007-7914-3_5

Viveiros de Castro, Eduardo. 2015. *The Relative Native: Essays on Indigenous Conceptual Worlds*. Chicago: University of Chicago Press.

Zalasiewicz, Jan, Mark Williams, Will Steffen, and Paul Crutzen. 2010. "The New World of the Anthropocene." *Environmental Science and Technology Viewpoint* 44(7): 2228–31. https://doi.org/10.1021/es903118j

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 319–341 DOI: 10.5840/techne201711876

On Cosmotechnics: For a Renewed Relation between Technology and Nature in the Anthropocene

Yuk Hui

Abstract: This article aims to bring forward a critical reflection on a renewed relation between nature and technology in the Anthropocene, by contextualizing the question around the recent debates on the "ontological turn" in Anthropology, which attempts to go beyond the nature and culture dualism analysed as the crisis of modernity. The "politics of ontologies" associated with this movement in anthropology opens up the question of participation of non-humans. This article contrasts this anthropological attempt with the work of the philosopher Gilbert Simondon, who wants to overcome the antagonism between culture and technics. According to Simondon, this antagonism results from the technological rupture of modernity at the end of the eighteenth century. This paper analyses the differences of the oppositions presenting their work: culture vs. nature, culture vs. technics, to show that a dialogue between anthropology of nature (illustrated through the work of Philippe Descola) and philosophy of technology (illustrated through the work of Simondon) will be fruitful to conceptualize a renewed relation between nature and technology. One way to initiate such a conversation as well as to think about the reconciliation between nature and technology, this article tries to show, is to develop the concept of cosmotechnics as the denominator of these two trends of thinking.

Key words: ontological turn, Gilbert Simondon, Philippe Descola, cosmotechnics, modernity

Introduction

It is scarcely deniable that the Anthropocene, beyond its obvious signification as a new geological era, also represents a crisis that is the culmination of two-

Yuk Hui, Institut für Kultur und Ästhetik Digitaler Medien, Leuphana University, Scharnhorststraße 1, 21335, Lüneburg, Germany; yuk.hui@leuphana.de.

hundred years of industrialization. The relation between humanity and "nature" has undergone a great transformation, and the constant arrival of ecological crises and technological disasters has well documented such a historical moment, and urges for a new direction of humanity to avoid its proper end. The Anthropocene, announced by geologists such as Paul Crutzen as the successor of the Holocene (Crutzen 2006), carries such a historical meaning. It also serves as a turning point for the imagination of another future or beginning—provided that this is still possible at all. For some political theologians the Anthropocene also represents the apocalyptic moment, in the sense that it will be the *kairos* that ruptures the *chronos*, the deep time of earth proposed by the founder of modern geology James Hutton towards the end of the eighteenth century (Northcott 2015). I put the word "nature" in quotation marks since it will be important to first elucidate its meaning before we can embark on a discussion of a renewed relation between technology and nature. A facile opposition between technology and nature has long been made, fostering the illusion that the only way to salvation will be to give up upon, or else to undermine, technological development. We may also find the opposite position, in the various discourses on transhumanism, the technological singularity, and eco-modernism, for example, which carry a rather naïve and corporate-favored idea that we will be able to improve our living situation, repair environmental destruction with more advanced technology, and intervene within creation (e.g., through DNA manipulation). Within these discourses there is virtually no question of "nature," since nature will be merely one of the possibilities of advanced technologies, and technology is no longer merely prosthetic, meaning as mere artificial replacement or supplement; instead, the order of things seems to have reversed, technology is not only supplementary, but rather it becomes itself the *ground* in contradistinction to the *figure*.

In recent decades, even before the concept of the Anthropocene became popular, anthropologists such as Philippe Descola had been pushing an agenda for overcoming the opposition between culture and nature, as best detailed in his brilliant systematic work *Beyond Nature and Culture* (2013). However, this attempt to overcome the opposition between nature and culture, I will argue, relinquishes the question of technology too quickly and too easily. The proposal to overcome the dualism agrees on the urgency of developing a program for the co-existence between humans and non-humans, but it takes a rather simplistic approach and therefore, to some extent, may fail to recognize the real problem of the Anthropocene as that of a gigantic cybernetic system in the process of realization. Presupposing such, some profound questions are hidden, and the Anthropocene will continue the

logic of development—a "metaphysics without finality," as Jean-François Lyotard puts it (Lyotard and Brügger 1993, 149), until it reaches the point of self-destruction. This article attempts to contribute to a clarification of the relation between technology and nature, and to the inevitable task for the philosophy of technology of reflecting on future planetary technological development. It also aims to resolve the above-mentioned tension through the concept of *cosmotechnics*, thereby hoping to move beyond the limit of the notion of technology (Heidegger 1977)[1] and to understand it from a truly cosmopolitical perspective.

1. From First Nature to Second Nature

In the two extreme attitudes mentioned above—one focusing on the sacredness and purity of nature, the other on its mastery—there is a lack of understanding of the profound question of different forms of participation of both humans and nonhumans. The participation of the non-human is either eclipsed by the question of technological dominance and mastery and hence rendered insignificant; or culture is seen as a mere possibility of nature in the sense that nature is the mother that gives rise to all and to which all will return. I would like to speak instead of a *second nature*,[2] in order to avoid indulging in an illusion of a pure and innocent *first nature*, as well as to avoid imprisoning ourselves in a pure technological rationality.

It is perhaps too obvious to mention that the world is composed of human and non-humans, and that they participate in different ways in different cultures. The question is rather: should we take it seriously, and if so, how? Knowing it and taking it seriously are two different things. The failure of the social constructivism of the twentieth century, as suggested by the sociologist Andrew Pickering (2017), should teach us to take these ontologies seriously, since they are not merely "constructed" but "real." The participation of non-humans varies from one culture to another according to different cosmologies. These cosmologies are not only schemas that define the modes of participation, but also correspond to the moral grounds of such participation. To elucidate this, we only need to remind ourselves of the role of *hau* and *mana* in Marcel Mauss's ethnography of gift economies (Mauss 2013), in which the moral obligation has its source in cosmology. A particular form of participation is only justified in so far as it meets or enlightens the moral—which doesn't necessarily mean harmony, but rather the codes and belief that constitute the dynamics of both individual and communal life. We can talk about the moral only in so far as human beings are being-in-the-world; and the world is only a world and not a mere environment when it is in accordance with

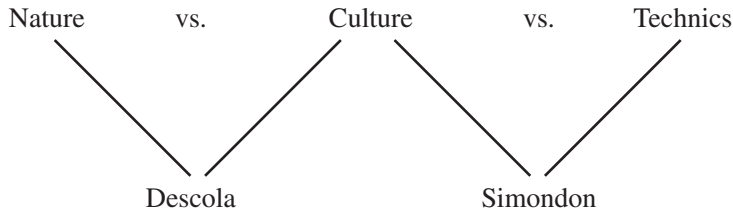
such beliefs. It is in the question of *second nature* that we can locate the question of the moral, since the moral is only revealed through a certain interpretation of nature; or to put it differently, nature is known according to orders and exceptions. In ancient Greece it is known as cosmology: *kosmos* means order; cosmology, the study of order. Nature is no longer independent from humans, but rather its other. Cosmology is not a pure theoretical knowledge; indeed, ancient cosmologies are necessarily *cosmotechnics*. Let me give a preliminary definition of cosmotechnics here: it means the unification of the cosmic order and moral order through technical activities. Human activities, which are always accompanied by technical objects such as tools, are in this sense always cosmotechnical. Modern technology has broken down the traditional relation between cosmos and technics; it becomes a gigantic force, which transforms every being into mere "standing reserve" or "stock" (*Bestand*), as Martin Heidegger observes in his famous 1949/1954 lecture "*The Question Concerning Technology*" (Heidegger 1977).

Without attempting to exhaust the rich materials we find across the history of philosophy, starting with the Greek notion of *physis* and *technē*, we will *firstly* access the notion of nature in light of the recent "ontological turn" in anthropology, a turn associated with figures such as Philippe Descola, Eduardo Viveiros de Castro, and Bruno Latour, among others. This ontological turn is an explicit response to the ecological crisis or ecological mutation according to Latour, proposing to take these different ontologies seriously, and to undermine and adjust the dominant European discourse of naturalism, in order to search for another way of co-existence. *Secondly*, I would like to supplement the anthropological work by suggesting how a co-existence between nature and modern technology can be conceptualized through the work of the French philosopher Gilbert Simondon. We will address the recently published posthumous works of Simondon in this context. We will try to show, in both the work of Simondon and the anthropologists, that the relation between nature and technology has a moral root that has been deracinated by planetary industrialization; and from there, we will attempt to address the possibility of a renewed relation between technology and nature, and thereby shed light on the concept of cosmotechnics.

2. Between Technology and Nature

In the writings of the above-mentioned thinkers, we can find two groups of opposing registers—which at first glance seems rather intriguing, as if there were a gap between them. Descola speaks of the dualism between culture and nature; Simondon speaks of the antagonism between culture and technics. Descola's

culture-nature dualism seems to have assumed that technics falls on the side of culture, while it is clear that for Gilbert Simondon technics is—at least, in the course of his writing—not yet fully integrated into culture. For Simondon there is a misunderstanding and ignorance of technics in culture (Simondon 2012, 10), which is one of the sources of a double alienation: the alienation of human beings in the sense of Marx, and the alienation of technical objects—for example, they are treated as slaves or products of consumption, like the slaves of Roman times waiting indefinitely in the market for the buyers (Simondon 2014, 58–60). In fact we can see a rather intriguing parallel between Descola and Simondon, as schematized in the following diagram:



Do these different configurations—nature vs culture, culture vs technics—result from differences between Descola's and Simondon's respective disciplines, or from their different diagnoses of the problems of their time? It is notable that Descola, the anthropologist of nature, rarely addressed the paleontologist and anthropologist of technology André Leroi-Gourhan, who is an important figure for Simondon's thinking of technology.[3] It is my contention that the anthropology of nature and the philosophy of technology should talk to each other in order to address the question of the Anthropocene. Some readers may doubt if these two schools of thought can be brought together at all: the anthropological school is largely rooted in the work of Lévi-Strauss, who adopts a quasi-Kantian transcendental perspective on myths and cosmology, while Simondon's thought could be characterized as a transcendental empiricism in the sense of Deleuze, which is situated in the immanence of relations, energies, and information. However, this opposition is only apparent, since on the one hand, in Part III of Simondon's *On the Mode of Existence of Technical Objects* (2012), he offered a way to situate technical progress beyond the technical reality (e.g., the internal dynamics of technical objects) towards a cosmic reality; on the other hand, the question of relation (though somewhat schematized) plays a central role in conceiving the mode of operation within different ontologies in Descola's *Beyond Nature and*

Culture (not to mention that Viveiros de Castro's *Cannibal Metaphysics* [2014] is a poststructural anthropological treatise inspired by the Deleuzian concept of intensity). This time we want to switch the context; that is, to facilitate a dialogue between poststructuralist anthropology and philosophy of technology.

2.1. Dualism between Culture and Nature

The culture vs nature opposition comprises one of the four ontologies that Descola calls "naturalism," alongside which he sets three others: "animism," "totemism," and "analogism" (Descola 2013, 122). In naturalism we find the nature/culture divide, which manifests as a divide between the human and the non-human. Such a divide is characterized by the physical continuity and the spiritual discontinuity between humans and non-humans, in which the participation of the non-humans is limited to being objects of the mastery and domination of the human. It would be too easy to attribute all these problems to the Cartesian division between subject and object. However, it is equally difficult to identify the origin of such thinking without recurring to the dominant philosophical scheme of early modern European philosophy. It is important to acknowledge that naturalism has not existed since the beginning of European culture; it is actually a "recent" product, or for Bruno Latour, an "incomplete" product on the sense that "we have never been modern" (Latour 1993). Descola showed that analogism rather than naturalism was significantly present in Europe during the Renaissance, and if this is the case, the "turn" that took place during European modernity seems to have provided a completely different epistemology regarding the relation between human and nonhuman, culture and nature, subject and object, and cosmos and physics; an epistemology that we can retrospectively analyze in the work of Galileo, Kepler, Newton, and others. If naturalism has succeeded in dominating modern thought it is because such a peculiar cosmological imagination is compatible with its technological development: nature should be mastered and it can be mastered according to the laws of nature.

Table 1: The schema of Descola's four ontologies

Similar interiority, Dissimilar physicality	Animism	Totemism	Similar interiority, Similar physicality
Dissimilar interiority, Similar physicality	Naturalism	Analogism	Dissimilar interiority, Dissimilar physicality

The Anthropocene is at once the crisis of naturalism and the crisis of modernity. It is under such a crisis that modernity is again called into question (Latour

2013), this time by anthropologists. The ontological turn in anthropology is a call for a politics of ontologies. What this politics leads to is primarily a pluralism which has been endangered by naturalism's spread throughout the globe by colonization. At the center of such a politics is the recognition of a plurality of ontologies in which natures play different roles in everyday life. Recognition is, however, only the first step; politics arises in the encounter between these ontologies. What kind of politics will it look like? During the conference "*Comment penser l'Anthropocène*," Descola referred to a story that Bolivia had included the rights of non-humans within its constitution (Descola 2015). We can understand this as an institutionalization of ontologies. However, the question that remains to be answered is what will be the fate of these indigenous ontologies and practices when confronting modern technology, which is the realization of naturalism? Or are these "practices" able to transform modern technology so that the latter acquires a new direction of development, a new mode of existence? This is one of the most crucial questions, since it is also about how to escape both colonialism and ethnocentrism. Descola frequently uses the word "practice" instead of technics or technology (Descola 2013). We can understand that he may want to avoid an antagonism between technics and nature; however, by doing so he also hides the question of technology. This is not to reproach Descola for forgetting the question of technics, since he is certainly aware of it when he writes:

> Animist "nature" and "supernature" are thus peopled with social collectives with which humans establish relations that conform with the norms supposed to be shared by all, for when this happens, humans and nonhumans are not content simply to exchange perspectives. They also, and above all, exchange signs, which sometimes leads to an exchange of bodies or, at the very least, indications that, in their interactions, they understand each other. Those signs cannot be interpreted by either side unless they are underwritten by institutions that legitimate them and make them meaningful, thereby ensuring that misunderstandings in the communications between the two species are kept to a minimum. (Descola 2013, 249)

There are codes and institutions; codes are already technical like the 'protocols.' However, therein hides another problem, one that is less strategic than ontological. We will have to recognize that the tension between ontology and technics is not clearly stated in Descola's thinking. In speaking of a tension between ontology and technics I mean that these ontologies are only possible when they are already complicit with the technical life—ranging over invention, production and daily

use. As a result, any transformation of the latter will directly alter the former. The arrival of modern technology in non-European countries in past centuries has created a transformation unthinkable for European observers. The concept of an 'indigenous ontology' itself has to be questioned first, not because it did not exist but because it is situated in a new epoch and transformed to such an extent that there is hardly any way to go back to it and restore it. This is precisely the reason that we have to conceive a cosmotechnical thinking from the standpoint of these ontologies without falling prey to an ethnocentrism.[4] The transformation triggered by modern technology not only happened in non-European cultures in the course of colonization, but also in European culture, with the significant difference that, for the former, it is through the import of such advanced technological apparatus as military technologies, and for the latter mainly through technological invention.

What is central to the anthropologists' concept of "nature" and "ontology" is cosmology, since such "nature" is defined according to different "ecologies of relations," in which we observe different constellations of relations, e.g., the parental relation between females and vegetables, or brotherhood between hunters and animals. These relations can be traced in technical activities such as the invention and use of tools. It is the reason for which we may want to conceive a *cosmotechnics* instead of speaking merely of a cosmology, which may limit us to discussions on theoretical knowledge and attitudes. Globalized modernization, Claude Lévi-Strauss has suggested in his *Tristes Tropiques*, brings forward a new meaning to the study of *anthropology*, namely *entropology*—note that both words pronounced the same in French (Lévi-Strauss 1992, 414)—entropic in the sense of the "disintegration" of forms of life through technological transformation, which silently homogenizes different cosmological relations into one that is compatible with modern technology. This is the problem of modernity as viewed outside of Europe, and it is undeniable that globalization has taken such a pace that what is called indigenous knowledge is marginalized, and the situation will continue to deteriorate. If we want to conceive the future of the philosophy of technology we must give it the task of thinking beyond the Western tradition. And in order to address this task, we must not be satisfied with how useful philosophy is to technological development and how philosophy can give an account of the ethics of a particular technology. Rather, we must conceive a philosophy of technology which tackles the fundamental dualism between nature and technology, humans and non-humans (animals, plants, machines), modern and non-modern, and go beyond them against a globalization dominated by the mere discourse of economy or political economy.

We can identify such an emphasis on the role of cosmology in the work of anthropologists and philosophers such as Viveiros de Castro, Déborah Danowski (cf. Danowski and de Castro 2016), and Tim Ingold (2004), among many others.[5] Here I will limit myself to addressing an interesting proposal from Donna Haraway. In her recent work "*Staying with the Trouble: Making Kin in the Chthulucene"* (2016), we find a similar strategy, which also indirectly addresses the question of technology. Although making no reference to Descola, she addresses the problem of the Anthropocene in a way that resonates with Descola's proposal. If Descola sees politics as the moment of encounter and negotiation of different ontologies, in a more or less Latourian sense, Haraway does not have a schematic presentation of ontologies but rather a more generalized conception of non-human politics. Haraway characterizes the Chthulucene as the next scene after the Anthropocene and the capitalocene. Chthulucene, according to Haraway, is a compound of two Greek roots—*khthôn* and *kainos*—which means to look from below from the perspective of other forms of living beings (Haraway 2016, 2). As a biologist and social scientist, Haraway proposes to think of politics as a way of "making kin," of conceiving a *sympoiesis* between different species. This neologism, "sympoiesis," relates to both symbiosis and autopoiesis. However, it differs from them since, firstly, it doesn't simply mean that which is mutually beneficial (Haraway 2016, 61); and, secondly, it emphasizes the fact that the relation between humans and other beings are highly interdependent, thus problematizing the "auto-":

> Symbiosis makes trouble for autopoiesis, and symbiogenesis is an even bigger troublemaker for self-organizing individual units. The more ubiquitous symbiogenesis seems to be in living beings' dynamic organizing processes, the more looped, braided, outreaching, involuted, and sympoietic is terran worlding. (Haraway 2016, 61)

It is a "bio-politics" par excellence, as Haraway writes that the "biologies, arts, and politics need each other; with involutionary momentum, they entice each other to thinking/making in sympoiesis for more livable worlds that I call the Chthulucene" (Haraway 2016, 98). We can probably summarize Haraway's proposal as a "biology contra technocracy," such that whenever humans develop technologies they will have to assess its impact on other forms of living beings. Haraway's approach is deeply ethical, and has the advantage of providing a generalized ontological politics and ethics for overcoming the Anthropocene. The concept of sympoiesis is an attempt to set limits to technocratic development, and the possibility of sympoiesis becomes the condition for protecting species from destruction. By

doing so, Haraway does not directly address the question of technology; rather, like Descola, she abstracts technology as culture, and therefore avoids a direct confrontation with the question of technology. It is by going to Simondon's work that we make the question of and confrontation with technology explicit.

2.2. Antagonism between Culture and Technics

Gilbert Simondon's work confronts the question of modern technology with rigor. He also notably influenced other thinkers such as Gilles Deleuze and Bernard Stiegler (the latter significantly extends the investigations of Simondon into the realm of contemporary digital technologies and the Anthropocene, cf. Stiegler 2015). It is true that in the work of Simondon, one finds less a reconciliation between nature and technology as one between technics and culture. As we have noted before, in the first pages of his *On the Mode of Existence of Technical Objects* (2012), Simondon had already diagnosed the problem of our society: there is an antagonism of culture against technics which comes from an ignorance and misunderstanding of the latter. It would not be wise to try to expound the technological thinking of Simondon in this short article; it is sufficient to point out that this misunderstanding of technics leads to the painful difficulty of co-existence between human and machines. We can simply understand it in the following ways. On the one hand, machines become opaque to their users, and only specialists understand how to repair their parts (and increasingly not the entire machine). This is one of the sources of alienation in the nineteenth and twentieth-centuries: workers who are used to practicing with simple tools are not able to cope with the new operations or understand the technical reality. On the other hand, machines are treated as merely functional objects, i.e., utilities; they are consumerist products secondary to aesthetic objects, and in extreme cases, slaves, as exhibited in the public conception of robots. This is why, already on the second page of *On the Mode of Existence of Technical Objects*, Simondon writes:

> We precisely would like to show that a robot does not exist, and that it is not a machine, as much as a statue is not a living being, but only a product of imagination, of fictive fabrication, and of the art of illusion. (Simondon 2012, 18)

Simondon is referring here to an operational and ethical relation between human and machine. The question of co-existence or being-with is of ultimate importance in this connection. Haraway and Descola are right to point out the necessity of reconsidering the question of co-existence with nature. However, such co-existence

is only possible when we reflect on the role of technical objects which do not only have their own existence, but also function as *relations* with other existences. The question of co-existence therefore concerns not simply the relations between the human and the non-human. We must also add to it the question of technical objects, or machines. It is our task here to point to a thinking that is present in the work of Gilbert Simondon concerning nature and technology, on the basis of which we can concretize the task of a philosophy of technology in the age of the Anthropocene. We may want to consider such thinking of Simondon an ecological thinking which concerns different modes of reticulation. Or to put it another way: if there is an ecology in Simondon, it understands technology in terms of modes of reticulation and technological progress as the constant transformation of forms of reticulation. This point is evident when we think of the emergence of different communication networks from analogue to digital in the twentieth century, and now with all sorts of social networks. However, not all modes of reticulation lead to a reconciliation between nature and technics; or perhaps we can say that, in Simondon's thought, it is characterized by a *cosmopoeisis*.[6] In order to elaborate on this, we must look into Simondon's speculative history concerning the genesis of technicity.

Before we continue our exposition of Simondon's thought, let us summarize what we have discussed above. I suggest, firstly, to consider the *technical* a priori in the concept of nature, which allows us to abandon a pure and innocent image of nature and gives us a "second nature"; and, secondly, the *cosmic* a priori in technological development, meaning that technics are always already cosmotechnics from the beginning. These are the two sides of the same coin that we call human existence and human progress. If we can reproach Descola, Haraway and others with not paying enough attention to the first, we must also reproach the technocrats for ignoring the latter to the extent that the cosmos becomes simply a standing reserve for exploitation, in the sense that cosmology becomes mere astrophysics. I will demonstrate this second point in terms of what I call a *cosmo-geographic* a priori in Simondon's thinking, which is crucial for the construction of the *techno-geographic milieu*.

3. The Cosmo-Geographic A Priori and Co-Naturality

First of all, we must address the question: what is nature for Simondon? In *L"individuation à la lumière des notions de forme et d"information* (Simondon 2005), nature is considered as the pre-individual, which is like the *apeiron* of Anaximander, an inexhaustible potential (Simondon 2005, 358). The pre-individ-

ual is what allows further individuation to take place. However, it does not mean that nature is a reservoir of energy, but rather that it is what is always anterior to the already individuated being and what gives rise to a second individuation when conditions are met. For Simondon the history of technology can be seen as a constant progress of the modes of reticulation of spiritual forces. The very beginning of the history of technology started with what he calls "the magic phase" (2005, 227–28). The reticulation of the magic phase is characterized by what he calls key points (*points clés*): for example, a giant tree, a huge rock, a tall peak, or a river. These geographical points are the key points, which maintain the reticulation of forces; or more precisely, it is not that these key points are the origin of the forces, but rather these forces are regulated according to the key points. In the magic phase, Simondon proposes, there is a form of unity, where there is no distinction between subject and object; the ground and the figure support each other, meaning that ground gives form and figures limit the ground, as we see in typical examples of Gestalt psychology.

> The magical universe is already structured, but according to a mode anterior to the segregation of object and subject; this primitive world of structuration is the one that distinguishes figure and ground, by indicating the key points in the universe . . . in fact, precedent to the segregation of unities, a reticulation of space and time is instituted, which emphasizes the privileged places and moments, as if all the power of human action and all the capacity of the world in influencing humans is concentrated in this place and moment. (Simondon 2012, 227–28)

The de-phasing or phasing out [*déphasage*] of the magic phase is developed into technics and religion. The vessels of rite—which are technical objects—become the key points of another mode of reticulation (Simondon 2012, 227). This is the departing point from which we can thematize the concept of *cosmotechnics*. This stage marked an aesthetic thinking which was able to create a convergence after the bifurcation of religion and technics, but which was later found to be insufficient. In Part III of Simondon's *On the Mode of Existence of Technical Objects*, there is a complicit and somewhat problematic tension between what Simondon calls aesthetic thinking and philosophical thinking (cf. Duhem 2009). Aesthetic thinking was not able to cope with the constant bifurcation, because aesthetic thinking is still situational, meaning its role will be to serve as "the paradigm for orienting and supporting the effort of philosophical thinking" (Simondon 2012, 276), implying that philosophical thinking will have to intervene to bring about

a higher order of convergence. As in Heidegger, in Simondon we find another presentation concerning the rupture of the relation between technics and nature during European modernity. Simondon accords with Jean-Jacques Rousseau's critique of the encyclopedia of Denis Diderot and Jean le Rond D'Alembert for its detachment of technics from nature—or, in Simondon's words, from "the elements" in the sense of the pre-Socratics (e.g., Thales's water, Heraclitus's fire, and Anaximander's *apeiron*) (Simondon 2016, 380). The detachment of technics from nature continued during European modernity, and as Simondon noticed, towards the end of the eighteenth century, the rupture was amplified to the extent that the ancient technics were repressed, the relation to the natural world was lost, and technical objects became "artificial" objects—artificial in the sense that it has nothing to do with nature (Simondon 2012, 126). This period corresponds to "a dramatic and passionate notion of progress, becoming rape of nature, conquest of the world and caption of energies" (Simondon 2012, 17).

It is this question that leads Simondon to mediate on the question of convergence and the possible reconciliation between nature and technology as a task of philosophical thinking instead of aesthetic thinking. However, it would not be justified to say that Simondon opposes aesthetic thinking and philosophical thinking. Simondon's criticism is that by glorifying the aesthetic value of objects (what he calls "aesthetic objects" (Simondon 2012, 10)), one tends to reduce the role of technical objects as mere utility and therefore ignore the signification of its technical reality; but we will always need aesthetic thinking, and it complements philosophical thinking. Since technics is fundamentally a matter of modes reticulation, there is always the possibility of reconstituting different key points. This is just to say that this philosophical-anthropological imagination of unities, which characterizes the beginning of the genesis of technicity, calls for a search for convergence that reunifies the different professions and different specialities in human history. In this connection Simondon invoked Martin Heidegger in his *Du mode d"existence des objets techniques*:

> In the technicity integrated in the natural world and the human world, these forms of respect and of disrespect manifest the inherence of values exceeding utility; the thinking that recognizes the nature of the technical reality is that which, according to the expression of Heidegger, by going beyond separated objects, utensils, discovers the essence and the capacity of technical organisation, beyond the separated objects and the specialized professions. (Simondon 2012, 303)

It is not clearly stated where the reference to Heidegger is to be found. However, we can probably make an allusion to Heidegger's essay "The Thing" (1971), in which he proposes the four-fold [*das Geviert*], namely, heaven, earth, the mortals and God, to characterize such a convergence in the *Thing*.[7] I reformulate Simondon's genesis of technicity as a *cosmotechnical* thinking, and would go beyond Simondon in adding that this search for convergence should also mediate the modern and the traditional, which in the process of modernisation became strangers to one another—this was the case in Europe, and it has been much more serious in China, Japan and other non-European countries over the past two centuries. This is also the reason why we should study theses reticulations of forces according to their own philosophical and political histories in order to tackle the problem of the Anthropocene. However, it would be an *illusion* to substantialize the ancient cosmologies against technology, and it will be our task to renew a cosmotechnical thinking in order to search for a continuity between the modern and the traditional by appropriating technologies.

Instead of seeing technological development as a rape of nature, Simondon tends to discover a *poeisis* in a certain development of technology, which has both an aesthetic dimension and productive dimension. However, we must point out that in the thinking of Simondon, reticulation is always given as a form of *cosmo-geographic* a priori, and it is the departing point that we can describe as a *techno-geographic milieu* of technical ensembles, such as railway networks and arenas. Commenting on the technical mentality of industrialization, Simondon proposes that:

> It is not a question here of the rape of nature or of the victory of the human Being over the elements, because in fact it is the natural structures themselves that serve as the attachment point for the network that is being developed: the relay points of the Hertzian "cables" for example, re-join with the high sites of ancient sacredness above the valleys and the seas. (Simondon 2009b, 22)

Simondon analyses the technology-nature relation through a detour of an antagonism between culture and technics. Technology is not raping nature, as is often claimed; such perception comes out of a misunderstanding and ignorance of technology. The aim of Simondon's thinking is to propose a program through which culture is able to re-integrate technology by re-connecting nature with technics. In so doing, the antagonism between technology and nature can be resolved. The question that has to be more systematically studied is that of how such a desire

and thinking are applicable to modern technologies? This question deserves much more dedicated analysis. We will only give a glimpse into the sort of possibility Simondon proposed in different contexts. This *cosmo-geographic* a priori of reticulation, when it is followed and adopted in the course of technological development, expresses a *poiesis* of the being-together of the human and nature. The following example that Simondon gave during a filmed interview with journalist Jean Le Moyn best illustrates how the cosmo-geographic could be compatible with the techno-geographic.[8]

> Look at this antenna of television as it is . . . it is rigid but it is oriented; we see that it looks into the distance, and that it can receive [signals] from an emitter far away. For me, it appears to be more than a symbol; it seems to represent a gesture of sorts, an almost magical power of intentionality, a contemporary form of magic. In this encounter between the highest place and the nodal point, which is the point of transmission of hyper-frequencies, there is a sort of "co-naturality" between the human network and the natural geography of the region. It has a poetic dimension, as well as a dimension having to do with signification and the encounter between significations. (Simondon 2009a, 111)

In this quote we can see the unity between the geographical milieu and the technical milieu, in which a cosmopoiesis is presented as a "co-naturality." The question is, firstly, where is this *cosmo-geographic* a priori from? It is not purely universal, since it varies from one culture to another, and conditions different forms of life; it is transcendental yet, since it is not universal, it also carries an empirical dimension and is thus subject to renewal. Secondly, what is the sense of the term "poiesis" as experienced in different cultures? The Greeks' sense of poetic experience is not necessarily the same as that of the Chinese. Simondon was no anthropologist, although he was a great connoisseur of Greek and Roman culture. He proposed a general theory of the genesis of technicity which can be supplemented by current debates in anthropology concerning the role of nature and cosmology. And cosmologies, when realized as cosmotechnics, will allow us to go beyond the limits of the technical system that is in the progress of realization, as well as to see how cosmological thinking can intervene into the imagination of technological development.

4. Beyond Nature and Technology

The question that is posed immediately is as follows: Is aesthetics, then, the solution to the problem we have discussed above? It is this question that takes us to the relation between the *cosmo-geographic* a priori and the construction of the *techno-geographic milieu*, and to the role of cosmotechnical thinking. In order to investigate this, we will have to look into another example that Simondon gave, concerning the connection between the technical and the natural milieus, demonstrated by the Guimbal turbine (Simondon 2012, 66–67). With this example, we also want to push this line of thinking further than Simondon did himself. The turbines antecedent to the Guimbal turbine suffered from the problem of over-heating: the turbine produced so much heat that it destroyed itself. Guimbal's invention consisted of a very important step toward integrating the "natural world" into the operation of the turbine. The "natural world" is here, for example, a river. The turbine is well wrapped and isolated with oil, and placed in the river. The current of the river will drive the turbine to move; at the same time, it also carries away the heat produced by the turbine. Theoretically, the faster the water, the larger the amount of heat produced; since the water is fast, heat will dissipate quickly. In this case, the river becomes part of the operation, though it is not really a component at the interior of the turbine; rather it is what Simondon calls an *associated milieu* (*milieu associé*) (Simondon 2012, 70). An associated milieu is defined by a recurrent causality between output and input, in a way that we can understand as "feedback" in cybernetics.[9] However, Simondon also goes beyond the "feedback" mechanism of cybernetics and considers the formation of the associated milieu within a general technical process of *concretization*. The associated milieu is in this case also a techno-geographic milieu. The machine demands an associated milieu, which is part of a mechanism that allows the machine to resume its normal working status in the face of both external and internal disturbance.

We may want to consider that here the *cosmo-geographic* a priori is neither merely aesthetic, nor being a background, but also operational. It has its *signification*, not simply as an aesthetic object, but also as a scheme interior to the technical object, and not simply the function exterior to the object. However, we may want to problematize this example given by Simondon: in the case of the turbine, and its integration of the natural world as part of its operation, how about those other living beings, for example fishes swimming in the river? This is a question that Simondon (2012) did not touch upon in his *On the Mode of Existence of Technical Objects*, and is also outside the scope of the antagonism Simondon sets up at the

beginning of his work: culture vs. technics. As such it may serve as a negative example in Haraway's (2016) *Staying with the Trouble*. We will propose that it is for this reason that we can supplement Simondon's analysis with current debates in anthropology, in order to conceive a *cosmotechnics* confronting the current global technological exploitation.

The notion of the *cosmo-geographic* a priori is fundamental to variouscosmotechnics, and the organization of such an a priori varies from one culture to another. The different "cosmotechnics" can be further analyzed according to their cultural specificities and understood in terms of different or alternative epistemologies, as well as *episteme* in the sense of Michel Foucault (1970) namely the relations between different scientific domains which define the regime of truth. We mentioned at the beginning of this article that the Anthropocene is often referred as a gigantic cybernetic system or in line of biologists a complex system, demonstrated by the cover of Stewart Brand's *Whole Earth Catalogue* (1968), in which we see the blue earth from the outside, the earth studied as a whole cybernetic system, while we have to recognize that this is situated in a specific epistemology, indicated by the end of the cosmos[10] and the beginning of ecology as proposed by Marshall McLuhan, namely the realization of the cosmos as a gigantic technoscientific object.

> Sputnik created a new environment for the planet. For the first time the natural world was completely enclosed in a man-made container. At the moment that the Earth went inside this new artefact, Nature ended and Ecology was born. 'Ecological' thinking became inevitable as soon as the planet moved up into the status of a work of art. (McLuhan 1974, 49)

At the same time, technological globalization only exports homogeneous technologies embedded within a very narrow and predefined epistemology, and other cultures are forced to adapt to this technology or else replicate it. We can call this process modernization. The modernization process driven by economic and military competition has blinded us of seeing the multiplicity of cosmotechnics; rather it has obliged us to identify all cosmotechnics as part of a universal technological lineage. It is necessary to approach the question of the Anthropocene interior and exterior to the technical system that we are confronting, to improve it from within, and to appropriate it with new epistemes.

The attempt to introduce the concept of cosmotechnics is to explore the limit of the current concept of technology as well as to re-affirm the relation between cosmology, morality and technology which has disappeared in the technological

system called the Anthropocene. I hope that with the notion of cosmotechnics we can re-approach modern technology in two schematic ways. Here I can only provide some preliminary thoughts. Firstly from interiority, we should question the epistemology of the techno-scientific applications in order to critically access it and to develop alternatives. It is clear when we look into established systems of knowledge such as medicine, which have been kept separated in the process of modernization, or one is subordinated to the other; for example, Chinese medicine can only be approved, when it is shown that the ingredients contain the types of chemicals legitimated in Western medicine. However the question of epistemology is not merely within the domain of science, but rather these epistemologies are enforced and universalized by capital, and it consequently leads to a naïve rationalization. Capitalist industrial technologies are efficient because they are mostly homogeneous and purely calculative. They are homogeneous because they bypass heterogeneous epistemologies and practices. These industrial technologies have the tendency to universalize, namely that they can easily go beyond cultural and national borders, a process known as globalization. However, it is necessary to critically access these industrial models and demonstrate alternatives.[11] A concrete example that I would like to provide is a project that I led with the computer scientist Harry Halpin to develop an alternative model to platforms such as Facebook. By tracing the history of social network back to the social psychologist Jacob Moreno and his invention of sociometrics, we show that such a social network is based on an individualist concept, namely social atoms, namely each individual is a social atom and the society is an aggregation of social atoms (Hui and Halpin 2013; cf. Hui 2015). We proposed to develop another model based on groups instead of individuals, collaboration instead of individual activities. Examples are surely not limited to social networks (e.g., in this case, the concept of social relations, individuals, groups, collectives), one should not feel helpless in front of the becoming-totality of modern technology, but should seek the possibility to re-appropriate it, like what Gilles Deleuze famously says "there is no need to fear or hope, but only to look for new weapons" (Deleuze 1992, 5).

Secondly from exteriority, we should conceive the cosmos as an exteriority to the technological system instead of the anthropocentric view of human activities as the center of the university, to bear in mind the limit of such a system, beyond which is the unknown and the mysterious.[12] However this is by no means to mystify the cosmos again, or a proposal to go back to the pre-modern cosmology, but rather to develop new epochal sensibilities which allows us to re-appropriate modern technology, not only to repurpose it (like what we have mentioned above)

but also to invent cosmotechnics of our epoch. I use sensitivity and cosmotechnics in plural in order to emphasize that it is not only one sensibility or one cosmotechnics, but rather a re-opening of the question of technology through the affirmation of non-modern cultures. In order to allow this to take place, *every* culture will have to retrieve and formulate its own history of cosmotechnics and only through such a historical study can new cosmotechnics be revealed to us. The Anthropocene presents the necessity to reconceive the relation between humans and the Earth/cosmos, which is reflected in the discussions among anthropologists, Descola's ontological pluralism, Viveiros de Castro's multinaturalism, as well as Latour's (2015) Gaia theory. However, this new relation cannot avoid the question of technology since nature is no safe harbor and this is the task that I think philosophy of technology needs to open up—that is to say, rediscover multiple cosmotechnics beyond the current discourse of technology, limited as it is to Greek *technē* and modern technology coming out of Western modernity, and to develop a theoretical framework that allows an appropriation of modern technologies as an *Ereignis* in the Anthropocene and an overcoming of the oppositions between culture and nature, and culture and technics.

Notes

1. Since the concept of "technics"—a term that I use here to cover all forms of technical activity—is very much limited, we can probably say, following Martin Heidegger, that there are two concepts of technics: firstly the Greek notion of *technē*, which means *poiesis* or "bringing forth" (*Hervorbringen*); and secondly modern technology, whose essence according to Heidegger is no longer *technē* but *Gestell*, in which being is understood as "standing reserve" or "stock" (*Bestand*). The limit is that there is no place for any non-European concept of technics once this theorization is accepted globally, as is currently the case.

2. I take the concept of second nature from Bernard Stiegler in his dialogue with Elie During in *Philosopher par accident* (Stiegler and During 2004), as well as from Gilbert Simondon, for whom (as for Blaise Pascal) second nature means more about habitude (Simondon 2012, 128). Bruno Latour, in his *Politics of Nature*, proposes to abandon the concept of nature, as he writes: "When the most frenetic of the ecologists cry out, quaking: 'Nature is going to die,' they do not know how right they are. Thank God, nature is going to die. Yes, the great Pan is dead. After the death of God and the death of man, nature, too, had to give up the ghost. It was time: we were about to be unable to engage in politics any more at all" (Latour 2004, 24–25). Contra Latour, I believe that one can only abandon the notion of *first* nature as totally innocent and

pure, but one cannot abandon the concept of Nature, since it is that which reconnects us to the question of the cosmos.

3. It is relevant to note that, in a dialogue with Pierre Charbonnier, Descola spoke of the two schools of anthropology in France during his formative years: there was, on the one hand, the *Formation à la recherche en Anthropologie Sociale et Ethnologie* (FRASE), founded by Lévi-Strauss; and on the other the *Centre de formation à la recherche ethnologique* (CFRE), founded by Leroi-Gourhan. Descola says that "this corresponds to two styles of anthropological thinking which are not totally contradictory, but they have largely stayed apart in the world of universities, because of the personality and of interests of their two founders" (Descola 2014, 31–32).

4. In *The Question Concerning Technology in China: An Essay in Cosmotechnics* (Hui 2016b), I use China as an example in order to explain how traditional knowledge was destroyed or undermined during the process of modernization. However, I also argue that a "going back" is no longer a real option, since it is impossible in view of the current geopolitical and socio-economic situation. I propose to develop a cosmotechnical thinking from Chinese philosophy in order to demonstrate how such a lineage of technological thinking, extracted from Chinese thought, can contribute to reflecting on the problem and future development of global technologies. Déborah Danowski and Eduardo Viveiros de Castro, in their book *The Ends of the World* (2016), criticized Latour's failure to recognize the advantages and resources of the "small populations and the 'relatively weak' technologies of indigenous people" (95), and it seems to me that one may easily fall prey to an ethnocentrism of believing that the solution is *already there* in either western or indigenous thought, and that it has been in some sense since the beginning. The major question for us is in what way indigenous ontologies might enter into dialogue with Western technology and metaphysics and thereby transform the current trend of global technologies.

5. Readers will be able to find a lot of literature on the politics of ontologies that we cannot list here (cf. Kohn 2015; Skafish 2014).

6. In *On the Existence of Digital Objects* (Hui 2016a) I reproached Simondon for limiting his notion of reticulation too much to geographical constraints, and argued that his theory of reticulation therefore cannot provide an appropriate order of magnitude for understanding digital objects. However, as concerns ecological and environmental crises, his emphasis upon the compatibility between the geographical milieu and the technical milieu is still significant.

7. The thing for Heidegger is opposed to object in the sense of Gegenstand—standing against; thing, or in German *Ding*, comes from the verb *dinc*, which means to gather, to assemble; in the object politics, there is a dualism between subject and object, while in the thing politics, it is about belong-together, a thing therefore has the function of gathering the four fold (cf. Hui 2016a, 161–64).

8. The video can be retrieved from Youtube: https://www.youtube.com/watch?v=VLkjI8U5PoQ

9. In Simondon's posthumous collection of articles *Sur la philosophie* (Simondon 2016, 51) we find that he had several translations for the term "feedback," for example "résonance interne," "contre-réaction," "récurrence de causalité," and "causalité circulaire."

10. Historians such as Rémi Brague (2006) and Alexandre Koyré (1957) in their work on Western cosmology have concluded the death of the cosmos in European modernity.

11. We can refer to the proposals and practices of Bernard Stiegler (2016) as well as Geert Lovink (2013).

12. I make reference here to Martin Heidegger concerning the anticipation of the Unknown as the task of poets, as opposed to the self-enclosing technological force (cf. Hui 2017).

References

Brague, Rémi. 2006. *The Wisdom of the World: The Human Experience of the Universe in Western Thought*. Chicago: University of Chicago Press.

Brand, Stewart. 1968. *Whole Earth Catalog* Fall 1968. http://www.wholeearth.com/index.php.

Crutzen, Paul J. 2006. "The "Anthropocene." In *Earth System Science in the Anthropocene*, ed. Eckart Ehlers and Thomas Krafft, 13–18. Berlin: Springer.

Danowski, Déborah, and Eduardo Viveiros de Castro. 2016. *The Ends of the World*. London: Polity.

Deleuze, Gilles. 1992. "Postscript on the Societies of Control." *October* 59: 3–7.

Descola, Philippe. 2013. *Beyond Nature and Culture*, trans. Janet Lloyd. Chicago: University of Chicago Press.

Descola, Philippe. 2014. *La Composition des Mondes - Entretiens avec Pierre Charbonnier*. Paris: Flammarion.

Descola, Philippe. 2015. *"Humain, trop humain."* https://www.youtube.com/watch?v=_EKlazkW-ls.

Duhem, Ludovic. 2009. "La tache aveugle et le point neuter (Sur le double « faux départ » de l"esthétique de Simondon)." In *Cahiers Simondon*, *Numéro 1*, ed. Jean-Hugues Barthélémy, 115–35. Paris: L'Harmattan.

Foucault, Michel. 1970. *The Order of Things*. New York: Pantheon Books

Haraway, Donna. 2016. *Staying with the Trouble: Making Kin in the Chthulucene*. Durham, NC: Duke University Press.

Heidegger, Martin. (1950) 1971. "The Thing." In *Poetry, Language, Thought*, trans. Albert Hofstadter, 163–80. New York: Harper & Row.

Heidegger, Martin. 1977. *The Question Concerning Technology and Other Essays*, trans. William Lovitt. New York: Harper and Row.

Hui, Yuk. 2015. "Modulation after Control." *New Formations* 84–85: 74–91. https://doi.org/10.3898/NewF:84/85.04.2015

Hui, Yuk. 2016a. *On the Existence of Digital Objects*. Minneapolis: University of Minnesota Press.

Hui, Yuk. 2016b. *The Question Concerning Technology in China: An Essay in Cosmotechnics*. Falmouth: Urbanomic.

Hui, Yuk. 2017. "Rhythm and Technics: On Heidegger's Commentary on Rimbaud." *Research in Phenomenology* 47: 60–84.

Hui, Yuk, and Harry Halpin. 2013. "Collective Individuation: The Future of the Social Web." In *Unlike Us Reader*, ed. Geert Lovink, 103–16. Amsterdam: Institute of Network Cultures.

Ingold, Tim. 2004. "A Circumpolar Night's Dream." In *Figured Worlds: Ontological Obstacles in Intercultural Relations*, ed. John Clammer, Sylvie Poirier, and Eric Schwimmer, 25–57. Toronto: University of Toronto Press.

Kohn, Eduardo. 2015. "Anthropology of Ontologies." *Annual Review of Anthropology* 44: 311–27. https://doi.org/10.1146/annurev-anthro-102214-014127

Koyré, Alexandre. 1957. *From the Closed World to the Infinite Universe*. Baltimore: Johns Hopkins University Press.

Latour, Bruno. 1993. *We Have Never Been Modern*, trans. Catherine Porter. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2004. *Politics of Nature: How to Bring the Sciences into Democracy*., trans. Catherine Porter. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2013. *An Inquiry into Modes of Existence: An Anthropology of the Moderns*, trans. Catherine Porter. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2015. *Face à Gaïa: Huit conférences sur le nouveau régime climatique*. Paris: La Découverte.

Lévi-Strauss, Claude. 1992. *Tristes Tropiques*, trans. John Weightman and Doreen Weightman. New York: Penguin Books.

Lovink, Geert, ed. 2013. *Unlike Us Reader*. Amsterdam: Institute of Network Cultures.

Lyotard, Jean-François, and Niels Brügger. 1993. "Examen oral – Entretien avec Jean-François Lyotard." In *Lyotard - Les déplacements philosophiques*, ed. Niels Brügger, Finn Frandsen, and Dominique Pirotte, 137–53. Brussels: De boeck-Wesmael.

Mauss, Marcel. 2013. *Sociologie et Anthropologie*. Paris: PUF.

McLuhan, Marshall. 1974. "At the Noment of Sputnik the Planet Became a Global Theatre in Which There Are No Spectators but Only Actors." *Journal of Communication* 24(1): 48–58. https://doi.org/10.1111/j.1460-2466.1974.tb00354.x

Northcott, Michael. 2015. "Eschatology in the Anthropocene: From the Chronos of Deep Time to the Kairos of the Age of Humans." In *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*, ed. Clive Hamilton, Christophe Bonneuil, and François Gemenne, 100–12. London: Routledge.

Pickering, Andrew. 2017. "The Ontological Turn: Taking Different Worlds Seriously." *Social Analysis* 61(2): 134–50. https://doi.org/10.3167/sa.2017.610209

Simondon, Gilbert. 2005. *L"individuation à la lumière des notions de forme et d"information*. Grenoble: Million.

Simondon, Gilbert. 2009a. "Entretien sur la méchanologie." *Revue de synthèse* 130(1): 103–32.

Simondon, Gilbert. 2009b. "Technical Mentality." *Parrhesia* 7: 17–27.

Simondon, Gilbert. 2012. *Du Mode d"Existence des Objets Techniques*. Paris: Aubier.

Simondon, Gilbert. 2014. *Sur la Technique*. Paris: PUF.

Simondon, Gilbert. 2016. *Sur la Philosophie*. Paris: PUF.

Skafish, Peter. 2014. "Anthropological Metaphysics/Philosophical Resistance." Theorizing the Contemporary, *Cultural Anthropology* website, January 13. https://culanth.org/fieldsights/464-anthropological-metaphysics-philosophical-resistance.

Stiegler, Bernard. 2015. "Sortir de l'anthropocène." *Multitudes* 3(60): 137–46. https://doi.org/10.3917/mult.060.0137

Stiegler, Bernard. 2016. *Dans la Disruption*. Paris: Les liens qui libèrent.

Stiegler, Bernard, and Elie During. 2004. *Philosopher par accident*. Paris: Galilée.

Viveiros de Castro, Eduardo. 2014. *Cannibal Metaphysics*. Minneapolis: Univocal Publishing.

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 342–362 DOI: 10.5840/techne201711977

Techno-Optimism and Rational Superstition

Alexander Wilson

Abstract: This article examines some of the implications of technological optimism. I first contextualize, historically and culturally (Christopher Nolan's *Interstellar* [2014] is considered as a particularly salient example), some contemporary variants of techno-optimism in relation to the equally significant contemporary exemplars of techno-pessimism, skepticism and fatalism. I show that this techno-optimism is often instrumentalized in the sense that the optimistic outlook as such is believed to have some influence on the evolving state of affairs. The cogency of this assumption is scrutinized. I argue that in the absence of explicit probabilities, such optimism presupposes some form of retro-causation, where the future is held to somehow have a retroactive effect on the past. This suggests that the underlying mechanism by which techno-optimism is supposed to be instrumental in bringing about the future is fundamentally *superstitious*. Such superstition, of course, goes against our common understanding of reason and rationality, for adopting rational expectations about the world requires that we avoid the emotional over-determination of our assessments. I show that applied reason is conceptually entangled with this superstitious optimism in the continued successes of technology. The article thus reveals a curious sense in which reason is intrinsically superstitious. I offer an evolutionary explanation for this, showing that the biological origins of reason will by nature tend to produce rational agents which are superstitiously bound to realism and causality, and thus implicitly optimistic about technology's capacity to overcome contingency.

Key words: anthropocene, reason, rationality, accelerationism, transhumanism, posthuman, prometheanism, neo-rationalism, prophetism, retro-causation

1. Introduction

The present article examines some of the implications of technological optimism. It is necessary to first contextualize, historically and culturally, some contempo-

Alexander Wilson, Institute of Communication and Culture, Aarhus University, Langelandsgade 139, Aarhus C, 8000, Denmark; alexanderwilson@cc.au.dk.

rary variants of techno-optimism in relation to the equally significant contemporary exemplars of techno-pessimism, skepticism and fatalism. As we will see, this techno-optimism is often *instrumentalized*, in the sense that the optimistic outlook as such is apparently believed to have some influence on the evolving state of affairs. The cogency of this assumption deserves to be scrutinized. If optimism (or pessimism for that matter) is uncalled for under conditions of uncertainty, then what other grounds might warrant such instrumentalizations of optimism? I will argue that in the absence of explicit probabilities, such optimism necessarily presupposes some form of retro-causation, where the future is held to somehow have a retroactive effect on the past. This suggests, I argue, that the underlying mechanism by which techno-optimism is supposed to be instrumental in bringing about the future is fundamentally *superstitious*. The obvious problem is that such superstition is contradictory to our common understanding of reason and rationality. To adopt rational expectations about the world, after all, do we not attempt to avoid the emotional over-determination of our assessments? Nevertheless, I show that applied reason is impossibly entangled with this superstitious optimism in the continued successes of prediction. The article thus reveals a curious sense in which reason is intrinsically superstitious. I offer an evolutionary explanation for this, showing that the biological origins of reason, understood as the conditionalization of inferences upon facts, will by nature tend to produce rational agents which are superstitiously bound to realism and causality, and thus implicitly optimistic about technology's capacity to overcome contingency. However, I end with speculative remarks on the purview of such techno-optimism in the contemporary "post-fact" paradigm, characteristic of the advanced Anthropocene, suggesting that the conditions for such optimism are wearing thin.

2. Contemporary Techno-Optimism

A marker of the human species' inscription into geological time, the Anthropocene also signals a crisis of the imagination. The theoretical symptoms of the age echo the postmodern zeitgeist according to which humanity has exhausted its 'futurity.' The ubiquity of post-historical and post-temporal narratives today is characteristic of western culture after what Francis Fukuyama called the "end of history" (1992); a defeatist, and pessimistic attitude has infected politics from the inside. As Fredric Jameson (2003), quipped, it has become easier to imagine human extinction than to imagine human life beyond capitalism—an idea reiterated by Slavoj Žižek (2011) and Mark Fisher (2009)—and it is now common for theorists to lament the age's incapacity to imagine the future. Furthermore, the

Anthropocene also corresponds to a withering away of trust in the real: if there are no longer strict distinctions between human and non-human, culture and nature, then we may also be loosing faith in the mind-independent existence of the "great outdoors" (Meillassoux 2006). As our technologies increasingly leave us suspended in the solipsism of our algorithmic filter bubbles, we may have entered a "post-truth" world (Oxford Dictionaries word of the year for 2016), where the fabric of a commonly shared compossibility of facts has worn thin.

Among those who have not completely lost hope, there are techno-skeptical critics of progress who will argue that the only way out of the Anthropocene is to revert to earlier, simpler ways of living. Many are committed to reestablishing a so-called ecological balance between humans and nature that eschews our slide into climate crisis. They will tend to defend the idea that there is such a thing as *implicit knowledge* in whatever is left of our innate animal taboos, folk prohibitions, religious morals and traditional constraints with regard to how we engage with the natural world. They often echo a tradition of philosophical techno-skepticism marked by names such as Martin Heidegger, Hannah Arendt, Ivan Illich, Arne Næss and others, which in more extreme instances suggest that our advanced technologies break our sacred bond with nature, or that by "playing god," as in the Jewish story of the Golem, we hubristically transgress our naturally "given" bounds.

On the other end of the spectrum, there nevertheless remain many techno-optimists, who do not buy such appeals to traditional, pre-technological, ecological, or "folk" knowledge. For the contemporary promethean, the only way out of the Anthropocene is forward. Many celebrators of the apparently unbounded potential of technological innovation argue that this pessimism about the technological future is overblown. The self-styled "rational optimist" Matt Ridley (2010) argues that techno-pessimism is an effect of the human's constant hesitance toward change. He sides with figures like Bjørn Lomborg (2001), who, though they accept that climate change is real, argue that fears about looming catastrophe are exaggerated. They trust that if only we let innovation flourish, new technologies will continually be developed to overcome future threats. Each generation worries of looming catastrophes, Ridley argues, but despite this exaggerated anxiety about change, technologies have steadily improved human well-being, health, and happiness.

> [T]he vast majority of people are much better fed, much better sheltered, much better entertained, much better protected against disease and much

> more likely to live to old age than their ancestors have ever been. (Ridley 2010, 15)
>
> The generation that has experienced more peace, freedom, leisure time, education, medicine, travel, movies, mobile phones and massages than any generation in history is lapping up gloom at every opportunity. (Ridley 2010, 237)

At the extreme of the techno-optimistic spectrum, we find transhumanists and enthusiasts of the "technological singularity," spearheaded by futurists like Ray Kurzweil (2006), who elevate Moore's law to a quasi-religious principle, and celebrate the infinite potential of technological innovation. The transhumanist's heralding of the technological supersession of human corporeality, individuality, and biology, is reminiscent of cult-like behavior, where a group of faithful followers awaits the technological rapture. Increasingly impatient for the singularity to arrive within their lifetime, they champion the acceleration of technological advancement; and if that scenario fails, many have hedged their bets on the future by making arrangements to be cryogenically preserved. It is interesting to note that such *accelerationist* agendas fall squarely in line with neoliberal calls for unfettered, deregulated markets: if only we would stop impeding the law of "accelerating returns," as Kurzweil's (2001) exponentialist account goes, all the problems of the world would be repaired by future technological innovations.

At the same time, we have what is now known as "left accelerationism" (Williams and Srnicek 2014). This is perhaps the only accelerationism that explicitly adopts the moniker, first coined by Benjamin Noys (2012) in reference to philosopher Nick Land's decidedly right-wing futurist stance. However this flavor of accelerationism attempts to reinvigorate futurist thought toward progressive and socialist objectives, by specifically attacking what they view as an uncalled-for resistance to the possibilities of reason and technology among thinkers of the left. In their view, we should abandon the left's "*folk politics*" (Srnicek and Williams 2016, 19–63), and its hesitance toward technological change, which has always failed to see that late capitalism impedes its own deterministic drive to dissolution. They argue that if advanced capitalism did not implement such mechanisms of technological deceleration, which keep people physically enslaved to various outdated forms of labor and meaningless drudgery—which could more efficiently be accomplished by machines—it would have already collapsed under what Marx identified as essential contradictions between capitalist forces and relations of production. Thus, in this view the left has been wrong to resist the advancement of

capitalism; it is a process that must run its course. Lift the fetters that capitalism imposes on itself, prevent it from resisting its own collapse, and finally enter the post-capitalist, post-work age.

The contemporary Promethean claims that humans are not bound to any predetermined way of being or interacting with nature. Now that we have stepped out from under the shadows of our gods, we owe nothing to any higher order. And in any event, to paraphrase Ray Brassier (2010), what do we have to loose? Prometheans will argue that, since hominization consists of an asymmetrical offshoot *out of nature*, humans are intrinsically *out-of-balance* within the cosmos, and thus that there is no point in trying to establish ecological stability. They will often point to the fact that, as Lyotard put it: "While we talk, the sun is getting older. It will explode in 4.5 billion years" (Lyotard 1998, 8). Hence, our best bet to reduce what Nick Bostrom (2002b) calls "existential risk" is to pursue hominization's divergence into the artificial realm, and to ultimately rid humanity of its dependency on nature, to cure our *addiction* to the earthbound biosphere. Notably, this perspective abides by the neo-rationalist doctrine according to which knowledge is *necessarily explicit*: there is no such thing as *implicit knowledge*; traditional beliefs for which reasons cannot be explicitly given are not knowledge: in order to know something, one must be able to give reasons for it. "[W]hat I cannot create, I do not understand," the words posthumously found on Richard Feynman's blackboard, mirror the Promethean's rejection of indistinct "folk" knowledge. While the techno-skeptics call on us to interpret the finitude of our human condition as telling us something about our limitations and suggesting basic forms of ethics, the techno-optimists mistrust such sedimented moral stances as leftovers of our irrational animal background, and the mythological scaffolds of reason that the enlightenment must finally kick away from beneath itself.

3. Promethean Superstition and Retro-Causation

Bernard Stiegler (2014) has highlighted how many Anthropocene films are pessimistic, such as, in his example, Lars von Trier's *Melancholia* (2011). But we find the optimism of the contemporary promethean movement better represented in another Anthropocene film: Christopher Nolan's *Interstellar* (2014). The protagonists in both films are faced with the final horizon of hominization: a world lacking a future. In *Interstellar*, the earth is dying under the retroactive effects of the human's exploitation of nature, and a Gaia who wants revenge. But instead of the mantra 'Enjoy it while it lasts,' a kind of moral for *Melancholia*—which incidentally is now repeated by James Lovelock with regard to the ecological

catastrophe that looms over us (cf. Aitkenhead 2008)—in *Interstellar* an opposing moral is ceaselessly repeated: 'Do not go gentle into that good night . . . ; Rage, rage against the dying of the light.' Dylan Thomas's poem exalts the insatiable self-preservation of life in the face of impending doom. The famous adage mobilizes a Promethean instrumentalization of positive thinking. It declares: the death of the earth will not mean the end of human life; the human will technologically overcome the limits of the ecosystem, its biology, and even the constraints of space-time itself; the human will transcend the organic embodiment of life to become pure cosmic, hyper-dimensional intelligence. The film is thus a testament to contemporary Promethean and transhumanist optimism. We recognize in it the unrelenting optimism of the gambler, who, by harnessing a faith in the deepest recesses of his soul, upon each throw of the dice unwaveringly believes that this time destiny will have aligned with his desire.

Now, beyond its typical Hollywood action-cinema deployment, and its decidedly white male, space-cowboy heroism, the film has the virtue of putting a finger on an aspect of the contemporary Promethean voluntarism that too often eludes us. Specifically, the film makes use of a curious narrative device involving *retroactive causation*, which, I argue, illuminates an equally curious superstitious aspect of contemporary techno-optimism. It is worth going over some key aspects of the film to see how this plays out. The ageing theoretical physicist played by Michael Caine must solve the riddle of quantum gravity in order to save human kind. But as we eventually learn, he had known all along that it would be impossible to solve this problem without superseding space-time itself, that is, without transcending the constraints of three-dimensional space and the asymmetry of lived time, which, it is suggested, is only possible within the singularity of a black hole. Importantly, he says nothing of this to our protagonists, instead convincing them to accept a dangerous mission to travel to a distant galaxy through a *wormhole*—a fold in space-time that produces a passageway between two distant points in the cosmos—with the goal of finding a new planet where humanity could relocate and start anew. This wormhole, we learn, had spontaneously appeared in a conveniently reachable location in space, only a few years prior to the film's events. It is suggested that the extremely opportune manifestation of this portal to a new Earth was probably the work of some highly sophisticated and benevolent alien civilization. Only much later do we learn that this was not the case. After a series of trials that make up the bulk of the film's drama—consisting of gestures of self-preservation as well as acts of altruism—now the central protagonist finds himself inside the black hole that occupies the center of the foreign galaxy. Only now do

we unravel the mystery: the chains of serendipitous coincidences and fortuitous contingencies that had led us to this Promethean transcendence of human limitations, were not, we now learn, the great work of an alien intelligence, sophisticated and benevolent. Rather, it was *we* all along. It was human kind itself, or perhaps more accurately a *posthuman* life or intelligence from the future, that had somehow been retroactively calling us forth, leading us toward its (our) own self-fulfillment. The entire plot reveals itself as an unraveling of the posthuman's self-creation; it had been bootstrapping its past toward its own satisfaction, all along. Crucially, the mechanism of this retroactive self-fulfillment of the future human is a *blind faith*, that is, an instrumentalized optimistic confidence in the future and the promise of technology. I call it instrumental because it hinges on a *deliberate overlooking of the facts*: it is by stubbornly overlooking the fact that the equation was impossible to solve that it will eventually have become solvable. Eventually, floating in the singularity and having thus freed himself of the constraints of space and time, our main protagonist can communicate the secrets of quantum gravity back to the past, thereby saving humanity from its fate. With this strange loop in time, the future will have chosen its past.

It is important to underscore the mechanism by which this takes place. It is the very commitment to positive thinking *despite the odds*, that turns out to be the vehicle of our salvation. Humanity is saved, not by assessing the facts and adjusting our expectations and inferences accordingly, but rather by deliberately overlooking the facts; not by coming to terms with the actual state of affairs, but by committing to an unfounded trust in the *necessary* positive outcome of our trials. Humanity's *rage against the dying of the light* is continually insinuated like a mantra, along with such motivational notions as "hope" and "love," whereas the true state of affairs, like a taboo, is superstitiously silenced. It is the attitude of wishful thinking, as such, blinded from the reality of the impossibility of the task, that in the end *transforms the impossibility into an inevitability*. Another salient example of this in the film is when our hero attempts to dock with the damaged spaceship while spinning wildly through space; his AI robot assistant computes that this will be "impossible," while the protagonist responds, "No, it is necessary." This is key: it is only by deliberately and instrumentally overlooking the probabilities that the task is in the end successful. Contemporary techno-optimism, I would like to suggest, exhibits the same instrumentalization of positive thinking: it complies with an unacknowledged belief in a retro-causal correlation between attitudes and time; a belief that the "can-do" attitude, not the accurate assessment of the state

of affairs, will in the end be vindicated. It is this superstitious, almost taboo-like rejection of reality that allows the techno-optimist's overcoming of fate.

This of course goes against the notion of *reason*, which the techno-optimists—like "rational optimists" and neo-rationalist accelerationists—claim to abide by. Reason can be defined as the attempt to adjust our expectations as faithfully as possible to the state of the world as it stands, that is, the world *beyond* our desires for it to be—and inclinations to make it into—something it is not. Is reason not supposed to evaluate the world in a way as unbiased and objective as possible? It follows that reason should avoid emotional over-determinations of the state of affairs. It is fine to be optimistic when probabilities are explicitly known to be in our favor. But when they are not known, and cannot possibly be, as in the case of our evaluation of the techno-scientific future, does reason not call on us to remain neutral? We cannot know what the future holds. We can make predictions, but of course, as Niels Bohr is often said to have repeated, prediction is very difficult, especially about the future. Consider the Collingridge Dilemma, a double bind where, in order to control technological development adequately or fruitfully and to avoid dangerous mishaps, society would need to know in advance what the technology in question will cause to happen (Collingridge 1981). By the time technological effects are felt, society has all too often relinquished control, for once technologies are widely implemented and entrenched, it is exceedingly more costly to make fundamental changes to them than before. Yet there is no way to know what will happen until they are introduced; we can make predictions, but are bound to overlook important factors. Knowledge always arrives too late. We have control only before we have knowledge, and we have knowledge only after we have lost control. So, if the techno-optimists are so rational, how exactly is their optimism warranted? How is one's optimistic stance supposed to be involved in conditioning the outcome of our trials? What warrants one's belief that wishful thinking retroactively affects what will have been the case?

4. Reason and the Metaphysics of Retro-Causation

The retro-causation featured in *Interstellar*, I believe, evokes some responses to these questions. The only way in which such a deliberate overlooking of the facts could have any effect on the turn of events is through a kind of retro-causality that ensures that the right *attitudes* toward the future are eventually compensated. For positive-thinking *on its own* to be instrumental in bringing about a future, there would need to be some kind of transcendental mechanism, outside of linear time, that ensures a "quasi-causal"—to use the Deleuzian term (cf. Deleuze 1990, 8,

33, 94–95, 108; Deleuze and Guattari 1983, 11, 141, 154, 194)—correspondence between dispositions to the future and what in the end happens to have taken place. There is an element of such a superstition in contemporary techno-optimism. In the absence of explicit probabilities, neither optimism nor pessimism seem warranted. So grand calls to be optimistic about technological progress must implicitly commit to the belief that, somehow, the future retroactively compensates the optimistic stance. If only the past in which we were optimistic about the future will in the end be vindicated, bootstrapped into existence, then we are bound to a superstitious respect of the future's powers of retro selection, in a way not unlike religious subservience toward gods.

This scenario actually echoes one of the legends of transhumanist subculture: the bizarre argument of *Roko's Basilisk* (Love 2014). An updated version of Blaise Pascal's Wager, which famously argued that one was better off believing in God *just in case* he did exist, Roko's Basilisk similarly argues that one is better off pursuing the advancement of artificial intelligence just in case the future AI decides to retroactively punish those who did not help it come into existence. We are thus all blackmailed by the evil future super-intelligence, for even our attempts to discredit the argument actually increase incentive for the AI to punish us. Better not take the chance, it is thought; better submit to technological transcendence by whole-heartedly embracing technological determinism. A related concept echoed by *Interstellar*, which has been influential in the neo-rationalist camp, is that of *hyperstition*, according to which forms of suggestion and insinuation can condition the course of history. Among the lasting ideas hatched from the Cultural Cybernetics Research Unit at the University of Warwick in the 1990s (cf. CCRU 2017), which greatly influenced the accelerationist and speculative realist movements, hyperstitions are intrumentalized or even *weaponized fictions* that, through memetic propagations that "go viral," thereby bootstrap themselves into reality, becoming fact. Thus the hypothetical conceptual bridge that allows for hyperstition to work is a *blurring of the distinction between fact and fiction*.

Certain commitments to retroactive forms of causation characterize the techno-skeptical stance as well. A prominent critic of Prometheanism, Jean-Pierre Dupuy defends what he calls "prophetism," being careful to note that the concept must be secularized (Dupuy 2014, 39, 57). It too is a quasi- or retro-causation that may be manipulated, coaxed, or conditioned, by adopting the appropriate attitudes and dispositions toward the future. His related notion of "self-transcendence" hinges on the familiar idea of the *self-fulfilling prophecy*. As he puts it:

> If the future causally depends on the way in which it is anticipated, and this anticipation is made public using a certain kind of language and a certain mode of description, any attempt to shape the future must take this element of anticipation into account. . . . The way the future is described and understood is part of what determines the future. (Dupuy 2014, 40–41)

As in the domain of economics, where speculations influence the value of the commodities and equities being speculated upon, Dupuy claims that, in all human affairs, attitudes and rhetoric constantly condition history in the *future perfect tense*. What will in the last instance have been the case is always the result of feedback loops between priors and prophecies. The prediction influences the result. It follows that we should be careful about what we say, for the wrong words or actions could quite literally *curse* the outcome of our trials. Peter Sloterdijk supports Dupuy's secular prophetism, arguing that we must do better than simply "learn from our mistakes," but eventually develop a "prognostic intelligence" in order to critically apply a "prophetic reason" (Sloterdijk 2015, 337). According to this doctrine, there is a means to rationally deploy the prophetic act, but this seems to necessarily demand a cautious, pessimistic, even apocalyptic stance: "only experienced apocalyptics can perform reasonable future policy-making because only they are courageous enough to consider the worst as a real possibility" (Sloterdijk 2015, 337).

But it is undoubtedly Gottfried Wilhelm Leibniz's superstitious optimism that best demonstrates the retro-causal principle at work in such metaphysical commitments. The world, in his view, exists nowhere but in the reciprocal meetings of different *simple substances*, which correspond to events of experience. The *compossibility* of the facts of the world results from the reciprocal inclusion of every point of view upon the world. A world's possibilities are therefore constrained by the compatibility of the contingent truths that occupy it. Nothing can happen that is not compossible with what has already happened, and retroactively, nothing that has happened in the past can have been incompossible with what is currently before us. Thus, as Deleuze stresses, there is in the Leibnizian principle of inclusion and compossibility a strange reversal of priority between necessity and contingency. Leibniz seems to have been unwilling to emphasize this, preferring to obstinately ground the contingent in the necessary (Deleuze 1990, 172). Nevertheless, the logic of compossibility (and incompossibility) implies that whatever expresses itself is bound by a web of mutual constraints between facts. This suggests that the particular arrangement of observed contingent facts that constitutes our world ret-

roactively influences the necessities that led to them, implying a strange reversal of causal priority: it is as though the contingent "effects" somehow *quasi-causally* bootstrapped their necessary "causes" to have been the case.

This same reversal of causal priority is still continually encountered in the various observation bias effects that intrude in our consideration of grand cosmological questions. The misleadingly named "anthropic principle" was coined by Brandon Carter (1974) as a limit to the Copernican principle: humans are not at the center of the universe, and the universe does not "care" about us; and nevertheless, the simple *fact* that we are here, observing and considering *this* given world, constrains what we might expect the universe's necessary conditions to be (cf. Bostrom 2002a). As if the past were being written retroactively in each contingent experience, ensuring that it have taken place, the laws of nature seem 'finely tuned' for human reason to be considering this given universe. If the values of the constants had been slightly different we would not be here observing the universe in the first place. This is because all the facts composing the universe must be *compossible* with each other, as Leibniz recognized, and so the conditions of our observation must be compatible with the facts observed.

Note that, in the philosophical literature on observation bias and fine-tuning, the polemic does not center on the question of whether this finely tuned predicament is probable or improbable. All will agree that the fact that we observe this world is *extremely improbable*, because it is but one option among potentially infinite possible worlds. It is therefore just as improbable to observe this world as it would be to observe any other possible world. The point of contention, rather, is whether one should be *surprised or unsurprised* that this improbable world happens to be the case. On one side we find those who argue that we should not be the least bit surprised to find ourselves in this improbable world. They will tend to deflate emotions associated with the realization of this improbability: no matter how improbable, they can always say, "it had to turn out some way." Stephen Jay Gould puts it thusly:

> [S]omething has to happen, even if any particular "something" must stun us by its improbability. We could look at any outcome and say, "Ain't it amazing. If the laws of nature had been set up just a tad differently, we wouldn't have this kind of universe at all. (Gould 1987, 395)

On the other side, there are those who reject such arguments as laughable and insist that the improbability of this world and the existence of conscious life is indeed very *astonishing*. If the correct way to think about this is to imagine that our

current experiential frame—ourselves as observers of this contingent world—is but one possible option drawn from a finite collection of optional observational frames, then according to arguments like the Doomsday argument, human existence gets more astonishing by the minute. Peter van Inwagen offers the following thought experiment:

> Suppose you are in a situation in which you must draw a straw from a bundle of 1,048,576 straws of different lengths, and suppose it has been decreed that if you don't draw the shortest straw in the bundle you will be instantly and painlessly killed: you will be killed so fast you won't have time to realize you didn't draw the shortest straw. Reluctantly—but you have no alternative—you draw a straw and are astonished to find yourself alive and holding the shortest straw. What should you conclude? In the absence of further information, only one conclusion is reasonable. Contrary to appearances, you did not draw the straw at random; the whole situation in which you find yourself is some kind of "set-up"; the bundle was somehow rigged to ensure that you would draw the shortest straw. (van Inwagen 2009, 190)

Notice that the reason you should be surprised, is not because you find yourself holding the shorter straw, but because you also experienced the moment before you had drawn it. The experience of the moment before drawing the straw, and the experience of having already drawn it, are not surprising on their own. It is their compossibility, there connectedness, that makes the situation so surprising. And as van Inwagen notes, in such situations we are compelled to ask for an explanation. Many who are surprised about the improbability of our being here will tend to correct their initial sense of awe with the introduction of explanations such as intelligent designers, gods, or sophisticated and benevolent alien civilizations (as suggested in the early scenes of *Interstallar*), or by simply positing that *the game was rigged in their favor*.

The goal of these strategies of explanation is, in effect, to artificially increase the probability of these circumstances. The claim that the game is rigged in our favor implies that there are hidden, implicit reasons that made this outcome highly probable. And this is precisely what occurs in Leibniz's (1989, 2007) theory of possible worlds: his insistence on the necessity of our world being the best possible transforms an improbable situation into a necessary one. It *had to be this way*, he says, because God chose the best possible world. We can trust that the best possible outcome will always turn out to be the case. And presumably, we should therefore not be astounded by the continued successes of human science and technology. In his jurisprudential defense of the Christian God against the

Epicurean challenge, Leibniz seems superstitiously committed to wishful thinking in order to condition the best of possible worlds to effectively have been the case, thereby vindicating the teachings of theology. It is tempting to speculate that the very notion of God originates in such a demand to explain the apparent improbability of creation. The logic of compossibility provides the mechanism of this bootstrapping of the factual by optimism. For does compossibility's strange reversal of priority between contingent and necessary not imply that the *attitude* we adopt before the unknown somehow participates, *quasi-causally*, in what *will have been*? It is difficult not to see the similarity between this reasoning and that of the techno-optimist.

The cogency of such optimisms depends on compossibility. If compossibility did not constrain the events of a world together, there would be no causality, no reason, and thus no possibility of techno-scientific purchase on reality. The question of whether we should be surprised or unsurprised about the continued apparent stability of causality, like that of the fine tuning of the cosmos, is conditional on how we interpret the fact of our being here. Is the experience of being here independent from all other events? Or is it causally linked to all prior events? If each event is *causally independent*—if each experience is drawn from a hat, as it were—then no experience is particularly surprising. Indeed, if one has anything to talk about, some experience *had to be had*. The surprisingness of experience, on the other hand, depends on the reciprocal presupposition of experiences, events, and facts. Surprise is only warranted if one finds that each prior circumstance had to turn out just right for this improbable experience to have been the case, in a long winning streak of connected, contingent gambles. We know, for example, that life in the universe is extremely rare; intelligent life, exponentially rarer; the more human techno-science advances, also the rarer in the cosmos it inevitably becomes. Though the vastness of the cosmos almost guarantees that there is life and even intelligent life elsewhere in the universe, these nevertheless are among the rarest forms matter will ever take up. In other words, though it is highly probable that there is other intelligent life in the cosmos, if one were to pick a point in spacetime at random, the chances of falling upon intelligent life, or even unintelligent life, would be extremely low.[1] And yet we somehow keep drawing the shortest straw. It is the radical improbability of this situation that begs every question, that in each case demands an explanation. And the explanation is always: *it had to be thus, the game must be rigged in our favor*. Is techno-optimism not implicitly founded in such reasoning?

5. Is Reason Intrinsically Superstitious?

Even more curiously perhaps, these considerations lead us right to structure of reason itself. If reason is the conditionalization of inferences upon relevant states of affairs, it loosely conforms to *Bayes's theorem*. It is the idea that the rational agent continually updates its horizon of expectation based on incoming information about the state of affairs. This implies an often unacknowledged assumption: the notion that facts condition what we may *expect to observe*. In other words, the successful application of reason depends on an "anthropic" feedback loop between observer and world, very much in the spirit of the Leibnizian metaphysics of compossibility: reason demands that our experience of *this contingent world* somehow conditions what we may rationally expect the necessities of the world to be.

But of course, David Hume (1921) saw that we have no justification for assuming this: reason depends on the regularity of causality, and this assumption rests on a leap of faith. We have no grounds for thinking that there is any link between what we have observed in the past and what we might expect to observe in the future. And by extension, nothing seems to justify our assumption that our observations or assessments of the world have any bearing on how we should infer anything outside of those observations. The supposition that consecutive events are causally related seems to hold to nothing but habit. If the Humean conjecture of radical contingency is taken seriously, as is called for by Quentin Meillassoux (2006), Immanuel Kant's (1996) subsequent transcendental "rigging" of causality appears to rest on little more than *wishful thinking*. Kant's argument mirrors the explanation of the "surprised" contemplator of cosmological fine-tuning: it had to be thus, he reckons, because, as a necessary condition of temporal experience, if causality didn't exist we couldn't have any experiences at all. His explanation again artificially transforms an improbability into an inevitability. It claims that the game is rigged to ensure that things turn out this way.

Rigorously speaking, therefore, the cogency of any optimism about prediction or inference depends on an implicit demand that the system be rigged in our favor. We have no ground for assuming that former observations have any bearing whatsoever on future observations. In other words, to be optimistic wherever we have no explicit grounds for being so, is necessarily to assume that we have *implicit* grounds for being so. The difference here has to do with the distinction economists draw between risk and uncertainty: risk describes situations where the distribution of probabilities is known, whereas uncertainty refers to situations where they

are not. Wherever we adopt a seemingly uncalled-for optimistic stance in such a context of uncertainty—for example, by positing Gods or transcendental laws that ensure the continued success of knowledge and predictability—we are tacitly engaging in a form of superstition. Reason rests on the belief that the world's relative predictability and the successes of knowledge are more than a fluke. And so each application of reason implicitly abides by the superstitious belief that causality will continue to work, as long as we don't jinx it. Kant's transcendental rigging of causation is, in this light, just as optimistic as Leibniz's theory of possible worlds. And most profoundly, it would seem that reason itself, defined as the conditionalization of inferences upon facts, presupposes an irreducible superstitious optimism. Bayesian inference, like Leibniz's confidence in God's plan, or Kant's trust in causality, or again the physicist's faith in the immutability of the laws of nature, implies a superstitious optimism that the world is rigged in our favor. The same superstition lurks in the techno-optimist's confidence that the challenges of the Anthropocene will all be eventually thwarted by technological providence.

Furthermore, to respond rationally to a given situation, one must assess the relevant prior conditionals. But it turns out that in all but the most trivial cases, distinguishing just what is relevant from what is irrelevant is not as straightforward as it seems. This is essentially what is known as the "*frame problem*": discriminating between a task's relevant and irrelevant conditions is an intractable problem, unsolvable in real-time, because in order to do so one potentially has to consider an infinite cascade of nested contextual frames (Shanahan 2016). The application of a hypothetically "pure" reason would thus require an absolute cognition of the objective state of affairs. But a single perspectival frame of reference can never have exhausted the question of just what is relevant to the task at hand. In real-world cases, it is furthermore unclear whether the conditions are mutually exclusive or collectively exhaustive: to assume this is, once again, optimistic. To be perfectly honest with ourselves about our situation, we would need to go on considering more and more nuances ad infinitum. "Pure" reason will therefore never be applied in any pragmatic situation, because its implied process of assessing conditionals will never come to a halt. "Pure" reason is undecidable. It is an infinite regress into intractable complexity, infinite subtlety and variation. Thus, whenever reason is actually *applied* in real-world situations, it is never pure, never free of cut corners, coarse grainings, and glossings over of the details. Applied reason is constrained by real time. Before it is too late, one must place one's bet on the table, and *wager* that one has found the best possible solution. In order to do so, reason always takes shortcuts through heuristics, rules of thumb, hunches

or other *implicit forms of knowledge*, starting with the most general hunch of all, that the conjunction of events tells us something about what to expect in the future.

This point was considered by Blaise Pascal in the defense of his famous wager. "God is or he is not," he insists, and "[re]ason cannot in any way determine it" (Pascal 2014, 81). Pascal thus acknowledged that, strictly speaking, "[b]y reason you can [choose] neither one nor the other, by reason you can defend neither of the two [positions]" (81). In developing his argument, Pascal engages with an imaginary interlocutor who defends the aporetic "pure" reason, described above. "Do not blame of falsity those who have made a choice, for you know nothing about it!" The interlocutor responds: "[I] will not blame them for having made this [or that] choice, but [for having made] a choice [at all]. For again he who chooses [either option] is in equal fault. . . . The just is to not wager [at all]" (81). In other words, the strict rationalist recognizes the impasse presented by the undecideable dilemma: we simply do not know whether God exists, so the only rational position is one of agnosticism, that is, to abstain from wagering one way or another.

Pascal, of course, argues against this "pure" or strict rational stance, which *Pyrrhonistically* avoids taking sides. Instead, he defends a pragmatic approach: "Yes, but one *must* wager. It is not voluntary, you are engaged. . . . Your reason is not harmed, because it is necessary to choose" (Pascal 2014, 81). But of course, his argument goes, you have much to gain in wagering to believe in God; for if he does exist, your belief will be compensated with everlasting life. Much like Roko's Basilisk, which impels one to commit to the development of AI, it is as though the God—defined as he who grants heaven to those who believe in him—blackmails those faced with the option of believing or disbelieving.

It is clear, though, that it is this particular way of defining God that constrains which wager is justified. One can imagine, for example, a world in which those who don't believe in God are rewarded with everlasting life. In such a case, by the same logic, one might be better off wagering inversely to Pascal. The problem is slightly different however, when we are faced with skepticism about reality, causality, or indeed with the purchase of technology and scientific prediction. For in these cases, it is difficult to see how one could construct a consistent counterfactual argument: if causality does not exist, if there are no laws governing reality, and if technoscience's apparent successes have been nothing more than a fluke, then it seems that no wager can be warranted. Indeed, it would be a performative contradiction to wager against the existence of the very conditions that warrant one's wager. To wager that causality does not exist—in other words that there is

no causal link between what is observed and what may turn out to be the case—is in effect to bet against one's own justification for wagering in this way.

Thus, again, it seems that there is a minimal sense in which we are impelled to wager that techno-optimism be the correct stance, for by comparison, techno-pessimism, ultimately founded in skepticism about causality or our means to assess it, falls prey to a performative contradiction. How can we predict that prediction is impossible? It is as though we are blackmailed into being superstitiously optimistic about the continued success of human techno-scientific development, by the very conditions of reason. The applicability of reason depends on the existence of deterministic relations between the facts we perceive and the probable outcomes we believe follow from them. But since a complete account of the facts relevant to a certain problem is intractable, belief in the applicability of reason and scientific prediction holds to nothing but superstition: we know that strictly speaking the world may not care about how we wager, while in practice it seems that the world impels us to be optimistic about technoscience, else be cursed with paradox and unintelligibility.

6. Techno-Optimism and Evolution

This superstitious techno-optimism impelled by the structure of reason may have a straightforward explanation. Reason did not originate with humans. Living beings have been conditionalizing their inferences on their experiences since time immemorial. Organisms are inference machines, and the first evolutionarily successful organisms were successful because they made sufficiently good inferences and predictions. They had to update their expectations based on the facts that presented themselves to their sensory apparatuses. At minimum, to survive the pressures of the chaotic world, a living being needs to read signals in the environment as advantageous or dangerous, nutrient or poisonous, friendly or hostile, or some more primitive version of such salient properties. What Stiegler (2013) calls the *pharmacological* character of technology originates, not with human exteriorization, but with the unicellular organism's polarized boundary. All life that survives for any non-trivial duration is therefore making a transcendental leap of faith, and has a continually reinforced trust in the causal regularity of the world it perceives. In other words, evolution selectively commits life to *realism;* though biology's randomizations have no doubt produced solipsistic creatures, they were presumably gobbled up by the predators they didn't believe were chasing them, and thereby failed to forward their genes to posterity. Evolution furthermore reinforces the organism's implicit optimism about the bearing experienced facts have on the evolv-

ing state of affairs, despite having no explicit justification for this assumption. Just as the human observer in anthropic arguments just happens to find themselves in a finely tuned universe, the organism takes a chance on the real, and after each event finds that its hunch was vindicated.[2] Is the contemporary techno-optimism not simply an extension of this principle?

It is clear that the inferences that keep the human population growing are techno-scientific, and no longer merely biological. Hominization has always supplemented its biological senses and actuations with artificial ones. Extending life's pursuit of continued existence, all technologies expand our capacities of prediction and inference. And yet, they may be testaments to the increasingly improbable winning streak of life on earth. If we wager that the successes of human knowledge, science, and technology will continue, despite having no explicit ground for doing so, it is that we assume that there are implicit grounds for doing so: the improbability of our stroke of luck is in this way transformed into a compensation for believing in our access to the real. Techno-optimism is thus the extension of an emotional over-determination of the state of affairs concealed in the evolutionary structure of practical reason, an unwavering faith in the possibility of prediction. From this perspective, the techno-optimist's rejection of myth and superstition, vitalism and other "folk" conceptions of the world will seem at least minimally hypocritical.

7. Concluding Remarks

Is the techno-optimist's superstitious faith in the continued success of techno-science warranted? Ultimately, the question comes down to the following dilemma: either it is better to be "purely rational" and never trust that we have sufficiently conditionalized our inferences, or it is better to be superstitiously optimistic that our best hunch will in the end be vindicated. It is strictly more correct to doubt, with Hume, that our experiences have any bearing whatever on the ongoing state of affairs. And yet the pragmatic requirements of life demand that, with Kant, we hypostatize the a priori necessity of the causal regularity of the real, as well as its correlation to human knowledge. If hominization has gotten this far, it is perhaps because it is driven by evolution's asymmetrical diffusion, its bias toward organisms that trust in causality and in the competence of their inferences. In this sense there is a case to be made in defense of the *pragmatic* reason of the apparent unreason of technological optimism.

But this argument in defense of pragmatic reason depends on compossibility. Ultimately, its possibility rests on how the Anthropocene will respond to one of

the most pressing questions of our time: what happens when our technological environment begins to dissolve this trust in the real? The Stieglerian line of thought according to which technologies condition and modulate our horizons of expectation is a major stumbling block for any prospect of rational Prometheanism. But furthermore, the Anthropocene implies the collapse of the boundaries we formerly ascribed between human and non-human, which may correspond to a crisis in our biologically compelled trust in realism. It is telling that, in the *post-truth*, or *post-fact* society, we are told that facts no longer matter: *emotions matter*. In the post-fact world each individual stands on different grounds, isolated in their own technologically mediated echo chambers and filter bubbles that feed them information increasingly foreign to any commonly recognized actual state of affairs. In Leibnizian terms, a post-fact world implies that compossibility is wearing thin, that experiences and events are no longer reciprocally presupposed. Untethered to any common historical thread, liberated from the constraints of a compossible real, free-floating affects now wishful-think themselves into oblivion. As our predictive landscapes abandon their commitments to realism, our self-fulfilling hyperstitions now diffract into a plethora of unconnected and worldless strivings. Without compossibility, we relinquish all claims to reason. So what happens when we no longer make the superstitious realist leap of faith? Will we too eventually go the way of those solipsistic mutants who did not believe that anything was the case, and were quickly deleted by evolution? Knowing this to be the trend, what can possibly warrant our optimism in the future successes of technology, science and reason?

Notes

1. This is the explanation given for Fermi's paradox of why we have not encountered aliens: though the existence of intelligent extraterrestrial life is probable, given its rarity, the distances between intelligent civilizations are so vast that they cannot practically be bridged.

2. Gettier cases in epistemology suggest that having an inference be vindicated by circumstances does not necessarily satisfy the criteria for knowledge: a true justified belief can always be true for the wrong reasons. There is no way to step out of the subjective stance to verify whether our inferences are vindicated for the reasons we hold to justify them, and, therefore, human "sapience" does not depart from this animal "sentience" in any qualitative manner. Though our inferences are no doubt more sophisticated than animal ones, our "knowledge" is not, in the last instance, of a different genre than the animal's guesswork.

References

Aitkenhead, Decca. 2008. "James Lovelock: 'Enjoy Life While You Can: In 20 Years Global Warming Will Hit the Fan.'" *The Guardian*, March 1. https://www.theguardian.com/theguardian/2008/mar/01/scienceofclimatechange.climatechange.

Bostrom, Nick. 2002a. *Anthropic Bias: Observation Selection Effects in Science and Philosophy*. New York: Routledge.

Bostrom, Nick. 2002b. "Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards." *Journal of Evolution and Technology* 9(1). http://www.jetpress.org/volume9/risks.html.

Brassier, Ray. 2010. *Nihil Unbound: Enlightenment and Extinction*. Houndsmills: Palgrave Macmillan

Carter, Brandon. 1974. "Large Number Coincidences and the Anthropic Principle in Cosmology." In *Confrontation of Cosmological Theories with Observational Data*, ed. M. S. Longair. International Astronomical Union / Union Astronomique Internationale, vol 63. Dordrecht: Springer. https://doi.org/10.1007/978-94-010-2220-0_25

CCRU. 2017. *WRITINGS 1993–2003*. Falmouth, UK: Urbanomic.

Collingridge, David. 1981. *The Social Control of Technology*. New York: Palgrave Macmillan.

Deleuze, Gilles. 1990. *The Logic of Sense*, trans. Mark Lester. London: The Athlone Press.

Deleuze, Gilles, and Felix Guattari. 1983. *Anti-Oedipus: Capitalism and Schizophrenia*. Minneapolis: University of Minnesota Press.

Dupuy, Jean-Pierre. 2014. *Economy and the Future: A Crisis of Faith*. East Lansing: Michigan State University Press.

Fisher, Mark. 2009. *Capitalist Realism: Is There No Alternative?* Winchester: Zero Books.

Fukuyama, Francis. 1992. *The End of History and the Last Man*. New York: Free Press.

Gould, Stephen Jay. 1987. "Mind and Supermind." In *The Flamingo's Smile: Reflections in Natural History*, 392–402. New York: W. W Norton & Company.

Hume, David. 1921. *An Enquiry Concerning Human Understanding*. Chicago: Open Court.

Jameson, Frederic. 2003. "Future City." *New Left Review* 21: 65–79.

Kant, Immanuel. 1996. *Critique of Pure Reason*, trans. Werner Pluhar, ed. James Ellington. Indianapolis: Hackett Publishing.

Kurzweil, Ray. 2001. "The Law of Accelerating Returns." http://www.kurzweilai.net/the-law-of-accelerating-returns.

Kurzweil, Ray. 2006. *The Singularity Is Near: When Humans Transcend Biology*. New York: Penguin Books.

Leibniz, Gottlieb Wilhelm. 1989. *Philosophical Essays*, trans. Roger Ariew and Daniel Garber. Indianapolis: Hackett Publishing Company.

Leibniz, Gottlieb Wilhelm. 2007. *Theodicy: Essays on the Goodness of God, the Freedom of Man, and the Origin of Evil*, trans. Austin Farrer. Eugene, OR: Wipf and Stock.

Lomborg, Bjørn. 2001. *The Skeptical Environmentalist: Measuring the Real State of the World*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139626378

Love, Dylan. 2014. "WARNING: Just Reading about This Thought Experiment Could Ruin Your Life." http://www.businessinsider.com/what-is-rokos-basilisk-2014-8.

Lyotard, Jean-François. 1998. *The Inhuman: Reflections on Time*. Cambridge: Polity Press.

Meillassoux, Quentin. 2006. *Après La Finitude: Essai Sur La Nécessité de La Contingence*. Paris: Seuil.

Nolan, Christopher, dir. 2014. *Interstellar*. Los Angeles: Paramount Pictures.

Noys, Benjamin. 2012. *The Persistence of the Negative: A Critique of Contemporary Continental Theory*. Edinburgh: Edinburgh University Press.

Pascal, Blaise. 2014. *Pensées*, ed. Philippe Sellier. Paris: Le Livre de Poche.

Ridley, Matt. 2010. *The Rational Optimist: How Prosperity Evolves*. HarperCollins e-books.

Shanahan, Murray. 2016. "The Frame Problem." In *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta. http://plato.stanford.edu/archives/spr2016/entries/frame-problem/.

Sloterdijk, Peter. 2015 "The Anthropocene: A Process-State at the Edge of Geohistory?" trans. Anna-Sophie Springer. In *Art in the Anthropocene: Encounters among Aesthetics, Politics, Environments and Epistemologies*, ed. Heather Davis and Etienne Turpin, 327–41. London: Open Humanities Press. Available at http://openhumanitiespress.org/books/download/Davis-Turpin_2015_Art-in-the-Anthropocene.pdf.

Srnicek, Nick, and Alex Williams. 2016. *Inventing the Future: Postcapitalism and a World Without Work*. London: Verso Books.

Stiegler, Bernard. 2013. *What Makes Life Worth Living: On Pharmacology*, trans. Daniel Ross. Cambridge: Polity Press.

Stiegler, Bernard. 2014. "The Anthropocene and Neganthropology," keynote lecture at General Organology: The Co-individuation of Minds, Bodies, Social Organisations and Technè, Canterbury, UK.

van Inwagen, Peter. 2009. *Metaphysics*, 3rd ed. Boulder, CO: Westview Press.

von Trier, Lars, dir. 2011. *Melancholia*. Hvidovre, Denmark: Zentropa.

Williams, Alex, and Nick Srnicek. 2014. "#Accelerate: Manifesto for an Accelerationist Politics." In *#Accelerate: The Accelerationist Reader*, ed. Robin Mackay and Armen Avanessian, 347–62. Falmouth, UK: Urbanomic.

Žižek, Slavoj. 2011. *Living in the End Times*. London: Verso Books.

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 363–385 DOI: 10.5840/techne201711374

Beyond Adaptation and Anthropomorphism: Technology in Simondon

Danika Drury-Melnyk

Abstract: This paper attempts to bring the work of Gilbert Simondon into conversation with contemporary discourse on climate change and the Anthropocene. Though his work pre-dates the coining of the term, Simondon, with his non-anthropomorphic view of technology, is in many ways a philosopher of the Anthropocene. In this paper I contrast Simondon's philosophy to the popular idea that technology is something we can use to adapt to the practical problems of the Anthropocene. I will begin by looking briefly at the narrative of adaptation in the Anthropocene. I will then discuss Simondon's philosophy of individuation in order to understand why he rejects these narratives of adaptation. Next, I will look at his own ideas on the role that can be played by technology. Ultimately, I hope to describe why, for Simondon, a view of technology that centres on relation rather than on a particular view of the human subject is crucial to human life. The significance of a non-anthropomorphic approach to technology extends beyond the current ecological crisis to all manner of injustice, violence, and misunderstanding between human groups as well as the environment.

Key words: Simondon, technology, individuation, climate change, environment, Anthropocene

Introduction

One of the most pressing concerns of our time is the question of how we will adapt to the existential threat of climate change. Many of the dominant narratives centred on adaptation face a tension as they attempt to apply time-tested anthropocentric models and narratives to a time in which those narratives seem to be on increasingly shaky ground. This is one of the fundamental tensions of the Anthropocene, the age in which the magnitude of our own influence over the environment is radically altering how we understand our place in the world. I would like to use the work of Gilbert Simondon to comment on this tension. His view is one well-suited

Danika Drury-Melnyk, MPhil KU Leuven; danika.drury@gmail.com.

to a time of shaky identities and permeable, fluctuating barriers between humans, nature, culture, and technology. I will discuss his philosophy of individuation in order to understand why he rejects these narratives of adaptation. I will then look at his own ideas on the role that can be played by technology. Ultimately I hope to describe why, for Simondon, a view of technology which centres on relation rather than on a particular view of the human subject is crucial to human life. The significance of a non-anthropomorphic approach to technology extends beyond the current ecological crisis to all manner of injustice, violence, and misunderstanding between human groups as well as the environment. I will begin by looking briefly at the narrative of adaptation in the Anthropocene.

1. Adapt or Die

One of the difficulties faced in the Anthropocene is that anthropomorphic answers often fall flat in a world which looks less and less human. The Anthropocene sees humans faced with aspects of the world that we have never had to deal with before. The term's usage has spread rapidly as scholars across disciplines attempt to explain the multitudinous ripple effects of this idea as it circulates through domains. As the editors of the Open Humanities Press's *Critical Climate* Change series Tom Cohen and Claire Colebrook note, the Anthropocene is marked by an attempt to comprehend and represent "the mutation of systems beyond 20th century anthropomorphic models" (Cohen and Colebrook 2014). It becomes more and more difficult to think of the environment as a benign background, a hostile threat, or even a source of life. Instead it is our entanglement with the environment—rather than the environment as a separate sphere—that is pushed to the forefront.

This shift in understanding throws a bit of a wrench into one of the most enduring ways of imagining the relationship humans have to the environment—adaptation. The ability of humans to adapt to the threats and bounties of their surrounding environments is frequently cited as one of our most prized traits. It has brought the species one way or another through ice ages and all manner of ecological disasters. Indeed, the general idea of most of the more optimistic responses to climate change is that we can, will, and must adapt to this new challenge. For instance, the European Commission's website on *Adaptation to Climate Change* states that "adaptation means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise" (European Commission 2017). The hope, unsurprisingly, is that we will be able to improve our existing technologies and habits to maintain human existence more or less as we know it. Such

organizations are optimistic about our intelligence and technological capabilities allowing us to maintain our current societal structures without significant change.

For instance, until its recent overhaul by the Trump administration, the website of the Environmental Protection Agency of the United States of America promised to "prevent harmful pollution from our power plants, and cars and trucks, while saving consumers money at the pump and building a strong, clean-energy economy" (Environmental Protection Agency 2017). The webpages of some of the world's most powerful environmental and scientific organizations—such as the United Nations Environment Program (UNEP) and the European Environment Agency (EEA)—echo this reassurance that such technologies can be applied to address the problem of climate change. What is promised is that this technology is safe, meaning that it is predictable and controllable. Crucially, it will allow us to maintain our current societal structures without too much significant change.

Such ideas can be comforting and even inspiring in a time in which the earth and even our own technologies often seem increasingly unknowable, unpredictable, and inhuman. There is a powerful irony in that it is often our own creations that are seen as the most strange, unfamiliar, or even threatening force in our world. Many of the most commonly expressed fears regarding technology centre on our inability to control what we have created. Although machines are designed and operated by humans, there is nonetheless always a concern that we might not be able to predict all the actions or effects of our technology. This can be seen in the trope of 'science gone mad' which circulates throughout popular discourse—the fear that our technologies extend our reach beyond our understanding, and allow us to meddle with forces we have no grasp of. Because of the great speed, power, and range of many technologies, we may not be aware of the effects until it is too late. The realities of climate change typify the unprecedented impact that technology allows humans to have on their environment.

While there are strains of thought, for example neo-Luddite movements (cf. Glendinning 1990), which call for the abolition or significant reduction of technology in human society, perhaps the most common response within mainstream environmental organizations is the cry to do technology better.[1] 'Better,' here, generally means more efficient, less wasteful, and without any harmful unforeseen side effects. While technology is often lauded as a great source of progress and stability, it is as often feared for being an alienating, destabilizing, and transgressive force. In the typical tale of the mad scientist, the scientist often ends up bound to their creation. The prototypical example is that of *Frankenstein*: the scientist abuses the power of science, transgressing the natural order, and creates a monster.

This common narrative arc often binds together the fate of the scientist and their creation, with the scientist either being killed by the monster or dying in an attempt to stop the monster. The worry, in short, is that technology is unnatural, and that left unchecked the unnaturalness of technology will spread into the environment and into humanity itself. In this case perhaps a more illustrative example is that of *The Fly*—because of a small oversight by the scientist, he himself becomes a destructive monster, fusing with the environment and his own creations in aberrant ways. In this picture, unpredictability and permeability are threatening. Adaptive approaches that are optimistic about technology generally hope to make future technologies less dangerous by making them more stable and controllable. The promise is that we will make no more monsters, but keep humanity safe.

However, the anthropomorphic framework on which our ideas of safe adaptive technologies hinge is breaking down as our relationship with the environment changes. The world seems simultaneously more imbued with human presence than ever before and more alien than ever before. Faced with our imminent extinction, the categories with which we are accustomed to organizing life seem increasingly flimsy and permeable. Human actions and technologies are spun out of control, muddled up with natural forces in one big oncoming storm before which we are simultaneously vulnerable and complicit. It is not surprising that the description in Donna Haraway's *Cyborg Manifesto*, of a world in which "nature and culture are reworked; the one can no longer be the resource for appropriation or incorporation by the other," now seems more pressing than ever (Haraway 2016, 9). Haraway identifies "three crucial boundary breakdowns" in her analysis: human-animal, organism-machine, and physical-nonphysical (Haraway 2016, 10–12). The idea that the world seems less human is tied to a growing uncertainty over what it means to say that we ourselves are human. It is difficult to sustain an anthropocentric framework without *anthros* as an anchor point and so classifications dividing ourselves, our technology, and the world in terms of passive or active, stable or unstable, human or inhuman become increasingly troublesome.

Simondon's work is focussed on elaborating a picture of existence which supersedes these categories. He largely rejects narratives of adaptation that hinge on an anthropomorphic framework. Adaptation, in his view, gives far too much import to organism and environment as individual actors, and not enough to the relation itself. While important to understand in any study of life, adaptation does not get at individuation because "for there to adaptation there must be an already individuated living being; individuation is prior to adaptation and is not exhausted in it" (Simondon 2013, 208). The idea of the individual as a stable equilibrium

treats the individual as something already distinct from that environment, without accounting for the process by which that takes place. What he believes is needed is a model of relation which does not just act on individual subjects or objects, but which "modifies the very fabric of subject and objects, in a much finer and more delicate way" (Simondon 2013, 209). This is what he tries to offer in his philosophy of technology and individuation.

2. Creative Mediation

Simondon sees the conventional view of technology—that which appears in many adaptive approaches to environmental crises—as one that derives from a Cartesian framework. Cartesianism, according to Simondon, sees the ideal operation of machines as a process of lossless transfer. In this view, machines are essentially as objects that transfer force. A perfectly functioning machine will be able to transfer force between points *A* and *B* without any diminishment or deviation. To use an illustration from Simondon's text "Technical Mentality," in a pulley system the force one exerts to lift an object should not be hindered by its passing through the system of ropes (Simondon 1989b, 18). In short, what Simondon takes from the Cartesian idealisation, is technology as an extension of the force of human will and human action without distortion of mutation. Technology is then framed as something derived from human aims and abilities (Simondon 1980, 2). It has no power outside of its ability to play a role in this pre-established system. It is seen as something passive, a vanishing medium through which we regulate our surroundings.

This view of technology as a passive automaton is typified in the sort of utopian future envisioned in the classic cartoon series *The Jetsons*: an incredible, futuristic society with all manner of amazing gadgets and automata all existing to prop up a nuclear family based society that looks remarkably similar to the standard of the time. What this view advocates, essentially, is technology playing a passive, servile role. There is a very intuitive appeal to the idea of technology as anthropomorphic automaton. If technology is simply a copy, something derived from the human, then we can understand and control it. If, on the other hand, we have created something which is not simply a derivation of ourselves but is in some way alien, technology becomes ambiguous, unpredictable. The realities of climate change seem to suggest that there are aspects of technology that we have failed to control. This indeterminacy threatens the model of the machine as automaton, opening up the possibility that our own creation could lead to something unseen and unfamiliar.

Simondon shares, in a particular way, the view of technology as mediator. For him, however, mediation has a very different sense. Rather than viewing mediation simply as a bridge between two stable, pre-established points which anchor it, in Simondon's view mediation is a creative force. The machine is indeed the locus through which different environments or milieus act on one another; however, at the same time the mediation between these milieus is actually constructive, bringing into being what Simondon calls a "third technogeographical environment" (Simondon 1980, 59). The mediation of technological objects actually bring about the very environments which allow them to function, and in so doing opens up new possibilities of definition for the terms involved.

For Simondon, the machine is not a vehicle for lossless transfer and the perfecting of technology "has nothing to do with an increase in automatism" (Simondon 1980, 4). The machine instead relies on "a certain margin of indetermination" (4) which allows it to be sensitive to the surrounding environment in which it functions. Simondon uses the architectural example of a vault to describe the type of mediation which comprises the existence of technical objects. An arched or vaulted ceiling is only stable once it is complete. Until that point it will crumble without external support, but once it is completed it utilises the tensions within its own structure to stabilise and regulate itself. In the same way, "an object that has a relational function continues in existence and is coherent only when it has begun to exist and because it exists" (60). In Simondon's eyes, the true moment of invention or creation is not when the principles and schematics of a machine are drawn up in a laboratory or in the mind of an inventor, but when in real circumstances "a jump is made and is justified by the relationship which is instituted in the environment it creates" (59). The invented technical object is able to function because of and as a part of these relationships. Without the environment that the technical object itself helps to create, the technical object would not work. In this way, "the technical object is the condition of itself" (59) and cannot be entirely determined by what comes before it.

Simondon thus rejects the project of making technology ever more controllable within a pre-established system. He sees this as an anthropomorphisation of technology which places it as a kind of automaton on a hierarchy below humanity. Within this anthropomorphic model technology does not contribute anything new, it simply takes us from point A to point B. The power of technology is supposed to be relative to its anchoring points; if technology is able to produce an unexpected outcome this calls into question the primacy of those anchoring points—in particular, the agency and stability of the human subject. This understanding of

technology is situated in a framework in which we are and must be the subjects controlling technology, and only in exceptional cases the objects of it. A move to reassert our mastery of technology is tied to a reassertion of the identity of humans as active subjects.

The idea of adapting by mastering technology to a greater and greater degree is intended to be for the betterment of humanity—or even to save humanity—but to Simondon's mind it is not enough to simply make technology better. Any attempt to improve technology without questioning the anthropomorphic framework by which we understand and use technology leaves in place what Simondon bluntly refers to as a "mask of facile humanism" (Simondon 1980, 1). The harmful effects of preserving a system in which humans must be at the top of the hierarchy are pervasive and immense. Not only do we suffer from the practical effects of misunderstanding technology but, Simondon insists, we also obscure "a reality that is full of human striving and rich in natural forces" (Simondon 1980, 1).

Simondon will instead call for humans to relate to technology not only as operators but as objects of technology (Simondon 2010, 233). This approach to technology is deeply tied to how he understands relation, identity, and systems in general. In order to understand Simondon's theory of technology and what it might mean to work with technologies that are not entirely determined by humans, I will first look at how the concepts of relation and stability are discussed in his philosophy of individuation.

3. Individuation and Relation

The idea of technology or any mediator as simply a bridge from A to B does not work for Simondon because he believes it is crucial that we do not understand individual entities and their surroundings simply as separate but interacting units. For Simondon, the relation between individuals and their environments is in many ways a more central question than that of the individual itself. He contends that philosophy and, to an extent, science have been blinded by a tradition that takes for granted the stable, substantial individual as its starting point. From there scholars work backwards to try to discover a principle of individuation. Instead, Simondon endeavours to begin from the point of view of the process of individuation, to which the individual is relative. He asserts that "the true principle of individuation is mediation" (Simondon 2013, 27). I will look at his philosophy of individuation to bring out his concepts of relation and metastable equilibrium, which will be crucial to understanding why his model of technology does not mesh with the kind of adaptive approaches described above.

3.1. Crystallization

Individuation occurs as a means of establishing relation or mediation in a situation where there is a buildup of tension that has no means of being articulated. Individuals form as a means of articulating that tension and enabling further communication and relation between the new individual and its surrounding environment. One of Simondon's most well-known illustrations of this is his example of crystallization. A crystal forms as a response to the buildup of tension and potential energy in a supersaturated solution. The amorphous solution—what Simondon refers to as the 'preindividual' state of the crystal—is rife with tension, but until the formation of the crystal there is no structure to organize it. It is a shock, the introduction of what Simondon calls a "germ," which sparks the formation of the crystal (Simondon 2013, 32). Concretely the germ could be a foreign body or some minute environmental change, but it brings the disorganised tensions within the substance to a head. In order to resolve the imbalanced substance, a crystal emerges as an organizing structure, allowing for new interactions with the substance that is now the surrounding environment of the newly formed crystal. The structure of the crystal brings the elements of the preindividual solution into a new relation by distinguishing what is internal to the crystal from what is external to it. The individual then is essentially, a way of organizing relations and exists by continuing to organize and maintain those relations.

The preindividual state is one of what Simondon calls *metastable* equilibrium (Simondon 1992, 301). The balance of this state is not anchored by any stable unit because such units have not been produced. It is a state whose precarious balance harbours the potential for drastic and cascading change at even the slightest shift in these tensions. The crystal utilises the energy of these tensions and resolves them by providing a structure in which differences can be articulated.

The resolution that the structure of the crystal provides should not be considered absolute. Even after the formation of the individual it continues to be a part of this process, rather than simply being cordoned off as an end product. This kind of stable equilibrium, in which an individual ideally has a closed unchanging state that it reaches, does not make for a good framework for understanding individuals. As a process of organization, individuation tends towards stabilization; however, the process feeds off the potential energy of the metastable system in which it arises. A crystal grows outward in layers. It develops on its outer membrane by differentiating some aspects of its environment from itself while integrating others to form a new layer. This development requires it to utilize the potential energy

still residing in the system which encompasses both it and its environment. This system is not completely static and stable as long as there remains the potential for further relation and change. As Simondon writes, "individuation does not exhaust the potentials of preindividual reality in a single move" (Simondon 2013, 24). If the individual were completely stabilized and disconnected from the metastability of the preindividual state it would have no capacity to develop. The crystal is not completed once it emerges as a distinct entity within the solution. Rather it has an "indefinite" potential for expansion which depends not on an internal principle but on the metastable equilibrium maintained in its relation to its environment (Simondon 2013, 87).

3.2. Metastability in Life

Understanding the role of metastability in individuation is particularly important when it comes to more complex individuals, such as living organisms. After the initial formation of the crystal's structure around the germ, the interior of the crystal is comparable to "dead skin," with all its activity concentrated on the liminal layer surrounding its exterior (Simondon 2013, 226). In this way, Simondon writes, "the form that we encounter [in the crystal] is only the vestige of individuation that once was accomplished in a metastable state" (Simondon 2013, 233). It is only in the moment of its formation that the whole of the crystal is engaged in the process of individuation.

Living organisms do not develop a stable centre in the same way that inert ones do; instead Simondon sees life as a prolonging or dilating of metastability in the relation between organism and environment at every level. Solidity, stability, and purity do not make good building blocks for life; rather, life consists in continually solving and resolving the tensions and incompatibilities of the metastable state. Rather than having an inert interior surrounded by an engaged exterior, "interiority and externality are everywhere in the living being" and "interiority is everywhere in contact with relative externality" (Simondon 2013, 161). The living body contains environments within environments, systems and organs which coexist but are in a sense exterior to one another. For instance, if the gallbladder were simply to allow the bile it produces to flow freely there would be drastic consequences. Instead, the secretion of bile must be carefully regulated, as must the flow of blood to the gallbladder and all other organs. Thus in relation to a given organ or gland or system, "the internal environment of the general body is actually an environment of externality" (Simondon 2013, 224–25). Though from the outside a living individual may appear to be stable, there are innumerable minute processes

taking place at any given moment to maintain that stability and to keep that individual alive. Their temperature must be regulated, muscles must be hydrated and adjusted, food must be digested. Without these infinitesimal micro-relations to the environment the organism would die, and eventually as it decomposed it would cease to be differentiated from its environment.

So far this sounds more or less like a description of homeostasis, but a homeostatic understanding of environmental relation would not capture what Simondon is aiming at. Homeostasis, like adaptation, certainly describes an aspect of the relationship between organism and environment but for Simondon it is crucial that we do not rely solely on a homeostatic model of environmental relation because such a model fails to capture the significance of relation in a system which is metastable. A homeostatic model of relation still leaves us with a picture of relation which is essentially interindividual—between already constituted individuals. To describe a model of relation that works not only between but through individuals, we must go beyond homeostasis.

It is not enough simply to say that there are relations between individuals, Simondon is aiming to explain that there are individuals by and through relation. Organism and environment are not and never become two separate poles. Interactions between them are not solely homeostatic in that they do not just produce stability. They also produce a feedback effect that amplifies and distorts as it builds to affect both organism and environment in ways which cannot be determined or predicted. This feedback effect produces new information that can change the individual and its surroundings in their very structure. Inert objects like the crystal are informed once by the germ which provides their initial structure but because living individuals exist by prolonging this metastable state of ontogenesis, they remain open to new information and new restructurings throughout the duration of their life. They are always part of a relational system whose metastability prevents it from becoming closed on itself. Preindividual reality remains a constant "source of future metastable states from which new individuations could eventuate" (Simondon 1992, 306). The prolonging of this metastable equilibrium keeps organisms alive and allows for further change and development not only physically but, as I will discuss, culturally.

The reason that technology cannot be seen as a simple, passive mediation between points *A* and *B* is because these points are never pure and stable to begin with. In response to a picture of human identity that hinges on stability and agency, Simondon proposes one in which these aspects occur only as fleeting phases in a wider system of relation. A system based in metastability and relation is one that

cannot be captured by a teleological notion of adaptation or a model of technology as automaton.

4. Beyond Adaptation

Simondon's critique of how adaptation has been used as a model for life makes up a fairly small part of his major work, *L'individuation à la Lumière des Formes et d'Information* (Simondon 2013), but it illuminates a significant aspect of his philosophy. He writes that adaptation "does not express vital functions in depth and cannot account for ontogenesis" and that "all intellectual systems based on the notion of adaptation should be reformed" (Simondon 2013, 209). He discusses both Darwinian and Lamarckian approaches to the idea and ultimately finds both wanting. He contends that in the end both the Darwinian and Lamarckian takes on adaptation share the same fault—they share an idea of the world as "already structured according to a system of unitary and objective reference in the theory of evolution" (211).[2]

It is, Simondon insists, this "objective conception of the environment that distorts the notion of adaptation" (Simondon 2013, 211). The environment and the organism are both understood as already having a set system of needs, values, and attributes. As Simondon puts it: "there is an idea that the object is an object for the living being, a constituted and detached object that represents danger, or food, or retreat" (211). In adaptation, Simondon writes, "the environment is essentially constituted by a goal, towards which the being is directed, and by an ensemble of forces opposing the movement of the individual towards the goal: these forces constitute a barrier," (209) an organism adapts by taking on different attitudes or behaviours to try to attain its goal despite the obstacles it faces. In this picture the individual and the environment are both all set up already—their interaction is just a matter of achieving a balance between the already existing attributes of each. Ideally, an adaptive organism tends towards a state where it will be able to prosper without further changes.

This understanding of adaptation, in other words, assumes a foundation and a teleology of stable equilibrium, and neglects metastability. It is a world in which relation is *inter*-individual or *between* organisms and an environment rather than taking place by and through them. As Simondon puts it, "for there to adaptation there must be an already individuated living being; individuation is prior to adaptation and is not exhausted in it" (Simondon 2013, 208). If we understand the world and organisms as separate or even opposing realms, then adapting and evolving are just a matter of overcoming the challenges we face to achieve a more

stable and harmonious existence. However, the world that we encounter is "not only a world where there is a barrier between the subject and the goal; it is above all a world which does not coincide with itself, because it cannot be seen from a single point of view" (209). In a model of life or environmental relation limited to adaptation our relationship to our environment never really changes, we just keep finding new ways to make it give us what we want. A teleological notion of adaptation does not leave room for the feedback effect of adaptive interaction, for the indeterminate ways that systems of relation may alter themselves.

The teleological understanding of adaptation and evolution described above is one roughly captured by the often dangerously misquoted maxim "survival of the fittest." While there are more nuanced takes on adaptation and evolutionary theory, this narrative remains convincing. Indeed, many approaches to climate change and to the Anthropocene take on this idea—that to survive we must become a fitter, stronger, smarter version of humanity. Simondon has considerably different ideas about what we ought to do to allow humanity to thrive. Discarding the idea that there is a 'fittest' version of humanity we must tend towards, Simondon instead proposes one in which we foreground those relations and aspects of life that are often considered liminal to humanity—the first and foremost being our technology.

5. Kingdom of Ends

The possibility introduced by technology is essential to what it means to be a living human community, and yet Simondon's theory of technology rejects an anthropomorphic framework. Though technology for the most part is seen as a means to an end, he vehemently disagrees with the imposition of an anthropocentric teleology onto technological progress, asserting that because of the way in which technological individuation works, the technical gesture takes us "beyond any kingdom of ends"—that is, beyond a set regime of human goals (Simondon 2015, 19). This aligns with his earlier point that the true invention of a technology takes place only when it begins to function in its environment, that is, only when it begins to work out its relation to its surrounding milieu. Technology is not only determined by us but, at its highest level, is self-regulating. Through its functioning it institutes and maintains new relations with its milieu—it creates the aforementioned third environment. The independence of technology from social norms makes technology a potentially revolutionary force and also a profoundly human one, though perhaps not in the way one might think.

It is precisely because technology is not entirely anthropomorphic, because it keeps in play a world not structured solely around a particular idea of the human subject, that it is so vital. Simondon sees collectivity and culture as further forms of individuation, further ways of organizing and directing the energy of the pre-individual being (cf. Simondon 1992, 7). This does not mean that society is based on the individual, but rather that it arises from the same metastable activity in which individuals maintain themselves. As in the case of the individuation of individual organisms, there is not a founding principle or a rational teleology guiding society, rather it invents itself as it goes along. It is this process of invention that gives society its life. Without this ability to keep metastability in play through restructuring and reinforming, Simondon believes that human communities will stagnate and succumb to entropy in much the same way as a living organism that can no longer grow or develop, or the inner layers of a crystal which remain inert in their homogeneity. If technology consisted strictly of mimetic automata, it would only reproduce the system of a kingdom of ends, allowing societies to close off and stagnate.

For Simondon, the true significance of technology for humans collectively is that it keeps cultures and social systems from becoming completely closed in on themselves. Though technologies are designed for specific functions, these goals can never be all encompassing. Properly understood, technology represents something "beyond the community," that is, beyond the community understood as a collection of atomistic individuals (Simondon 1989a, 266). The operation of the technical being has a normativity that is distinct from the atomism of social normativity and, in adopting a new technology, societies also open themselves to unforeseen, indeterminable possibilities. Technology thereby "makes possible the penetration of a new normativity into a closed community" (265). The machine, Simondon writes, is not subsumed by communal norms or aims but remains "open to the world" (290). Technology works to keep in play the potential energy of the preindividual state. The technological being acts like a "germ of thought" that "transmits from individual to individual a certain capacity for creation" (267). Simondon's use of the term "germ" here harkens to his discussion of crystallization. In this regard, technology acts as the spark for change, a force which can harness and restructure the metastable potential of its milieu. The society that adopts a new technology therefore also "effectuates a new structuring of its code of values" (265). This capacity to remain open to the world, to develop and restructure systems of values and organization, is what keeps communities vital.

6. Naturalizing the Anthropocene

What Simondon contends is that in many cases it is not technology itself that creates problems so much as a misunderstanding of what technology is. Technology opens up human communities to a milieu which is always in flux, which is constantly changing as a result of the interactions of different groups and individuals. The teleological kingdom of ends has little to do with how technology actually functions and is instead "a system that is closed upon an acculturated [*culturalisée*] image of man" (Simondon 2015, 19). The framing of technological objects as inert automata springs from this same view that preserves the stability of the individual while neglecting the potential that individuals, both living and non-living, have for mutation and difference.

Simondon writes that "culture has become a system of defense designed to safeguard man from technics" (Simondon 1980, 1). A culture that excludes technology does so in order to protect the sovereignty of its particular acculturated vision of the human subject. Erecting protective walls around itself, it remains "intra-groupal"—"the ensemble of techniques of direct human manipulation that each human group employs to perpetuate its own stability" (Simondon 2015, 18). An acculturated image of man is one which is assumed to be complete and self-stable. This, of course, neglects the relativity of individuals to a process of individuation. An anthropocentric hierarchy confines the technical object as well as the human individual to a stable role or identity. Without this openness to new potential restructurings, human communities are closed off from anything new and will stagnate

The assumption that technology can be subsumed by an anthropogenic kingdom of ends risks oversimplifying questions regarding the role of technology to a question of whether humans are good or bad, productive or destructive. The understanding that we have of technology and the ways in which we currently use it are not ahistorical and do not exhaust the possibilities of technology in human life. In trying to uphold anthropomorphic systems despite the increasing apparentness that the world does not conform to them, we leave largely unquestioned the specific relations and inequalities that have created an ecological crisis.

Andreas Malm has written extensively on the anthropocentric narrative surrounding the ecological crisis of the Anthropocene. In a 2014 article written with Alf Hornborg, he critiques the idea that "the path to the fossil economy was laid down when our hominid ancestors once upon a time learned to control fire" (Malm and Hornborg 2014, 63). Malm and Hornborg write of the above narrative as a

kind of naturalization—nature here being construed as something inevitable and unchangeable. They, like Simondon, link this to the influence of a Cartesian metaphysics and define their approach as marked by "the abandonment of Cartesian dualism" (63). The birth of the fossil fuel economy was, they contend, "a qualitatively novel order in history" (64) which should not be seen as an outcome of transhistorical or ahistorical principles. They instead analyse how "the historical origins of anthropogenic climate change were predicated on highly inequitable global processes from the start" (63) and proceeded along a path that could not be chalked up to the inevitabilities of human nature or population expansion. Any path instead arose from historical contingencies and a complex concatenation of socio-political power dynamics which are anything but predetermined.

Malm and Hornborg charge that the term Anthropocene captures none of this and in fact works to obscure it through a peculiar paradox: "climate change is *denaturalised* in one moment—relocated from the sphere of natural causes to that of human activities—only to be *renaturalised* in the next, when derived from an innate human trait, such as the ability to control fire" (Malm and Hornborg 2014, 65). While this criticism of the term itself may seem like nitpicking, the narrative that Malm and Hornborg, among others, critique is a powerful one and illustrates the persistence of an anthropomorphic model of the world. In ways both subtle and pervasive, the effect of this anthropogenic naturalisation narrative "is to block off any prospect for change" (67).

Simondon likewise sees the understanding of technology contemporary to his day as the prolonging of a stagnant narrative. It reiterates dualistic ideas that may have been less conspicuous in the pre-industrial age, but which are revealed as completely inappropriate to describe the advent of industrial—not to mention post-industrial—technologies. Simondon writes that while for the most part pre-industrial technologies, such as a pump to gather water, may be considered "closed" in that "their immersion in the environment is short-term," industrial technologies are distinguished by a more long-term and resonant interaction with the environment (Simondon 2015, 19). While industrial technology does achieve certain ends, it goes beyond a framework based solely on utility because it "also provokes a transformation in the environment, which rebounds onto living species, man included" (19). The effects of technology do not just disappear into their expected end products, instead the engagement of technology with the environment amplifies them, so that the environment becomes "the instrument for the propagation of transformations, and every human group is more or less affected by the environment's transformation" (18). Our techniques, our ways of manag-

ing technology, have not changed at their core since the preindustrial age. This is hugely damaging because "the anticipation of such vast effects on the environment, and the planning that this necessitates, . . . form no part of pre-industrial techniques" (19). Because an anthropocentric system largely neglects any effects of technology outside of predetermined ends, unexpected effects of technology arise suddenly and often menacingly.

7. Re-apocalypse

Of course, writing at the time he did, Simondon could not have foreseen the full extent of climate change nor the broader shift in our understanding that marks the Anthropocene. Nonetheless, he sees the misunderstanding of technology as having a devastating effect not only on the environment but on human life and culture in all respects. In particular, he writes at length about the detrimental effects of excluding technology from culture. For the most part "culture sees techniques as purely utilitarian, which is to say as concatenations of means" (Simondon 2015, 19). It is, as discussed, supposed to be subservient to the kingdom of ends as defined by human cultural groups. In separating culture from technology, the true potential of technology to contribute to society is lost. Simondon writes that this utilitarian use of technology is not a way forward. The use of technology by human societies wishing only to preserve their stability as a closed cultural unit is hugely destructive, alienating, and works in service of "the man who wishes to dominate his fellows" (Simondon 1980, 2). In Simondon's vision technology is something which allows us to better understand and work with the complex, vast, and shifting ways in which we are related to one another and to our environment. However, he saw the technology of his age being used largely as a tool for reinforcing the sovereignty of the human subject—over nature as well as over one another.

Simondon's writing seems at times painfully aware of the violence and harm that can be done by misused technology. He mentions not only its environmental effects but the conflict and violent domination over other human groups that results when technology is misunderstood and misused. In a 1965 text he discusses colonialism and imperialism as outcomes of a culture not grounded in a proper—that is to say ontological and non-anthropocentric—understanding of technology. He writes that "there are cases in which one group imposes a culture on another—in colonization, for example, or in the processes of influence that the great powers of the world exert on countries of less elevated [élevé] rank that come to partially depend on them" (Simondon 2015, 18). In both these cases technology is used to dominate human groups for the sake of allowing others to assert themselves above

them, to prosper and reaffirm the solidity and validity of a particular intra-groupal human identity. While this is intended by the dominating group to preserve their own stability, Simondon writes that the dangers of shoring oneself up against change and difference will still be felt. As he writes:

> Culture becomes insulated when a human group isolates itself; it assures a stability that allowsthe group to survive, but if it is disconnected from its environment, if it excludes techniques, orfails to understand them, then it sustains a process of degradation the outcome of which may be fatal. (Simondon 2015, 19)

Indeed, in many respects climate change is not the only apocalyptic threat linked to technology. One can think of examples such as the nuclear arms race, or the forced displacement of people around the world for the sake of industries such as mining or logging. Across the world genocides and colonization enabled by technology have ended the worlds of entire peoples. Though climate change is, with reason, prioritized as—to quote the United Nations Environment Programme (UNEP)—"the major, overriding environmental issue of our time" we should not neglect the ways in which our use of technology has long had destructive effects not strictly related to this apocalypse (United Nations Environment Programme n.d.). As Métis scholar Zoë Todd asks while reflecting on a conference on the Anthropocene she attended in Denver, Colorado:

> What does it mean to have a reciprocal discourse on catastrophic end times and apocalyptic environmental change in a place where, over the last five hundred years, Indigenous peoples faced (and face) the end of worlds with the violent incursion of colonial ideologies and actions? (Todd 2016b)

The Anthropocene connotes a difference in scale—an existential threat to the entirety of humanity across the planet—but there is little doubt that inequalities will continue to be perpetuated as the effects of climate change and environmental degradation worsen. Climate change is certainly a threat to all of us, but not equally and not all at the same time. As Rory Rowan notes, "environmental catastrophe is already here—it's just not evenly distributed" (Rowan 2015, 3). Malm and Hornborg similarly point out that the apocalypse we face in the era of the Anthropocene is not an unequivocal extinction: "If climate change represents a form of apocalypse, it is not universal, but uneven and combined: the species is as much an abstraction at the end of the line as at the source" (Malm and Hornborg 2014, 66–67). Because our use of technology is guided not by attentiveness to the

technology itself, but by the protective impulses of cultures that see technology as a mere means, those who are most vulnerable to the effects of climate change are often those who are already marginalized by socio-economically dominant cultures and therefore have the least voice in the debate. As we face the end of the world in the Anthropocene, we nonetheless continue to erase worlds in both a discursive and practical sense. This is a particularly cruel irony because, as Todd points out, there has long been a wealth of knowledge systems, legal orders, and "cosmologies that enmesh people into complex relationships between themselves and *all* relations, and with climates and atmospheres as important points of organization and action" but this knowledge has been marginalized in favour of more anthropomorphic models (Todd 2016a, 4). If the Anthropocene sees anthropomorphic models stretched beyond their limit then, if we take Simondon's criticisms to heart, it is partly because those anthropomorphic models are too rigid. If we are to challenge our established systems and engage in the kinds of radical reconceptualizations that Simondon calls for, we cannot afford to lose the voices of those on the frontlines of the end of the world.

Even if we do adopt new technologies that will allow us to dramatically curb greenhouse gas emissions, to clean and de-acidify the oceans, to reduce pollution and remove toxins from the soil, even if we do all these things it does not mean that we have fundamentally changed the way in which we use technology. Make no mistake, staving off the climate change apocalypse is imperative and would save countless lives but it is not enough to address the underlying problems that Simondon discusses. By unyoking technology from a set idea of human nature, Simondon encourages a much more radical and far-reaching rethinking of technology. It is not enough to adapt only in order to survive climate change and carry on to fight another day: we need a fundamental change in the way that technology is positioned with regard to human culture.

8. A Culture of Technology

Simondon wants to bring into everyday life a relationship with technology which is not derived from our socio-economic structures, but which is instead ontological. He argues that we cannot take for granted a static human nature or way of being either as a foundation or an endpoint. The imposition of such a framework creates a culture isolated from technology and doomed to stagnation. As Andrea Bardin and Giovanni Carrozinni describe it, for Simondon "the problem of providing a technical-political regulation of the human is the problem of regulating a field essentially lacking in pre-established nature and finality" (Bardin and Carrozinni

2017, 32). To do this we must update our thinking on technology to understand it not as just as a means to pre-established ends, we need what Simondon calls a technical mentality.

This is to be achieved by ending the segregation of technology from culture. This re-evaluation of technology as something vital and creative will "give man the means of thinking about his existence and his situation in terms of the reality that surrounds him," a means of understanding the position of individuals with regard to the nexus of relations we participate in (Simondon 1980, 7). Our relation to technology—and by extension the environment and anything outside of a narrowly defined human subject—should not be understood as a vertical hierarchy. Simondon suggests in the first part of *On the Mode of Existence of Technical Objects* (1980) that humans should not be thought of as subservient to machines, but neither as masters of them.

Technology does not just consist of tools which allow us to achieve direct ends, instead it is a way of modifying ourselves through modifying our environment. To this end, Simondon writes that real technological progress concerns the modification of technological ensembles. The ensembles consist not only of machines but of the entire social, political, and practical environmental context in which they function. Muriel Combes in fact suggests that technical ensembles for Simondon could just as well be called "technosocial formations" as they consist not only of machines but "specific assemblages of humans, technical individuals or machines, technical elements, resources, and milieus" (Combes 2013, 95). Technological ensembles are not just a means to an end; they are a network of relations and actions which feedback on each other:

> [M]an stimulates his environment by introducing a modification; as this modification develops, the modified environment offers man a new field of action, demanding a new adaptation and arousing new needs. The energy of the technical gesture, having passed through the environment, returns to man and allows him to modify himself and evolve. (Simondon 2015, 19)

This, for Simondon, is a true sense of evolution, not defined by a pre-existing teleology but an open system which restructures and regulates itself. In this sense "evolution is not really a perfecting but an integration, maintaining a metastability that relies increasingly on itself, accumulating potential, assembling structures and functions" (Simondon 2013, 213).

Within the non-hierarchical relation of the ensemble "man is forced to learn a new function and to find for himself a position in the technical ensemble that is

something other than the position of individual" (Simondon 1980, 97). Simondon illustrates this using the analogy of a conductor and their orchestra; he writes that insofar as a person is the organizer of a mechanical process they are "among the machines that work with him" (4). A conductor, Simondon notes, is distinct from a simple taskmaster. The direction of a conductor is not simply a unilateral imposition of a certain tempo and intensity, rather it is carefully maintained in relation to the movements and interrelations of the orchestra. The conductor provides a focal point for the orchestra's relations to each other and for their existence as a group. However, the conductor is also a part of this group and affected by their membership in it.

In many ways this does not fit well into contemporary discourse on climate change or the Anthropocene. Simondon was not writing about the potential of imminent extinction and so, while his work is clearly deeply concerned about the effects of misusing technology, his tone conveys considerably less urgency than many writing today. While concerned, he is not panicked and there is an overall sense of optimism through much of his work.

He acknowledges, for instance, that any real technological or human progress will be both slow and risky. The great, innovative leaps forward of spectacular new inventions "[give] a spectacular impression of the abstract notion of possible progress" but this is largely because their "performance contrasts with those of other machines and the possibilities of the surroundings" (Simondon 2010, 234). Real technological progress "must be a progress of the whole," the entire ensemble (235). His belief is that by integrating technology and its wider ensemble of environmental and human relations into what is considered human culture we participate in a technological ensemble which is self-regulating according to its functioning, rather than superimposed ends. He admits that "such progress would therefore be much slower at each point and much more profound in its totality, thus much more truly progress" (234).

Ruminations on the ontology of identity and relation may seem too abstract at a time when action is urgently needed, but as Jason Moore bluntly puts it: "Shut down a coal plant, and you can slow global warming for a day; shut down the relations that made the coal plant, and you can stop it for good" (Moore 2016, 94). For Simondon any betterment that technology may offer humans centers not on individuals or on particular technologies but on the relational networks between people and their communities and environments. In his view not only should we not continue to use and understand technology in the way to which we have been accustomed, we cannot. Technology will always buck our expectations because it

always institutes its own norms and relations. It will always find ways of functioning which are not governed by our designs. Rather than clinging to a hierarchy in which humans are above technology, able only to understand it within a scheme of means and ends, we must adopt a position in which we are able to see how we are entangled in a milieu of environmental and technical relations. This means giving up the privileged and protected position of sovereign subject. The idea of embracing systems of organization which are not centred solely on a stable notion of the human individual may inspire trepidation but in Simondon's view there is so much to human life beyond what we identify with the individual. Our relations with our environment, with others, the communities we participate in, all these arise from processes which include the individual but also exceed it. Because of this, Simondon can assert that what is lost in the safety and stability of hierarchy would be made up for by the flexibility, resilience, and richness that we stand to gain.

9. Conclusion

A response to climate change and the Anthropocene which tries to adapt old anthropomorphic systems to new circumstances is not enough for Simondon. Particularly in a time that pushes the boundaries of what how we understand humans and nature, solutions which try to maintain a rigidly anthropomorphic framework will not reach the root of the problem. For Simondon, the problem is a way of understanding and using technology which attempts to reduce technology to a simple means to our ends. Not only does this narrow focus on an anthropogenic teleology mean that we tend to neglect all the other effects that our use of technology has, it also closes human culture off to the rich potential that technology has for instituting new relations. Being isolated from a more profound understanding of technology means that we also isolate ourselves from the environment and from each other. Though Simondon was not writing at a time when climate change was as pressing a concern, for him isolation from the wider network of the technological ensemble will always be world ending because it gives human cultures no way to develop. Attempts at developing through nationalistic domination and competition are doomed to fail because they can only cling to a fragile stability without really producing anything new. A reconsideration of our relationship with technology as Simondon advocates has a profound impact that includes but goes beyond the current climate change crisis and can help us reconsider our discussions of technology, society, and apocalypse in the Anthropocene.

Notes

1. For an expression of this view within the realm of philosophy one might look to the eco-modernist manifesto (Asafu-Adjaye et al. 2015). Iterations of this idea can be found not only in the formal institutions I mention but in popular discourse, for instance interviews and speeches by high-profile entrepreneurs such as Elon Musk (Korosec 2015) and Richard Branson promise that not only can technology save us but that the development of this technology will and must "make good business sense" within existing economic frameworks (Scher 2017).

2. Simondon does offer Lamarck some praise for considering evolution as "incorporating effects introduced randomly by the environment into the individual" (Simondon 2013, 212fn23) as well as for "considering the individuated being as playing a key role in adaptation" (Simondon 2013, 211).

References

Asafu-Adjaye, John, Linus Blomqvist, Steward Brand, Barry Brook, Ruth Defries, Erle Ellis, Christopher Foreman, David Keith, Martin Lewis, Mark Lynas, Ted Nordhaus, Roger Pielke Jr., Rachel Pritzker, Joyashree Roy, Mark Sagoff, Michael Shellenberger, Robert Stone, and Peter Teage. 2015. *An Ecomodernist Manifesto*. http://www.ecomodernism.org/.

Bardin, Andrea, and Giovanni Carrozinni. 2017. "Organising Invention through Technical Mentality: Simondon's Challenge to the 'Civilisation of Productivity.'" *Culture and Organization* 23(1): 26–33. https://doi.org/10.1080/14759551.2016.1240400

Cohen, Tom, and Claire Colebrook. 2014. "Series Note: Critical Climate Change." In *Minimal Ethics for the Anthropocene*, by Joanna Zylinska, 2. Minneapolis: Open Humanities Press. http://www.openhumanitiespress.org/books/series/critical-climate-change/.

Combes, Muriel. 2013. *Gilbert Simondon and the Philosophy of the Transindividual*, trans. Thomas LaMarre. Cambridge: MIT Press.

Environmental Protection Agency. 2017. *Reducing Greenhouse Gas Emissions*. https://19january2017snapshot.epa.gov/climatechange/reducing-greenhouse-gas-emissions_.html.

European Commission. 2017. *Adaptation to Climate Change*. https://ec.europa.eu/clima/policies/adaptation_en.

Glendinning, Chellis. 1990. "Notes toward a Neo-Luddite Manifesto." *The Anarchist Library*. http://theanarchistlibrary.org/library/chellis-glendinning-notes-toward-a-neo-luddite-manifesto.

Haraway, Donna. 2016. "A Cyborg Manifesto." In *Manifestly Haraway*, 3–90. Minneapolis: University of Minnesota Press.

Korosec, Kirsten. 2015. "Elon Musk: Only a Carbon Tax Will Accelerate the World's Exit from Fossil Fuels." *Fortune*. http://fortune.com/2015/12/02/elon-musk-carbon-tax-paris/.

Malm, Andreas, and Alf Hornborg. 2014. "The Geology of Mankind? A Critique of the Anthropocene Narrative." *The Anthropocene Review* 1(1): 62–69. https://doi.org/10.1177/2053019613516291

Moore, Jason, ed. 2016. *Anthropocene or Capitalocene? Nature, History and the Crisis of Capitalism*. Oakland, CA: PM Press.

Rowan, Rory. 2015. "Extinction as Usual?: Geo-Social Futures and Left Optimism." *E-Flux Journal* 65: 1–11.

Scher, Robin. 2017. "Sir Richard Branson Says Climate Change Is a Great Opportunity: Here Are 5 Ways He May Be Right." *Alternet*. https://www.alternet.org/environment/sir-richard-branson-says-climate-change-great-opportunity-here-are-5-ways-he-may-be.

Simondon, Gilbert. 1980. *On the Mode of Existence of Technical Objects*. trans. Ninian Mellamphy. London, ON: University of Western Ontario.

Simondon, Gilbert. 1989a. *L'individuation psychique et collective*. Paris: Aubier.

Simondon, Gilbert. 1989b. "Technical Mentality," trans. Arne de Boever. In *Gilbert Simondon: Being and Technology*, ed. Arne de Boever, Alex Murray, Jon Roffe, and Ashley Woodward, 1–18. Edinburgh: Edinburgh University Press.

Simondon, Gilbert. 1992. "The Genesis of the Individual," trans. Mark Cohen and Sanford Kwinter. In *Incorporations*, eds. Jonathan Crary and Sanford Kwinter, 297–319. New York: Zone Books.

Simondon, Gilbert. 2010. "The Limits of Human Progress: A Critical Study," trans. Sean Cubitt. *Cultural Politics* 6: 229–36. https://doi.org/10.2752/175174310X12672016548405

Simondon, Gilbert. 2013. *L'individuation à la Lumière des Formes et d'Information*. Grenoble: Éditions Jérôme Millon.

Simondon, Gilbert. 2015. "Culture and Technics," trans. Andrea Bardin and Giovanni Menegalle. *Radical Philosophy* 189: 17–23.

Todd, Zoe. 2016a. "An Indigenous Feminist's Take On the Ontological Turn: 'Ontology' Is just Another Word for Colonialism." *Journal of Historical Sociology* 29: 4–22.

Todd, Zoe. 2016b. "Relationships." *Cultural Anthropology*. https://culanth.org/fieldsights/799relationships.

United Nations Environment Programme. n.d. *Climate Change Adaptation*. http://www.unep.org/climatechange/adaptation/.

Techné: Research in Philosophy and Technology ISSN: 1091-8264
21:2–3 (2017): 386–404 DOI: 10.5840/techne201712479

What Is Called Caring? Beyond the Anthropocene

Bernard Stiegler
Translated by Daniel Ross

In honour of Rudolf Boehm

Abstract: This article addresses the question under what conditions it is still possible to think in today's era of the Anthropocene, in which the human has become the key factor in the evolution of the biosphere, considering the fact, structurally neglected by philosophy, that thinking is thoroughly conditioned by a technical milieu of retentional dispositives. The Anthropocene results from modern technology's domination of the earth through industrialization that is currently unfolding as a process of generalized, digital automation, which tends to eliminate reflection and to block any genuine questioning of its own development, producing a state of generalized entropy at all levels—ecological, psychic, social, economic, and, in particular, the noetic or thinking. The radical undermining of the very possibility of thinking and questioning, thought by Martin Heidegger in terms of Enframing, should be understood as a pharmacological situation that calls for a therapeutic reversal of the toxicity of current digital technologies into a remedial instrument for realizing a negentropic turn beyond the Anthropocene and toward the Neganthropocene. This requires that thinking starts to understand itself as caring, i.e., as a taking care of itself by taking care of the technical *pharmaka* that thoroughly constitute and condition it and that can render human life as noetic life both deeply unlivable and profoundly worthwhile.

> A few years ago, while visiting or, rather, rummaging about Notre-Dame, the author of this book found, in an obscure nook of one of the towers, the following word, engraved by hand upon the wall:—
>
> ΑΝΑΓΚΗ

Bernard Stiegler, Institut de Récherche et d'Innovation, 111, rue Saint-Martin, 75004 Paris, France; Bernard.Stiegler@centrepompidou.fr.

> These Greek capitals, black with age, and quite deeply graven in the stone, with I know not what signs peculiar to Gothic caligraphy imprinted on their forms and upon their attitudes, as though with the purpose of revealing that it had been a hand of the Middle Ages which had inscribed them there, and especially the fatal and melancholy meaning contained in them, struck the author deeply.
>
> He questioned himself; he sought to divine who could have been that soul in torment which had not been willing to quit this world without leaving this stigma of crime or unhappiness upon the brow of the ancient church.
>
> . . . Thus, with the exception of the fragile memory which the author of this book here consecrates to it, there remains today nothing whatever of the mysterious word engraved within the gloomy tower of Notre-Dame—nothing of the destiny which it so sadly summed up. The man who wrote that word upon the wall disappeared from the midst of the generations of man many centuries ago; the word, in its turn, has been effaced from the wall of the church; the church will, perhaps, itself soon disappear from the face of the earth.
>
> It is upon this word that this book is founded.
>
> —*Victor Hugo,* Notre Dame de Paris

1. Thinking Carefully in the Anthropocene in Order to 'Try to Live'

Halfway through the second decade of the twenty-first century, we, non-inhuman beings that we are, find ourselves trying to live within a state of emergency that is permanent, universal and unpredictable, and that seems bound to become unliveable. We all feel this urgency. But, most of the time, we deny it—except when we have no choice but to observe its immediate and disastrous effects upon our everyday existences, which tend thereby to find themselves reduced to subsistence, that is, to survival.

This permanent, universal and unpredictable state of emergency affects the entire biosphere, threatening every form of life. And, from the side of the *noetic* form of life—that of the non-inhuman beings that we try to remain—it affects all forms of *investment* and therefore all social constructions, leading to their disintegration and threatening to lead to the worst kinds of political regression: witness the proclamation in France of a 'state of emergency' allowing the government to suspend normal law and paving the way for all manner of states of exception that remain still to come.

In the next few years, this exceptional state will continue to deteriorate, because it is *now* that we are reaching the limits of that geological era known as the Anthropocene, in which *Anthropos* has become a key factor in the evolution of the biosphere—which is also the Capitalocene, and doubtless also what Martin Heidegger called 'modern technology.'

In 1993, the Anthropocene crossed a threshold: via the World Wide Web, that is, with global digital networks (in 2016, half the world's population is 'connected' whenever and wherever it may be), the conditions for the installation of the *disruption* have now been met (Stiegler 2016b). The latter enables capitalism, which has now become thoroughly computational capitalism, to *systemically* short-circuit any theoretical elaboration, any social appropriation, any collective individuation, any legal framework and any political deliberation.

In the disruption, the technology of digital tertiary retention *outstrips and overtakes* [*prend de vitesse*] thinking, whatever forms it takes, in all quarters creating *theoretical vacuums* and *legal vacuums*. This raises the question of how it might *still be possible* to think in the Anthropocene—in particular if we agree with Georg Wilhelm Friedrich Hegel's definition of thinking not just as an isolated mental and psychic activity, solitary and atomized, but as a process through which mind or spirit is socialized—and is so in the experience of its fundamental lateness.[1]

This lateness is the experience of what I tried to think in *Technics and Time* as an originary default of origin—of which we must take care [*et qui doit être pansé*].[2] And this is what, after the most recent volume of that series, I have understood as the question not of dialectics, whether idealist or materialist, but as the *necessity* (Ἀνάγκη) of *quasi-causality* such as it was elaborated by Gilles Deleuze on the basis of Stoic morality and the Nietzschean conception of the will to power.

Quasi-causality, thus understood, is what takes up the default of origin so that it can become that which is necessary. The first three volumes of *Technics and Time* described the consequences of the default of origin as the periods, eras and epochs of what Jacques Derrida called the 'history of the supplement,' based on what André Leroi-Gourhan described as a process of exteriorization. Subsequently, *Automatic Society* and *Dans la disruption* introduced the questions of entropy, negentropy, the Anthropocene, the Capitalocene and the concept of exosomatization. The last of these, exosomatization, was borrowed by Nicholas Georgescu-Roegen from the works of Alfred Lotka, with the aim of *regrounding* economic theory (Georgescu-Roegen 1971).

Under what conditions can we still think in the Anthropocene? On the condition that we think it [*penser*] in order to treat it, to take care of it [*panser*].

To think [*penser*] *in order to care* [*panser*] is to 'try to live'—in the sense of the sublime tension of the beautiful *Cimetière marin* (Valéry 2013) (repeated and interpreted in Hayao Miyazaki's *The Wind Rises* [2013])—for example, by practising biology as a vital function in exosomatization, such as Georges Canguilhem treated it [*panse*] when, at the beginning of *Knowledge of Life*, he stated, as a starting point and as a point of method, that is, a way of opening a path, that "knowing only in order to know is hardly more sensible than eating in order to eat, killing in order to kill" (Canguilhem 2008, xvii).

2. Anti-Anthropy

To care-fully think [*panser*] the Anthropocene is to think *beyond* the Anthropocene—towards the Neganthropocene.[3] The Neganthropocene is the prospect that must be *opened up* from within the blocked horizon that is the Anthropocene. But this requires a neganthropology.[4]

Neganthropology defines the noetic form of life as neganthropic. Neganthropy is what results from that combination of the capacities of the living to temporarily and locally defer entropy (which Erwin Schrödinger called negative entropy) that have arisen since the fact of exosomatization. Exosomatization does not simply produce negative entropy, or anti-entropy (Bailly and Longo 2009; Derrida 1982): it produces neganthropy, or anti-anthropy.

Such a process is a noetic *différance*, that is, a temporalization and a spatialization occurring *as exosomatization*. Exosomatization is a form of organogenesis that produces organs that are non-living yet essential to the survival of the organism, which is thus equipped with organs that are not just endosomatic, that is, organic, but exosomatic, that is, organological.

Unlike organic organs, however, the mutual relationships between organological organs are indeterminate, as are the relations they maintain with endosomatic organs, the psychosomatic organisms that they compose and the social organizations wherein they develop. Hence exosomatization engenders a pharmaco-logical situation where exosomatic supplementation *simultaneously saves and threatens* the noetic form of life that is exosomatized life—as anthropy and as neganthropy.[5]

Noesis, here, has the vital function (in Georges Canguilhem's sense and in Alfred North Whitehead's sense) of increasing the neganthropic potential and reducing the anthropic impasses to which exosomatization always inevitably and simultaneously leads.

3. Hypercritique

To care-fully think [*panser*] the Anthropocene in the twenty-first century is to think *at the limit* of the thinkable [*pensable*]—and of the 'care-able' [*pansable*]. This thinking that cares at the limit requires us to think the limit;[6] it requires what *Technics and Time, 3* (Stiegler 2011) described as a *new critique*—which is also a *hypercritique*, which, so to speak, carries the concept of the limit to its limit in a test of cosmological limits that would have been inconceivable to classical critique, and which simultaneously arises as the entropic processuality of the expanding universe, the anthropic impasse that is the Anthropocene and the exosomatic condition of all noesis.

Hypercritique is what thinks the limits of thinking, that is, of critique itself in the conditions and *under* the condition of exosomatization such that it thereby constitutes and destitutes the *there* (*Da*) and as that which there is (*es gibt*), that is, as that, *es*, which gives, *gibt*.[7] Exosomatization, insofar as it 'transcends' noetic life by *imposing itself* on it, is what trans-forms *surrealities* into various forms of transcendence. These surrealities, which extend throughout the history of exosomatization (as magic, divinities, the one true God and resulting forms of sacredness, including in secular law as politics and the profane sacredness of law, if we can put it like that), constitute what *La société automatique 2* will describe as a surrealist cosmology.

It is *in this sense* that, within what Martin Heidegger tried to think under the name of *Gestell*, which is the *empty surreality of that desert* that Friedrich Nietzsche saw coming as the endpoint of 'nihilism,' after Immanuel Kant, and in the Anthropocene (such that, as the Capitalocene, it leads to the generalized proletarianization imposed by calculation, which replaces thinking as well as knowledge, that is, care), the hypercritique that cares about and cares for [*panse*] the limits of thinking, and therefore of critique itself, must be an organology as well as a pharmacology.[8]

Organology considers noetic life from the threefold perspective of psychic individuation, technical individuation and collective individuation. These three forms of individuation, the relations between which are transductive (which means that no one of them can occur without the other two), result from the process of exosomatization—that is, from the fact that some three million years ago a form of life arose that is *incomplete in its material form*, that is, *in its organogenesis*. This was the advent of a neotenic form of life, whose constant production, through the generations, of new artificial organs is the condition of its survival, in turn requir-

ing *social organizations* to ensure the *exchanges of organs* between exosomatic organisms and to ensure the arrangements of these organological organs with the organic organs of these organisms.

According to this perspective, *words*, too, are organs, fruits of *poiēsis*, and each generation must relearn them, pending the direct or indirect coining of new ones. To coin new words, like the creation of instruments and other organological organs, is always a collective activity, and this collectivity produces circuits of transindividuation, which in turn support this collectivity.[9]

The organizational functions that ensure the coming together of the social [*faire-corps au social*]—in the sense indicated by Émile Durkheim when he refers to organic solidarity—are, as exchanges of organological organs, the *economy*, and, as the arrangement of these organological organs with the psychosomatic bodies in which this life consists, *education*. To learn to speak, or to shoot an arrow (which is vital in an Amerindian society, where it therefore begins at an early age), or to play an instrument, or to count, and ultimately to *care for things* [*panser*] *in a thousand ways*, is what exosomatization requires from the first moments of a newborn's life.

It is magic, the supernatural, religion and/or politics that govern the relationships between economy and education—at least until the disruption occurs as the final extremity of the Anthropocene such that it *breaks with* exosomatization conceived as social solidarity [*faire-corps social*]: in the disruption, whose *radicalized* form is transhumanism, society disintegrates.

That the production and exchange of exosomatic organs is the condition of the form of life of the noetic beings that we are, or that we are trying to be, is the primary thesis elaborated by Karl Marx and Friedrich Engels in *The German Ideology* (Marx and Engels 2004). They showed that, through these exosomatic organs whose production is the rule of social evolution, systems of domination are created and operate, themselves supported by knowledge, and that this leads to a struggle between classes.

Furthermore, what would become Marx's great theme in *The Communist Manifesto* of 1848 was already present in the third of the *1844 Manuscripts* (Marx 2011): that in the epoch of industrial capitalism, that is, with the emergence of an exosomatic development that would lead to the Anthropocene within what Vladimir Vernadsky called the biosphere, the capturing of knowledge, holding it within the apparatus of production, would lead 'abstract labour' (as Marx and Engels referred to it) to destroy living knowledge. The Anthropocene thereby leads—and

as the disruption—towards what the *Grundrisse* would in 1857 describe as full automation.[10]

The current period of the Anthropocene consists in just such a process of automation, which we call disruption. The latter has, however, in terms of automation, become structurally insolvent: it destroys purchasing power and therefore market solvency.[11] What this means is that macro-economic change is required on a global scale.

Living knowledge, as Marx conceived it in 1844 (cf. Henry 1983), is, in its structure, open to the infinite and the improbable. And, as such, it is neganthropic. The annihilation of living knowledge to which we contribute with the data economy, which transforms it into calculable information through the process of digital grammatization, is the most advanced stage of fixed capital as it becomes a production force that excludes living knowledge.

Fully automated informational fixed capital, moreover, tends to close itself into a *closed system*: in its struggle against the tendency of the rate of profit to fall, it tends in a structural way to increase the rate of entropy. Self-referential, and turning the users of the information system into its servants, that is, 'technogeographical'[12] *functions* of the system, which thereby constitutes an associated milieu,[13] the individuals dissolved into this system thereby become 'dividuals' (Deleuze 1995, 177–82; Stiegler 2016a, §14), and repetition (which Derrida also called 'iteration') no longer produces either différance in Derrida's sense, or difference in Deleuze's sense. Such is the growth of the desert.

The issue here is hypomnesic tertiary retention. And the first to conceive this issue, which is the exteriorization of knowledge and the possibility of its proletarianization, was not Marx but Socrates, for such are the stakes of the question of the *pharmakon* (Stiegler 2010a)—it was in *Protagoras* that the theme of the *pharmakon* first appeared. *Hence the question of pharmacology constitutes the first and last issue in the history of philosophy*, and does so starting from an organological situation in relation to which what, after Heidegger and Derrida, we call 'metaphysics' (as the object of deconstruction) would amount to the *constant denial*.[14]

Conceived in this way as a process of exosomatization, where what Whitehead called the function of reason would be to provide the *incalculable, improbable and as such neganthropic* criteria for the therapeutics required by this pharmacology—this therapeutics forming what we call forms of knowledge—the test and the ordeal of the *limits of noesis* is *at present* required because in *this* 'present,' the Anthropocene itself is reaching its limits: the Anthropocene is entering its final phase, as disruption, and as a 'shift'[15] approaches that would complete

a chaotic bifurcation (and that would also be catastrophic, in René Thom's sense of the word).

To care-fully think [*panser*] in the Anthropocene is to *evaluate and transvaluate the disruption* as the *final extremity* of nihilism—an evaluation carried out from the perspective of a *transvaluation of that transvaluation* of all values which Nietzsche affirmed as the urgent need to leap (*Sprung*) beyond the 'last man.' And it is to do so beyond the nihilism that has led to the global spread of *ressentiment*[16] in the hegemony of the calculation of averages.

In the next volumes of *Technics and Time*, as in *La société automatique 2. L'avenir du savoir*, it will, indeed, be a question of *transvaluing the Nietzschean transvaluation, precisely because what Nietzsche could neither know nor think was exosomatization*.

4. Vocation, Provocation, Falling

To care for [*panser*] the Anthropocene is to think it from the perspective of a leap capable of *piercing the blocked horizon*.[17] What Heidegger called Dasein, constituted by its 'possibility of questioning' being (Heidegger 2010), can question *in fact* only insofar as it is itself *put* in question (Stiegler 2013). And this putting in question (or question*s*), this challenge, is the fact of technics, such that, itself emerging from prior challenges, from prior instances of putting in question to which it responds as the *operation(s)*[18] of Dasein put into question (the insistence on this word, *operation*, will be explained later), it always *provokes* new challenges and new questionings, and always poses new problems—in passing through the *vocations* to which it also gives rise.

Today, the being put into question and the *provocation* (*herausfordern*, 'challenging forth') in which this consists, confronted with problems now posed by previous responses to prior challenges, is crossing a threshold that paves the way for a bifurcation of immeasurable magnitude—in the history of what Heidegger called Dasein, as well as in the history of what Derrida called différance and the supplement. This bifurcation is a leap into the *im-mense*, that is, into excess: into *hubris* and violence (*Gewalt*[19]), opening onto what Heidegger called the abyss (*Abgrund*).

This questioning and challenging is what Heidegger, confronted in the 1940s with what had become *inconceivable* in this putting into question(s), began to call *Gestell* (Heidegger 1977)—as that which requires a leap towards the *Ereignis*.[20] The being put into question(s) that results from the *provocation* in which *Gestell* consists, inasmuch as it might *put an end to any possibility of questioning whatso-*

ever,[21] is occurring as the completion of the Anthropocene—which is what in his time Heidegger called 'modern technology.'

The completion of the Anthropocene conceived in this way is the completion of the period of nihilism-become-capitalism: it is nihilism as computation. And it is from algorithmic and reticulated computation that disruption installs what Thomas Berns and Antoinette Rouvroy call algorithmic governmentality—as the thoroughly computational capitalism that is establishing an era of *absolute non-knowledge*.

In this absolute non-knowledge, knowledge itself disintegrates into the in-formation generated by fully automated calculation, and into fixed capital, which, along with 'big data,' forms the hyper-synchronized associated milieu—or what I call the digital Leviathan (Stiegler 2016a, chap. 5)—produced via the applied mathematics of correlational algorithms. In this hyper-synchronized milieu, *the diachronic can no longer exteriorize itself other than diabolically*, that is, outside of any circuit of transindividuation, or, in other words, outside of any synchronic metastability.

It is on the basis of this *herausfordern*, and as a new age of what Heidegger called 'standing reserve' (*Bestand*), that there has arisen, today, in the disruption, a pseudo-scientific ideology calling itself 'transhumanism.' This transhumanism is embodied in a global industrial project in the form of a strategic marketing of unprecedented virulence.[22]

This pro-vocation (as the first moment of the doubly epokhal redoubling) calls, however, for a struggle against transhumanism, and this combat (*polemos*, and not only *eris*) is a *vocation* (in the sense developed in Stiegler 2009 (1–2), that is, the *production of noetic circuits opening the era of a new epistēmē*. This *herausfordern* calls for the *second* moment of the doubly epokhal redoubling that is the *Ereignis*, and as 'vocation': *fordern*, to demand, claim, require.

Transhumanism tries to *inscribe into exosomatization itself the structural short-circuiting of this vocation* that is the *function of reason*—and it is in this way that the Capitalocene tries to impose its hegemony *ad vitam aeternam* through the unlimited extension of computational power.

The pro-vocative putting in question(s) that is the *Gestell*, product of the noetic dreams of the *Aufklärung*, is more than 'historial' [*Geschichtlich*]: it *puts historiality itself in question*. Hence it invites us to revisit the entire Heideggerian corpus starting from the question of *Geschick* (fate)—as well as that Nietzschean phrase: *amor fati*. This challenge to historiality also challenges noeticity, and this

manifests itself today, massively, as de-noetization, but it is also the very thing of which Heidegger was the first victim.

The falling prey [*déchéance*] *that would entangle Heidegger in the wake of the Nazi movement stems from an earlier de-noetization*, described by Husserl in *The Crisis of European Sciences*—a crisis that translates into a *transgenerational withdrawal* [*défection*] *of knowledge*, arising from a *pharmacological crisis*. That someone who claimed to be a thinker of falling, of *verfallen* and *Verfallenheit*, would himself fall prey makes it all the more essential to undertake a meticulous reading of his thought and its history. And, in this connection, Rudolf Boehm, in 'Pensée et technique' (Boehm 1960), has indeed shown how Heidegger's inaugural, tortuous question of *tekhnē* thoroughly traverses the individuation of Heidegger's own Dasein.

The historic falling prey of Heidegger to Nazism has *everything* to do with the detours he took in his attempt to think *tekhnē*. As *pharmakon*, and as the *unthought* of science, but also of philosophy and law, and therefore of politics, *tekhnē* is what provokes the *more or less local regressions* that characterize the twentieth century—of which Nazism is the worst expression—and that all foreshadow the great *planetary* regression that at the beginning of the twenty-first century we all find ourselves forced to endure.

In 1935, after the plebiscite that brought Hitler to power, and in relation to which it is highly doubtful that Heidegger would either have voted no or abstained, Edmund Husserl wrote in *The Crisis of European Sciences* that it is possible, "*today*," to listen to the "Hymn to Joy," so characteristic of the epoch of the *Aufklärung*, "only with painful feelings. . . . A greater contrast with our present situation is unthinkable" (Husserl 1970, 10). Hitler had on August 19, 1934 obtained 89.93 percent of the votes cast, for his proposal that, with the death of President von Hindenburg, he himself should combine the functions of president and chancellor, and so become the full Führer of the German people, according to the *will* of the people expressed by its 'free vote':

> Firmly and deeply convinced as I am that all state power derives from the people and must be sanctioned with a free and secret vote, I ask that the decision of the government be submitted to the German people without delay with a free plebiscite.[23]

This would be a freedom to vote in relation to which philosophical *courage*—which is always also a political *lucidity*, and in which any philosophical truth *before all else* consists (as Foucault recalled in the months before his death)—would

prove to be *absolutely deficient* in Heidegger, who never managed to care for the default *that is necessary*.

5. The Courage of Caring for the Present

To think in the sense that Heidegger claims to do, when he defines *thinking* as *care* (*Sorge*), that is, as *caring* [*panser*], panser in the sense that it is a matter of taking care of care itself [*panser le panser lui-même*], and, in so doing, of thinking thinking itself, as *What is Called Thinking?* (Heidegger 1968) invites us to do, is always to think and to care for the *general* form of what any age refers to as *today*. It is always to think and to care for it in and from the *singularity* of today that is or that becomes or that happens *here* [*là*], as the *Da* of Da-sein, as that which happens in and with *this* today, so to speak, as 'our present situation.'

In the situation within which it presents itself, this 'today,' if it *does*, indeed, *present* itself, now *presents itself as never before*, as remaining *irreducible to any generalization*—irreducibly intransigent: "intractable," as Roland Barthes said of what he referred to as the *punctum* (Barthes 1984, 77), which, *precisely as such* (inasmuch as this irreducibility exceeds the *studium*, being extra-ordinary), is what *requires*, and as an *imperative*, the 'courage of truth.'

The courage *of truth*, which was *obviously* lacking in the thinker of *verfallen* and *Verfallenheit* (falling prey, entanglement, degradation, decline, ruin, decay, collapse, enslavement), is *just as* lacking in those who either repeat his discourse like asses astonishingly equipped with the capacity of the parrot, and equally so in those who refuse to read it.[24] In 1936, counter to this historical cowardice of thinking, Husserl gave a lecture on 'The Origin of Geometry' in which he called his own entire project into question, challenging an enterprise that he had begun at the end of the nineteenth century by confronting the crisis of mathematical foundations. In so doing, he reopened the question of the *pharmakon* that had appeared at the very origin of philosophy.

The scope of this calling into question(s), which has *still not* been explored in depth even after Derrida, continues to escape most professors of phenomenology—confirming for today's younger generations the idea that in order to understand the singularity of the present situation and to consider its being *there*, phenomenology is *presently useless and vain*. It is true that *our there is not there* [*notre là n'est pas là*]—and that therein lies the whole problem, which is also that of the 'epoch' of the 'absence of epoch.'

Nevertheless, it is only after phenomenology, brought to its most extreme point by Husserl and 'reset' [*relève*] by Derrida as the *logic* of the supplement, that

it is possible to consider this uselessness and vanity. Heidegger, that Dasein who was Heidegger, was incapable of elucidating the situation that revealed itself to Husserl's eyes between 1934 and 1936, a crisis that would subsequently lead to a not-being-there where *today* all those fantasies return that had ensnared Heidegger (as well as some others, who are not themselves negligible), only because Heidegger and these others did not know and could not think the *pharmakon*, which also means that they could not take care [*panser*] of it—precisely *unlike* Husserl, that is, *to the différance* of Husserl's introduction, in 'The Origin of Geometry,' of the question of the technical condition of *alētheia* conceived as having an essential relation to *apodeixis* (Husserl 1978), and, in that noetic différance, creating an *exosomatic différance*.

As for today in general—insofar as, being *there*, it *constitutes the present* historially, that is, in Heidegger's terms, insofar as it *presents* being as 'destination' (*Geschichtlichkeit*), and as an *epoch* of the history *of being*—as for today in its 'generality,' and inasmuch as 'for any time' today is what *constitutes* an *epoch*, and presences *itself* as such, as that which, therefore, represents itself, the temporality of this today stems from what Heidegger was aiming at when he referred to *Anwesenheit*, as a way of thinking the *time* of being.[25]

Presence, *Anwesenheit*, in the today of the Germany of the 1920s and 1930s, that today understood by the Da-sein of Heidegger, is always *in general and also* what *presences*, when a 'destinal' (*geschichtlich*) moment occurs, and for Dasein in general insofar as it is the being who questions in general, *only* as the *overturning putting in question* of the *Gegenwart*, of the present: it is as such always *also* its absenting, that is, that which hollows out an expectation in the present, and in a kind of not-being-there(-yet).

Now, nothing is more ambiguous and necessary than such an expectation—which is a protention, and, more precisely, it is the arche-protention that proceeds from being-towards-death (*Sein-zum-Tode*). This *Sein-zum* . . . is indeed oriented towards the actualization of entropy that is death, but, as *Entschlossenheit* in the *eigentlich*, that is, in 'ownmost temporality' or 'originary' or 'authentic' temporality, this being-towards . . . , or being-to . . . , is not only negentropic, but neganthropological.

I have begun to investigate this in *Dans la disruption* (Stiegler 2016b, §116) by positing that being-towards-death is not just *also* but in fact *firstly*—and as being-towards-the-future [*avenir*] insofar as it cannot be reduced to becoming [*devenir*]—the *arche-protention required by a being-for-life that exceeds life*. This is something that *Being and Time* does not investigate.

The arche-protention of being-for-life presents itself at the heart of this presence only as the hollow of an absence that is also an anxiety. This anguishing hollow that inhabits any *Sein-zum-Tode* is the haunting (the spectrality) that *returns* from *tertiary retention* inasmuch as it constitutes a *Weltgeschichtlichkeit*, but this is what that Dasein who was Heidegger did not manage either to think or to care for [*ni penser, ni panser*], or to take care of (*verbinden, versorgen*)—and which is the condition of possibility and impossibility of what Derrida called 'survival,' or 'living on' (*la survie*).

6. To Think the Wound in the Experience of P(a)nser

As Heidegger might have said had he been French, it is in *Old French* that we can hear what it contains for thinking.[26] For *penser, to think*, previously meant *soigner*, *to care*, to treat:

> [The word *panser*] was first written *penser*, a spelling used until the eighteenth century, although *panser* and *pancer* can be verified from 1453. In the seventeenth century, both forms were used to distinguish the two meanings, resulting in the separation of the two verbs. *Panser* first means 'to care for, to feed (a horse),' the meaning of 'feeding' coming from the influence of another verb *panser*, meaning 'to nourish, to fill the belly/rumen' (from *panse*); the verb is always used in relation to a horse, but in the sense of 'giving care to its grooming, brushing, combing' (1453). (Rey 2012)

These histories of *panse*, which would undoubtedly have delighted Nietzsche, call for *an organology of pansée, inasmuch as it is also written as—and hence 'thinks itself' (so to speak) as—pensée*, and as the act of *taking care firstly by nourishing*, this question of nourishment being a question of assimilation, on which Nietzsche would both meditate and ruminate.[27]

> In 1680, Richelet reported *panser les oiseaux*, 'feeding the birds, caring for them,' as falling into disuse. The modern medical sense, 'treating the wounds of a man' (1314), is found in the old locution *penser la plaie*, before the direct construction as *panser une plaie, un blessé* (1472), and the absolute construction (1845–46, *panser à sec*). The word is sometimes used in a figurative sense as meaning 'to relieve, to appease' (early fourteenth century). (Rey 2012)

To think would therefore be to take care, to care for, which is also to say, to act, to make—(the) différance: it would always be to think the wound. But what wound?

The wound is *hubris*, *delinquere*, the violence (*Gewalt*) of the necessary default, which also *affects* Persephone and as her *palaiou pentheos*, her very ancient mourning, her old affliction, her 'ancient wound.'[28] This wound is a disease, an *affection*, and this *affect* can also become infected.

Hubris therefore needs those who can *dress, treat, care for and heal* this wound: *panseurs*. The word *panseur* is 'found in the fifteenth century in relation to those who care for a horse and after 1623 in medicine (*panseurs de vérole*, pox dressers).' *To think* would always be *to exert therapeutic activity*: *hubris*, which as we will see Heidegger names both violence (*Gewalt*) and in-quietude (*Unheimlichkeit*, uncanniness) (Heidegger 2000; Boehm 1960), is what, as the *excessiveness of exosomatization*, generates *pharmaka* that *require panseurs*. This requirement, this request, this 'demand,' this 'call,' *requires* a vocation—*fordern*.

To deepen this path of care [*pansée*], which passes through *Taking Care of Youth and the Generations* (Stiegler 2010b), and which leads us to introduce some neologisms that are particularly awkward in their spelling—*p(a)nsée* and *p(a)nser*, and here we would need to return to what Derrida wrote concerning the misspelling, the fault of orthography, that différance assumes (Derrida 1982)—we must return to the first steps that were taken at the beginning of *Technics and Time* on the basis of an analysis of Leroi-Gourhan's palaeo-anthropology: where there appears the *traceology* of the default that it is a matter of caring for, of *p(a)nser*, in order to do what is necessary, and as the traceology of thinking.

Notes

1. On this point, and on the singularity of the current situation in this regard (that is, the disruption and its speed), see Stiegler 2015, §64.

2. *Translator's note*: Throughout this text, Stiegler makes continuous use of these unusual terms, *pansée* and *panser*, mostly found in Old French. Although he explains his utilization of this term in detail later in the text (in §6), explaining the origin of the term in the care for, grooming of, and feeding of horses, it is worthwhile and indeed necessary to draw the Anglophone reader's attention to this word from the outset. This is because, while the French reader cannot fail to notice the similarity between *panser* and *penser* (to think), there is no way of conveying this in English. In this respect, Stiegler's linking of these terms presents a far greater problem to the translator than, for example, Heidegger's linking of *Denken* and *Danken* (thinking and thanking). But this substitution of the letter *a* for an *e* is, for Stiegler, less an echo of Heidegger than of Derrida, that is, of différance, as will become clear in what follows. This is despite the fact that Stiegler's title, *Qu'appelle-t-on panser?*, deliberately repeats the form of Heidegger's 1951–1952 lecture course published as *Was Heisst*

Denken? More immediately, it is necessary to beg the reader's indulgence for the fact that a variety of strategems have been employed in the translation of this term, rather than a single, uniform approach: there being no possibility of an 'ideal' solution, at times the word is kept in French, at other times it is translated as 'care-ful thinking' or 'thinking carefully,' 'caring' or 'to care,' and at still other times as 'thinking and caring.' Very rarely, it is translated as 'treating,' 'to treat' or 'treatment': in such cases, emphasis is placed on the therapeutic character of treatment, combined with the, say, 'noetic' sense of treating a problem in a treatise, but specifically *not* referring to the sense of the treatment of data by computational or algorithmic processing. The hope motivating this approach is to fortify the reader's tolerance for the occasional presence of this rather alien French term within the text by at other times providing assistance with readability, so that together these strategies might encourage the reader to internalize the necessary associations.

3. The Neganthropocene is what neganthropology tries to think, where thinking also means caring. The contours, axioms, theses and hypotheses of neganthropology will be specified in Stiegler, *La société automatique 2. L'avenir du savoir* (Fayard, forthcoming). Neganthropology aims to establish what the Anthropocene should become, 'transvaluated' by the Neganthropocene, thereby opening both a new epistemic era for noetic forms of life (against the de-noetization currently underway) and the possibility of a contributory economy founded on this new *epistēmē*, in turn generating new forms of knowledge—of how to live, do and conceive—starting from a quasi-causal (and non-'dialectical') reversal of what has proven to be *absolute non-knowledge*.

4. The theoretical elements presented here as the foundations of such a neganthropology will be more systematically developed in *La Société automatique 2*.

5. These concepts, which have been advanced in Stiegler 2016a and Stiegler 2016b, will be developed further in *La Société automatique 2*.

6. This is what Bataille experienced and cared about [*pansé*] in his time and in his way.

7. The 'there is,' *es gibt*, appears as the *putting in question of the question* when Heidegger, confronted with the *Gestell*, allows the question of the *it is* to withdraw.

8. Such a 'critique' obviously does not imply a 'mastery,' contrary to what has been believed by some readers of Stiegler 2011, who remain too eager to constantly repeat the same thing.

9. That this support can also be unbearable [*insupportable*] is what is depicted in the film *Padre Padrone* (Taviani and Taviani 1977).

10. See Marx 1973 and my commentaries in Stiegler 2015, chap. 6, and Stiegler 2016a, chaps. 5–7.

11. This is why Ars Industrialis (arsindustrialis.org) asserts the need to implement a contributory income, an experimental approach undertaken in the Plaine Commune urban region (recherchecontributive.org).

12. In an extended sense of the concept of the technogeographical milieu presented in Simondon 2017—where it is a matter of physical geography, whereas here we are referring to human geography. See Stiegler 2016a, §22.

13. See Simondon 2017 and my commentaries in Stiegler 1998, Stiegler 2014, and Stiegler 2016a.

14. On denial, see Stiegler 2016b, §§12, 34, 50, 72, and 101, and chap. 15.

15. On this shift, see Barnosky et al. 2012 and my commentaries in Stiegler 2016b, esp. §20.

16. On this point, see Stiegler, *La Société automatique 2*, chap. 2.

17. This obstacle blocking the horizon is what Florian, my silent interlocutor in Stiegler 2016b, calls 'the end.'

18. The operations of *Dasein*, that is, of its retentions and protentions, are the stakes of what Simondon called the allagmatic. On this point, see the intervention by Anaïs Nony at the 2016 summer academy of pharmakon.fr.

19. This question of violence, of *hubris* and of justice should obviously be articulated with the thought of Walter Benjamin.

20. See in particular 'The Turning,' in Heidegger 1977.

21. I develop this point in Stiegler 2013, chap. 1. On what, with respect to this putting in question(s), encloses Heidegger's position and the 'fourfold' within 'metaphysics,' and which encloses at the same time those whom, particularly in France, we call 'Heideggerians,' see Stiegler 2016b, §126, and Stiegler, *La Société automatique 2*.

22. Stiegler, *La Société automatique 2* has the specific goal of showing that this new age of ideology (in the sense of *The German Ideology*) coincides with a new age (in the way we refer to the age of gold or bronze or fire) of exosomatization, which the transhumanists understand as requiring no criteria other than that of the market, that is, of calculation, in order to *non-allagmatically* effect [*opérer*] the choices generated by the artificial selection through which, for the last three million years, technical life has exosomatically pursued the organogenesis of the living.

23. Adolf Hitler, text of the decree, dated August 2, 1934, requesting the 1934 plebiscite, quoted in Jessen and Richter 2011, 240.

24. It is the same, consequently, for Derrida, who is either treated as a god who must be repeated to the letter, which is beyond ridiculous for this thinker of the letter, or ignored—and ignored because he would supposedly be 'Heideggerian.'

25. Here we should engage a dialogue with Patrick Boucheron and his great *Leçon inaugurale* at the Collège de France. This is what will be outlined in Stiegler, *La Société automatique 2*.

26. And more precisely, if I believe a conversation that I had with Warrant Sack, in Provençal. As for Old French and Old German ('Old High German'), they bear within them the whole question and the problem of the *there* and of its *no-longer-being-there* in the absence of epoch. In the next volumes of *Technics and Time*, and in particular in the final volume, I will go into these questions of *not-being-there* as such, that is: as questions of *local-ity*. We will see that *local-ity* is *what Heidegger cannot take care of* [*panser*] because, like most of the philosophies of the twentieth century, and with the exception of Bergson, he ignored the issue of entropy and the issue of localities that form negentropically—even though the *there* of Dasein, insofar as it always presents itself as being not (yet) there, is neganthropological. That there which is not yet, and which, in this there, *is not thought* yet (see Heidegger 1968, a text in which Heidegger thinks thinking firstly as memory), is exosomatic. This means that it is not a simple locality such as the *Umwelt* of the animal. It is an *ethos*, which is also to say, the *khora* of a taking place constrained by *dikē* and *aidōs* as the *criteria of artificial selection* for which *phusis* provides to mortals *no given or donation* other than their very facticity within the default such as it can, and in that must, become that which is necessary, *anankē*. These questions, which will be thoroughly disentangled [*débrous-saillées*] in *La Société automatique 2. L'avenir du savoir*, will set out the path that will be opened up in the final three volumes of *Technics and Time*, as the breakthrough from the Anthropocene to the Neganthropocene.

27. These questions of assimilation and selection will be entered into more deeply, with Nietzsche and with the analyses of Barbara Stiegler (in Stiegler 2001 and 2005), in *La Société automatique 2*, chap. 3.

28. Plato, *Meno* (Plato 1961) discussed in Stiegler 1998, chap. 5. *Translator's note*: And see Stiegler 1996.

References

Bailly, Francis, and Giuseppe Longo. 2009. "Biological Organization and Anti-Entropy." *Journal of Biological Systems* 17: 63–96. https://doi.org/10.1142/S0218339009002715

Barnosky, Anthony D., Elizabeth Hardly, Jordi Bascompte, Eric Berlow, James Brown, Mikael Fortelius, Wayne Getz, John Harte, Alan Hastings, Pablo Marquet, Neo Martinez, Arne Mooers, Peter Roopnarine, Geerat Vermeij, John Williams, Rosemary Gellespie, Justin Kitzes, Charles Marshall, Nicholas Matzke, David Mindell, Eloy Revilla, and Adam Smith. 2012. "Approaching a State Shift in Earth's Biosphere." *Nature* 486: 52–58. https://doi.org/10.1038/nature11018

Barthes, Roland. 1984. *Camera Lucida: Reflections on Photography*. London: Flamingo.

Boehm, Rudolf. 1960. "Pensée et technique. Notes préliminaires pour une question touchant la problématique heideggérienne." *Revue Internationale de Philosophie* 14: 194–220.

Boucheron, Patrick. 2015. "Ce que peut l'histoire." Inaugural lecture at the *Collège de France*, 17 December 2015.

Canguilhem, Georges. 2008. *Knowledge of Life*. New York: Fordham University Press.

Deleuze, Gilles. 1995. "Postscript on Control Societies." In *Negotiations*. New York: Columbia University Press.

Derrida, Jacques. 1982. "Différance." In *Margins of Philosophy*, 1–17. Chicago: University of Chicago Press.

Georgescu-Roegen, Nicholas. 1971. *The Entropy Law and the Economic Process*. Cambridge, MA: Harvard University Press. https://doi.org/10.4159/harvard.9780674281653

Heidegger, Martin. 1968. *What Is Called Thinking?* New York: Harper & Row.

Heidegger, Martin. 1977. *The Question concerning Technology and Other Essays*. New York: Harper & Row.

Heidegger, Martin. 2000. *An Introduction to Metaphysics*. New Haven, CT: Yale University Press.

Heidegger, Martin. 2010. *Being and Time*. Albany: State University of New York Press.

Henry, Michel. 1983. *Marx: A Philosophy of Human Reality*. Bloomington: Indiana University Press.

Husserl, Edmund. 1970. *The Crisis of European Sciences and Transcendental Phenomenology*. Evanston, IL: Northwestern University Press.

Husserl, Edmund. 1978. "The Origin of Geometry." In Jacques Derrida, *Edmund Husserl's Origin of Geometry: An Introduction*. Lincoln: University of Nebraska Press.

Jessen, Ralph, and Hedwig Richter, eds. 2011. *Voting for Hitler and Stalin: Elections Under 20th Century Dictatorships*. Frankfurt: Campus Verlag.

Marx, Karl. 1973. *Grundrisse: Foundations of the Critique of Political Economy (Rough Draft)*. London: Penguin.

Marx, Karl. 2011. *Economic and Philosophic Manuscripts of 1844*. New York: Dover.

Marx, Karl, and Friedrich Engels. 2004. *The German Ideology: Introduction to a Critique of Political Economy*. London: Lawrence & Wishart Ltd.

Miyazaki, Hayao, dir. 2013. *The Wind Rises*. Tokio: Studio Ghibli.

Plato. 1961. *The Collected Dialogues*, ed. Edith Hamilton and Huntington Cairns. Bollingen Series LXX. Princeton, NJ: Princeton University Press.

Rey, Alain, ed. 2012. *Dictionnnaire historique de la langue française*. Paris: Le Robert.

Simondon, Gilbert. 2017. *On the Mode of Existence of Technical Objects*. Minneapolis: Univocal.

Stiegler, Barbara. 2001. *Nietzsche et la biologie*. Paris: PUF. https://doi.org/10.3917/puf.stieg.2001.01
Stiegler, Barbara. 2005. *Dionysos et la critique de la chair*. Paris: PUF.
Stiegler, Bernard. 1996. "Persephone, Oedipus, Epimetheus." *Tekhnema* 3: 88–91.
Stiegler, Bernard. 1998. *Technics and Time, 1: The Fault of Epimetheus*. Stanford, CA: Stanford University Press.
Stiegler, Bernard. 2009. *Acting Out*. Stanford, CA: Stanford University Press.
Stiegler, Bernard. 2010a. *For a New Critique of Political Economy*. Cambridge: Polity.
Stiegler Bernard. 2010b. *Taking Care of Youth and the Generations*. Stanford, CA: Stanford University Press.
Stiegler, Bernard. 2011. *Technics and Time, 3: Cinematic Time and the Question of Malaise*. Stanford, CA: Stanford University Press.
Stiegler, Bernard. 2013. *What Makes Life Worth Living: On Pharmacology*. Cambridge: Polity.
Stiegler, Bernard. 2014. *The Re-Enchantment of the World: The Value of Spirit Against Industrial Populism*. London: Bloomsbury.
Stiegler, Bernard. 2015. *States of Shock: Stupidity and Knowledge in the 21st Century*. Cambridge: Polity.
Stiegler, Bernard. 2016a. *Automatic Society, Volume 1: The Future of Work*. Cambridge: Polity.
Stiegler, Bernard. 2016b. *Dans la disruption. Comment ne pas devenir fou?* Paris: Les Liens qui Libèrent.
Taviani, Paolo, and Vittorio Taviani, dir. 1977. *Padre Padrone*. Rome: Rai 2.
Valéry, Paul. 2013. "Le Cimetière marin/The Graveyard by the Sea." In *Valéry's Graveyard*, ed. Hugh McGrath and Michael Comenetz, 3–13. New York: Peter Lang.

View publication stats