

Interdependencies of Technology and Degrowth – Some Cultural Foundations

Oliver Parodi

****DRAFT****

1 Introduction

Work, economy and growth nowadays are fundamentally linked to technology, technological progress and the handling of our world by and through technology. If we are talking about degrowth as a passage of civilization we have to keep in mind that our (modern/Western) civilizations are technological ones: At present, we all are living in a world which is strongly formed and deeply affected by technology. Technology is dominating the global forms and ways of production. But how will production beyond post-Fordism and the industrial society look like: a return to handicraft with a new spiritual awareness or a cultivated and restrained high-tech-production by machines satisfying our basic needs? Technology nowadays can be seen as an expression par excellence of a “logic of quantitative multiplication” and a main key to the “yoke of labor”. So when talking about work and degrowth, we have to deal with technology, and moreover a shift to degrowth implies a fundamental shift in understanding, dealing, handling and developing technology.

In debates about degrowth, the dimension of technology has not been discussed very widely and deeply so far. Visions are often drawn up in black and white. Positions and values of technophiles and technophobes (proponents and opponents of technology) collide abruptly.

In my paper I want to take a closer look at the cultural conditions of technology and their interdependencies with degrowth by providing input from the perspective of the philosophy of technology and cultural theory. An understanding of what is culturally inscribed in and transported by technology opens doors for discussion and agreement and for (slowly) changing the deeply rooted attitudes towards and carried by technology, and thus may help designing technology that meets the needs of a degrowth society.

Some relationships will be explicated, e.g. between Technology and Nature: In the philosophical debate of the last 50 years technology has been strongly linked to nature, resp. to the way of dealing with nature. Some philosophers still say that technology is nothing but the domination of nature – or “the counter-nature”. Degrowth implies a different way or alternative ways of dealing with nature and consequently technology is involved and affected, too. This brings us to technology as a medium: technology as an intermediary between us and our (natural/cultural) surrounding. While we are more and more recognizing and understanding our world by technology, we are increasingly modifying and designing it via technology. In addition, as an intermediary technology separates us from nature, fellow men, etc. Technology expedites alienation. How does this fit in with the ideas of “mutual, creative

and loving partnership” in division of labor and with the aim of improving the “conditions of life on this planet”?

Technology and degrowth: In general and especially from a historic perspective, growth, wealth and civilization are directly linked to technology and technological innovation. What about degrowth? Is this vision a fundamental shift in human history – or is it inhumane? Where will the transition to degrowth lead to: a world with less or no technology, to other technologies, to the same or similar technologies like today but with other attitudes, concepts, significance, and importance in our (everyday) live?

Here my understanding of “degrowth” is closely linked to the concept and political vision of sustainable development (cf. Jonas 1986; Hauff 1987; Kopfmüller et al. 2001; Bundesregierung 2002; Ott/Döring 2004; UN 2012) and, furthermore, to the *sufficiency* strategy – the culturally most scaring and revolutionary point of sustainability.

Giving inputs from cultural theory and the philosophy of technology and asking questions as mentioned above shall prepare the ground for discussion of various interdependencies of technology and degrowth at the workshop. This contribution is intended to present some ideas that may stimulate discussion and understanding of visions and examples of technology (or non-technology) in a degrowth society, which hopefully will be presented at the workshop more thoroughly.

2 Readjusting Basic Cultural Attitudes

After this brief outline, the following sections will focus on some basic elements of transition to a degrowth society which does not deny technology in general but changes the meaning of and the way of dealing with (and via) technology.

The first step on this way is to overcome an idea which is nearly constitutive of our (modern/Western) cultural image and also of our concept of technology, namely: the polarizing division of nature and culture as well as of nature and technology. The instrumental relation of man and his “environment” based on this concept must be corrected and modified – even first and foremost in technology.

2.1 Prevailing Separation of Culture and Nature

The basic concept of culture as *counter-nature* (cf. Großklaus/Oldemeyer 1983; Parodi 2008) underlies the modern concept of culture, is valid even today in broad areas of our cultural practice (and theory) and is effective largely without being queried. This can be briefly illustrated as follows:

- Nature is considered the counter-concept of culture (dichotomic world formula): “The concepts of nature and culture are sufficient to describe this world” (Marschall 1993, p. 17).
- The theory and philosophy of culture are often based on the separation of nature and culture (cf. Hansen 2000).
- A common concept implies: “Culture is the transformation of nature by work.”

- Another common concept is this: “Culture is what makes us different from nature.”
- Even the degrowth and sustainability debates are influenced by this separation; the ecological pillar is based on the natural sphere, while the economic and social pillars are rooted in the sphere of culture.

2.2 Present Separation of Technology and Nature

In an analogous way, *technology* can be regarded as *counter-nature*. This is associated with the idea of incompatibility of technology and nature. Throughout Western cultural history the concept of technology, with a few exceptions, has constituted the counter-concept of “nature”. When modern times began, technology closely associated with the natural sciences (and later on with the economic system) became the central cultural program of dealing with the world. Its content is man’s greatest possible *independence* of nature, *domination* of nature, and *exploitation* of nature.

Even modern common ‘definitions of technology’ clearly reveal this dichotomy of technology and nature and the exploitation of nature based on it. Indications of the prevailing technology/nature divide can be found, e.g., in philosophical definitions like:

- “Technology, after all, is nothing but overcoming nature by human consciousness. [...] Technology being counter to nature is a principal characteristic” (Günter Ropohl, quoted from Huber 1989, p. 35)¹.
- “Technology [is considered] the opposite of nature” (Precht/Burkhard 1996, p. 512)².
- Technology “means exploiting natural resources and the forces of nature in the interest of satisfying human needs” (Brugger 1998, p. 393)².

More proof (of a de-facto opposition to nature) can be found in prevailing technical practice:

- The way in which mankind handles the world by technical means is the main cause of the disappearance of nature and living space.
- Nature conservation and technology are diametrical opposites.
- There is no such thing as “nature technologies” or “conservation technologies” – the very concepts give rise to linguistic uneasiness (at least in German).

2.3 Outdated Separation

This polarized, exploiting relationship to nature via *technology as counter-nature* is no longer modern but outdated and dangerous. It is important to correct this relation between nature and technology, which is perceived as a wrong, dangerous attitude. This approach is supported by two things (among others):

- First, the disappearance of nature in our world of life as a consequence of the ubiquitous introduction of technology into our natural living environment. Nature is cultivated,

¹ Translation by the author.

turned technical, disappears as such, merges with technical artefacts and culture. What remains are ecological connections. Technology and nature are merged into “ecofacts” (Parodi 2008, p. 194, after Karafyllis 2003). Where, “in an ecological context, technology and nature are blended inseparably and unforeseeably, it no longer makes sense to arrange phenomena by the distinction between technology and nature” (Luhmann 1997, p. 522).

- Secondly, the ecological crisis of an ongoing growing human treatment which impressively shows that the current concept of technology as a practiced program of dominating and exploiting nature is now producing consequences which threaten the very existence of mankind. The ecological crisis, however, is the expression of a cultural practice based mainly on the man-culture-technology versus nature split.

2.4 Correcting Misconceptions

History shows that sustainability designs and also the idea of degrowth were sparked off by ecological problems. In a cultural perspective, this means that they are ignited by the ecological deficits of the long-term, complete cultural practice of modern nature management. This, in turn, indicates that sustainability, if it is to go beyond the mere control of symptoms and beyond increasing efficiency – as aimed by the degrowth movement, can be installed and implemented permanently only if the underlying cultural misconceptions are corrected. These misconceptions are fixed in the counter-natural position of culture and technology, are expressed in the ecological problem situation, but are not limited by dealing with nature. They even exist in the relation to our social, individual, and ‘generational’ environment as well as to our living environment. The following misconceptions or outdated attitudes of men or a collective to their ecological, social, individual and generative ‘environment’ have to be corrected:

- Overemphasis on separation and being separate – neglecting connectedness with the environment.
- Overemphasis on autonomy and independence – neglecting inclusion and dependence.
- Overvaluation of individuality and difference – undervaluation of collectivity and what is similar.

Separation, autonomy, and individuality expose human beings, take them out of their natural environment. They generate and suggest power. Overemphasizing this can be considered a misconception in two ways: on the one hand, in an ethical sense, because overvaluation and emphasis take value out of any environment, open the door to violence and exploitation; on the other hand, epistemologically, because emphasis, if it is only a theoretical suggestion without any reality, gives rise to wrong conclusions and failing actions. Irrespective of which aspect applies: Wrong actions also harm the whole and, in this way, directly or indirectly also those who (think they) are powerful and ruling: us as human beings. In this connection, it is irrelevant whether these misconceptions are adopted towards nature, the environment, or other persons. “It is the same misconception of persons relative to the whole which, on the one

hand, exploits and destroys the natural environment and, on the other hand, impairs social order and development” (Meyer-Abich 1984, p. 264).

The same culturally deep-rooted, wrong attitudes can be found behind today’s ecological and social misconceptions.

Recognizing these misconceptions is mostly painful. In cultural history, this can be seen as the scientific “humiliation of people” mentioned by Johannes Rohbeck referring to Sigmund Freud (cf. Rohbeck 1993, p. 10).² However, mere recognition is not sufficient to correct cultural practices.

It should be emphasized at this point that I am not interested in relinquishing entirely the instrumental attitude of human beings vis-à-vis their environment, especially in technology, “cultivated” in an extreme sense up to the present time. I am more interested in diminishing the importance of that approach and supplementing and correcting it. The distant user’s attitude of man relative to his environment as an object of use must be reduced, and the instrumental attitude must be balanced more and more by an attitude of valuation and association. If one wants to follow Martin Buber and Ernst Oldemeyer, (technical) use of the co-world would have to be in the “humility of being part” of a larger, e.g. eco-natural, entity (cf. Buber 1960; Oldemeyer 2005; Parodi 2008). “This is no attempt to do away with technology but rather to release it from its opposition to nature, into which it has run” (Meyer-Abich 1984, p. 265)³.

2.5 Correcting the conception of “technological man”

And even if we look at ourselves – at humans – respectively on our culturally shared self-conception, we see that it is strongly related to the above-mentioned misconceptions and separation of culture/technology and nature. Thereby in our modern idea of man human being is strongly identified with the cultural and technological side of the world. The naming “homo oeconomicus” and “homo faber” given to modern humans is an expression of this identification. Human being is nearly equated with the economic-technological complex or sphere of human societies. Peoples’ destiny is to work and produce things (see Ropohl “Sachen machen”, 1999), their sense is use.

Further hints for this identification of man and technology are given by technophobe pictures of man and technology which say that we are no longer master of technology but its servants. The active proponents of technology must recognize that they are not (any more) “masters of their creation, but are ruled by the products they themselves created” (Rohbeck 1993, p. 10). Less “human” pictures reduce people to small wheels in a big machinery called technology or technological civilization (see Günther Anders “Prometheus’ decline” or Mumford 1974).

² After cosmological injury, Copernican removal from the center of the world, biological injury as per theory of evolution, and psychological injury in psychoanalysis, human beings in the industrial age experience technological injury (cf. Rohbeck 1993, p. 10).

³ Translation by the author.

Both types of pictures have in common that there is no (more) distance between man and technology. Being technology includes: no space for reflection and even no possibility to rule, form or deny technology.

In the context of the evolution of human consciousness Wilber writes: “There is much that is good about the (ego) structure – a logical and syntactic brilliance produced by medicine, natural science and technology. However, we do not make technology work for us, because we ourselves are this structure. Rather, we have completely identified with it [...] For example, we have made the absurd demand that technology should turn earth into heaven, which basically means, it should turn the finite into the infinite. In this desperate and wild endeavor to inflate the finite to infinite proportions, we have only inflated finiteness. To recognize its limits seems impossible to us. Instead of transcending the finite, the unconscious search for transcendence only drives us to distort and destroy it. And this is exactly how things stand” (Wilber, p. 328)⁴.

And in the course of “human enhancement” even the material stronghold of human nature, the human body, is now more and more invaded by technology. Human bodies merge with technical artifacts, technology within our bodies takes command of our organic systems and functions, takes command over the last niche of nature living in us. Human and technology build a (new) material identity.

We have to balance the overestimation of technology, to disrupt the identity of human and technology, and instead to establish a distance between them.

Even if technology may be the most powerful and most far-reaching project in the history of man, we are well advised not to confound the project with the creator and operator of the project. This project may demand a great deal of us today, but we can refuse it, subordinate and integrate it in the multiple aspects of human being and let it work for us.

3 Cultivation of Technology

One step to overcome the misconceptions and outdated and misleading meaning of technology is to bethink ourselves of the variety of human being laid down and already existing in our culture. But technology, for its part, is often seen as separated from culture, is sometimes even seen as counterpart to culture (remember e.g. the “two cultures” discussions). This separation – of technology and “culture” – must also be overcome. “Overcome” in this context does not mean to level out all differences and deny the possibility of analytical distinction, but rather to bridge the two areas and implement technology as a human (humanistic) and cultural enterprise. To cultivate technology means to include it into the canon of human expressions and modes of living.

First and foremost, it is safe to say that our world of life to a large extent has become a technical or technically dominated one (see Section 2.3). The world is increasingly turning into a technotope (cf. Erlach 2000). Also our way of handling the world and our environment, irrespective of whether this is natural, ecological, cultural, or social, in most cases is mediated technically. Technology more and more acts as a medium, linking man to his several

⁴ Translated by the author.

environments. Human beings nowadays grasp and understand⁵ their environment indirectly, by technology. In the dual sense of Jakob J. von Uexküll, human beings perceive and modify⁶ their environment increasingly by (means of) technology.

3.1 From Making Culture Technical to Making Technology Cultural

Also cultures and cultural practices are not unaffected by technology. On the contrary: Culture is seen to become more and more technological, first of all, purely in the manner of an object: Our culture, our collectives, communication, and conventions more and more rely on technical equipment and processes. More and more technical artefacts permeate our everyday existence, connect us with the environment, or constitute it.

Also mentally, our culture (again and again) is subject to technology. This is not about technical artefacts but rather about things technical (also transported in those artefacts) in the form of technical fitness and rationality for a purpose. Today our culture is permanently threatened by being reduced to that instrumental attitude explained in the previous chapter.

Reducing culture to technology can be counteracted by introducing culture into technology. This is to imply the full programmatic incorporation of technology into (the respective) culture, which is the complete permeation of technology by culture.

In this program, technology must not be considered, evaluated, and designed as a sphere autonomous and separate from culture. On this side, there is technology (cars, TV, telephone), on the other side, there is our culture, there are movies, communication. On this side, there is the purpose of our technical activities, our work, and detached from this, on the other side, there is the sense of our life. (This is commonly referred to as “alienation”.) Instead of making the purpose sense, as is the case when culture is made technological, which also reduces human beings and their culture to *homo faber* or *homo oeconomicus* as mentioned above, the purposes would be embedded in the relationships of the respective culture, thus providing sense and meaning.

In a concrete way, making technology part of culture means the pro-active inclusion of culture in the development and use of technology. Technology development is to be pursued with culture in mind, i.e. many more and, above all, cultural aspects should be included in designing technology, to bring more facets of human being in.

3.2 Functioning Technology

The omnipresence of technology, its power, and its role in our everyday world make it important that culture and, with it, sustainability also infuse technology – not only in theoretical ideas, but in a very specific sense, in technical systems, structures, and equipment. In the interest of this development, a soundly based, profound linguistic rearrangement will be proposed here first.

⁵ In German “begreifen”.

⁶ In German both “perceive” and “modify” is expressed by one word: “wahrnehmen”.

Where only manufacturing and using very specific technical artefacts is referred to (cars, mobile phones, dams, power plants), first of all a catalogue of requirements can be compiled which such technical products ideally should meet (see Table 1).

The question from what point in time on technology or a piece of equipment is said to *function*, will barely extend to the second point of the catalogue of requirements to be mastered for that purpose. A car functions when it runs, can be steered and, perhaps, also braked. A power plant functions when it produces electricity, a genetically modified plant functions when it produces the desired chemical substance, etc. “Functioning” can now be used to draw a line between points 2 and 3 – exactly marking the well-known, criticized split between nature and culture.

So, in common usage and, consequently, in culturally accepted convention, technology simply functions when it meets the purpose of dominating nature and controlling situations in accordance with the laws of nature. This can also be supported theoretically.

Table 1: Catalogue of Requirements

Technology should be ...	
(0) conceivable, generally imaginable	
(1) scientifically possible (in terms of physics, chemistry, biology, ...)	- NATURE -
(2) feasible in engineering terms	

(3) economically meaningful	
(4) legally arguable	
(5) politically desired	- CULTURE -
(6) socially wanted	
(7) ethically tenable	
(8) aesthetically adequate	

Author's archive

3.3 Luhmann's Effective Isolation

According to Niklas Luhmann, technology can also be understood as “functioning simplification”. Accordingly, technology arises in a “process of effective isolation”, in “excluding the rest of the world”. “Functioning can be ascertained when the world excluded can be kept from impacting the intended result.” “The major distinction determining the ‘technology’ form is that between controllable and uncontrollable situations” (Luhmann 1997, pp. 524f.)⁷.

⁷ Translation by the author.

This “process of effective isolation” of technology, this “exclusion of the rest of the world” occurs in the development of technology mainly along the line dividing nature and culture. This initially leaves out the entire “cultural” hemisphere of the world. Technology is designed with respect to nature and the control of it. Technology *functions* when it is able to correctly model and control natural conditions.

This concept of technology may have been adequate and acceptable at the time of incipient agriculture, may be even at the time when railroads were built in the Wild West. However, in our present cultivated life full of technology, in which more and more people, ecology, technology and culture, and less and less nature, are encountered as technology becomes increasingly more powerful, this concept is outdated and, as explained above, in summary even very dangerous.

One question comes to mind: Does technology really function if it is realised in accordance with the laws of nature but, at the same time destroys the eco-natural foundation of existence of mankind and human society? Does technology really function if it violates fundamental cultural achievements (such as democracy, human rights, private sphere, dignity) while observing the laws of nature? Does the three-gorge dam function if it makes millions of people homeless and dooms hundreds of thousands to poverty? Does gene food function if consumers do not want it? Does ‘developed’ technology function in the ‘developing’ third world if this technology is not used in that part of the world because of cultural peculiarities?

According to Luhmann, the “‘successful’ reduction” occurring with functioning technology “boils down to harmless ignoring” (Luhmann 1997, p. 525). Ignoring – already existing – cultural aspects in technology here and now is seen no longer as harmless. Effective isolation, “exclusion of the rest of the world”, must no longer (at the latest as of today) occur along the dividing line of nature vs. culture. A successful reduction of complexity is no longer possible by leaving out the cultural side and, in this way, the main human aspects. In this regard, the interpretation of technology must be expanded in the same way as the concept of functioning technology.

The term *functioning technology* should henceforth be used only when that technology is able to model correctly, and control, not only natural situations (or those obeying the laws of nature), but also cultural aspects (social, economic, culture-specific ones, etc.). Technology functions only when it meets the societal functions it is expected to fulfil and, ultimately, makes sense within the framework of that respective culture.

According to the catalogue of requirements above, this would mean: Functioning technology is the correct term only when this technology *also* meets at least basic requirements under points (3) to (8). Technology does not function, thus the necessary agreement, if it is not desired, creates social unrest, causes intra- or inter-generational injustice, violates the law or human rights, fails to meet sustainability requirements, or has major aesthetic deficits. Such comprehensive view should be addressed already in the design phase of technology. Specifications could be complemented with these categories (items (3) to (8)) in the very design of technical products, thus further institutionalizing cultured technology.

3.4 Implications of Functioning Cultured Technology

Implementing this kind of technology functioning also in the cultural sense would have far reaching practical implications. Here is one example: A large hydroelectric dam accordingly would function in rich and well organized Central Europe, while a plant with the same (physical and engineering) units would not function in a developing country where dams are often associated with displacement, corruption, dependency, and hunger, thus violating human rights.

An expanded catalogue of requirements of this kind certainly would not make it any easier to design functioning technology for the world. However, would this not point to the very challenges today associated with technology on a large as well as on a small scale? Enhanced requirements would not lead to a (further) acceleration of technical innovation, but perhaps it is this decelerating element which could work as a module in a culture of sustainability and as a brake for degrowing.

Moreover, the often suggested or assumed “contextual independence” of technology would be finished once and for all. Technology is dependent on a context: Its conditions, impacts, secondary consequences begin and end (not solely) in the natural sphere but, above all, in the cultural sphere.

Cultured and culturally functioning technology would make this technology more comprehensive and thus more human, also in a humanistic sense. Technology as a powerful means of redesigning the human environment would be an expression not only of its dominating and useful capabilities but, comprehensively, also of its humanity taking into account as many facets as possible. Technology would contribute towards implementing the human aspect in human environment, would allow human beings to come to the fore in their handling the world. However, this would result in a more human design of our sphere of living.

4 Conclusions

More important than the question of whether we need more or less technology for a degrowth society is the question of what culturally spread attitudes and stances on technology are implemented there. What meanings are inscribed in technology?

Following Adorno who said that art is the antithesis of society, technology (nowadays) can be seen as thesis of society. In technology (or in the scientific, economic, technological complex), our deeply grounded and age-old modern worldview finds expression (see Parodi 2008), which determines our handling of and dealing with the world around us (formerly with nature but nowadays more and more with social and human or cognitive entities, e.g. the emerging information and communication technologies or human enhancement).

The old thesis is characterized by expansion, control and material growth. The adjunctive cultural (and often individual) foundations have to be expressed, reflected and changed – but in a dialectic way. It’s not about completely neglecting these characteristics, but transforming

them and embedding them into a new, broader range of attitudes toward the world around us. The separation of nature and culture/technology/human has to be extenuated, even the separation of culture and technology. The nowadays misleading conceptions of autonomy and individuality have to be diminished and complemented.

One first step toward adequate (understanding and handling of) technology for a degrowth society might be to cultivate technology as illustrated above and speak of functioning technology only if the whole cultural claims are reached.

Another step could be: to see and act with *technology as a play* – but that's another story to be told at another conference.

References

- Banse, G.; Nelson, G. L.; Parodi, O. (2011): Sustainable development – The Cultural perspective. Concepts – aspects – examples. Berlin.
- Böhme, H. (2001): Was ist Kulturwissenschaft? – URL: <http://www.culture.hu-berlin.de/lehre/kulturwissenschaft.pdf> [25.05.2010] (in German)
- Brugger, W. (1998): Technik. In: Brugger, W. (ed.): Philosophisches Wörterbuch. Freiburg i. Br., pp. 393-394 (in German)
- Buber, M. (1960): Urdistanz und Beziehung. Heidelberg (in German)
- Bundesregierung (2002): Perspektiven für Deutschland. Unsere Strategie für eine nachhaltige Entwicklung. Berlin. – URL: http://www.bundesregierung.de/nsc_true/Content/DE/___Anlagen/2006-2007/perspektiven-fuer-deutschland-langfassung,templateId=raw,property=publicationFile.pdf/perspektiven-fuer-deutschland-langfassung [15.03.2011] (in German)
- Erlach, K. (2000): Das Technotop. Die technologische Konstruktion der Wirklichkeit. Münster (in German)
- Grunwald, A.; Hartlieb, J. von (eds.) (2012): Ist Technik die Zukunft der menschlichen Natur? 36 Essays. Hannover (in German)
- Großklaus, G.; Oldemeyer, E. (eds.) (1983): Natur als Gegenwelt. Beiträge zur Kulturgeschichte der Natur. Karlsruhe (in German)
- Hansen, K. P. (2000): Kultur und Kulturwissenschaft. 2nd rev. ed. Tübingen (in German)
- Hauff, V. (ed.) (1987): Unsere gemeinsame Zukunft. Der Brundtland-Bericht der Weltkommission für Umwelt und Entwicklung. Greven (in German)
- Huber, J. (1989): Technikbilder. Weltanschauliche Weichenstellungen der Technologie- und Umweltpolitik. Opladen (in German)
- Jonas, H. (1986): Das Prinzip Verantwortung. Versuch einer Ethik für die technologische Zivilisation. Nördlingen (in German)
- Karafyllis, N. C. (ed.) (2003): Biofakte. Versuch über den Menschen zwischen Artefakt und Lebewesen. Paderborn (in German)
- Kopfmüller, J.; Brandl, V.; Jörissen, J.; Paetau, M.; Banse, G.; Coenen, R.; Grunwald, A. (2001): Nachhaltige Entwicklung integrativ betrachtet. Konstitutive Elemente, Regeln, Indikatoren. Berlin (in German)

- Luhmann, N. (1997): Die Gesellschaft der Gesellschaft. Vol. I. Frankfurt am Main (in German)
- Marschall, W. (1993): Die zweite Natur des Menschen. Kulturtheoretische Positionen in der Ethnologie. In: Hansen, K. P. (ed.): Kulturbegriff und Methode. Der stille Paradigmenwechsel in den Geisteswissenschaften. Tübingen, pp. 17-26 (in German)
- Meyer-Abich, K. M. (1984): Wege zum Frieden mit der Natur. Praktische Naturphilosophie für die Umweltpolitik. Munich (in German)
- Mumford, L. (1967): The Myth of the machine.
- Oldemeyer, E. (2005): Die Ich-Es-Einstellung als Voraussetzung technischer Kreativität. Bewusstseinsgeschichtliche Bemerkungen im Anschluss an Martin Buber. In: Dürr, R.; Gebauer, G.; Maring, M.; Schütt, H.-P. (eds.): Pragmatisches Philosophieren. Festschrift für Hans Lenk. Münster, pp. 302-314 (in German)
- Ott, K.; Döring, R. (2004): Theorie und Praxis starker Nachhaltigkeit. Marburg (in German)
- Parodi, O. (2011): Three steps towards a culture of sustainability. In: Parodi, O.; Ayestaran, I.; Banse, G. (eds.): Sustainable development – relationships to culture, knowledge and ethics. Karlsruhe, pp. 75-92
- Parodi, O. (2008): Technik am Fluss. Philosophische und kulturwissenschaftliche Betrachtungen zum Wasserbau als kulturelle Unternehmung. Munich (in German)
- Parodi, O.; Ayestaran, I.; Banse, G. (eds.) (2011): Sustainable development – relationships to culture, knowledge and ethics. Karlsruhe
- Prechtl, P.; Burkhard, F.-P. (eds.) (1996): Metzler-Philosophie-Lexikon. Begriffe und Definitionen. Stuttgart (in German)
- Rohbeck, J. (1993): Technologische Urteilskraft. Zu einer Ethik technischen Handelns. Frankfurt am Main (in German)
- Ropohl, G. (1999): Allgemeine Technologie – eine Systemtheorie der Technik. 2. Aufl. München
- United Nations – Division for Sustainable Development [UN-DSD] (2009): – URL: <http://www.un.org/esa/dsd/index.shtml> [12.09.2012]
- Wilber, K. (2009): Halbzeit der Evolution – der Mensch auf dem Weg vom animalischen zum kosmischen Bewusstsein. Fischer Verlag (in German)

This article is based on: Parodi, O. (2011): Three steps towards a culture of sustainability. In: Parodi, O.; Ayestaran, I.; Banse, G. (eds.): Sustainable development – relationships to culture, knowledge and ethics. Karlsruhe, pp. 75-92.