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BETWEEN PHENOMENOLOGY
AND POSTSTRUCTURALISM:
A METHODOLOGICAL QUESTION**

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EMERGENT TECHNOLOGIES BETWEEN PHENOMENOLOGY AND POSTSTRUCTURALISM: A METHODOLOGICAL QUESTION

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Abstract

This essay aims at understanding the importance of phenomenological method in questions of new technology and changing life-worlds. Emergent intelligent technology fundamentally change the way we live, perceive and act in the world. This fundamental shift includes a blurring of categories such as natural/artificial, biology/technology, real/virtual to name just a few. This calls forth philosophical reflection. Posthumanist theories as well as media theories, which have their roots in poststructuralism, propose a new materialism of the embodied and embedded subject, that evolves through and with its environment. The differences between phenomenology and poststructuralism become obvious when one works on the impact of technology on human self-understanding: There is an appeal to poststructuralist thinking because it encompasses complex and dynamic systems and relations. I will argue that in these accounts the role of experience lacks systematic reflection. The question of how we experience the profound changes in our perception, construction of knowledge and self-understanding is rarely addressed. Phenomenology as method has the clear advantage of having developed a methodological and systematic approach to qualitative experiences, which is central to a philosophical account of human-machine relations. In this essay I will address the methodological question along the lines of Maurice Merleau-Pontys's thinking and contemporary approaches.

Keywords

Technology, Phenomenology, Method, Experience, Technogenesis

1. Introduction

This essay aims at understanding the importance of phenomenological method in questions of new technology and changing life-worlds. Emergent intelligent technology fundamentally changes the way we live, perceive and act in the world. Major parts of global economy and systems of transport will soon be governed by automated systems. Humans interact increasingly with intelligent robots and connect their bodies through technological devices with the Internet of Things. This fundamental shift includes a blurring of categories such as natural/artificial, biology/technology, real/virtual to name just a few. Such a blurring of lines calls forth philosophical reflection. Current theories in media philosophy and philosophy of technology make use of poststructuralist theories. When Katherine Hayles (2012) speaks of the technogenesis of consciousness or Bernard Stiegler's epiphylogenesis (1998), the evolution of humans through technology, they describe processes beyond human experience and are related with accounts of

relational or process ontology (e. g. Karen Barad 2007). Those theories describe being as a temporal and relational becoming/process.

The philosophical movements of postmodern and posthuman thought are essentially post-metaphysical in the sense that they question anthropocentrism and the categories established in the course of humanist thinking. In this line of thought, a new materialism of the embodied and embedded subject, that evolves through and with its environment has become central. This subject is not the strong Cartesian ego cogito, but a weak and temporal node of relations and affects. Brian Massumi (2002) goes as far as to establish a theory of movement independent from what is moving. The blind spot of such accounts is experience. If the subject is conceptualized as relational, cognitive and intentional agency is also decentralized. The notion of experience is thus marginalized.

Here I challenge the absence of a conceptual framing of experience in the above-mentioned theories. The working hypothesis is that the strong presence of poststructuralist thinking in posthuman philosophy and philosophy of technology needs to be complemented by a phenomenological account of novel experiences in technological life-worlds. Such an account is important to establish new constructive and creative relations with technological possibilities as well as for the constitution of moral standards and ethical guidelines for intelligent technologies.

The differences between phenomenology and poststructuralism becomes obvious when one works on the impact of technology on human self-understanding: There is an appeal to poststructuralist thinking because it encompasses complex and dynamic systems and relations. In contrast to that phenomenology seems too preoccupied with the subject. Nevertheless, this tradition has the clear advantage of having developed a methodological and systematic approach to qualitative experiences, which is central to a philosophical account of human-machine relations.

In a first step, I will give an overview of how I think technology impacts on human self-understanding: This becomes visible in cultural narratives and how the embodied human subject is imagined, narrated or pictured. In the second part of this essay, I will develop an understanding of the way contemporary philosophy of media and technology deals with human-machine relations. Most of these accounts are strongly influenced by poststructuralism, such as the theories of Brian Massumi, Katherine Hayles, Bernard Stiegler or Mark B.N. Hansen. My aim is to understand why this method has become so predominant even though most of the authors are also trained in phenomenology and often reference to Edmund Husserl, Merleau-Ponty while the concept of qualitative and bodily experience is omitted.

I will argue that in these accounts the role of experience lacks systematic reflection. The question of how we experience the profound changes in our perception, construction of knowledge and self-understanding is rarely addressed. Most of the theories no matter from what field agree

on one thing: There is no such thing as a strong subject. This has not only been shown by neuroscience but also in philosophy the notion of a strong unified subject has become dubitable probably long before Foucault's dictum of "man would be erased, like a face drawn in sand at the edge of the sea".¹ It might have started already in early human history with the evolution of cognitive capacities through tools, symbols and oral narratives.² With the advent of new technologies, the hybridization of humans and technology is taken to a whole new level. The central question is: How can phenomenology account for the qualitative changes in our experience of technological life-worlds? I will conclude my considerations with some thoughts on Merleau-Ponty's late writings, especially his notion of the *flesh*, as a possible framework that integrates the poststructuralist insights and phenomenological analysis of experiences in and with technology.

2. Human self-understanding challenged by technology

My aim is to understand how emergent technologies challenge human self-understanding: More precisely the impact of current reductionist views of human cognition growing out of neuroscience and their application in predictive smart technologies. Neuroscience strongly promotes the view that the human subject essentially is a cerebral subject.³ Despite a growing interest in more holistic accounts and the importance of embodiment as it is promoted through contemplative neuroscience and phenomenology (Evan Thompson 2014, Thomas Fuchs 2009, Antonio Damasio 2006), the view of the brain as necessary and sufficient condition for any mental act prevails. Examining the view critically, Vidal and Ortega (2017) show in *Making of the Cerebral Subject* that people rarely think of themselves as their "brains", even though this reduction of psychological processes to the neural processes is heavily propagated by neuroscience as well as neurophilosophy. Patricia Churchland (2013) even named her recent book *The Self as Brain*. She argues that:

Without the living neurons that embody information, memories perish, personalities change, skills vanish, motives dissipate. Is there anything left of me to exist in an afterlife? What would such a thing be? Something without memories or personality, without motives and feelings? That is no kind of me. And maybe that is really okay after all.⁴

A functional brain is a necessary condition for being a person, but that does not mean that it is also a sufficient condition. While there is a strong brain-centered rhetoric present in science and its popularizations through media and cinema, people still think of themselves as beings with an individual body, history, psychology plus a brain. This keeps on being the status quo despite of various predominant approaches in neuroscience and psychiatry of the past and the present to treat patients as brains. One of the common credos of psychiatry and in major mental health agencies today according to Vidal and Ortega is: "there are no mental diseases, only brain diseases."⁵

The authors cite a study by Emily Martin from 2009 stating that patients nevertheless have problems to adapt a view of themselves as "brains" because this view cannot accommodate personal experiences and narratives of how it is like to be a person with this or that condition. In short: Neural atypicalities are never simply experienced as that. For once, nobody actually experiences one's own neural processes. And second: Any given condition is experienced mentally and thus integrated in a holistic framework of embodied psychological, intersubjective, social and autobiographical experiences. None of those can be accounted for in terms of neural processes.

The tension between the neuroscientific reduction of the individual to neural processes and the self-understanding of people as being embodied social beings with mental states is paradigmatic. One might say it is the contemporary *conditio humana*. As such it should be questioned from a philosophical perspective.⁶ Within the individual this tension is not as problematic as on a social level: Neuroscience with its aura of novelty and cutting-edge imaging techniques remains a story of success, even though imaging techniques create much less new and relevant knowledge as their successes in funding suggest (comp. Vidal, Ortega 2017). Nevertheless, the idea of a central organ that can be manipulated to create better humans, enhanced cognitive performances or novel perceptions is very tempting, which explains that everything using the label *neuro-* is a potential academic and economic success.

Neuroscientific imaging techniques and the fascination they trigger are the entrance point to the topic of technology. Imaging techniques do not present images of brain processes, but create pictorial representations of theories about neural processes.⁷ They act as visualizations of more or less adequate theories and models of neural activity. It is the fascination with the possibility to hack our brains that is enforced through neuroscience's liaison with imaging techniques. This successful relation feeds back into the creation of artificial intelligence and smart devices. The two main questions for me are: First: What image of human cognition, emotion and purpose gets integrated in technology? And second: How do we imagine human-machine relations and societies of the future? This second question is directed toward digital art and cinematic narratives.⁸ These two fields are linked by one encompassing narrative: That is the idea that intelligent technology will eventually transcend the human race and either in a merger with human intelligence or all on its own evolve to new level of existence. This is what computer scientist and futurist at Google Ray Kurzweil calls the singularity (Kurzweil 2006), a historical point zero in which humans and technology merge. Whether this is a real possibility or not lies beyond the scope of my research. I aim at an understanding of how technology is experienced. Cinema is one strong cultural force which displays human concerns, hopes and self-projections into future societies. I take these images and narratives as a source to evaluate how the relation with technology is imagined and what concepts of human and artificial intelligence are at stake here (comp. Förster 2016). An interpretation of

contemporary utopian and dystopian narratives will give a clue about what to for in current developments in technology. What images and normative components concerning human behavior are incorporated in the technologies now? This question is very different from what is commonly asked: It is not about the anxiety of being outrun by technology and neither is it about technology becoming self-conscious. It is necessary to reveal the human factor in artificial intelligence: Beyond the dystopian narratives lies a fascination for an enhanced and more efficient human intelligence that is related to the reductive notion of the malleable cerebral subject in neuroscience. To uncover these reductive features in existing and emergent technologies a phenomenological approach is needed to look beyond the surface of profit-maximization and smooth user experiences.

3. Poststructuralism vs. Phenomenology

Coming back to the initial methodological question of poststructuralist inspired theories vs. phenomenological ones: It does not make much sense to put poststructuralist accounts into opposition to phenomenological ones, also given that poststructuralism in large parts is rooted in phenomenology. Still, these two approaches open up two different lines of critique, that from outside seem in part mutually exclusive. Theories coming from the poststructuralist tradition emphasize the problematic features of the concept of the subject and especially the subject in Humanism, while phenomenology is all about the subject as the locus of qualitative experience. Humanism, anthropocentric thinking as well as the *anthropocene* as a historical result have become the target of critique in poststructuralism and postmodern thought. The anthropocene is a geochronological concept describing an epoch in which human activity predominantly influences developments in nature and society. What might have appeared as a positive outlook in enlightenment and within the narrative of progress in modernity now figures as destructive force: Humans are responsible for exploitation and destruction in the name of profit. Furthermore, the processes triggered by human activity are far too complex and exceed human capacities to regulate them. Poststructuralist critique targets the idea that human beings are more special than any other life-forms because of their rationality and moral sentiments. Also, the interpretation of everything from a human perspective has become problematic in the light of climate change and the destruction of whole ecosystems. Without going into detail here, one can say that current theories share the conviction that anthropocentrism needs to be replaced by an ecological account of humans being embedded within a complex system of relations and agencies.

This description of environments as complex nets of relations and agencies has both an ontological and a phenomenological claim. In terms of ontology, most theories refer to Merleau-Ponty, Alfred North Whitehead, Gilles Deleuze and Gilbert Simondon. In short, the aim is to develop an understanding of reality as a complex and open system of relations in constant

development. For the problem of human-machine relations that means first and foremost that there is no essential difference between human and technological agency. Jennifer Gabrys for example creates the notion of the ambivital, that can be both a human or artificial agent:

Rather, the citizen works through processes that might generate ambivitals: ambient and malleable urban operators that are expressions of computer environments. While the ambivital is not an expression of a cognitive subject, it does articulate the distribution of nodes of action within the smart city. [...] I would suggest that who or what counts as an ambivital is not restricted to a human actor in the smart city, since the articulation of actions and responses occurs across human-to-machine and machine-to-machine fields of action.⁹

In an ontological perspective those theories replace essence with relations to be the fundamental feature of reality. Most current positions in philosophy of technology represent a critique of the modern subject, the strong subject that acts according to reason and is able to shape the world by its own agency. Human agency has proven to be a dangerous construct that erects dualistic abysses, borders between humans and all other species and destroys habitats on a planetary scale. Donna Haraway pronounced the slogan of this post-anthropocene era: "Make kin, not babies!"¹⁰ Theories that propose relational ontologies (comp. Haraway (2016), Hansen (2012), Hörl (2008), Massumi (2012)) do so with a critical agenda: They aim at an understanding of being that encompasses different agencies and perception. This means that both the classic notion of an object (as tool or technological object) as well as the transcendental subject, as the condition of possibility of perception and hence of the object become devalued and in an ontological sense secondary, Mark B.N. Hansen writes:

We must reconceptualise the coupling of human and technics beyond the figure of the 'technical object.' In the wake of computational technologies that distribute sensibility beyond consciousness, the correlation between human-implicating individuation and technics has moved beyond what we might think of as its objective stage [...] and has entered a properly processual stage in which technics directly intensifies sub-perceptual dimensions of human experience. [...] The technical object had to make way for technical processes that operate through far more complex imbrications with human activity.¹¹

The development of computational technologies according to Gabrys and Hansen has produced a situation in which human agency and perception stands in no relation of ontological primacy to technological objects. Thus, the focus lies on relations and processes. This ontological framing is in line with Merleau-Ponty's phenomenology. His whole thinking is characterized by the idea, that the categories of subject and object only arise from a primordial embeddedness within an environment:

We have the experience of an I, not in the sense of an absolute subjectivity, but rather one that is indivisibly unmade and remade by the course of time. The unity of the subject or of the object is not a real unity, but a presumptive unity within the horizon of experience; we must discover, beneath the idea of the subject and the idea of the object, the fact of my subjectivity and the object in the nascent state, the primordial layer where ideas and things are born.¹²

In a genetic perspective, this emphasis on becoming gives rise to theories that focus on the intertwining of cognitive abilities and contact with the world, such as theories of extended and enactive cognition, embodiment.¹³ Concerning the influence of technology one might think of Katherine Hayles (2012) concept of the *technogenesis* of human mind or Bernard Stiegler's *epiphylogenesis* (1998) of human cognition. Those theories build on the fact that human perception is increasingly engineered through non-human, computational processes. Stiegler would extend this idea and say that human cognitive history was already from early on shaped by non-human, that is technological means. For the impact of computer technology, that does not only mean that computational processes process large amounts of information quicker than the human mind. First and foremost, it means that the contents of perception become selected by predictive and preemptive machine agency. Self-learning algorithms are used to gather data and predict human behavior up to a level that no human intelligence could ever do. Searching through google for example: These days everyone knows that slightly creepy feeling of having searched for a certain item online and having instantaneously popping up adds for that very same item on every social network used soon thereafter. This is a very transparent form of predictive computing. The depth of this phenomenon is much larger than we expect, because basically everything in the virtual realm is based on prediction.

With the internet of things (IoT), the virtual penetrates the real world in much deeper sense than we expect. Literally every object will be connected and equipped with sensing devices, life-worlds become intelligent infrastructures, which is already at play with the artificial intelligences Alexa, Siri or Bixby, who can register every move we make and every word we speak. All that data can be used to generate outputs tailored specifically to each user. The experience to live in a Facebook bubble with a completely personalized feed can in principle become the predominant form of human life. The Netflix production *Black Mirror* repeats this topic in its dystopian versions over and over again. In season 4, Jodie Foster directed the episode 2, *ArkAngel*, in which a little girl gets injected with an implant that connects her mind to a surveillance device that can locate the child at any time, observe her vital data, project what she is seeing and erase possibly traumatic content from her vision. This means her perceptual world is engineered nearly entirely by computational technology and the parental fear for her life. This episode shows in a very drastic

way how far people are willing to go for the sake of safety, be it for themselves or for their children. It is utterly painful to watch and symptomatic of how little understanding of the dynamics of real life we are willing to integrate in machines that should serve efficiency and safety purposes. This claustrophobic scenario of complete observation ends in a violent fight between the teenage daughter and her overly anxious mother. Even if that scenario is fictive, the consequences of 9/11 already made it pretty clear how much preemptive oppression we are ready to put up with for the sake of very abstract safety. The predominance of dystopia in popculture these days is only one symptom of problematic developments in technology. There is also an increasing awareness in politics that emergent intelligent technology will need to be subjected to an AI ethics as well as the consequences for human labor need to be reflected, since a major wave of displacement of human work is already taking up speed.¹⁴ In the last section of this paper, I will argue for the need of a phenomenological perspective on technology for the sake of a productive critical stance.

4. Making the case for a phenomenology of emergent technologies

As outlined before the poststructuralist view with regard to technology implies a critique of the essentialization of the subject-object dichotomy. Also, there is a more or less implicit critique of humanism, which points in the same anti-dualistic, anti-essentialist direction. The main idea is that we need to think beyond humanism toward a more inclusive concept of perception, sentience and agency. Even though I share this position wholeheartedly there is a shortcoming with regard to actual human-machine-relations. To understand the impact of new technologies on perception, cognition, everyday life, and societies we need to employ a phenomenological perspective. As mentioned earlier, phenomenology implies a different critical agenda than poststructuralism: Positions with focus on phenomenological method will engage in an understanding of the experiences arising from human-machine-relation. Such theoretical frameworks pay attention to the lived body, the variations in the perceptual setup and the intentionalities involved in human-machine-entanglements. In the view of poststructuralists this means falling back into essentialist or humanist thinking. They would diagnose this as melancholy for the subject - this phrase comes up in many discussions in my experience.

The following questions need to be tackled: 1. What do we gain by adopting a phenomenological approach? 2. What notions of experience and being human are at stake? 3. Is there a phenomenological alternative to ecological concepts drawn from poststructuralism? I will give a rough sketch of what I think could be viable alternative or rather complementary approach to predominant theories on technology currently in use.

4.1 What do we gain from a phenomenological approach?

The gain to be expected from a phenomenological approach is pretty straight forward: A phenomenology of human-machine-relations will give a much more fine-grained description of how we experience technology. This also opens up a field of possible comparisons and differentiation between a range of human-machine encounters or even mergers (in the case of body-invasive technology). To accomplish such an analysis of the relations in question it is not necessary to define the type of intelligence at stake for example in robots or AI in general. Neither is a transcendental theory of the subject necessary. To give an example I give a longer quote from Mark Coeckelbergh about a phenomenology of human-robot relations:

A phenomenological analysis of human-robot relations, then, must distinguish between various kinds of human-robot relations and must do so on the basis of appearance, that is, the appearance of the robot as experienced by the human. Thus, for the purpose of understanding human-robot relations we must distinguish between male and female robots, humanoid robots and pet robots (dogs, cats, etc.), ‘friendly’ robots versus ‘neutral’ or ‘unfriendly’ ones, etc. Regardless of what the robot ‘really’ is (if it makes sense to say this at all), in each case, the nature of the human-robot relation will differ, depending on appearance. [...] These hypotheses are not trivial in the light of a philosophical tradition that attaches much importance to ontological difference. They urge philosophers to turn away from questions such as ‘When does a robot have consciousness?’ (which concerns the ‘mind’ of the robot) and to take an approach that is in line with research on how humans perceive and treat new media and robots. [...] As argued above, what counts for understanding human-robot relations is not the relation the robots may have to the world, but their appearance to us, humans —that is, our relation to others and the world. [...] If this is true, the question whether or not humans are really or fundamentally different from non-humans such as animals or robots is much less relevant to how we should shape our relations with these non-humans than usually supposed.¹⁵

Such more fine-grained descriptions are by no means limited to the interaction with social robots. They can in general be done with any interactive device or environment. Such a research has at least two great benefits: It adds a more detailed perspective to the large-scale ecologies and relational ontologies and it has an inter- or transdisciplinary reach because research in technology design, urban planning or the health sector can use these results and integrate them in their own doing.

4.2 What notions of experience and being human are at stake?

The most common critique phenomenological positions are facing is a return to the subject and to an essentialism about human nature. Both can be rejected. First: a phenomenological analysis does not necessarily imply a transcendental subject. On the contrary, many phenomenological positions, especially theories of embodiment hold that subject and object only arise from mutual contact and are shaped by being embedded in an environment characterized by dynamic relations. Merleau-Ponty notes for example: "[...]the chiasm, the intentional 'encroachment' are irreducible, which leads to the rejecting of the notion of the subject, or to the defining of the subject as field, as a hierarchized system of structures opened by an inaugural there is."¹⁶ Such a notion of the subject lends itself perfectly to the current situation in which dualistic categories of real/virtual, organic/artificial or human/non-human are getting more and more fluid. A subject framed in these Merleau-Pontian terms is conceptualized as a having a plasticity similar to what neuroscientists define as neuroplasticity, meaning that the brain can adapt to altered situations or transfer function from damaged regions to other areas. That is to say that the process of becoming is what remains constant. As for the notion of the human similar things can be said. A phenomenological description is not about uncovering a human nature or essence. It is about understanding *how* being human is experienced. Coeckelbergh makes that very clear:

Modern technology may be problematic. But changing and shaping matter and bodies—even if that always takes place within particular constraints and can never be fully controlled—is part of what human existence is about. The notion of human being is broad enough to include this technological aspect of human existence; whereas the notion of human nature suggests too much separation between nature and technology, between nature and culture, and between natural humans and the technological world.¹⁷

4.3 Is there a phenomenological alternative to ecological concepts drawn from poststructuralism?

As I have shown, poststructuralism-inspired conceptions of ecology do explicitly not distinguish between human and artificial agency or sensing and thus do not allow for a phenomenological analysis of what it means to live in technological environments. The concept of the *flesh* as presented in Merleau-Ponty can be an alternative here because it allows for deep intertwining of all kinds of sensing and agency while it contains a focus on experience. It expands the logic of perception beyond the perceiver. In Merleau-Ponty's view perception is only possible because the perceiver and the perceived share the fact of being perceivable, touchable and embodied. Just as things relate to their surroundings via their material form and perspective so does the perceiver. In the case of human subjects *being embodied* means two things: Being a lived body with

sentience and qualitative states as well as having a body that can be an object of perception just as stones, tables or cars.

Thanks to this double-sidedness of the body human perception is deeply intertwined with its environment. This environment is changing profoundly now. With digital technology being embedded within the *flesh* of the perceptual world, there is a new form of sensing present: the digital sense culture. This is why I use the term *digital flesh* instead of the Merleau-Pontian notion of *flesh* or *flesh of the world*. The concept of the *digital flesh* focuses on the continuity between human and artificial sensing and is meant to serve as a starting point of a more fine-grained perspective of the experiences involved. Merleau-Ponty holds that being in touch, being related and being embedded within an environment gives rise to higher order cognitive capacities like self-awareness. The concept of the *digital flesh* is meant to describe the depth of the experiential dimension in technological life-worlds. It is directed toward a distributed sense-culture which transcends the dualism of biology and technology and merges digital and biological forms of perception, folds them into each other and creates spaces of new sensations. The concept of the *digital flesh* in my view contains the best of both theories: The poststructuralist insight of deep relatedness and constant becoming paired with a phenomenological description of the qualitative impact of changing life-worlds.

¹ Michel Foucault, *The Order of Things* [1966]. Routledge, London 2001, p. 422.

² Comp. Merlin Donald, *A Mind So Rare: The Evolution of Human Consciousness*. W.W. Norton & Co, New York 2001.

³ Comp. Francisco Ortega, Fernando Vidal, *Being Brains. Making the Cerebral Subject*. Fordham University Press, New York 2017.

⁴ Patricia Churchland, *Touching a Nerve. The Self as Brain*, W.W. Norton & Comp., New York, London 2013, p.12.

⁵ *Ibid.*, p.17 f.)

⁶ Comp. Yvonne Förster, *Ecological Subjectivity vs. Brainhood: Why Experience Matters*. In Markus Mühling (ed.): *Perceiving Truth and Value Phenomenological Deliberations on Ethical Perception*, series: Religion, Theology, and Natural Science, Vandenhoeck&Ruprecht, 2020b, pp. 63-76.

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⁷ Förster, 2017.

⁸ Also, in literature, there is a huge number of narratives dealing with technology and its impact on human self-understanding. For further reading see Hayles 2005 and Vidal, Ortega 2017, Chapter 4. There has been a notable shift from a preference for utopian plots in the Obama era to dystopian topics such as Margaret Atwoods *The Handmaid's Tale* (1985) after Trump's election. The sales of this book went up by 30% in 2016 according to an New York Times article. There it is stated that: "The sudden boom in popularity for classic dystopian novels, which began to pick up just after the election, seems to reflect an organic response from readers who are wary of the authoritarian overtones of some of Mr. Trump's rhetoric".

⁹ Jennifer Gabrys, *Programming Environments: Environmentality and Citizensensing in the Smart City*. In: *Environment and Planning D: Society and Space*, 32 (1), 2014, p.34.

¹⁰ Donna Haraway, *Anthropocene, Capitalocene, Plantationocene, Chthulucene*. In: *Making Kin. Environmental Humanities* 6, 2015, p.161, <https://doi.org/10.1215/22011919-3615934>

¹¹ Mark B.N. Hansen, *Engineering Preindividual Potentiality: Technics, Transindividuation, and 21st-Century Media*. In: *SubStance*, 129, vol. 41.3 (November 2012), p. 51, p. 55.

¹² Maurice Merleau-Ponty, *Phenomenology of Perception*. Routledge, Abingdon, New York 2014, p. 228.

¹³ e. g. Shaun Gallagher, *How the Body Shapes the Mind*. Oxford University Press, Oxford 2006.

¹⁴ comp. James Hughes, Kevin LaGrandeur (eds.), *Surviving the Machine Age - Intelligent Technology and the Transformation of Human Work*. Palgrave Macmillan, Cham (CH) 2017.

¹⁵ Mark Coeckelbergh, *Humans, Animals, and Robots: A Phenomenological Approach to Human-Robot Relations*. In: *International Journal of Social Robotics* 3, 2011, pp. 197–204. <https://doi.org/10.1007/s12369-010-0075-6> p. 199, p. 203.

¹⁶ Maurice Merleau-Ponty, *The Visible and the Invisible*. Northwestern University Studies, Evanston 1969, p. 239.

¹⁷ Mark Coeckelbergh, *Human Being @ Risk: Enhancement, Technology, and the Evaluation of Vulnerability Transformations*, *Philosophy of Engineering and Technology*. Springer Netherlands 2013, p. 34 f.

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