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On the Influences of Technology on Morality

Doctoral Thesis of Ehsan Arzroomchilar

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Chapter One; Preliminaries

Introduction

In characterization of our contemporary society and accordingly distinguishing it from pre-modern societies, emergence of modern technologies would probably be a significant break point. Technology is a major mark of the modern life in this sense. We are immersed in human-made material surroundings, technology is all around. Conceiving of a life void of technology is notoriously difficult, if not impossible. We provide services to the elderly by caregiver robots, commute by car, make food by toaster, communicate by cell phone, read printed books, get rest on bed, purchase with credit cards, see things through eyeglasses and so forth; a multitude of both mundane and sophisticated technologies have surrounded us. Our daily activities seem to be implemented, most often, by technology's interference. Can we think of carrying out anything where there is no technology involved? We might probably be able to imagine a world where caregiver robots, cars and laptops are not operative, but can we ever think of a world where there is no clothing available? Although modern technologies are significantly different than their antecedents in antiquity, as I will talk about it later, technology, in general, seems to have been an integral component of human life. If one still thinks that a clothing-less world is conceivable how about one where a *sharpened* stick is not around for haunting? We couldn't have survived, it appears, without technology. The most basic needs of humans, e.g., food and shelter, hinge upon artefacts.

Technology furthermore empowers us to get things done in an efficient way. We cannot continuously walk for hours, we therefore invent motor engine for assistance. Even if we could that wouldn't be fast enough, that would have taken up much time. We cannot push a huge stone in order to provide a shelter, we invent axe subsequently to come in handy. We cannot calculate fast enough, we use then a calculator. We cannot keep all our schedule in mind, we consult our smart phone's note accordingly. It appears then that human beings modify the surroundings to strengthen themselves and boost their resilience. This is the role we usually entrust to technology and the way we wish to put the latter into use.

But technology does not just gently partake in our actions, i.e., it is more than an aid for our doings. Should it was just that, there would have been barely anything worthy of philosophical reflection with respect to technology. Put simply, if it was the case, technology would have remained the

exclusive territory of engineers. But technology may go beyond *instrumentality* by affecting us. Technology is not merely subservient to us as its creators, that is to say, it is not fully faithful to the planned assignments. It may alter our behavior in turn. I may have laid across the floor if there had not been any bed invented, or sited on my knees while siting, if the chair were not in the room. Beds and Chairs, in this sense, *form* the way we lay and sit, while discourage, or even exclude sometimes, the alternative fashions of behavior.

Yet the influence of technology is not restricted to the bodily comportment. Technology may also change values. In some north European countries the length of the tube of vacuum cleaner was designed too short and uncomfortable for men to work with and causing them back pain. But such a configuration turned out to be disinclining men to clean the home in effect and in doing so it tended to reinforce sexist assumptions about who should do housework (Waelbers 2011: 2). A specific mode of design then may promote a particular value, or disvalue.

Technology may also change our self-identification. We may consider ourselves handsome and charming or otherwise unstylish and outmoded within different clothing. A stylish suit, or a fancy car may boost our self-esteem. In the wake of In Vitro Fertilization (IVF) method infertility is no longer conceived as a destiny, rather it is a healing disease. We might overcome ultimately aging as human enhancement scientists envision. We might be able to modify our genome to shape ourselves or our offspring in a preferable way. Couples may try sexual behavior merely for pleasure without aiming for procreation where pills and protection tools are available. Making love has taken on a different meaning in the wake of contraceptive drugs. The introduction of such pills, moreover, led to an increase in the number of females participating in the higher education (Goldin and Katz 2002). Women, this way, could identify themselves as peers of their fellow men after the introduction of such drugs.

Technology, beyond individuals, may also manipulate society's norms. Langdon Winner, an American scholar, brings up the case of the low-hanging overpasses on Long Island in New York in his seminal writing 'Do Artefacts Have Politics?' (Winner 1980). Those overpasses were deliberately built very low in order to prevent buses from using the road and allow only automobiles to pass underneath. At the time when these bridges were built this meant that racial minorities and the poor, who could not afford buying cars and who generally relied on public

transportation, were effectively prevented from reaching the beaches. These overpasses shaped the ethnic and racial composition of people at the beach. Racism was back through a material object.

As another example to show how technology can substantially change society is the tale of the introduction of typewriter. Kittler (1986) illustrates how the development of typewriters affected the condition of women as well as secretarial profession. Prior to the advent of typewriters, secretarial positions were mostly occupied by men. Typewriter commencement however, changed dramatically the ordering, for women were deemed to be the best fit to work with typewrites than men. The reason was that at the time it was quite common for young ladies to learn piano and grow accustomed with its keyboard. This familiarity with the interface of piano, gave them privilege over men to work with typewriter, given the similarity of the keyboard of the latter with the former's. Thereafter, Kitter observes, secretarial occupation came to be considered as a feminine job, giving rise accordingly to a new structure of societal arrangement. Technology's consequences for the society may be so lasting.

In a nutshell, we primarily re-restructure the environment through our technological interferences. In the next stage we come to be -mainly unknowingly- affected by the very same material environment. And this circle plays out permanently through a dialectic pattern. Human life and the material environment, tightly knitted, are in an ever interaction in one way or another.

In the following sections, I will deal with a wide range of topics. At first, the relation of technology and modernity will be discussed. This is an important step to show how modernity expedited the growth of technology. Second, a few remarks on the metaphysics of technology will be in order. We need to bring characteristics of technology into a comparative view, with respect to other kinds of artificial objects, e.g., social artifacts and artworks. The third section will be devoted to a brief historical overview of philosophy of technology. There I will talk about three distinct periods of philosophy of technology. Finally the last section of the chapter, will disclose the outline of the work.

Technology and Modern Thought

Even though technology is taken to be associated with modern thought it should be noted that it is not a radically new phenomenon. Rather It is of great antiquity. Technology is tied with our humanity as well as our evolutionary history. Primitives, after all, needed to utilize tools in providing shelter for protection from a diverse range of threats. They had to use stones or woods, for example, to fulfil their immediate needs. From such a perspective technology has featured as part of our adaptation mechanism throughout history (Rivers 2005: 557-558). Nevertheless, modernity was a breakthrough to the history of technology.

Descartes claimed that human's selves, as thinking beings not having any extension in space, stand in a sharp contrast to the world that is extended. This way, his philosophy, was a crucial moment of subjectifying the mental life over external objects. Since then we started transcending our selves, prioritizing the latter over the world, and consequently to explore the world, or to put more precise, *our* world. Objects of our surroundings came to be taken subordinate to us. Then we, as conscious subjects, may think about world, make sense of it, and more importantly *utilize* it to our own interests. Such a process of inferiorization of the nature, taken as the aggregate of *objects*, rather than an independent entity, was a preliminary step to the further utilizations/exploitations (Rivers 2005: 565). Along such a trajectory and in time we came to assume that we have the privilege to sit upon the royal seat and command the nature[1]. Nature, as the subservient, either was already in accord with our interests or otherwise had to become modified, in one way or another, to be so. This way, we, moderns, gradually came to receive a new type of rationality, an *instrumental* one. Such a rationality gave rise to instrumentalization of the world. Consequently technological values, like efficiency, speed, efficacy and productivity became the dominant values of modern societies.

But it is not the whole story. Such an instrumentalist worldview, not only has been a precondition for emergence of technology, but also it became accelerated, by technology in turn. Technology pushes us yet further along the way of instrumentalization of the world. It means that right after developing technology created by the instrumental mentality, technology begins enforcing the

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[1] The field of environmental ethics today has great, though critical, insights to suggest in this field. The very root of all environmental crisis, according to the authors of the field, may be traced back to such a new understanding of the world. Awe or respect towards the nature is lost in modern era, and healing of the environmental problems needs, above all, a process of re-enchantment of the world. For an overview see Brennan (2021).

instrumentalist attitude in turn. The relationship between technology and us, as pictured so, is not one way, rather it is reciprocal.

Throughout my writing, however, I will not be much concerned with the context of the emergence of technology. Equally I will not be much concerned with the relation of technology with modernity as such. Rather the influence of technology on human, and in particular human values, will be my primary goal. That is to say, I will be interested predominantly in the impacts of technology on morality. Exploring different approaches, I will be in pursuit of a way to deal with the diverse consequences of technology.

Technology and Metaphysics

We are surrounded by a human-made world. We have filled our immediate environment, far from natural objects, with artificial ones. But what is this phenomenon, i.e., technology? What are the characteristics of it? How do we distinguish technical objects from other types of objects, e.g., natural objects? It's worth talking a bit about the nature of technology in one section.

We usually describe a wide variety of phenomena by the term technology or alternatively artefact[2]. To begin with, a prehistoric stone axe is as much technology as an advanced caregiver robot. We might even take some living organisms to be artefacts, or artificial, rather than natural. A genetically modified bacteria, for instance, might be conceived as an artefact. Moreover the term technology exceeds material objects, as modern infrastructures as well as information-processing systems are also thought of as technology today.

In characterization of technology the first intuition coming to mind is that while natural objects are out there as *brute facts*, technological objects are brought into existence by an intelligence being. As a first clue to characterization of technology we may think that artefacts are made, or at least modified in a certain way, to fulfil a task. Intuitively we can distinguish an act of deliberately sharpening a bough for haunting from a natural one fallen from tree. Such a criterion for

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[2] Although there might be some differences between two terms as will be discussed both terms will be used interchangeably in this writing, except when explicitly they are distinguished.

differentiation of artifacts from natural phenomena seems legitimate except some complications would loom. How much work should go into a thing to turn it into an artefact? For instance from which point a certain stone would turn into an axe? The border of natural and artificial, far from being definite, is blurry. There seems to be therefore a spectrum wherein natural objects and technical ones are located in two opposite sides and in between a multitude of things that might be called natural/artificial. I am not going to be caught up in such demarcation problems. For my aim, it does suffice to clarify that intentional human interference plays a decisive role in differentiation of artificial and natural, leaving aside the enigma of how much work is required to call an act of human an interference.

Next, a further distinction may be made between technological objects and social objects. Marriage, institutions, organizations, laws and state borders after all are artificial, that is to say, they have come to the existence by us. But evidently they are not usually described by the word technology. What is then the difference between technical artefacts and what we might call social artefacts?

For delineation we might better appeal to the *materiality* of the former against the latter. Despite the fact that some of social artefacts, too, involve matter - e.g., contracts and treaties may involve paper or pen- matter does not seem relevant in cases of social artifacts. It appears that social phenomena are not substantially germane to any matter (Kroes 2012: 14). Rather they can be instantiated without any material being involved.

Again some difficulties arise here immediately (Kroes 2012: 14). The first one has to do with the boundary between social artefacts and the technical ones. From which point social and technical artifacts would turn into one another? Look at a quote from Searle in this regard;

> Consider for example a primitive tribe that initially builds a wall around its territory. The wall is an instance of a function imposed in virtue of sheer physics: the wall, we will suppose, is big enough to keep intruders out and the members of the tribe in. But suppose the wall gradually evolves from being a physical barrier to being a symbolic barrier. Imagine that the wall gradually decays so that the only thing left is a line of stones. But imagine that the inhabitants and their neighbors continue to recognize the

line of stones as marking the boundary of the territory in such a way that it affects their behavior. For example, the inhabitants only cross the boundary under special conditions, and outsiders can only cross into the territory if it is acceptable to the inhabitants. [...] The line of stones performs the same function as a physical barrier but it does not do so in virtue of its physical construction, but because it has been collectively assigned a new status, the status of a boundary marker (Searle 1995: 39-40, cited in Kroes 2012).

While primarily the materiality of the wall was of decisive importance gradually it started to lose its centrality to the degree which it was replaced with a social agreement ultimately. The wall, departing from a technical one, turned gradually into a social artefact. Where, exactly, did this transformation happen? We hardly can draw a line, it seems.

The second troublesome issue arises when we realize that in many real-life situations social and technical are tangled and so difficult to extricate. For example, imagine a system of traffic regulation, operative in a cross road (Kroes 2012: 15). It consists of many factors, ranging from a traffic light and police force standing across the street, to traffic tickets and surveillance cameras or even the state as the authoritative power. Which one is technical and which one social? It looks we have an array of interacting elements both social and technical at the same time, or alternatively, neither is purely social nor purely technical. It seems then the boundary between social artefacts and technology is not clear again. Going into more details is beyond the preview of this writing and I don't aim to engage myself with such problems here[3].

Still there exists a further kind of artefact, next to technical and social, which is artistic artefact. A painting, for example, or a statue are artificial, i.e. they are deliberately made by humans. What is the difference between the latter case and the foregoing ones? Leaving aside again all perplexities, one may posit that while both technical and social artefacts are going to fulfil a *function*, that is to say, serving to perform a *practical* goal, artistic works are not supposed to imply any function. Rather they are designed and made to serve aesthetic purposes. They are supposed to beautify our

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[3] See for example Kroes (2012) to see how he suggests some ways out of these obstacles.

surroundings rather than achieving any practical goal (Kroes 2012: 2). In this sense aesthetic objects, in contrast with the previous ones, are not utilized in an *instrumental* fashion.

Below I delve a bit more into the nature of *function* in artefacts, but until then let me summarize what I have elaborated so far. We first situated artificial objects against natural objects. We then divided the former into three subcategories[4]; technical artefacts, social artefacts and artistic artefacts. The following diagram summarizes the classification of objects.
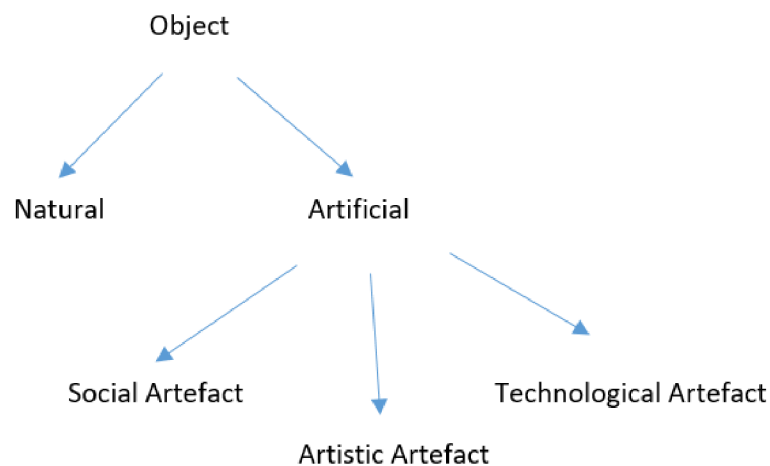
From now on I will leave aside social and artistic artefacts and will be engaged merely with the technical artifacts.

Now I need to briefly address an important feature of technology which is that of function. As a preliminary step let's reconsider again Searle's example which was discussed above. As the case of wall reveals there is a huge divergence between the way a wall exercises its function and that of state borders. While in the former physical configuration is what exercises power, that is, keeping outsiders out, for the latter this is just the *intentionality* of a collective to play a crucial part (Kroes 2012: 18-20). How physical systems differ from intentional ones? Simply put, in a

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[4] One may speak also of 'biological artefacts' referring to the organisms which have been genetically modified for a certain purpose. Kroes brings up the cases like 'genetically engineered bacteria' for purification of sewage. But I am not concerned with this category here.

physical system the initial conditions of the system fully determine the subsequent behavior of the system. For example, if we knew speed, acceleration, mass and force of a system in a particular moment, we would be able to precisely anticipate the subsequent behavior. In contrast, intentional systems could not be predetermined by virtue of the initial state. Put differently, as Kroes notes, while a physical system is driven by *causes*, the drive of an intentional system is indebted to *reason* (Kroes 2012).

How such an intuition applies to technology? With respect to technology, which side of the foregoing division may be at work? To begin with, materiality has a decisive role in case of technical artefacts. Technology exercises its force, it seems, partially by its material configuration. Part of the nature of the chair upon which I am sitting right now is provided by its materiality, that is, the fashion it is designed. Without matter it would be so hard to imagine how a technology can work at all.

Nonetheless, technology is not simply a piece of material. It has also *function*. It has been modified to deliver a certain service. The notion of function indicates that *intentionality* cannot be excluded from the characterization of technology. In fact, as Kroes observes, function is the locus where cause and reason meet, that is, function is an arena where physical configuration and intentionality come together. Put simply, function links intentionality to the physical arrangement of a technology, according to Kroes. If so, engineers or designers seem to be agents who embed intentionality into a physical structure. My *intention* of cutting bread may be exercised by a piece of metal having been recast in a particular design. A knife is the expression of my intentionality in a material way.

This way we may come to a preliminary conception of technology; technology is what has a function, and it instantiates the function[5] through a physical structure[6] (Kroes 2012: 38-40).

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[5] For an extensive treatment of the notion of 'function' and different varieties of that, see Preston (2009). There, Preson distinguishes between different approaches to function. According to her basically there are two main approaches to the function of artifacts: 1- Intentionalist view according to which function is directly and exhaustively determined by individual or collective human intentions. 2- Reproduction view that appeals to the history of selective reproduction as the primary factor in explaining function of artefacts. In light of such a classification, she later lays out nine different theories of function in her writing.

[6] I don't aim to get involved with the discussion of whether we need to distinguish intended function by the designers with that of users in the context of use. For such details one may see Kroes's own work (2012).

Hereafter I will leave aside all details and will be engaged with this working formulation of technology[7].

Technology and Human Beings

How might technology influence human beings? Generally there are three views on the relation of technology and human beings/society (Briggle and Mitcham 2012: 44-48). Some take technology to inherently be neutral or value-free. Technology cannot go beyond human's intentions on this account. Technology seems here as slave for its possessors coming to be used exclusively on the latter's volition. One should note however that such an *instrumentalist* approach does not need to posit that all the things concerning the nature of artefacts are predetermined by the designers. Rather an instrumentalist may consistently approve that technology can go along different paths of development after its initial introduction. In order to be an instrumentalist or believe in *dependency* of technology on human's volition (Briggle and Mitcham 2012), one just has to acknowledge that technology grows determined merely by humans' intentionality – be it designers' intentionality or users'. Put simply, on this account the relation of human beings and technology is unidirectional rather than a bidirectional one, that is, the former can exercise its power over the latter but not the other way around. In light of such an insight those working under the label SCOT (Social Construction of Technology) may perfectly be consistent with instrumentalism, given that they take technology to embody an *interpretive flexibility* that allows for a wide range of divergent interpretations and meanings[8]. But there is no force inherent to technology, according to SCOT, and society is in full command of technology. In this regard, in

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[7] Moreover, I will leave out also all nuances one might find between the notions of technology and that of artefact, as mentioned earlier, I will use them interchangeably in the same sense. There is a rich literature concerning their alleged differences, as one may explore. For example Richard li-Hua (2009) defines technology as consisting of four closely interlinked elements: Technique, knowledge, the organization of the production, and the product. In this sense technology is thought of to be a broader notion than that of artefact. Here, however, I am not concerned with their differences. For another historical treatment of the notion of technology look Hansson (2017).

[8] I will bring into view the pillars of this movement in chapter three. Suffice to say here that it is a movement to study technology in an empirical way. Here technology is taken to be formed exclusively by social elements. That is, technology can fully be reduced to the intention of the collectives.

an instrumentalist conception of technology, the latter is taken to be quite subordinate to humans' will.

The second attitude towards technology is a substantialist approach. Here technology is taken to be independent of humans, at least to a significant degree. Once brought into existence, technology finds its own way forward according to the substantialist conception of technology. Moreover, every aspect of human beings' life incontrovertibly becomes affected by technology. Ellul, a prominent French thinker, for instance, holds that the process of development of technology becomes independent to the extent that old technologies are *automatically* replaced by new ones because the successors are more efficient (Ellul 1964). The trend of development of technologies carries on, to a large extent, based on an *internal logic*, independent of human's will in this sense. Not only its emergence, but also the subsequent behavior of technology occurs *autonomously*, and this way its influence on human beings exceeds beyond what has been anticipated.

Langdon Winner, an American scholar, extensively discusses such aspect while narrating the story of low-hanging overpasses on Long Island in New York in "Do Artifacts Have Politics?" (Winner 1980). Those overpasses were deliberately built very low in order to prevent buses from using the road and allow only automobiles to pass underneath. At the time when these bridges were built this meant that racial minorities and the poor, who could not afford cars and who generally relied on public transportation, were effectively prevented from reaching the beaches. These overpasses then shaped the ethnic and racial composition of people at the beach. Winner took this to mean that (at least) some technologies have political properties *in themselves*. They exercise their power in their own. In a similar vein, Heidegger, advanced a deterministic ontological understanding of technology as *revealing* the reality inevitably in a certain way. On his account, technology unfolds being as *Bestand,* i.e., a permanent *reservoir* for human. This in turn excludes the other probable meanings of reality for humanity. Crucially, such a view towards things as *resources* for our exploitation, would not be bounded just to our material surroundings, rather it would also predominate our humanly relationships. It means that in the long run, we would considered our human fellows to be resources to be exploited[9]. Heidegger takes such status of technology to be a destiny, not open so much to change.

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[9] Later, in this chapter, I will treat Heidegger's philosophy of technology in more details.

Lastly, further scholars, constituting the third trend, came to the conclusion that neither of *dependency* and *independency* view could do justice to the reality of technology. Rather we need a middle position to display interconnectedness of human and technology. In this camp technology is not just a passive tool. Nor can it master human beings either. Instead they both possess some power over the other without the capacity to fully determine the other.

We might find, above all, two prominent movements within this approach standing out. Latour (1993), while advancing his theory, ANT, elaborated how both the foregoing positions are unrealistic. He refers to the ongoing debate in the US as to the legitimacy of holding gun, where on the one hand those contending that 'people don't kill, rather guns do' call for prohibition of carrying gun. On the other hand one can find their rivalries who proclaim 'guns don't kill, humans do' suggesting accordingly for retention of the existing liberal regulations. Latour (1993: 6) however takes issue with both noting that,

> The dual mistake of the materialists and of the sociologists is to start with essences, either those of subjects or those of objects. ... Neither the subject, nor the object, nor their goals are fixed forever.

With a gun in hand, he argues, humans don't remain the same as before, they are *translated* through enrolment into the relationship with gun. Also guns cannot remain the same, they are *translated* too, from unanimated things to a weapon for taking a revenge for instance[10].

On such a view, neither human beings nor technologies are fully reduced to the other. Rather they are *interdependent* (Briggle and Mitcham 2012). They affect and simultaneously become affected. Human life is in a tangled relationship with technology where one should not degrade either of them against the other.

The second major movement within the last approach is postphenomenology according to which technology and human co-shape one another[11]. *Mediation* is a key term within the latter two

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[10] I will revert to Latour and his theory in chapter three.
[11] I will extensively elaborate postphenomenology in the next chapter.

frameworks. According to mediation theory technology affects both human beings and the world that appears within consciousness. Mediation, in this sense, 'denotes to the mutual dependency of human and technology' and their interaction (Dorrestijn 2017: 313). The latter notion has extensively been used and applied by the contemporary scholars (McLuhan 2003; Ihde 1990; Feenberg 2002; Kockelkoren 2003; Peter-Paul Verbeek 2005; 2011).

Technology and Morality; a Historical Overview

Having established the context, now we are in a position to deal with our concern more specifically. Morality, will be my primary focus in this writing, as mentioned earlier. In moral discussions associated with technology however there is a broad range of concerns going on. Different approaches have emerged across time to study ethics of technology. To begin with, one can place her focus on the type of queries that can be answered merely through empirical endeavors. We might ask, for instance, 'are we happier than before in the wake of technology or not[12]?' or 'Do we score more quality today to our life or not[13]?'. In this work I cannot deal much with such empirically-shaped approaches and will leave them out all accordingly. I will be following instead more systematic approaches to ethics of technology. This way we would be able to cover a wider range of relevant issues.

Before exposing some of contemporary approaches to technology, however, we need first to be informed of a historical overview. In the next section I will provide a narrative of ideas of some towering figures in late nineteenth and twentieth century.

There seems to be, in general, a consensus on identifying three phases of philosophical reflection on technology; early stage, classical stage and lately the period 'after empirical turn' (Achterhuis

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[12] For a treatment of the issue and to see the effect of technology on our happiness one can see Michael Steger and Joo Yeon Shin's work (2012), 'Happiness and Meaning in a Technological Age A Psychological Approach'. Over there they explore the different interpretations of the notion of well-being and subsequently investigate the consequences of specific technologies like gadgets, communication technologies and medical technologies, on happiness and the meaning of our life. They argue that we need to bring every instance of technology into relief to see how it may affect happiness and meaning of the life.
[13] Ruut Veenhoven (2012), in his analysis 'Quality of Life in a Technological Society: A Macrosociological Approach' argues that we live far better than our forefathers. This quality of life, he argues, is a consequence of technology by the improvement of two elements of 'happiness' and 'longevity of the life' of people.

2001). In a rough sketch one can claim that accounts of technology have been vacillating from an optimistic view in the first phase to a thoroughly gloomy picture in the second phase and ultimately to a moderate assessment of technology in recent decades. Below I elaborate these in more details.

Early Stage of Philosophy of Technology; an Optimistic View

Ernst Kapp seems to be the first figure to explicitly use the term philosophy of technology (Franssen et al. 2018; Dorrestijn 2017). According to him, technology is the *extension* of human organisms. Hammer, is nothing but the extension of our fist for example or wheel is nothing but an extension of our running power (Dorrestijn 2017: 314). Human beings, on Kapp's account, by reflecting upon technology, come to attain a better understanding of themselves, through likening organism and mechanism. Kapp applies his reading of Hegel to analyze the process of technological development and the progressive self-understanding, as a historical progress in the human condition (Dorrestijn 2017: 314).

Karl Marx, was the next disciple of Hegelian school to reflect on technology by placing it within a dialectical understanding of historical progress. Technology seemed quite fit to Marx's picture, where the material-economic condition was considered as a force to the completion of human's consciousness. Even though Marx identified a threat associated with technology in terms of its scarcity and its fair distribution (Dorrestijn 2017: 314) overall, in both Kapp and Marx, technology was taken to be positively constructive.

Classical Philosophy of Technology; Pessimistic View

The second trend of reflection on technology, which came to be called the 'classical philosophy of technology', was fraught with a dystopian conception of technology (Achterhuis 2001). As Brey identifies this second phase started around 1920s into 1980s (Brey 2010). Such a gloomy vision of technology, Brey argues, was partly a reaction to the thoroughly optimistic image of 'the Enlightenment and its ideal of progress' (Brey 2010). The latter's rosy picture is evidently reflected even in the prominent figures like Descartes for example, when he envisioned that 'humanity will

have ever more control of nature as a result of the technological application of science, and thereby improve its own living conditions and well-being' (cited in Brey 2010). In nineteenth century the Enlightenment's dream came true and technology started to permeate every aspect of human life.

Later, however, some thinkers felt not only the vision of autonomy and well-being of humankind had not realized, but technology had come at a considerable cost. Urbanization, emergence of consumer society and mass production turned out to be problematic. In time it became more evident that technology was not just undesirable, rather catastrophe in some occasions. Nuclear bomb, Auschwitz, environmental crisis and loss of values demonstrated that technology may end up with the extinction of humanity. Against such a backdrop, the classical philosophy of technology came into existence. Here I will provide a narrative of some-and certainly not all-prominent figures of this period.

Ellul (1912–1994), a French philosopher and sociologist, is usually taken to be one of the first authors to warn of the influence of technology on morals and consequently called into question the idea of value-neutrality of technology. He argued that modern technologies had become 'autonomous' at the expense of the autonomy of humans (Ellul 1964). He also noticed that technology creates its own culture and subsequently would destroy local societies and sub-cultures. As he notes;

> Particular technological developments and applications permit certain forms of civil society and political community while excluding others …. Technology cannot be a set of neutral instruments, because their 'neutrality' is defined within the imposed way it should be used (cited in Waters 2006: 127).

What Ellul seems to be saying is that technology homogenizes all cultures and subcultures at the expense of taking away all diversities.

Postman puts this idea in a more cogent fashion;

A medium is the social and intellectual environment a machine creates. Of course, like the brain itself, every technology has an inherent bias. It has within its physical form a predisposition toward being used in certain ways and not others. Only those who know nothing of the history of technology believe that a technology is entirely neutral….Each technology has an agenda of its own. It is… a metaphor waiting to unfold (1985: 58).

Technology, it seems, owns an internal logic that inevitably imposes its force upon social life of civilians. We may not scape out of it according to this deterministic outlook.

Heidegger was probably the most important figure of this period; the one whose views are still vividly alive and inspiring. In a seminal article *The question concerning technology* from 1977 Heidegger treated technology in an extensive way. He drew upon what he called metaphysics of technology to bring into view the role of technology in styling modern worldview.

Over there, he rejects at first both the idea of technology as 'a means to an end' and that of 'human activity'. He calls these approaches 'instrumental and anthropological definition of technology' respectively (Heidegger 1977: 3). He then comes to the conclusion that technology is 'a way of revealing' (Heidegger 1977: 12). But revealing of what? According to Heidegger, reality does not always stand in the same relationship to human beings. Rather all relations are provisional. In each epoch reality becomes revealed in a different and distinct mode. It implies that we don't have any access to reality 'in itself', rather it is just 'reality for us' that is grasped by humans (Seubold 1986, cited in Verbeek 2005). Reality is nothing but a move from concealment into unconcealment. This is what may be called 'revealing' in Heidegger's word; coming into light in a certain way. Heidegger posits that technology is 'a way of revealing reality' in a new and unprecedented way, as he writes '[t]echnology is a mode of revealing. Technology comes into presence in the realm where revealing and unconcealment take place, where … truth, happens' (Heidegger 1977: 14). Technology then is a *pattern* through which reality shows itself to us, coming to be identified in a certain way. Once a certain kind of revealment occurs all alternative disclosures become lost and latent. In this sense, If the dominant way of unconcealment is that of technological we don't have any access accordingly to other possible meanings of reality, Heidegger contends. We are stuck, or one might say doomed, to understand reality in a technological mode in modern era. According to him, there is a 'way of unconcealment' that holds sway in every particular epoch and this is

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what determines the way reality is going to be unconcealed. In our time this 'way of unconcealment' is through technology.

But the way of technological revealment of reality is different than alternatives and in this sense it is especial. Making sense of reality in our time involves a specific character as human beings 'set upon' and 'challenge' what they bring forth as real. For modern man reality is a sort of 'standing-reserve' of which we can utilize and exploit unconstrainedly (Heidegger 1977: 19). This particular mode of reality, as standing-reserve, or as raw material, is what Heidegger describes by the German word *Gestell*[14]. Importantly, at the Gestell lies the *essence* of technology (Heidegger 1977). Heidegger appeals to the example of Rhine river to make his point. Here refers to the hydroelectric plant on the Rhine where it is

> set into the current of the Rhine. It sets the Rhine to supplying its hydraulic pressure, which then sets the turbines turning. This turning sets those machines in motion whose thrust sets going the electric current for which the long-distance power station and its network of cables are set up to dispatch electricity. In the context of the interlocking processes pertaining to the orderly disposition of electrical energy, even the Rhine itself appears as something at our command. The hydroelectric plant is not built into the Rhine River as was the old wooden bridge that joined bank with bank for hundreds of years. Rather the river is dammed up into the power plant. What the river is now, namely, a water power supplier, derives from out of the essence of the power station. In order that we may even remotely consider the monstrousness that reigns here, let us ponder for a moment the contrast that speaks out of the two titles, 'The Rhine' as dammed up into the power works, and 'The Rhine' as uttered out of the art work, in Holderlin's hymn by that name. But, it will be replied, the Rhine is still a river in the landscape, is it not? Perhaps. But how? In no other way than as an object on call for inspection by a tour group ordered there by the vacation industry (Heidegger 1977: 16).

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[14] Usually translated as *enframing* (Noted by the translator, w. Lovitt)

The crucial point Heidegger is making here is that Rhine, as an aspect of reality, had come to be revealed primarily as standing-reserve (*Bestand*[15] in his own word). Only later, after creation of such a meaning of the river, we came to construct the plant. We required a specific meaning of the river as a precondition to be able to build a technology over it. Technology, on the account of Heidegger, is an effect itself, not the cause; the effect of Gestell, as mentioned above. The way of Rhine's unconcealment in our time fundamentally diverges from that of Holderlin, Heidegger claims.

So far Heidegger's treatment is mainly metaphysical in nature. But he does not stop here, and comes to touch upon the moral implications of technology too, since this way of revealing, namely Gestell, is not innocent. Rather it is a 'supreme danger' for Heidegger. But what is so dangerous about technology? Generally Heidegger takes any form of revealing to be a danger, since 'in whatever way the destining of revealing may hold sway, the unconcealment in which everything that shows itself at any given time harbors the danger that man may quail at the unconcealed and may misinterpret it' (Heidegger 1977: 26). Put simply, Heidegger identifies that every manner of revealment of reality may cause to forget about the reality of being. Any particular fashion of unconceallement is ultimately amount to hindering the meaning of being. We would become ignorant of the real meaning of the being this way. For example where

> everything that presences exhibit itself in the light of a cause-effect coherence, even God can, for representational thinking, lose all that is exalted and holy, the mysteriousness of his distance. In the light of causality, God can sink to the level of a cause, of *causa efficiens*. He then becomes, even in theology, the god of the philosophers, namely, of those who define the unconcealed and the concealed in terms of the causality of making, without ever considering the essential origin of this causality (Heidegger 1977: 26).

But Gestell is not anything like other styles of unconceallement, the danger of it is not restricted only to what the foregoing passage implied. Rather Gestell is the 'supreme danger', as said

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[15] Bestand ordinarily denotes a store or supply as 'standing by.' (noted by the translator of work, W. Lovitt)

(Heidegger 1977: 27). Heidegger makes the case for his contention on two grounds. First, taking everything in the nature as standing–reserve would give rise ultimately to the situation where human 'himself will have to be taken as standing-reserve' (Heidegger 1977: 27). Human beings would soon turn into tools to deliver a service, pretty much in the same manner as a technological understanding of being. Put simply, we would tend to behave others, it seems, in an instrumental way in light of a technological conception of being. The second front is that if such a technological ordering prevails, it subsequently 'drives out every other possibility of revealing' (Heidegger 1977: 27). It would block, he claims, all other alternatives.

Heidegger's description of technology, as is clear now, is both deterministic and pessimistic. On his account, there cannot be any way out of such a *fate*. We live an era where reality already is disclosed in a certain manner, i.e. a technological framing, and there is no room apparently to scape; it is our destiny.

Borgmann was the one who, along the way already paved by Heidegger, elaborated technology in more details. In his book *Technology and the Character of Contemporary Life* (1984) he speaks of a 'pattern' that commands modern technologies at large. The pattern which he calls 'device paradigm' refers to the characteristics that modern technologies, unlike their pre-modern precedents, possess. By modern technologies he means all artefacts around, as 'objects such as television sets, central heating plants, automobiles' and the like. Devices like these which permeate everywhere 'represent clear and accessible cases of the pattern or paradigm of modern technology' (Borgmann 1984: 3). Modern technology, by imposing its inscribed pattern, has dramatically changed the 'character of contemporary life', he argues. But what is this 'device paradigm' which is exclusive to the modern technologies? To being with, such a pattern grounds on one key feature; *availability*. Technologies envisages to liberate humans from all burdens and difficulties by making available things that used to be difficult to acquire or realize. Availability in turn is delivered, 'if [technology] … has been rendered instantaneous, ubiquitous, safe, and easy'; it means that 'goods that are available to us enrich our lives and, if they are technologically available, they do so without imposing burdens on us' (Borgmannn 1984: 41).

Borgmann provides the example of 'warmth' to show how it has transformed into a 'good' or 'commodity', given that it is available now. He differentiates traditional fireplaces from modern apparatuses. While in the former case we had to chop, gather and put woods into the fireplace to

create warmth, in the latter warmth is available without any bother. Today we just need to push a button to turn on a central heating system for bringing warmth into our house and in this sense warmth is instantaneous, safe, ubiquitous and easy. Warmth of a fireplace, in contrast, was far from being available. That is, we needed time to devote to create warmth (i.e., it was not instantaneous), we needed to go for gathering woods and subsequently we may have hurt ourselves (i.e., it was not safe), we could not deliver warmth to all areas of the house, rather just the surroundings nearby would get warm (i.e., it was not ubiquitous), and all this meant work, skill, experience, endurance and time (i.e., it was not easy). Now we have access to 'devices' whereas our forefathers had to make their life just with 'things' (Borgmann 1984).

Moreover, device paradigm came to be dominant with its two components; *commodity* and *machinery* . Device has a machinery part which conceals the background stage into which a lot of works went to efficiently work. Modern technology divides everything into two parts; a latent machinery part and a visible commodity (Borgmann 1984). Unlike the pre-modern technologies, we don't have access to the machinery part of the modern technologies.

Such ease and comfort, created by technology, however is not without cost, Borgmann argues. Modern technology provides us with such pleasure at the cost of imposing a specific lifestyle which might in turn promote 'consumption' (Borgmann 1984: 92). The latency of the machinery of modern technology, and at the same time availability of its commodity, has enabled humans to fulfil their needs in a painless manner. Borgmann takes the so-called couch potato to be the exemplar of a consumerist culture; an individual who is not engaged with people, world, books, games and the like, just seating before a TV set and keeps watching it. Technology, on Borgmann's account, drives society to take a couch potato lifestyle.

However gloomy Borgmann's outlook may sound one should not overstate the corollary of his views. His observation does not end up with rejection of modern technologies altogether implying accordingly to pursue a pre-modern life deplete of any technology. Borgmann is not an anti-technology. Rather we need just to take a critical position towards technology according to him. We should not let technology transform us into slaves. His own blueprint lies at what he calls 'focal things' or 'focal practices' (Borgmann 1992). Focal things or practices for Borgmann are things that can bring back humans' involvement with the world, that is, things that invite people to engagement. They are 'matters of ultimate concern that are other and greater than ourselves'

(Borgmann 1992: 169). Moreover, they 'are concrete, tangible, and deep, admitting of no functional equivalents; they have a tradition, structure, and rhythm of their own'. He brings up some instances of such focal things and practice. 'Running' and 'the culture of the table', for example, are his prescriptions to break up, at least partially, the technological pattern of life (Borgmann 1984). Enjoying a meal on the table with one's family along with all prior attempts to prepare stuff, or running in nature, may counter the consumerist flavor of life brought about by modern technologies.

In the similar vein, Rivers (2005) elaborates another divergence of modern technologies and the pre-modern ones. In modern era 'means' are prioritized over 'ends'; in the old age

> ends had taken precedence over means because the fulfilment of an intended goal was the principal reason why technology was pursued. The emphasis on the ends over means was reversed by the modern age because the pursuit of means as an act of involvement took precedence over ends (569).

This have had significant consequences on the characteristics of human beings, Revers argues. Like Borgmann, he concludes that such a substantial change of rationale has ended up with consumerist behavior of users of technologies. The point he is trying to make is very paramount; we used to solve our *problems* with the help of technology, but now innovation, creation and technological development *per se* seem to be of value for western societies. Rivers goes on to enumerate further implications of the current technological culture when he refers to the 'greatest problem' of technology which is

> the obstruction of self-reflection about the nature of being. Being has been replaced by busyness, by a self-generating activity of everydayness, which fills up each day with mindless diversion. It makes life trivial. Although completely consumed by the present moment, we have forgotten the importance of being's presence. The absence of self-reflection is the result of technology's ability to encourage our preoccupation with things. Excessive consumerism, which is one of technology's negative effects, has a

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direct and immediate effect when confronted with technology. We dissipate our energy; we waste our time; we live unexamined lives. Technology inhibits deep thinking because it is concerned primarily with activity, not contemplation. Because thinking is fundamental to self-awareness, technology is an obstacle to self-identity. It is a threat to internality (Rivers 2005: 573).

In sum, in the classical approach[16] to technology, technology is deemed mainly as an evil, on the ground that it conditions human life, more or less, in a deterministic way. Besides, there is hardly any way out of such a gloomy fate.

The Third Stage of Philosophy of Technology; the Empirical Turn

The classical approach to technology, although more systematic than its precedent, i.e., early philosophy of technology, suffered from some shortcomings (Brey 2010). First of all, it was too one-sidedly pessimistic; It did not acknowledge the possible positive aspects of technology. In time it came to be felt that technology is ambivalent in nature and may bring also desirable outcomes. From this perspective the classical philosophy of technology did not do justice to technology. Secondly, the image of technology, portrayed by the classical approach to technology was too deterministic. Technology was perceived to be holding humanity captive, shaping subsequently the latter's life. Nothing was left of the power for humans. But such a view did not seem correct. Science and Technology Studies (STS), for example, showed that technology in many respects was contingent and a *construction* of society. A deterministic image of technology then seemed not to be realistic. Third objection, finally, was that the classical approach to technology was too abstract and generic to be able to display reality. It was not sensitive to particular technologies, indifferent accordingly to the concreteness. While we might think that varied technologies may bring about distinct consequences the classical treatment was monolithic and uniform in its manner.

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[16] I prefer to use the notion classical *approach* rather than classical period or classical philosophy of technology. While the latter connotes a specific time frame the former does not imply such a qualification. In this sense classical approach may be recognized even in more recent times, as the case of River proves.

All this led to a 'turn', beginning from 1980s, to a new wave of exploration of technology[17]. According to a new generation of scholars the classical approach did not do justice to technology (Brey 2010). First of all they felt we needed to study technologies in their specificity, meaning that every instance of technology should be studied in a distinct manner. Secondly, we need for an empirically-informed research, rather than *a priory* generalizations. Thirdly, we need primarily a descriptive account to make sense of the 'black box' of technology far from normative approaches. All this heralded a *turn* to empirical studies of technology in late twentieth century. Technology seemed not to be deterministic anymore rather contingent, not one-sided rather multifaceted.

In next chapters, I will focus mainly on the third approach to technology through elaborating two major currents, namely postphenomenology and Actor-network theory (ANT). I will also illustrate the underpinnings of the influential movement of Social Construction of Technology (SCOT). As mentioned, all such approaches share a focus on *individual* and *concrete* technologies, *empirical* approach, and *descriptive* account with respect to technology.

The Outline of the Work

By now, via a brief survey, I have tried to establish a general context for my narrative. In the next chapters I will take up specific topics to explore. As I said earlier, my primary focus will be on moral dimensions. For morally treating technology, however, I have to provide an overview first, by examining influential frameworks. The structure of the work is as follows.

In the second chapter I will throw light on postphenomenology as a prominent movement whose approach is to bring technology into relief from a *first*-person perspective. Building on the classical phenomenology, postphenomenology contends that the best way to comprehend the effects of technology is a phenomenological approach. Don Ihde, the American scholar and the founder of postphenomenology, however, rarely touched on normative aspects of technology. It was just his student Peter Paul Verbeek, the Dutch scholar, who applied postphenomenology on the moral

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[17] As Brey claims, one can even discern two trends of empirical turn. He refers to an engineering-oriented turn, taking account of technology itself, and a society-oriented turn, stressing social dimension of technology. In my writing I will focus mainly on the latter. For more one can see Brey (2010).

sphere. He provided a postphenomenological approach aiming at *moralizing* technology. I sympathize with much of his views, but I have also a number of objections which I will deal with in next chapter. Verbeek's insights seem very plausible, yet as I will argue we better to distinguish an ethics of *design* from an ethics of *use*. To that purpose I will also draw on Dorrestijn's work. His approach can be read as an ethics of use. Even though my concern will be both *ethics of design* and *ethics of use* I will be brief on the latter.

In chapter three, I will be engaged with Actor-Network-Theory (henceforth ANT). From its infancy, ANT has proven influential in an array of different disciplines. Bruno Latour, the main speaker of ANT, will suggest a revised ontology where the world consists of *networks* rather than *individuals*. Besides, to account for varied phenomena, he will argue, we should not merely invoke humans but non-humans play a role as well. The associative of human and non-humans is the ultimate unit of the world on ANT's account. If postphenomenology was an exploration of technology from a phenomenological point of view ANT is an approach from a *third-person* perspective. As a ground upon which ANT emerged, I will also touch briefly on Social Construction of Technology (henceforth SCOT) movement. SCOT paved the way for empirical investigation of technology. Referring to one of their case studies, namely the history of bicycles, I will try to bring the basic tenets of SCOT into relief. SCOT too will suggest great insights helpful to be used in my work.

In the fourth and the main chapter I will present and defend a schema to suggest an approach to ethics of technology. By integration of relevant pieces of both ANT and SCOT into postphenomenology I will try to provide access to a comprehensive way to evaluate moral dimensions of technology. I will argue that we need both an inside-out as we as an outside-in approaches to bring technology into light. The traditional notion of good life and in particular that of well-being will feature as an ideal model. I will argue that for an ethics of technology we need a set of foundational objectives in light of which to morally evaluate technology. And theories of well-being will play such a role. The fourth chapter is meant to develop a systematic procedure, as I will explain, for moralization of technology.

This work, I believe, may serve as a ground for designers to moralize technology. The advantage of the approach developed in the work, would be its comprehensiveness in terms of integrating relevant elements from different frameworks. I argue that neither postphenomenology nor ANT

alone is able to do justice to the role of technology in the real-life. Rather we need a combination to capture all that is brought about by a technology.

Chapter Two; Postphenomenology

Introduction

By now we should have come to an understanding that the problem of artifacts' impacts on morality is the matter of *how* rather than *if*. But how can one explore the role of artifacts in the moral sphere? Exploring moral dimensions associated with technology, not only is of crucial importance from a theoretical point of view, but also entails far-reaching practical implications. More importantly in design and development of a technology there would arise dozens of moral dilemmas which should be taken into account before any decision making.

In this chapter I will examine an influential movement in philosophy of technology to see how it makes sense of technology and how moral dimensions are treated. Postphenomenology, as briefly said, is an approach that primarily emerged in late twentieth century by the works of Don Ihde, and later his student Peter Verbeek.

Postphenomenology finds its root in different traditions, as I will discuss shortly, and rests on several pillars. Mediation is the backbone concepts against which the activeness of technology is brought into view. I will expound the notion of mediation in detail and here suffice to say that it implies the interconnectedness of human and technology in the sense that they equally influence one another. A next tenet of postphenomenology is the so-called *relational ontology*. On this account, the nature of human beings, technology and the world are taken to be consisting in relations and emergence rather than being stable and pre-given. Along this line I will speak also about various types of human-technology relationship. Such relationships, and in general mediation of technology, come through a specific structure of amplification/reduction that will be touched upon later in separate sections. A further principle of postphenomenology is the notion of multistability. It is meant to reveal the contingency of technology which goes against all deterministic views of technology. Technology displays different stabilities within different contexts rather than embodying an invariant nature. To provide a thorough outline of postphenomnology I will also delve into its methodologies. I will elaborate three methods accordingly to show how one may conduct a postphenomenological endeavor.

After bringing all key elements into relief I will be ready to elaborate a postphenomenological ethics of technology. This purpose will be fulfilled first by drawing in works having been put

forward by some of postphenomenology scholars and then by evaluating them in second half of the chapter.

From Classical Phenomenology to Postphenomenology

From its outset, postphenomenology's goal was making sense of technology in its social and cultural context. To that purpose, Ihde drew upon three different traditions (Rosenberger & Verbeek 2015: 1); first, the classical phenomenology and its predecessors, Husserl, Heidegger and Merleau-Ponty (Ihde 2009: 11), as it is discernible from Ihde's note that 'postphenomenology is a modified, hybrid phenomenology' (Ihde 2009: 23). Second, the American pragmatist tradition, and third, research in the empirical field of 'Science and Technology Studies' (STS) and in particular the 'empirical turn' in the philosophy of technology (Achterhuis 2001).

Phenomenology was established as a school of thought by Husserl and later continued by his student Heidegger. The classical phenomenology was in pursuit of a real knowledge of the world, along the 'study of structures of experience' through the notion of intentionality (Smith 2018). Intentionality in turn was taken to be the unique feature of human mind as to being about or directed to something external to it. We don't simply think but we think about something. We don't just believe, rather believe something. This applies in every mental state according to phenomenologists, that is, a sort of about-ness or directedness towards something is always at work. The association of a thought (as a mental phenomenon) and its respective object, by the notion of intentionality, seemed a key to Husserl's to overcome the deeply rooted problem of subjectivism in post-Cartesian thought. In fact, in line with the Cartesian project Husserl came to the achievement of situating knowledge on a solid ground. This success was gained by the application of the notions of consciousness and intentionality and consequently linking human subject to its surrounding. Investigating the human-world relationship continued by the later phenomenological thinkers. Studying the consciousness, however, in Husserl's successors took on different forms, manifested by highlighting the *embodied perception* in Merleau-Ponty (i.e., the role of body in human experience) and the notion of *being-in-the-world* in Heidegger (i.e., situatedness of intentionality in the everyday activities) (Smith 2018; Verbeek 2005: 99–119). The

insight of embeddedness of human in the world on the one hand and investigating their relationship on the other was appealing to the postphenomenologist.

While the influence of the classical phenomenology is undeniable, as the movement's name indicates, postphenomenology does not embrace the classical phenomenology uncritically as the prefix 'post' suggests. Husserl's phenomenology was established in order to gain access to a *real* and undisputable knowledge, by the application of the tenet of 'back to the things themselves'. While science is seeking *analysis* of the world phenomenology aimed at *describing* the world instead. In fact, early phenomenology by Husserl was taken to be a rigorous science (Ihde 2009: 7). The main motive of phenomenology was thought to be regaining access to the *original* world. Such a perspective is what postphenomenology takes issue with and subsequently distances itself from the classical phenomenology (Rosenberger & Verbeek 2015: 11). Phenomenology, postphenomenologists hold, far from *describing* the world needs to be seeking 'understanding the relations between human beings and their world' (Rosenberger& Verbeek 2015: 11). Postphenomenology, accordingly, dispenses with what it takes to be *pre-given* object and subject altogether. This stress on *relations*, and more precisely on 'mutual constitution' of human and world, 'sharply demarcates the postphenomenological approach from classical phenomenology' (Rosenberger & Verbeek 2015: 12). Its ontology is, as they say, *relational*. Below, while illustrating the notion of *mediation* it will be clear what postphenomenologiests precisely mean by the term '*relational* ontology[1]. However, it should be noted that postphenomenology does not have anything to do with a *relativist* ontology. Scholars working under the label postphenomenology are not relativist after all. A relational ontology simply means thinking in terms of *mediation* rather than *alienation*, as I will discuss (Rosenberger& Verbeek 2015: 11).

Yet another doctrine of postphenomenology, as opposed to that of the classical phenomenology, is its experimental commitment to the particular technologies. It is mostly concrete technological apparatuses that draw the attention of postphenomenologists. This is the point Ihde makes when he points out 'how diverse [technologies are], …, how differently embedded in different cultures even the same technologies may be' (Ihde 2008a: iv). Consequently, referring to the so-called

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[1] Elsewhere, Rosenberger (2013; 2014b) speaks about 'relational strategy' to mean 'the understandings and the bodily habits a user develops in order to take up a technology for a particular purpose' (2013: 289). In other words, by the term he refers to the process of learning how bodily and perceptually relate to a specific interface and how it is relevant to our experience and perception.

traditional *transcendental* treatment of technology, he criticizes that 'such an analysis was useless since it could not discriminate between the results of playing a musical instrument ... and the process of genetic manipulation' (Ihde 2006: 271). Far from sweeping *a priori* generalizations about technology postphenomenology prefers to take a realistic stance and depart from embodied artifacts. As Verbeek notes, postphenomenology studies technology not 'in terms of its conditions of possibility but in terms of concrete artifacts, and yet to continue to pose philosophical, and not merely empirical, questions (Verbeek 2005: 6).

According to Rosenberger and Verbeek, all those studies which label themselves postphenomenological share at least two basic tenets:

> First, they investigate technology far from as an abstract sense, in terms of 'the relations between human beings and technological artifacts', to study the role of technology in shaping human. They ... consider technologies ... as 'mediators of human experiences and practices'. Second, they 'combine philosophical analysis with empirical investigation'. It means rather than simply 'applying' philosophical theories to the technologies, they try to make sense of concrete individual artifacts[2](Rosenberger& Verbeek 2015: 9).

Now we can move forward and deal with the second source of inspiration of postphenomenology, and that is, the tradition of pragmatism. Ihde takes pragmatism to be able to enrich phenomenology by 'avoiding the problems of subjectivism and idealism with which early phenomenology was cast' (Ihde 2009: 11). In Ihde's words, pragmatism may enrich the classical phenomenology as follows:

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[2] Jesper Aagaard & others, in their book 'postphenomenological methodologies' argue for similar criteria in order for a study to be qualified as postphenomenological (2018: xviii). According to them every postphenomenological inquiry should 'be anchored in an anti-essentialist, relational ontology (the 'post-' part) and it must take departure in embodied experience (the 'phenomenology' part)'.

The enrichment of pragmatism includes its recognition that 'consciousness' is an abstraction, that experience in its deeper and broader sense entails its embeddedness in both the physical or material world and its cultural-social dimensions. Rather than a philosophy of consciousness, pragmatism views experience in a more organism/environment model (Ihde 2009: 20).

And finally, the third source upon which postphenomenology build its framework is the so-called *empirical turn* in philosophy of technology inspired by Science and Technology Studies (STS). Roughly speaking, there are two main perspectives under the umbrella of STS; Social Construction of Technology (SCOT) and Actor-Network Theory[3] (ANT). Developed by Weibe Bijker, Trevor Pinch, and others (e.g., Pinch & Bijker 1984; Bijker 1995; Collins & Pinch 1998; Pinch & Trocco 2002; Oudshoorn 2003), SCOT investigates how a specific technology may have emerged out of social conflicts and disputes rather than through a smooth development out of engineers' volition (Bijker 2010: 71). In this sense, emergence of technologies, far from being the outcome of an 'internal logic' of technology, has witnessed 'interpretive flexibility'. That is, their nature has been constructed out of different interpretations, as they argue[4]. The stress on experimental inquiry to track down the path of development and exploring the interpretive flexibility of a technology was alluring to postphenomenologists. I will have more to say in this regard later, but now I turn to some details of postphenomenology.

Mediation and the Relationships with Technology

Once we notice our relationship to the world, we would hardly find a direct contact with it. Most often there are technological items involved anyway. While we are looking at a charming landscape through eyeglasses, or a doctor is examining a pregnant woman's womb by means of a sonogram, or when we are chatting with a friend by Skype, there is just an indirect contact with the world. Even in cases when we tend to be sure we are in contact with the world directly, there

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[3] Later, in next chapter I will return extensively to the details of the ANT.
[4] I will return to SCOT in next chapter.

might be artifacts, although implicitly, involved. To exemplify, when we plan to go on picnic in nature we have already counted, although implicitly, on our own car. Or many western youths choose to go to the south and southeast Asia running away from overpopulated cities hoping to settle in nature. But this is not possible unless they have already assumed the capacity to make money through an online carrier. All this implies that we progressively live in a technological world. Technology in this sense is part of the furniture of the world.

Technology, however, is not a neutral, or one might say, innocent intermediary. Once stood along the way of the relationship between human and the world it actively would restructure the order, that is, it *mediates* both human beings and the world. In the absence of the internet freelancers could not migrate to the lands 10000 k.m away, e.g., the Philippines, to dwell in nature. Even beyond facilitation, the internet might have *encouraged* them to travel away across world and find new places to live. In this sense the internet has been more than just a simple tool to rely on, rather it has been active.

On the other hand, the internet also mediates the world, in a way that distance seems irrelevant in picking a career. Distinct sites across world, which seemed discrete in the past, come to be connected in the wake of technology. Both human and the world have come to look differently in light of the internet. Similarly the presence of trolley in malls to help carrying the purchased staff, or equally the car parked in the mall's parking, may have *persuaded* people to purchase more than usual. They might also prompt people to go shopping less, say, once a week, rather than in a tight timing because they are able to buy more and hoard accordingly all the things needed for the near future.

The world also seems differently when trolleys and cars are around. Purchasable things in the grocery store look lighter, so to speak, convenient to carry, in the presence of artifacts like trollies. Both human and the world, in this sense, undergo changes in light of technology. They both would come to be mediated in a new fashion. The notion of mediation is, arguably, paramount within postphenomenology and it will be reiterated time and again[5].

But how the relationships users bear with technology might be further specified? Don Ihde (1990) has articulated various types of relationships one may hold with technology. According to him our

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[5] I will revert to the notion of mediation later while I am talking about ethics of technology.

relationship to technology can take one of the forms of *embodiment* relationship, *hermeneutic* relationship, *alterity* relationship and *background* relationship. Verbeek later has expanded the list to six. He has subsumed also a *fusion* relationship as well as an *immersive* relationship (Verbeek 2011; Rosenberger & Verbeek 2015). More details follow below.

By an embodiment relation, Ihde means a relationship within which one is merged with a tool in such a way that the latter withdraws from attention. A pair of eyeglasses is an iconic example here; once worn they refuse to be at the center of one's attention anymore, except when they get dirty or smudged[6]. In fact, here one has to embody the glasses first in order to put them in their proper function, i.e., they need to grow part of the body. Artefact during such a relationship is not an object of the world anymore, one among other objects, rather having become embodied as it were. One looks *through* glasses into the world rather than simply looking *at* them. A relevant notion here is that of *transparency*. The more transparent a tool grows, the more embodied it becomes, and the less attention is drawn accordingly. When one starts walking with a cane, for instance, in the early days, the artifact still seems present in the center of her attention, as an external object. But in time she comes to grow accustomed to it to the extent that the cane becomes part of her sensorial system seemingly. Technology, in an embodiment relationship, tends to recede into the background of the consciousness. One can schematize the embodiment relation as below:

Embodiment relation: (I – technology) → world.

By a hermeneutic relationship, Ihde refers to a state where a sort of *interpretation* or *reading* is central. When a doctor investigates the uterus of a pregnant via an ultrasound image, or when someone is informed about the temperature of the surroundings via reading a thermometer, there is a hermeneutic relationship to technology operative. A hermeneutic relationship is akin to the embodiment relationship as far as technology mediates the relationship between human and the world yet diverges from that since the artifact is not thoroughly absent in the consciousness. In

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[6] It is not surprising to find an echo of Heideggerian insight. That is what Heidegger called moments of *break down*. According to him things are not normally objects of our attention rather we relate to the world through them. This is what he is trying to show by his example of a person who hammers a nail into a piece of wood, with the terms *ready-to-hand* versus *present-at-hand*. In normal everyday cases, Heidegger contends, the hammer is not at the center of the carpenter's attention, rather it recedes into her consciousness, that is, she is practicing *through* hammer. But once 'something goes wrong', i.e., when hammer is too heavy to work with or it is broken, it would start to draw attention. Heidegger contrasts these two states in order to show how our relationship to the world is not constituted in terms of subject-object relationship, rather we are *Dasein*, we are-in-the-world, coping with it. See his *Being and Time 2000*.

fact, in a hermeneutic relationship world is not perceived *through* artifact but by virtue of, or by *means* of that, i.e., we have to put it in *use* intentionally. The respective diagram would look like this:

Hermeneutic relation: I → (technology – world).

In an alterity relationship, according to Ihde, one is not in contact with the world, rather with the technology itself. Here the technology comes to reveal itself in a quasi-human fashion. When one is purchasing a coffee from a vending machine, for instance, a specific interaction emerges. Vending machine asks and replies some questions, as it were, i.e., there would arise a kind of communication between them. More sophisticated technologies like robots or software may also appear as an agent once utilized. Here world does not play any prominent role, rather human interacts merely with tools. The relevant diagram may be as follows:

Alterity relation: I → technology (– world)

The last type of relationship is the background relationship with technology. Where a background relationship with technology is operative, we do not relate to the technology itself. Rather technology only prepares the stage for, or the background of, our experience. A central heating system for instance warming the house while we are having our dinner is an instance of this kind of relationship with technology. We bear an indirect relationship with technology, one might say, in such cases. Schematically one can draw this relationship as follows:

Background relation: I (– technology – world)

Further, Verbeek has introduced the fifth and sixth types of relationship. In a *cyborg relation*, or a *fusion one*, human and technology are merged to the degree which one cannot distinguish between them anymore (Verbeek 2011: 140). The case is no longer like someone who incorporates an object like eyeglasses or hearing aid into her body, rather beyond that, there is no discernible border between them, so to speak. In other words, the fusion relationship problematizes the very idea of user, usage and embodiment (Rosenberger 2018: 175). In the area of biotechnology, for instance, brain implants can mitigate Parkinson disease or the deaf. Such an intervention in the human nature has notably blurred the border between technology and human. Human enhancement technologies

in general tend to be incorporated into human nature to make a whole. Fusion relationship might be depicted like this accordingly.

Fusion relations: (I / technology) → world

Before introducing the last kind of relationship we need to enlighten two points which so far have remained untouched. First, the arrows used in the diagrams are not arbitrarily drawn, rather they are to mean something. They are supposed to stand for human *intentionality*. In an embodiment relationship, as the arrow suggests, our intentionality is directed to the world *through* technology. Based on the intuition that the relevant technology here is not going to draw our attention to itself, our attention just needs to pass through the artefact to reach the world. In contrast, in a hermeneutic relationship, our intentionality is directed to the technology involved to interpret a readout or a sign. In an alterity relationship, further, we are directed at technology itself. Here our intentionality is targeted exclusively to the artifact. In the background relation, on the other hand, we are neither necessary directed at the world nor technology, rather we are present against a context which is prepared (at least partially) by a technology. In a *fusion relation*, finally, as Verbeek elaborates, our intentionality is not directed to the world through technology, rather intentionality, it seems, is *created* out of the fusion of human-technology (Verbeek 2011: 144). It's not just a human, as it were, who is the source of intentionality here, but we are encountered by a 'half-organ-half-technological' which emanates intentionality.

The second point to make pertains to the order of relationships introduced. Along the way of the introduction of varied kinds of relationships provided in this section, technology moves gradually away from human. Where we might start with a fusion relationship in that technology and human are such fused that a so-called *cyborg* is realized and the given technology subsequently cannot be conceived to be divorced, in an embodiment relationship technology can be detached from human. And along this rout down we gradually would loss proximity to ultimately arrive to the background relationship where technology is situated at the farthest position with respect to the human.

And here arises an immersive relationship with technology as the last kind. If, as one extreme, one can imagine of a fusion relationship, as another, technology stands in an immersive relationship with human. That is, if in the fusion connection, human and technology were merged, here, in an immersive relationship, technology and environment are fused (Rosenberger & Verbeek 2015: 21-

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22). Verbeek takes the example of smart toilets, smart beds and augmented reality devices which all can develop an interactive relationship with human beings.

One can think of the immersive relationship as follows:

Immersive relation: I → (technology → world)

In the last two types of relationships technology does not only mediate human's intentionality, but it brings its own intentionality, as Verbeek observes. The kind of intentionality involved here is bidirectional, i.e., a sort of hybrid intentionality is operative (Rosenberger & Verbeek 2015: 22). Smart environments, for instance, *perceive* their users, and *act* upon them, it seems (Rosenberger & Verbeek 2015: 21). While by the Ihde's classification of relationships we had already overstepped the boundaries of humanism, in two latter forms, Verbeek claims, we move towards 'the boundary between posthumanism and transhumanism', since 'they involve a non-human form of intentionality, i.e., an 'artificial intentionality', so to speak (Verbeek 2011: 140).

Two Dimensions of the Technological Mediation

Technological mediation moreover may be conceptualized along two different paths; the *hermeneutic* dimension of mediation and the *existential* dimension (Verbeek 2005; 119). While in the latter human's *actions*, *behaviors* and in general, the way she is present in the world, is mediated, in the former one can notice how human perception is affected, or generally how technology can affect the way world is *revealed* for human (Verbeek 2005: 119). With respect to the hermeneutic side technologies help to shape the way reality is represented within human consciousness, or looking alternatively from another perspective, technologies cause one's interpretation of reality to be affected. On the existential side, technologies help to shape the way one is present in the world, through mediating her actions and practices. That is to say, the latter is associated with pragmatic aspects of one's life. While the departure point within the existential dimension of mediation is the subject the hermeneutic side of mediation begins from the object.

The latter side is the primary concern of Ihde, and it finds its best expression in his work. Ihde has expanded the notion of hermeneutic to include, along with linguistic phenomena, also *materiality*

(Ihde 2009). In this new conception, not only linguistic phenomena like words and sentences need to be read or interpreted, but also material objects require to be decoded. And this last point is what has long been oversighted in the natural science. According to him, 'materiality, in a double sense, pervades the natural sciences, both in the form of what is investigated and in the instrumental modes by which the investigation proceeds' (Ihde 2009: 68). Natural sciences are intensely visualist, even when the original phenomenon is, for example, auditory. The usual trajectory within the dominant fashion of doing science is to reduce and to transform the imaging process into a visualization (Ihde 2009: 64). In this sense, modern sciences are reductionist, one can say. New technologies make new science possible, in both natural science as well as social science, Ihde argues (Ihde 2009: 74). New instruments have made aspects of reality visible that would have remained latent otherwise. We don't have any access to the celestial bodies within astronomy without such instruments. Ihde notes that we don't even know how celestial bodies look like in reality, provided that all our data have been gathered *through* technology. Such technologies, importantly, must *read* these bodies first and then transform them into images in order to make them intelligible. Therefore, in doing science there always are two levels of interpretation; we have to read the world through reading an image which is itself a visualized interpretation of the world in a certain way already. The second area is the arena of the mediating role of technology which usually is underestimated among scientists. In both limited passivity of astronomy and the highly interventional practices of particle accelerators we read the world through materials, instrumental means[7] (Ihde 2009: 68). Ihde has still a lot to say about the mediating role of technology in science, but given that the topic of this writing is morals, this much suffice to enlighten the notion of mediation.

One may say in all cases of mediation the existential dimension and hermeneutic one, although distinguishable, both are concomitantly present. We rarely would come across an occurrence of mediation in that only one dimension is around. A change in perception after all, will be followed,

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[7] In his writing (2009) 'Visualizing the Invisible Imaging Technologies An Empirical Turn', Ihde discerns two revolutions in the history of science, as a result of two revolutions in imaging technologies; the first one happens with the invention and use of optics, lens technologies. In this phase the technological limits remained largely isomorphic with human bodily visual limits. We may here explore the *identity* of the moon in two occasions, observing it through telescope and directly with eyeball. The second revolution, is the capacity to image phenomena not perceptible to direct bodily-sensory organs. The second one is a postmodern turn, according to Ihde. In the latter revolution there arises a material hermeneutic, where the representation, unlike the former, is not analog, but it occurs through a hermeneutic process.

by a subsequent change of behavior. The reverse is true as well. A modification of behavior may cause to disclose new facets of reality. Perception and action are knitted together this way. For a freelancer working from thousands of kilometers away the internet has already changed her world. For her, thanks to the internet, the company for which she is working is not distant anymore, rather it seems to be right there, in the neighborhood. The internet reveals a mediated reality for her in this sense, i.e., the space is bypassed. On the other hand, having access to the internet assists her to decide differently and subsequently live differently. From this point of view, the internet imposes its mediation along both poles of mediation.

Before taking up another key element of postphenomenology, namely *multistability*, I need to bring into light a further intuition regarding the notion of mediation.

Two Sided-ness of Technological Mediation

Ihde further delves into more details of the relationship between human and technology. After having advanced the notion of mediation, he contends that mediation always comes in a specific structure, that is, the structure of *amplification/reduction* (Ihde 1990: 78). There occurs always a distortion by the mediation of technology according to Ihde. In this sense, in every case of mediation, some aspects of reality are enhanced while others become weakened, that is to say, there is a two-sidedness involved in all cases of mediation (Kiran 2015). When a doctor looks into the image of an internal organ he is encountered by an augmented image of that in a way that it is clearer than normal. Yet at the very same time it also conceals the peripheral and marginal neighborhood of the organ, meaning that part of the reality is reduced or dismissed. This structure of deformation holds, as Ihde notes, in all cases of mediation wherever an artifact is around. From this perspective not only technology deviates the reality but does it through a particular pattern.

Can we imagine of a case of mediation where such a structure is broken? Can a case of augmentation come without any reduction? The answer is no, Kiran argues. Not only impossible, but it is also even nonsense to imagine, he says. While enhancing some aspects why don't let other aspects to be weakened, especially where it can lead to noise and impede (Kiran 2015)? After all we normally enhance aspects of a phenomenon in order to bring it into view for a specific purpose.

Ihde's conception of the foresaid structure covered the hermeneutic aspect of mediation, as his concern was predominantly with the mediation of technology in scientific work. This is the reason why his own examples involved, by and large, cases of mediation in human perception. Although Verbeek (2005) was the one who developed the idea to also account for the existential aspect of mediation the most comprehensive conception comes from Kiran (2015) who tried to develop the idea to show how such a structure is operative in varying contexts.

In the existential dimension (which he labels the ontological dimension), technology involves a *revealing/concealing* structure, constituting the world we find ourselves in. In the epistemological dimension, mediation of technology is in the form of *magnification/reduction*, thereby shaping the type of knowledge we gain of the world. Through the practical dimension, technological mediation displays an *enabling/constraining* structure that shapes action and behavior. And finally, in the ethical dimension this pattern expresses an *involving/alienating* structure. As it is clear now, mediation of technology in all respects comes through a particular patter; a dichotomist pattern.

Multistability

The idea that postphenomenology promotes 'relational ontology', instead of an essentialist account, brings yet an allied concept into relief, and that is the notion of *multistability*. The intuition here is that technological artifacts don't possess any essence, instead, they exhibit different qualities in different contexts, or put differently, rather than having invariable essences they have variations of *multistable* (Ihde 2009: 16). The notion of *multistablity implies* that technology has multiple *stabilities* or *variations*. No technology is 'one thing, nor is it incapable of belonging to multiple contexts', in Ihde's word (Ihde 1999: 47). Technology does not have any intrinsic property accordingly, and it comes to acquire properties in various relations in its varying use contexts. It can be used in different configurations, with different users, in a variety of styles. An illuminating analogy here is the so-called Necker cube[8] (Ihde 2009: 14) as it can display varied

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[8] In his book, postphenomenology and technoscience, Ihde explains the idea of multistability through the so-called phenomenon of 'visual illusions' (Ihde 2009: 12-15). In his treatment of these illusions, as with the case of Necker cube, Ihde shows how phenomenological notion of variation can provide a richer explanation than that of empirical psychology.

patters when viewed from different perspectives[9]. A lighter, as another example, is usually used to light candles or cigarettes, but can also consistently be used to open bottles[10]. Another paradigmatic case is a hammer (Ihde 1993: 37). As Ihde observes a hammer 'could, and perhaps is dominantly used, for its designed purpose—to hammer[11]. But it could be used as a paperweight, an objet d'art, a murder weapon, a pendulum weight, a door handle, etc.'. The scope of uses is not extendable indefinitely though and depends on various factors, and more importantly on the physical configuration of the object. Put simply, a technology can always be utilized for many purposes, but not simply *any* purpose. While postphenomenolgy tends to be engaged with the analysis of the relationship between human and non-human, the notion of multistability highlights the insight that artifacts are players only by virtue of their materiality, i.e., their physical configuration[12]. In this terminology, an individual stable relationship with a technology is known as a *stability* and also as a variation[13] (Rosenberger 2014b: 377). In the aforementioned case of hammer, every alternative usage of it is a particular stability. It should be noticed though that multistability is not a purely social notion[14]. Rather it is a sort of ontology, the one that does not

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[9] Tobias Röhl extends the concept multistability in 'ethnographically observed situations' where a particular artifact is used. He applies this extended notion on the educational context where various types of artifacts- ranging from quasi-transparent ones like blackboard to epistemic objects which take on an otherness presence like geometrical model of a prism to calculate the area of a prism- are involved. Here he places various artifacts in contrast and comparison with one another to phenomenologically study the role they play in teaching and learning. See his paper 'Inviting and Interacting Postphenomenology and the Microsociology of Education' 2018.

[10] Aagaard in his writing 'Entering the Portal Media Technologies and Experiential Transportation' cautions against underestimating the usage of the notion of multistability and its unfortunate consequences. According to him we should not embrace multistability uncritically. He warns us that 'an overly optimist approach to multistability' may ultimately render 'postphenomenology politically and ethically neutered' (Aagaard 2018: 58). In his phenomenological treatment of 'multitasking' he worries about the prevalence of so-called multitasking, i.e., being possible thanks to technology – talking to friends and simultaneously checking the cellphone, for instance- that would ultimately undermine ethics and particularly 'ethics of attention' (Aagaard 2018: 58). By this he implies that we should not be so welcoming toward every stability or variation which a technology takes on.

[11] Here, Ihde draws upon and expands Heidegger's hammer at the same time.

[12] In the same line, Madeleine Akrich (1992) has developed the notion of material 'inscription' to refer to the way technologies are altered to better fit into their social roles. I will return to it in next chapter, while I am delving into STS movement.

[13] This multiplicity of usages may take the social, political or even religious shape. For example as a work outside postphenomenology tradition, yet in the similar vein, Karine Barzilai-Nahon and Gad Barzilai (2005), in their paper 'Cultured Technology: Internet and Religious Fundamentalism' explore how Internet takes on new function among marginal fundamentalist groups. Over there, they outline how fundamentalist groups exclude the disadvantages of the internet while benefiting from it through dissolving the likely tensions between the use of internet and their goals, accelerating ultimately fundamentalist behaviours.

[14] There is a parallel notion in the STS tradition which is similar to that of multistability, and that is the notion of 'interpretive flexibility'. It refers to the socially undetermined design and use of technology. As Bijker, a leading figure in the field, through his study on the history of bicycle shows, in the early stages of the development of a particular technology it is flexible, meaning that it could have been designed in different shapes. In case of the bicycle the early days have been witnessed several types among which today's design came to be dominated ultimately. This

appeal to transcendental essences or an invariant core of a technology, that is to say, it is non-traditional account[15] (Rosenberger 2018: 187).

There is also a flip side of the notion of multistability. The multistability implies not only the fact that artifacts can have different meanings in different cultural contexts, but also that the same goals can be realized in different technological ways. Evidence for it is Verbeek's reference to 'the difference between western navigational techniques and the traditional navigational techniques of the South Sea islanders. Western navigation is strongly instrumentally mediated and mathematical in nature—whereas South Sea islanders navigate by carefully observing stationary clouds, birds, and wave patterns' (Verbeek 2005: 135). As Ihde recapitulates it 'humans develop different solutions to the same problems' (Ihde 2016: 112). In sum, the relationship between a technology and its usage is not one by one function, or alternatively put, technology does not determine human behavior.

Before closing this section I would like to lay bare a further application of the notion of multistability. The emergence of multiple stabilities of technology ordinarily serves also as an argument against overly-deterministic accounts of human-technology relations (Rosenberger 2014b: 373). As Verbeek puts it, 'technology is never purely determinative, for in principle other cultural relations with a given artifact are always possible. But neither is it purely instrumental, for when an artifact receives a particular definition within a cultural context—and thus becomes stable rather than multistable—it still contributes to shaping that context (Verbeek 2005: 138).

Now, to complete the outline of postphenomenology, I turn to the methodologies to conduct a postphenomenological study.

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social phenomenon occurring in the first stages of the development, substantially is different from multistability of technology which is *inherent* and ever-present. In the chapter I will elaborate STS in some detail.

[15] Rosenberger furthers the notion of multistability by dividing it into negative use of the notion and positive one (Rosenberger 2014a). In the negative side multistability is applied only to demonstrate the non-deterministic nature of technology whereas in the positive side one may go through each stability providing an explanation for it. For more see the original article.

Methodologies

As Rosenberger and Verbeek have pointed out, postphenomenological research does not have a strict methodology (Rosenberger&Verbeek 2015: 32). Yet one may come up with a general description all postphenomenological studies share;

> First of all, they typically focus on understanding the roles that technologies play in the relations between humans and world, and on analyzing the implications of these roles. … second, that postphenomenological studies always include empirical work as a basis for philosophical reflection. … Third, postphenomenological studies typically investigate how, in the relations that arise around a technology, a specific 'world' is constituted, as well as a specific 'subject.' … Fourth, on the basis of these three elements, postphenomenological studies typically make a conceptual analysis of the implications of technologies for one or more specific dimensions of human-world relations—which can be epistemological, political, aesthetic, ethical, metaphysical, et cetera. The central question then is how technologies help to shape knowledge, politics, aesthetic judgments, normative ideas, religious experiences, et cetera (Rosenberger&Verbeek 2015: 31).

Comporting with these criteria, several attempts have been made to develop a number of methods to do postphenomenology. The foremost method out of which all other methods have grown is *variational analysis*. Variational analysis stemmed from Husserl's ideas, as will be elaborated below. *Variational cross-examination* and *participant observation*, having been put forward by Rosenberger and Hass respectively, are two further methods of which may be thought as the extensions of variational analysis. I will explore each of them in turn here.

Variational Analysis

A widely spread method for doing postphenomenological investigation is thought of as *variational analysis*, a concept intimately tied with that of multistability. It is considered as the most common methodological strategy in postphenomenology (Ihde 1993: 7). It is through a variational analysis that one may recognize the 'complicated structure of multistability' of technology, or equally identify 'multistability as a phenomenological result of variational analyses' (Ihde 2009: 16). The core idea comes directly from Husserl's work as his PhD project was on theory of variation in mathematics (Beyer 2018), but it was recast when it came to be embraced in postphenomenology. As Ihde notes, 'in Husserl's earlier use, variations were needed to determine essential structures, or 'essences.' Variations could be used to determine what was variant and what invariant' (Ihde 2009: 12). With placing a thing in different contexts and looking into it from different perspectives its essence or the invariant part of it stood out on Husserl's account. For doing so, Husserl just required freedom from all prejudices by *bracketing* the natural attitude, or suspension of our preconceptions, a move he calls *epoché*, i.e., a pre-reflective attitude towards the world. According to him, after practicing the epoché, and through the application of variational analysis, a researcher could then reduce everything to the stable part, i.e., its essence. But Ihde maintains that after the application of method what emerged or 'showed itself', far from 'essence', was multistability (Ihde 2009: 12). In this revised account, 'by creatively brainstorming alternative possible meanings and uses for a technology, its status as multistable is revealed' (Rosenberger 2014b: 381). Rather than identifying the essence of a technology, through applying the method, one may identify the particular stabilities of a technology[16]. Put simply, while Husserl's variational analysis is meant to bring an invariant essence of the object, in postphenomenology the method would give rise to a number of stabilities associated with a particular technology.

In sum, variational analysis serves as a method of searching out the various stabilities possible for a given technology by a variety of ways; be it empirical investigation, armchair brainstorming, anthropological study, or other means (Rosenberger 2018: 176).

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[16] There are a number of additional methodologies put forward by several figures to do postphenomanology, most of which are in intimate association with variational analyses. For example, Tobias Röhl (2018) proposes four methods for postphenomenological investigations; (1) maximally contrasting artifacts, (2) minimally contrasting artifacts, (3) contrasting contexts of use, and (4) auto-ethnographic observations. In a similar vein, Jesper Aagaard (2018) proposes two further methods, namely 'researcher reflexivity' and 'analytical validity'.

Variational Cross-examination

Rosenberger (2014b; 2017b) has developed a further method which is called *Variational cross-examination*. According to him, the variational analysis, widespread in the postphenomenological literature, may be conceived of only as the first step of a 'larger methodological framework' (Rosenberger 2014b: 381). He notes that by variational analysis we may come to the cognition that there are multiple stabilities and not just one. But this can only serve as the starting point, and we have to proceed. In the second step, he argues, we need to study each of such appeared stabilities in turn making sense of each. His method involves critically contrasting the various stabilities of a multistable technology for the purpose of exploring how a particular stability has come to prevail (Rosenberger 2014b: 369). His cross-examination entails three independent endeavors (Rosenberger 2014b: 382-386); studying (1) the comportments and habits, the way our body relates to the technology, (2) the role within a program, meaning that studying the programs and anti-programs by different networks, and (3) material tailoring, the way a technology is tailored in different configurations and different networks.

By tracking the role of subway benches in the society he provides a narrative to show how such benches have been an arena of a battle between officials and homeless people to be taken advantage of. In this sense, officials primarily planned benches to be used by those roaming a park or waiting at stations for a bus each morning. On the other hand, however, the homeless tends to use it as a place for laying across and apply it accordingly as a bed. These two usages of a bench, along with other potential ones, prove the multistability of the artifact so far. This is not enough though, Rosenberger argues. One needs to move forward by application of the foregoing steps to illuminate the specific features of each usage. This is an important task, he thinks, to bring social and individual aspects into relief. Regarding the bodily comportment and habit, i.e., the first step, one may explore how the bodily relationship of a user with the bench takes shape, when the latter is used as a seat and once used alternatively as a bed. Or alternatively one can identify how these usages become transparent for the users, for both the homeless and the everyday commuter, while other usages come to recede from attention.

As for the second stage of the cross-contrasting, Rosenberger takes the networks and program of actions into his consideration[17]. According to him, these two usages are in fact the outcomes of two different rivalry networks. Applying the insights of ANT, one may figure out who the actors involved in each program of action are, namely bench-as-seat and bench-as-bed. In doing so we may identify the social facets as well, next to individuals, e.g., the role of state and municipal officials, for instance, which might have gone unnoticed within the framework of postphenomenology.

The third path ultimately, is by taking the materiality and physical property of the bench into account. Here one should take notice to the appearance of the bench and what is called *material inscription* within ANT's framework. Material inscription refers to the aspect of physical body of an artifact that facilitates a specific usage, while discouraging or excluding other stabilities (Akrich 1992). In case of benches, one may observe how the physical configuration of the normal benches may give rise to two different uses, namely bench-as-seat and bench-as bed. By installing vertical dividers on the bench on the other hand, and making laying across the bench impossible accordingly, one may turn bench into a seat-prohibiting bench. Such inscription and physical appearance can help one to account for different stabilities of an artifact to realize how a particular usage prevails. Moreover, we can bring political dimensions to the fore as to how the most powerful network may ultimately impose its favored physical as well as functional status on the bench to subsequently defeating the competing programs of action.

Equipping variational analysis with these three steps, according to Rosenberger, can strengthen the method for conducting an in-depth postphenomenological research. However, there are other proposals to enrich variational analysis as I said. Among all, I will go through one, namely, participant observation.

Participant Observation

Phenomenology tends to depart from one's own subjective experience, from a first-person perspective. It implies that the fountain of knowledge is thought of to be the content of the

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[17] In next chapter, while ANT is being explored, notions like program of action and the like will be clear.

intentionality of an *isolated* subject, which is being studying introspectively. Cathrine Hasse (2018) has proposed to take also others' subjective experience into account, by exploring the experiences of them and 'their relations to technologies in practice' to learn 'what matters to them' (Hasse 2018: 246). *Participant observation* 'entails close attention to technologies and the consequences they have when people engage with them' (Hasse 2018: 247). According to her, 'what participant observation does is to challenge and sometimes strip you of normative assumptions to let you see things as they really are when people engage with technologies and each other'. (Hasse 2018: 250). In this sense, this 'anthropological' approach purports to extend the postphenomenological methodologies from human-technology relationships to 'human-human-technology relationships' (Hasse 2018: 252).

Hasse provides an anecdotal account of her participation in an observational training in an obsolete observatory in order to see what is going on over there and observe subtleties of exercising physics and astronomy in practice. Along with other students and teachers she took part in the course to learn what it looked like to be a physicist. Through such hands-on experience she then came to illustrate how one may understand the real meaning of terms like 'measurement' and 'exact' as well as learning how positioned body becomes accustomed to the scientific enterprise. Engagement in an actual condition helps to realize how a 'collective consciousness' takes place, along a long way of 'social adjustment' and 'social alignment'. It may reveal how students try to imitate others in order not to look 'fool', and how a student of physics gradually ascends to ultimately become a teacher of physics. Participation entails embedding and using your own bodily presence in the lifeworld of others (Hasse 2018: 252). This participation in turn may help one to enhance one's understanding of the nuances of technology mediation. Such an experience consists in living with others, imitating whatever they do, learning their life, raising new questions, finding answers, studying them in practice and finally getting a sense of what it means to be like them. Hasse's approach seems to diverge from both introspection, to explore one's own inner experience, and conducting interviews or armchair brainstorming to make sense of other's concrete feelings. As she argues, participant observation may reveal why the same technology could be perceived variously by different perceivers, or put precisely, how technologies start to undergo stabilization (Hasse 2018: 255). In a sense, Hasse means to further the rout initiated by scholars like Rosenberger to bring a third-person perspective to postphenomenoloy.

In the foregoing I engaged myself to the methodologies which predominantly are being implemented to do a postphenomenological research. It was the last step along the way of providing an overview of postphenomenology. After having sketched the outline, now, I turn to the primary concern of this writing, i.e., moral sides of technology.

Postphenomenology and Ethics of Technology

So far we have been seeking to investigate the way technology plays out within our life. More importantly, mediation of technology was the prominent focus of postphenomenology teachings. Such a *descriptive* treatment of technology however is not all we need. Bringing up what technology actually does, although insightful, is just the opening stage. We need also a normative account of technology. Technology is not all good. It sometimes turns out to be evil. We need thus an evaluation of morals of technology. This brings us to the business of ethics of technology.

To begin with, the founder of postphenomenology, Don Ihde, barely touched upon moral dimension of technology. It was just his successors who developed his ideas into moral theory. Above all, Peter-Paul Verbeek is a leading figure here.

Verbeek, at first, differentiate between what he takes to be *true* and legitimate ethical considerations of technology from what has been going on under the same label throughout twentieth century. By this caveat he tries to rebut the way technology was treated within the classical period of philosophy of technology. After a critical evaluation of some figures (see Verbeek 2005) he objects that such accounts are flawed on the ground that the classical philosophy of technology placed its focus 'outside or even against the realm of technology' (Verbeek 2011: 3). 'Rather than criticizing the phenomenon of technology itself', Verbeek suggests one should study 'actual technological practice and development' (Verbeek 2011: 3). To that purpose and as a preliminary step a plausible ethics of technology needs to get rid of the 'separation of the realm of technology and the realm of society' (Verbeek 2011: 4). Humans are technological beings, just as technologies are social entities, he argues (Verbeek 2011: 4). In this sense an ethics of technology has to incorporate the phenomenon of mediation (Verbeek 2011: 6). Before going into details, we need first to take a closer look, once again, to the notion of mediation.

As we saw so far, the notion of mediation is intended to describe the role of technology in the course of everyday life. Technology should not be treated as an intermediary standing between human beings on the one hand and the world on the other. Such a longstanding dichotomy is misleading according to this account. By contrast, human and technology bear an intimate relationship to one another. They are meshed in a certain way. By mediating the relation between human and the world, technology brings about new objectivity and new subjectivity (Verbeek 2005: 196). To elaborate such a relationship, Verbeek explicates how a medical device like ultrasound may create new subjects as well as new objects. Obstetric ultrasound, used for examination of a pregnant woman, promotes new form of relations through ringing the fetus into the notice (Verbeek 2008). First of all, the fetus itself is revealed for parents as an *unborn child*. It grows detached from its context this way, i.e., mother's body, and appears in this way as an independent individual. Consequently, parents acquire new subjectivity along this relation. The pregnant woman turns into a *mother*, separated from the child, looking at her child. Her husband, on the other hand, turns into a *father* subsequently, coming to become involved in the process of having baby (Verbeek 2011: 26). In this sense, all parties involved acquire new and unprecedented ontological state, as it were.

The ultrasound is also able to bring about a moral dilemma for the expecting parents. If, through examination, it turns out that the fetus suffers from a serious disease, say Down syndrome, they would face a situation never possible in the absence of such a technology. They would have to decide whether or not to have an abortion. They would transform this way from merely expecting parents into decision makers. Even if they had chosen not to take any ultrasound examination they would have been decision makers (Verbeek 2011: 26). The ultrasound then 'transcends the mere functionality of making visible an unborn child in the womb'. Far beyond simply providing the parents with an image, it would bring about new objectivity and new subjectivity. In Verbeek's words, subject and object, that is to say, human beings and the world, co-constitute each other in the wake of technology (Verbeek 2005: 113).

Contemporary technology scholars, like Verbeek, Ihde and Bruno Latour[18], take issue with the modern dogma of a demarcation between subject and object (Verbeek 2001: 28). Far from being pre-given separate spheres, subject and object are interwoven in a way that they become co-shaped

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[18] A towering French figure whose conception of technology will be explored later .

in relation to one another. Here one may find an echo of the Heideggerian idea of being-in-the-world. We are not that modern subjects who come to know the surroundings by virtue of intentionality. Instead, we relate to the world in far more complex ways than merely bearing epistemological attitude towards the world. Before and above knowing the world, we *live* in the world and we are shaped in relation to it.

The dominant modern dichotomy between subject and object has also been featuring within ethical sphere since the enlightenment era; a tenet that is called 'humanism' (Verbeek 2011: 22). Both major schools in the contemporary ethics, namely deontological ethics and consequentialism, presuppose such humanist attitude (Verbeek 2011: 30). The driving force of ethics in its contemporary sense is the question of 'what should I do?', in contrast with its counterpart in antiquity as to 'what is the good life?'. The modern departing point implies a pre-given subject which is standing in a sharp opposition against a pre-given world. In this sense a radical separation is taken for granted between the subjective realm and the objective one. We need to take an amodern approach, Verbeek urges, to understand ethics of technology.

In order to do justice to the role of technology with regard to morals we have to first get rid of such a dualist vocabulary (Verbeek 2011: 22). In a modern standpoint technology falls within the objective realm, devoid of any moral role. This is the rationale why technology has long been precluded from moral reflections so far. Given that technology falls short to meet the prerequisites of morality, e.g., intentionality and freedom, it would be no surprise that technology is expelled. Accordingly, if universe is divided into two categories of intentional beings on the one hand and inanimate objects on the other, where there is a gulf in between, there would arise two kinds of knowledge, that is, natural science on the one hand and social science on the other. Consequentially while speaking of ethics which is associated with the latter the former does not lend itself to any normative discourse. Following authors like Heidegger and Foucault, Verbeek is trying to challenge the adequacy of the modern vocabulary for describing the morality of technology. Mediation is a key notion to bridge the world of subject to that of object. Mediation of technology is where human beings and technology meet. Without a sonogram, subjectivity of parents would have been far divergent. Human's subjectivity is fluid in the sense that it develops in *relation* to the material surrounding. And this is exactly the meaning of a relational ontology, as mentioned, to which postphenomenology subscribes.

Such an ontology has obviously enormous ramifications within ethical sphere. Technology no longer can be excluded from normative evaluations. If artefacts play such a decisive role in the process of human's subjectivation they would be contributors to ethics accordingly. In this sense moral agency is not to be taken exclusively *humanistic* (Verbeek 2011: 52). Yet it is not an easy task to reconcile the inanimate objects to normative sphere. There seem to be excessive obstacles here. Verbeek notices that there are generally two major preconditions associated with moral agency; intentionality and freedom (Verbeek 2011: 54). He tries then to show how technology might be able to meet both and enter subsequently the realm of agency. Obviously, he does not claim that technology *as such* possesses intentionality and freedom. It does not make any sense after all. Instead, he takes an alternative route aiming to argue that human *per se* cannot meet these two requirements either. That is to say, as long as human decisions and actions are technologically mediated, ethics is not purely a human affair, rather it is a *hybrid* sphere (Verbeek 2011: 66). But how can he justify his contention?

Technology and Moral Agency

As said, to account for the mediated character of moral agency Verbeek highlights two principals, jointly taken to be the basis of moral agency; intentionality and freedom. He first delves into the meaning of intentionality and ultimately discerns two distinguished usages of the term; the phenomenological notion of intentionality in terms of being directed towards things, on the one hand, and the capacity of forming intention, on the other (Verbeek 2011: 55). His contention is that our intention, or directedness to the world, cannot be construed in terms of a pre-given subject which directs itself towards the world. Rather it should be conceived in terms of a mediated subject that turns towards a mediated object. Provided that human subjectivity develops in relation to the environment (including artifacts around) there may not be a pure human intentionality, Verbeek argues. Technology mediates the way the subject is going to direct itself to the world. It mediates moreover the world itself. Therefore, he insists, we have to assume a 'composite intentionality' or 'distributed intentionality'. Our intentions are not constructed in vacuum, rather they are formed in a world which is technologically fraught. If human beings are interknitted with technology there

does not seem to be any room for a purely humanistic intentionality, rather intentionality is a hybrid property.

On the subject of freedom, also required for moral agency, Verbeek goes along a similar path. He notes that our freedom is not *absolute*, rather *constrained* by the external factors. We are not that autonomous agents that enlightenment thinkers tended to take for granted. We make decisions and take actions within the limitations imposed by our environment, including technology. Not only there are limitations, which negatively affect us, but the material surroundings can also positively contribute to our actions. The internet, as said, is able to persuade us to live like nomads on the basis that we can make money by taking a freelance career. In this sense, technology structures the way we behave.

Such a picture would disprove the notion of autonomy, at least in its absolute sense. On the other hand, however, we are not predetermined in the sense that the idea of freedom turns out redundant. Subsequently we should retain the notion of freedom, albeit in a revised sense. Mediation theory promulgates the idea that the material environment participates, in part, in shaping our intentions or put simply, it co-realizes our intentions. Verbeek, tries to provide a revised conception of freedom 'as an agent's ability to relate to what determines him or her[19]' (Verbeek 2011: 60). Technology, according to him, helps to constitute freedom by providing the context in which human existence takes place (Verbeek 2011: 60). Not only we don't take any action in a way divorced from technology, but technology serves as a *precondition* to our deeds. It prepares the stage to practice actions in relation to it. Verbeek provides such a conception of freedom as a *composite* affair, to highlight the role of technology in our doings. Freedom, as with intentionality, is *distributed* among human and non-human (Verbeek 2011: 61). Both are manifested over a distributive arrangement, that is, they are not features of individuals. In light of such an understanding of intentionality and freedom he tries then to introduce objects into the realm of morals. If both intentionality and freedom are composite and distributive, morality as well as moral agency, are not to be conceived of purely humanistic (Verbeek 2011: 64).

To remove any possible misunderstanding a clarification here is in order. None of the preceding remarks are going to be read as ascribing freedom or agency to technology as such. Verbeek warns

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[19] This reading of freedom is adopted from Michel Foucault, as Verbeek admits later.

against such confusions as to take artifacts as venues of freedom, intentionality and moral agency. Technologies 'in themselves' cannot be free, intentional or moral agent. Rather agency, freedom and intentionality are characteristics of composite networks encompassing both human and non-human. On such an account no individual may be ascribed as agent, be it human or artifact. In contrast, Verbeek takes the association of human and technology to be moral agent, i.e., agency is the feature of networks.

Technology and Ethics of Use

In light of the foregoing, now, I begin bringing into view the moral implications of postphenomenology. To elaborate ethics of technology I prefer to classify my discussion into two categories; ethics of *use* of technology, and ethics of *design* of technology. In this section I will take up the former and in the next section the latter will be exposed. For the ethics of use I will draw upon two scholars; Verbeek and Steven Dorrestijn, a Dutch scholar. And concerning the ethics of design Verbeek's views will be the main source.

After his contribution to the descriptive framework of postphenomenology, Verbeek furthers his approach by exploring the implications of the composite character of agency. The thinker with whom he feels the most affinity is Michel Foucault, the figure whose treatment of *subject constitution* has proven influential since its inception. Seen from Verbeek's perspective Foucault's analysis of the structure of *power* and its influence on our *subjectivation* is consistent with, and extendable to, the power exercised by technology through its mediation (Verbeek 2011: 70-73).

According to Foucault our subjectivity is the product of an array of external forces. Ranging from hospital and school to prison, all institutes are disciplining us in one way or another to bring about a certain subjectivity. Inspired by such teachings, Verbeek tries to provide an explanation for his own reading of freedom. Our subjectivity is 'shaped in interaction with power', he notes, or else, 'freedom is an activity, a practice of dealing with power' (Verbeek 2011: 73). In this sense freedom is not the matter of being free of every external force, but an *activity* to be engaged. One becomes a subject not by securing a place outside the reach of power but by shaping one's subjectivity in a critical relation to power (Verbeek 2011: 73). It implies that freedom is to be the 'practice of

subject constitution' in a 'free relation to the world in which one lives' (Verbeek 2011: 74). Not only technology cannot do away our subjectivity, but it is exactly a backdrop against which our subjectivity develops. On his own words 'rather than being passive objects of mediating technologies, then, human beings develop an engaged relation to technological mediations and actively contribute to the ways their mediated subjectivity is formed' (Verbeek 2011: 83). Elsewhere he writes:

> The Foucauldian concept of freedom offers an interesting alternative to the criterion of autonomy that is often used in ethical theory. While the concept of autonomy stresses the importance of the absence of 'external influences' in order to keep the moral subject as pure as possible, the concept of freedom recognizes that the subject is formed in interaction with these influences (Verbeek 2011: 85).

The idea of incorporating Foucault's insights into the ethics of technology is better developed in the work of a further scholar, Dorrestijn. Here I leave Verbeek's elaboration and I will place my focus on his work. Dorrestijn tries to read Foucault through the 'lens of technological mediation' (Dorrestijn 2012: 222). According to him, mediation theory, on the current status, is not the answer, but the problem (Dorrestijn 2017: 313). In every ethical discussion apropos of technology we need to begin with the mediation. But it is just the very first station of ethics of technology, not the last. Dorrestijn objects that Ihde's and Verbeek's approaches in the end equate technical mediation with ethics (Dorrestijn 2017: 319). The insights associated with mediation theory, to prove how our lives are entangled with technology, he argues, can throw light on our situation, but they cannot be the ultimate solution. While sympathizing with mediation theory he worries that 'the cost of a more detailed account of technical mediations and the hybrid form of human existence seems to be the loss of a solid ground for ethical claims' (Dorrestijn 2012: 226).

In his read of Foucault, the mediation of technology does not appear by definition as a negation of human agency and freedom (Dorrestijn 2012: 228). Mediation, in contrast, is that constructive force which subjectivation occurs in relation to it. Ethics of technology in this sense is the matter of an ongoing process, not the result, one might say. The central focus in ethics, far from already

being a subject, 'is the constitution of the subject, the emergence or formation a self with self-reflexive experience' or simply, the process of 'becoming a subject' (Dorrestijn 2012: 232).

'Foucault's critical ontology of the self', Dorrestijn argues, 'corresponds with the approach of 'technical mediation in recent philosophy of technology' (Dorrestijn 2012: 226). According to Foucault, in antiquity, ethics has been a matter of 'practical skills and exercises of governing and fashioning oneself'. This *practical* knowledge was concerned with how one achieves mastery over one's own course of action and a way of living (Dorrestijn 2012: 232). Dorrestijn claims that reading Foucault in this way and taking account of 'this extension of moral theory, from reflection on free subjects responding to law, to the formation of specific instances of subjectivity' would open up a way to the ethics of technology (Dorrestijn 2012: 232). 'While Foucault's earlier work' can be seen as a 'dramatic attack on the autonomous subject taken for granted in modern ethics', Dorrestijn thinks 'his later work is concerned with developing an alternative ethical framework'.

This may parallel the insights of postphenomenology furthermore. Mediation theory, as explained, may be interpreted as a reaction against the enlightenment conception of autonomy. But it needs also to be supplemented with a second move, namely positive treatment of ethics in the technological epoch. And this latter move too can be found in Foucault's work, Dorrestijn identifies. In his later work, 'Foucault begins to understand ethics as the active engagement of people with governing and fashioning their own way of being in relation to conditioning circumstances' (Dorrestijn 2012: 227). On this account, he claims 'the influences of technology no longer appear by definition as a negation of human agency and freedom'. Ethics is not to be taken as a matter of an autonomous subject's actions, rather that of human exercise of governing and fashioning oneself. Put simply, there is no threat to ethics when it turns out that the subject is conditioned by technology, rather the decisive point in ethics is how to cope with such conditioning.

He proceeds by applying the Foucault's thoughts on technology. Foucault discerns and distinguishes four dimensions in ancient ethics (Foucault 1992: 25–32); moral substance, subjectivation mode, ethical elaboration, telos. *Moral substance* refers to the particular part of self which is going to be trained, i.e., the part that is supposed to be fashioned. In modern era, the substance that is supposed to draw people's moral attention, has been taken to be intention or *will,* whereas for Greeks, according to Foucault, it was their moral *character* (Dorrestijn 2012: 233).

By *subjectivation mode* Foucault means the motivation or the obligation behind the process of fashioning or governing the self. The question here is why one should be moral? For centuries, the main motive for ethical engagement has been the acknowledgement of a duty, stemming from divine or rational moral laws (Dorrestijn 2012: 234). For Greeks though, the motivation 'for engaging in ethics was not duty' or conforming to a code-based rule but 'the wish to give style to one's existence and to earn the respect of peers'.

Ethical practice or *ethical elaboration* was nothing except training to style the self. Also 'Foucault emphasized the importance of what he called technologies or practices of the self in ancient ethics, such as meditation, diet, and consultation with a mentor. In modern times, these exercises have become separated from ethics', Dorrestijn argues (Dorrestijn 2012: 234). In ethical elaboration, concern is the manner through which such moralization of self comes about.

The last dimension, *telos*, is meant to address the ultimate destination self is willing to reach. What is the ultimate ideal to get to? In Christianity for instance the hope for an afterlife serves as telos for ethics. In Foucault's view the telos of ethics in antiquity was self-mastery, as opposed to being slave to one's passions (Dorrestijn 2012: 234). This implies an approach that is not only theoretical but also practical (Dorrestijn 2017: 317), a kind of 'card of the self', one might say.

Inspired by Foucault, an ethics of use of technology might mean an ongoing 'problematization', or a 'critical ontology' of our technically mediated existence (Dorrestijn 2017: 319). To live a moral life in a technologically mediated world therefore, one needs to stay alert to herself in a deliberate and self-reflective way.

I think Dorrestin's account of four dimensions of ancient ethics can be perhaps recast as questions of what, why, how, and where respectively. In this respect, within ethical discussions of technology, one may ask; 1- What is supposed to be fashioned or styled?, 2- Why one is practicing this process of subjectivation?, 3- How such process of practicing ethics would be implemented?, and 4- where the self, through a moral training, is going to reach?

In order to establish an ethical framework for our technologically mediated life, Dorrestijn pursues the answers to the forgoing questions. For the first component of ethics, namely the question of seeking out the *moral substance*, he identifies our 'hybrid self or technologically mediated self'. The latter diverges radically from the modern conception of self, associated with a 'free,

autonomous subject'. As Foucault has pointed out, the modern self is shaped by disciplinary powers or power relations, that is to say, modern subject is informed through its relation to various powers. We are, to some extent, the result of external forces, or put precisely, of the interactions with external powers. Human subject is, to some extent, governed and fashioned by the 'disciplinary power'. Given that the latter is inevitable, humans, subsequently, 'have to accept the impossibility of a sovereign position' (Dorrestijn 2012: 226). There is no subject genuinely free of any constraint or untouched by technology. In this sense the modern conception of autonomy is a myth, and if this is the case, 'ethics of technology does not entail defending what is genuinely human but caring for the quality of one's hybrid mode of being' (Dorrestijn 2012: 234). In ethics we no longer need to deal with an autonomous subject that takes action in isolation, void of external forces.

For the second ingredient of ethics, *mode of sujectivation* or the question of why, Dorrestijn contends that no obligation or following a rule or code of ethics, can serve as a motivation, given the hybrid nature of self. Instead, attaining style may be a driving force for exercising ethics. On such an account 'ethics is then not about obeying, subjecting to technology, but about concern for the influences of technology and the wish to give style to our hybrid form of existence' (Dorrestijn 2012: 236). By exercising ethics, we are not going to do what is morally right, rather through ethics we actively inform our subjects in an ongoing course of interaction with technology.

Third, we get to *ethical elaboration*, meaning that at this level we are supposed to choose a method to meet the question of how. Dorrestijn extensively treats this question and subsequently suggests some ways to practice a mediated morality. The first way is the idea of 'domestication of technologies'. Here he draws on a project having been compiled in a book titled 'domestication of media and technology' wherein a number of technology scholars have explored the ways of domesticating technology. Among them Sørensen's contribution (Sørensen 2005: 40-60) is of crucial importance for Dorrestijn. There Sørensen wishes to give an account of the interplaying network of technology and society. Far from being 'completely malleable' or the reverse, quite determined', the integration of technology is an outcome of a long and ever going negotiation with society according to Sørensen. He discerns that households *tame* technology rather than simply *consuming* it (Sørensen 2005: 44). technology and society are both fluid, not immutable. Society as well as households come to append meaning to technology through a long process of adaptation,

habituation, appropriation, objectification, incorporation and conversion, Sørensen observes. By conducting two studies, namely the history of 'Norwegian appropriation of the car', and the 'study of gender and mobile telephony', Sørensen demonstrates how they are co-productions of society norms and enactment of technology (Sørensen 2005: 49-56). Dorrestijn takes such *domestication* or *taming* of technology to be a sort of moral practice in the course of encountering of human and technology. Here users actively take part in appropriation of technology. Consequently, it may serve as a practice of active shaping one's subjectivity. Subjectivity then arises out of an interaction of self with the external world.

Second arena where moral elaboration could be exercised, according to Dorrestijn, is 'pilot and usability test' (Dorrestijn 2012: 237). Tests are done in order to identify function of a new product. In general, it is taken to be the very moment when a transition is happening from *design phase* to the *use phase*. Dorrestijn holds that, rather than being really a transition moment, test can serve as a context 'to see how the accommodation of technology by users takes place, in an experimental setting, and with the possibility of making adjustments to the technology' (Dorrestijn 2012: 237)[20]. The idea behind it seemingly is the assessment of technology in *practice* while it is not yet officially lunched.

Finally, the last component of ethics comes along; the question of *where to reach* and in particular the *telos* of ethical practice. The goal of ethics, in Dorrestijn's account, is to reach the state and cultivate the required traits to *actively* cope with the external forces, in contrast to, being slave to technology. This stage is what Foucault would consider as the real freedom. According to Dorrestijn, the 'telos in an ethics of technology is a guiding vision for the design and use of technology that mediates human existence' (Dorrestijn 2012: 238). Put differently, such telos could be thought of as the ideal to accommodate technology in a way that the latter becomes *our* own device. The goal of an ethics of technology should not, rather could not, be freedom of any impacts of technology, rather coping with technology while *experiencing* of agency as well as fashioning oneself.

In sum, all the foregoing remarks might be distilled to the idea that an ethics of (use of) technology means how to actively get along with external technological forces, rather than standing in an

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[20] It goes without saying that the third and last way in ethical elaboration may be, he proposes, through art. However he just passingly gives a reference without going into details.

aggressive opposition to them. Such an ethics should teach us how to appropriate technology as 'our own' material, and not as a constraint or alienator.

Despite Dorrestijn's account might be objected on a number of grounds- as it has been criticized by some[21]- it may be taken as a solid ground to establish an ethics of technology. I leave Dorrestijn here and revert again to the Verbeek's treatment of ethics.

Verbeek and Ethics of Design

Expounding Dorrestijn's work on ethics here along with Verbeek's is not a coincidence. Rather they may read as complementary. While the former's work can be conceived as an ethics of *use* the latter's concern might be recast as an ethics of *design*. For Dorrestijn what is at stake is the question of how *users* should live well with technology whereas Verbeek primarily concerns with the question of how designers should navigate a moral business. From this perspective they both may serve as supplementary for the other. From now on I will go over Verbeek's ideas to finish the whole picture.

After having treated the phenomenon of mediation of technology, Verbeek, takes one step further and so as to examine how such insights work in practice he tries to bring ethics into the phase of design. Designing technology is an 'inherently moral activity', it is 'materializing morality', he maintains (Verbeek 2011: 90). In this sense, design implies making morals into a piece of material. Designers are 'practical ethicists' who use 'matter than ideas' (Verbeek 2011: 90), or one might say, designing is a material form of doing ethics (Verbeek 2011: 91).

At the outset he distinguishes between two different levels at which moralization of technology may be exercised (Verbeek 2011: 91). The first *minimal* level is 'that designers try to assess whether the product they are designing might have undesirable mediating capacities'. At this level of practice, designer does virtually nothing unless she feels something goes wrong. The second

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[21] For example, Marli Huijer in her paper 'A Critical Use of Foucault's Art of Living' notes that Dorrestijn's usage of Foucault's concept of 'Art of Living' might eventually rule out the possibility of rejecting a technology altogether. She insists that 'the option that individuals or society refuse certain technologies, such as nuclear technology, should be kept open' (Huijer 2017: 4).

level, on the other hand, the *maximal* level of moralization, refers to a condition where 'designers could explicitly try to *build in* forms of mediation that are considered desirable'. In the first sense, designer was going to play a limited role in design whereas in the second sense she actively influences human's behavior, i.e., she explicitly designs morality into technology.

Verbeek himself seems to favor the second sense of moralization calling for an active participation in loading ethics into technology. In a sense, he is an exponent of a 'behaviour-steering' technology or an active 'moralizing technology' (Verbeek 2011: 95). Building on Achterhuis's ideas he holds that 'Instead of moralizing only people ('do not shower too long'; 'buy a ticket before you enter the subway'), designers also need to moralize the material environment'. An active moralization of technology here might mean 'to a water-saving showerhead we could delegate the task of seeing to it that not too much water is used when we shower, and to a turnstile the task of making sure that only people who have bought a ticket can enter the train' (Verbeek 2011: 95). Although the active sense of moralizing technology seems to raise ethical objections at the first glance with respect to users' freedom, human dignity and democracy, Verbeek argues that active moralization does not necessarily undermine such values (Verbeek 2011: 94-97). I will go over his arguments later.

There is a crucial point here worth emphasizing before moving forward. Incorporating mediation into design, as discussed, implies affecting human *behavior* by the way of a particular material. If so, design process includes also exploring the unexpected influences of materials on behavior of users in future. Verbeek speaks of a cluster of probable unexpected effects called 'rebound effect' to foreground his point. A first type of rebound effect is a phenomenon where an artifact generates exactly the opposite effect of what was intended for (Verbeek 2011: 93). An example here is a washing machine. It consumes less energy, but for the very same reason people tend to use it for small quantity of laundry, leading to a higher energy consumption (Verbeek 2011: 93). This occurs because the design of technology has been executed in a technology-oriented way rather than taking also behavior of users into account, Verbeek argues (Verbeek 2011: 93). As another example one may mention energy-efficient houses. They are intended to provide an optimal combination of fresh air and heat conservation. Yet many inhabitants tend to open the window for get fresh air. Here the exploration of the future users has been visibly absent (Verbeek 2011: 93). All we need, Verbeek believes, is taking mediation theory seriously.

In order to bring mediation theory into the ethics of active design, Verbeek discerns three levels of contexts where morals should play role; anticipating mediations, moralizing mediation and methods of moralization. *Anticipation* is an important phase for any ethical approach to technology. It refers to the ability to predict the ways in which a specific technology might manifest its mediation. Three major players or 'three forms of agency' matter in such anticipation (Verbeek 2011: 99); the designer with his delegation, the technology with its emergence, and the user with her appropriation. Any approach intending to do justice to morality should take them all into account, Verbeek argues. None of them is neglectable in this sense. His emphasis on all players is the reflection of mediation theory. But prediction of meaning and role a technology is going to play in future is not that easy. As the notion of multistability has taught us earlier the usage of technology is not predetermined. It may be appropriated in different ways. It is not just the artefact that determines its subsequent usage, users too play a significant role. Technology is multistable, that is to say, the future role of technology is going to be articulated, to some degree, by the users, as the case of rebound effect enlightens. Energy-saving bulbs, for example, led to an increase rather than decrease in energy-consumption, for the reason that people tended to use them in places that wouldn't have been so otherwise, places like corridors or gardens. Automatic control systems are another example of how things may go into unforeseen directions. They have been invented to ease the users and rid them from switching on and off the light or heating system from time to time. But sometimes users prefer to be in control of them and consequently devise ways to escape the control of such systems (Verbeek 2011: 93). Such an inherent unpredictability of technology usage renders the process of anticipation a difficult undertaking. Nonetheless, prediction, at least to some degree, is possible, Verbeek argues. In order to overcome the complexity 'designers should try to establish a connection between the context of design and context of use' (Verbeek 2011: 99). He suggests three methods to establish such a connection; prediction by the designer imagination, with methods of Constructive Technology Assessment, and finally, the so-called scenario method making use of virtual reality and the like (Verbeek 2011: 99). The logic underlying all is to predict future uses in prior. I will briefly explain each in turn.

By designer imagination he means 'trying to imagine the ways the technology-in-design could be used and then shaping user operations and interpretations from that perspective' (Verbeek 2011: 100). In fact, such imagination is supposed to fill the gap between technology-in-design and technology-in-use. Designer needs to brainstorm the wide range of relationships which is likely to

be held with a particular technology. This is important in order to be able to predict all potential mediations. As an exemplar of such anticipation, Verbeek recounts the configuration of a certain design of couch to show how things may look like in practice (Verbeek 2011: 101). These alleged couches are covered by a sort of leather upholstery which in time and due to use, new pattern would emerge on the surface of the couch. Such a design may help the couch not to seem worn out ahead of time. This in turn makes the owner cherish the artefact thereby prolonging the lifespan of it. The underlying idea is that people usually tend to change their stuff before the latter actually becomes obsolete. Therefore, if the designer were successful to establish a psychological bond between the possessor and the respective artefact, consequently it may lead to a less waste or pollution. This case exemplifies how a specific kind of design may take mediation into account, by going beyond merely technical sides and anticipating the effects of the artifact on users. This way designers can steer the behavior of users.

Constructive Technology Assessment (CTA) is a process through which 'all relevant stakeholders in the design of technologies are involved' in order to generate 'variations that are exposed to a selection environment which is formed by entities like the market and government regulations' (Verbeek 2011: 102-103). Here it is supposed to pick the 'fittest' variation of technology through a process that one may consider as 'democratization of the design process'. Verbeek notes that such an approach traditionally has been exercised merely with regard to human actors, and consequently the mediating role of technology itself has been overlooked. Therefore, he argues, we need to integrate the possible mediating role of technology into the method (Verbeek 2011: 103). In sum, CTA is a method to bring all consumers, citizens, employees, corporations, social groups together in order to reach to a better design through studying all relevant aspects of a particular technology.

The last trick to link the context of use with that of design is scenario method which is characterized as thinking about possible scenarios in the use context. Every scenario is a possible usage in the use phase. One way of scenario anticipation is through putting technology into the use context by using virtual reality technologies (Verbeek 2011: 104). This test may be operated in order to explore all possible uses and not just the particular functionality intended by the designer(s). Virtual representation helps designers to anticipate the possible future usages when technology is not yet introduced into the market (Verbeek 2011: 105).

After anticipation, in the second phase, we would enter the phase of assessment of our anticipations. Anticipating is not enough, 'designers will also have to assess the quality of the anticipated mediations' (Verbeek 2011: 105). Such a step is required because some of possible uses would create hostile situations. One way of exercising such evaluation is *stakeholder analysis*, according to Verbeek's suggestion, where 'all relevant moral arguments regarding the technology-in-design are gathered and balanced, taking the perspective of all stakeholders involved'. After collecting all arguments from all participants involved and by measuring them against one other, we would reach an informed conclusion about the moral quality of a decision. Such a variant of stakeholder analysis is quite prevalent in applied ethics, however Verbeek does not embrace it uncritically. He pursues instead a revised version whereby an *integration* of stakeholder analysis and mediation theory is central (Verbeek 2011: 106). Moral assessment should not be limited just to human stakeholders, he argues. Technology and its mediation should be taken into consideration as well. Four different levels need to be morally explored in order to augment the stakeholder analysis (Verbeek 2011: 106-107). First, assessing the intended mediations inscribed directly by designers into the artifact. Second, addressing the unintended mediations, insofar as they can be anticipated by the tools discussed earlier. Third, the form of mediation is relevant and worth appraising. Form of mediation can take on various forms. Technology can *force* one to do something, like in the case of a speed bump on the road forcing driver to slow down the car. It can be *persuasive*, like when a car generates a beep sound until the seat belts are fastened. Or alternatively they can *seduce* people to do or not do something, and this happens when a designer influences someone's behavior through non-cognitive methods, like the way the specific upholstery starts to look beautiful after a while. Fourth and the last is evaluation of the eventual outcomes, once a technology is in the market, which could be radically different with the anticipated ones. Together, these four elements would lead to a comprehensive evaluation of the work of designer, on Verbeek's approach.

The last phase, after anticipation and the respective moral assessment, is methods of moralization and design. Here the question is what instruments are available so as to moralize technology. To this point, over the previous two stages, we first tried to predict the future uses, and subsequently evaluated them to ensure if our prediction is reliable. Now we would like to bring such intuition into practice, that is to say, to moralize technologies. Verbeek, after examining the typical methods in applied ethics comes up ultimately with two tricks, i.e., *moral inscription* and *value sensitive*

design. He deals, not extensively though, with each in turn while trying to tweak the current versions of them, to devise an integrated method in the end. Going deeply into details is beyond the purview of current writing, and I just will provide the general outline in brief.

Moral inscription, building on Latour's and Akrich's ANT and more importantly the notion of *scrip*[22], investigates how to *redesign* the appliances and devices in a favorable fashion. In this method, the existing scripts are analyzed and *rewritten* by 'taking into account how users might appropriate the redesigned device' (Verbeek 2011: 114). The idea underlying it is the difference between *user logic* and *script logic* along with the intuition that what happens in reality is an outcome of *dialogue* between these two. In case these two logics stand in contrast with each other unexpected outcome appears. Therefore, it requires redesigning in a new way to put two logics in compliance with one another. For example, while washing machines are designed to rinse the plates as a part of their task people tend to rinse them under running hot water. This mismatch could be dissolved by rewriting machine's script and adding a rinse button or appearance of a message once it is being done (Verbeek 2011: 114).

In *value sensitive design* approach, on the other hand, 'moral values that need to be supported by the technology-in-design replace the technological functionalities as the primary focus of design activities' (Verbeek 2011: 114). VSD aims to integrate conceptual, empirical, and technical investigations to offer a 'possibility for anticipating and designing moralizing technologies' (Verbeek 2011: 115). It has been applied in a particular web browser (Mozilla Firefox), for example, in order to respect user's privacy.

In this way, Verbeek comes up with a comprehensive framework for a moral design. To recap his approach I quote his summary here:

> 1- First, a designer has to decide 'whether to moralize the design in an explicit way' or not.
>
> 2- In case 'an explicit moralization of technology is aimed at, a conceptual analysis can be made of the values and norms to be designed into the technology to see what kinds

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[22] In the next chapter I will have a lot to say about this notion.

of norms and values are embodied and installed by the technologies-in-design'. After this, designers should be looking for ways to 'materialize these norms and values and to develop prototypes of a technology that helps to shape human practices and experiences'

3- Then 'a mediation analysis of the product-in-design should be made, with the intention of anticipating the future mediating role of the technology in design'. [Here] … 'the moral imagination of the designer, assisted by a scenario-oriented approach and virtual-reality technologies, can play an important role' ….

4- 'After this step of anticipation, a moral assessment should be made of all mediations involved. As indicated…, a method of applied ethics, such as stakeholder analysis, could be used here, with four points of application standing out: the intended mediations that are deliberately inscribed in the technology; the implicit mediations evoked by the design, insofar as they can be anticipated; the forms of mediation used; and the eventual outcomes of the technological mediations'.

5- In the last stage finally and on the basis of this moral assessment, 'a design can be chosen'.

Evaluation and Assessment

Thus far I have been articulating the portrait of postphenomenology in general and then the relevant moral considerations based on it. While the former was taken to be the contribution of Ihde and to lesser degrees that of Verbeek, Rosenberger and others, the latter was the contribution of both Dorrestijn and Verbeek. As I said before, Dorrestijn's focus may be read to be related to the context of *use* of technology whereas Verbeek's work might be viewed as an ethics of *design*. Even though I have some comments to improve postphenomenology in its general sense I postpone it until the last chapter. Here, instead, I will restrict my concentration to an evaluation of the foregoing treatment of moralities. Yet I don't have much to say apropos of Dorrestijn's contribution. I endorse his Foucauldian approach, so long as use of technology, rather than design thereof, is concerned. In contrast, in this section, I would like to evaluate some of Verbeek's remarks.

Verbeek has made a great deal of contribution to both postphenomenology and ethics of technology. Even though I sympathize with much of his vision I also have few objections. First, I will take issue with the place he ascribes to artefacts, since it seems to be an overstatement about the role of technology. And the second issue will be associated with his generosity to grant permission to intervene in users' behavior, by legitimizing a *maximal* way of moralization of technology. I dig into them in turn.

The Sensibility of Distributive Moral Agency

The first challenge for Verbeek's contribution is the relation between human and technology with respect to the notion of moral agency[23]. According to Verbeek's commitments, as we have seen, it is not possible to ascribe moral agency to humans and at the same time to deny it of artifacts. One might take the general drift of his approach as to blur any distinction between the moral agency of humans and artifacts[24]. In fact, Verbeek's postphenomenological understanding of agency does not seem to provide any ground for drawing a neat distinction between humans and nonhumans, because they are both taken to be part of mutually constituted hybrids. He often also urges to avoid any kind of absolutizing subject and object (Verbeek 2005: 112). In many passages Verbeek demands to change our perspective on subjectivity and objectivity and, rather than assuming them as pre-given, consider them as co-shaped by one another (Verbeek 2005: 112). We, human beings, in some limited ways do design and use artifacts, but they also structure our actions, perceptions and morals. We stand in a reciprocal relationship in this sense with technology. We may initially decide to purchase a car and put it in use accordingly, for instance, but immediately it would start affecting our behavior, expectations and thoughts. Once we own a car we may be able to rent a house far from our workplace while we would have been obliged otherwise to live

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[23] This section integrates the paper Arzroomchilar & Novotny (2018). For more extensive treatment of the moral agency of artefacts and its relevant objections see the original source.

[24] At least at one occasion Verbeek claims that the idea that 'technologies in themselves *have* a form of agency that we normally only attribute to human beings' is a misreading of his work (Verbeek 2014: 79). He even notes that 'it is in fact hard to find scholars who seriously defend the thesis that technologies can be full-blown moral agents just like human beings are' (Verbeek 2014: 79). One may find these claims at odds with the general gist of his view. I hope to make clear by now that Verbeek does not have resources to distinguish between the (moral) agency of artifacts and of humans. Also, by the way, it is not so rare to find scholars ascribing 'full-blown agency' to some highly sophisticated artifacts such as AI robots, autonomous cars, etc. (These, however, are special subsets of artifacts, whereas Verbeek deals with artifacts in general).

in the proximity of the workplace. Our behavior is affected by the fact that we possess a car and as a result our situation within the world changes. There is no pure object vis-a-vis pure subject in this sense but all is 'packed together' (Verbeek 2005: 164). The experiencing subject and the experienced object are in an ongoing process of interaction.

Verbeek's claim that the subject is inseparable from the object allows him then to hold that 'morality appears to be a coproduction of humans and nonhumans' (Verbeek 2014: 78) or that 'morality is a hybrid affair' (Verbeek 2005: 80). One must overcome the view that morality is 'located exclusively in humans' (Verbeek 2005: 80). The reason is simple – there is no pure human being nor pure artifact.

The consequence of the human-artifact inextricability thesis is that human beings taken as such cannot be moral agents. Verbeek is perfectly aware that this calls for a new conception of moral agency. He says accordingly: 'rather than applying a human conception of agency to nonhumans, I rework the concept of agency in order to show that it should actually be seen as a property of hybrids rather than of humans only' (Verbeek 2009: 255). None of them could be deemed to be a self-subsistent agent alone. Morality is an attribute of a *composite*, of a network of human beings and artifacts.

Despite one can agree with much of his intuition and in particular the observation that human and artifacts are interconnected in a way that they continuously affect one another yet Verbeek's conception of moral agency seems open to at least three kinds of objection[25].

First, it seems Verbeek has misdescribed the moral status of artifacts by equalizing their contribution to moral acts. The conditions for an event to obtain ought not to be taken as a proper part of the event itself. Factors that bring about a specific framework within which a particular event happens are to be distinguished from the event itself. If I look at some beautiful scenery through a pair of binoculars, although this instrument does partly shape the framework of my

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[25] Other kinds of criticism have been put forward as well. Illis and Meijers (2014), for instance, object that Verbeek discusses only two necessary conditions of moral agency, intentionality and freedom, and ignores others. Philip Brey (2014) worries that by redefining moral agency and ascribing it to artifacts we are forced to ignore certain relevant features of human moral agents. Thorough and detailed criticism within the analytical tradition can be found in Peterson (2011) and (2017, 185–); cf. also Selinger et al. (2012). While I am sympathetic to these kinds of criticism, my approach is more (although not exclusively) 'internal', i.e., I would like to point out tensions within Verbeek's own philosophical commitments.

experience, it is only *me* who is looking at that scenery, not me-plus-binoculars. The binoculars do not look at anything, they merely provide a condition within which I can see a particular thing and not others. So even if it were appropriate to ascribe moral agency to artifact-human hybrids, it is humans rather than artifacts that are the primary locus of intentionality and freedom and hence of moral agency. The mediation of artifacts merely extends the sphere of moral agency which is grounded in, and properly ascribed to, human beings alone.

Why does Verbeek tend to obliterate distinctions between humans and artifacts? One of the reasons has to do with the way he describes his examples. True, no one had foreseen that the introduction of energy-saving bulbs would lead to an increase in energy consumption. This does not mean, however, that it was these light bulbs as such that decided that and hence are in the relevant sense responsible for it. We could have foreseen the danger and taken precautions. The lightbulbs could not. So, while it is true that artifacts dramatically change our lives and moralities and hence hardly are mere passive tools, they nevertheless are not agents. It is to Verbeek's credit that he underscores the power of technology in our era and warns us about using and developing artifacts in an irresponsible way. However, one might disagree with his account of the nature of artifacts and their moral agency. To highlight the role that technology can play in life one does not need to misrepresent the real functioning of artifacts.

Second, Verbeek's views on moral agency undo the distinction between artifacts and natural objects as well. If the only criterion that is at work in ascribing moral agency to a thing is whether it somehow affects the morality of actions, then (at least) some natural objects also qualify as moral co-agents. Hence, we cannot distinguish them from artifacts. For it is clearly not just artifacts that structure our behaviors and steer our actions. Imagine, for instance, that Peter is walking in a dense forest and due to the existence of lots of trees and boughs he is obliged to constantly change direction. The trees and boughs act in the same way as a pair of binoculars does, except that they are natural objects, not artifacts. Does it make them moral agents as well? Is there any difference between the way that cars, knives or other artifacts affect our behavior and that of the forest's effect? All of these put some specific restrictions on our activities, co-shaping our actions in a similar way. Or let's take another case. Suppose Mary runs into someone she hates and wants to take revenge on. Now imagine the following two possible scenarios. First, she takes a gun from her car and shoots the guy. He dies. Second, she leans over, picks up a big sharp stone and throws

it at him. Again, he dies. What is the difference? Both the stone and the gun encouraged her to kill the guy and both shaped her actions. Stone-plus-Mary and gun-plus-Mary are both moral agents in this sense. Thus, Verbeek should acknowledge that (at least some) boughs and stones are moral co-agents. And if artifacts can be moral co-agents, then anything can. Perhaps Verbeek would be comfortable with this consequence. Many of us, however, would like to preserve the distinction between artifacts and natural objects and ascribe the status of moral co-agents only to some things.

Third[26], Verbeek has not left any place for the possibility of making a distinction between simple artifacts, such as a knife, and more evolved ones, such as autonomous cars. These are obviously not on the same level. For example, some of the more sophisticated artifacts may display abilities which make them more likely to qualify as moral agents than other simple ones. For a clearer grasp we can map out a spectrum representing various entities with respect to their intelligent behaviors dimension. In such a picture, we can locate natural objects at one extreme and human beings at the opposite one, with artifacts in between. It seems that not all artifacts could be situated at the same distance from humans. More complex artifacts, such as autonomous cars that need to 'decide' how to react in unprecedented traffic situations, should be placed nearer to human beings than for instance knives. They imitate some aspects of human intelligent behavior. Today's intelligent artifacts still lack some human abilities, such as moral deliberation or consciousness, but they do possess abilities such as learning, (a sort of) thinking and decision-making. Perhaps eventually an AI robot will be constructed that will count as a full-blown moral agent. Simple artifacts such as flints or pencils, however, do not qualify. One's impression might, then, be that an adequate account of the morality of artifacts needs to do justice to the differences within their kind.

Verbeek's remarks about the roles that artifacts can play in our lives are strikingly insightful. These observations should be taken seriously in designing and developing artifacts and in policymaking associated with them. He has shed light on how profoundly artifacts can change morality and hence how important it is in applied and even in general ethics to take them into account. However, despite all of his contributions, the only lesson to take is that artifacts are much more powerful tools than we used to think, nothing less and nothing more. They are not as such agents nor co-agents, even though when we possess them there are lots of consequences for us humans. The

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[26] The third point is developed by D. Novotný, and in this sense, is his contribution.

ability of artifacts to change our lives requires us to become more careful and more responsible in developing and introducing technologies.

Maximal Intervention and Human Beings' Freedom

The second problematic dimension of Verbeek's schema is that in designing of technology he seems to have no qualm with undermining human freedom as much as it takes. Yet his maximal treatment of moralization of technology seems to threat human's freedom or dignity. Deliberately building morality into materials is tantamount to diminishing the range of possible choices of users after all. Is it legitimate to license technology so generously to persuade, seduce, or even sometimes coerce and force us to go to a particular direction? Isn't it in fact threatening the very ground on which ethics is standing? Couldn't behavior-steering technologies be intimidating human dignity?

As discussed earlier Verbeek's departure point is the Foucault's insights as to ethics is not matter of possessing a full-blown autonomy, rather it resides in self-styling through bearing an active relation to the external powers. Taking mediation of technology as though it is the most powerful external force in contemporary life, he is convinced that one can make a compromise on freedom as much as one might wish. In such a perspective one is not much concerned with freedom of action, rather the stress is predominantly on the relationship one holds with technology. Rather than being salve of technology, on this account, one needs to establish an active informed relationship in relation to technology. Such an interconnection is precisely where ethics grounds.

To justify his position Verbeek moreover likens mediation of technology to imposition of constitution and the relevant social laws under the pretext that technology is not different from them in nature (Verbeek 2011: 96). If there are already so many constraints around, his argument implies, why bother to feel threatened by technology then? As he writes 'few people will protest the legal prohibition of murder, so why protest the material inhibition imposed by a speed bump that prevents us from driving too fast at places where children are often playing on the pavement?' (Verbeek 2011: 96). For better or worse, technology is already mediating us, why shouldn't then, he infers, bring mediation into careful examination and ultimately design the latter in accord to our preferences? (Verbeek 2011: 96). He goes even further to maintain that doing otherwise is in fact

unethical. Deliberately moralizing technology amounts to taking responsibility for the design, in contrast with leaving it with engineers which can lead ultimately to *technocracy* (Verbeek 2011: 110). He therefore takes such maximally moralizing technology to be a sort of *democratizing* the process of technology design[27]. Such a deliberate moralization seems to be in fact distributing power to rule out the engineers' corruption. He also invokes to the fact that not every mediation of technology is a force or compulsion, rather most often it takes on a form of persuasive, encouraging, seductive character (Verbeek 2011: 110). If so, there would be still much room for human's volition, he concludes.

How convincing Verbeek's arguments are? Even though I share part of his intuition I find the very core of his claim untenable. The main problem, as I will argue, lies in the fact that Verbeek tries to advance a maximal interference by designers. He is not content with only disposing of immoral dimensions of mediation, rather he goes far afield to allow for realizing moral-promotor-materials, so to speak. I think this is too strong a conclusion he would like to draw from weak premises. Here I try to call into question his approach in more details.

In the first argument he correlates the status of technology with other inhibiting factors. He reminds us of 'laws, norms, desires and more' by which our freedom comes to be bounded. But does such an analogy work? Yes and no. I contend that the answer is yes if by moralizing technology he means the weak sense of the word, namely the minimal approach to design. The answer is no, on the other hand, in case by moralization he aims to refer to the strong sense, i.e., deliberately hook up ethics into technology. That is certainly a true fact after all that we are already constrained by a multitude of external forces. But it cannot justify letting new forces manipulate further our freedom. Though I agree with Verbeek to note that on some occasions we would have to bite the bullet and let technologies, to a large degree, determine a particular behavior yet it cannot justify loading morality into artifacts with any excuses. The installation of a speed bump in a school's neighborhood, for instance, to oblige drivers to slow cars down seems to be supported, by the argument that otherwise it might end up with a catastrophe. But it may be argued that such fatal situations are rare, therefore we cannot take such an intervention for granted. In contrast, Verbeek

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[27] Concerning democratizing technological design and ridding of the dangers of technocracy one may find excellent insights in Feenberg's work, specially his book 'questioning technology' (1999).

seems to sanction even the introduction of the so-called 'persuasive mirror'[28] where there is no immediate fatal threat involved. Granted, Verbeek is sensitive to democratizing the design of the mirror, but one can still object that he does not care enough about breakings into humans' freedom (Verbeek 2011: 112).

I feel sympathy with the Foucauldian approach where the way one is bearing a relationship to technology is far more critical than the impairment of our autonomy *per se*, but Verbeek's attitude, I assume, is detrimental to the very foundation of ethics. Even in a Foucauldian sense, certain degree of freedom is required, and one cannot give it all away so cheaply. Maximal intervention in technology design aiming at development of moral machines does not seem satisfactory, I think.

Verbeek's second argument is not innocent either. He begins with the claim that 'the actions of human beings who are dealing with technologies are always mediated'. He concludes subsequently that 'deliberate moralization of technology … amounts to accepting the responsibility this implies' (Verbeek 2011: 110). I concur that our actions are most of the time mediated by technology, but it would not necessarily follow that we are also permitted to reinforce the mediation of technology. Again, the problem lies in the gap between the weak sense of moralization and the strong sense of the word. His premises are not capable to drive the conclusion, i.e., intelligibility of moralizing technology in the strong sense. However, that remains relevant for sure, that we need to take responsibility for designing technology not to generate evils. But this latter concern is met simply through taking measures in a weak sense of moralization.

The third argument put forward by Verbeek indicates that he is quite aware of the threat of behaviour-steering technologies. Here he appeals to the intuition that not all technologies *coerce* or *force* users rather they most often just mildly encourage or alternatively seduce users to do certain deeds. In fact, this seems to be his most solid argument for moralization. However, it does not hit the target again, I think. That is certainly a general truism that as long as technology does not force anyone, rather just gently invites to a certain path, users' behaviour would remain undetermined still. There seem to be some room, subsequently, for exercising freedom in this way. But one may keep wondering why we would need to limit our power and knowingly let artefacts

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[28] Mirrors which were intended to convince one to keep a healthy diet by the way of displaying the future look of her.

affect our behaviour? What are the advantages of discarding a number of possibilities in advance when there is no direct threat for human life?

In response Verbeek might say that if mediation is not going to determine users' future actions, and subsequently people could still act differently, why not deliberately mediate the latter's behaviour to generate desirable results? A persuasive mirror directing users into a healthier life, after all, would culminate in maximizing the pleasure in a long run, put in a consequentialist vocabulary. Even though there is no immediate threat of one's life here building such mediating effect into mirror does not seem primarily harmful, one might argue.

To meet this objection, I have two points to make. First, one should note that such a 'desirable result' will come at the cost of diminishing freedom, albeit admittedly not through discarding freedom altogether. But note that no one can assure such a gain is worth the respective loss. How is it possible at all to weight gains and costs against one another to reach a conclusive decision? Furthermore, who is going to make such decisions as to with respect to which technologies sacrificing a certain degree of freedom is worth the subsequent gain or not? How would be the procedure of such decision making? It seems difficult, if not impossible, to arrive at a consensus as to where a maximal intervention would be legitimate and where not.

My second point pertains to the implications of such authorization. Couldn't such a liberal approach pave the way for powerful companies to use, or misuse sometimes, such permissions to direct consumers' behaviour? Once deliberate manipulation of users' behaviour is authorized, big companies would probably start taking advantage of it to their best benefit. Such a circumstance where everybody tries to arrange the material surrounding to manipulate others in her interest seems to be open to criticism.

Closing Remarks

Before closing the chapter, a clarification is in order. Thus far I have been defending a minimal sense of moralization of technology. One may think subsequently that, such a minimal approach would render the very notion of mediation obsolete by reducing the *ethics of design* simply to *risk*

management. If designers need not to step in unless a fatal case is going to come along, why bother to explore the mediation of technology then?

In the last chapter I will explain why such an approach would not necessarily reduce the ethics of technology to risk management. Briefly put, I will propose an alternative formulation where the degree to which designers are eligible to intervene would depend on the kind of mediation resulting from a given technology. In case of a hostile mediation designers would need to intervene as much as it takes. Otherwise, they should stay passive. In this sense, both maximal and minimal intervention will be required, albeit put in different vocabulary. That is, where a mediating effect is going to contribute to an evil result –regardless of the degree of the evil- designers have to intervene *actively* to eradicate the vicious outcome. By contrast, in case an artefact is not going to strengthen an evil designers must be passive and stay away.

In sum, I dedicated this chapter to articulation of postphenomenology. Beginning with general description of the framework I also dealt with moral implications of postphenomenology especially within the work of successors. While embracing much of insights, I took issue with some dimensions of the teachings. Most importantly, I objected maximal intervention of designer aiming at materializing ethics. But as it is clear, such a flaw was not inherent in postphenomenology, and it may be mitigated easily. In fact, it was an objection against Verbeek's suggestion, rather than postphenomenology itself. In chapter four, however, I will address some of inherent shortcomings of postphenomenology which need to be remedied. In this way I will try to illuminate why postphenomenology would fall short to capture all it seeks, that is, it is unable to bring all aspects of mediation into view. I will argue that through a mere first-person approach, i.e., an approach from 'within', some of aspects of technological mediation will be left out. We need then, I will insist, to supplement phenomenological approach with a third-person approach. I will find such an 'outside-in' approach within the tradition of Science and Technology Studies (STS). I will bring into light the potentials for an amalgamation in particular within Social Construction of Technology (SCOT) and Actor-Network-Theory (ANT) movements. Next chapter is devoted to these frameworks.

Chapter Three; Actor-Network-Theory

Introduction

Actor-Network-Theory or simply ANT, was at first meant to explain scientific knowledge and scientific activity. In time, however, it came to be construed also as an array of philosophical insights about technology. The rationale behind it was the ANT's emphasis on the crucial role of non-humans in general, and technology in particular, in advancements of the scientific knowledge. While prior to that science had been treated predominantly as an *intellectual* business, or sometimes as a social phenomenon, ANT highlighted non-human facets of the scientific knowledge. In this chapter I will be engaged chiefly with the relevant pieces of ANT. I will also provide an expository section related to a further movement called Social Construction of Technology (SCOT).

Crossing the Boundaries

ANT is a generic term to cover a whole cluster of ideas from various thinkers, Bruno Latour in France and further scholars like Michel Callon, Madeleine Akrich and John Law. Moreover, its teachings have undergone constant transformations (Micheal 2017: 5-6). There are different insights then one may legitimately associate with ANT to the extent that some have differentiated 'Classic ANT' from 'Post-ANT' (Micheal 2017). There seem to have arisen diverging views sometimes under the umbrella of ANT. Nevertheless, one may bring into view the underlying key components of it which are relevant within all readings of ANT. In this chapter, I will draw mainly upon teachings of arguably the most prominent ANT writer, Bruno Latour. Occasionally I will also invoke to other ANT theorists like Callon and particularly his seminal study (1986) which turned out to be of great importance for ANT.

ANT is meant to bring into view the role of non-humans. Yet, however novel and creative, it did not emerged in vacuum. It was built, in one way or another, upon precedent frameworks. On the roots of ANT, Micheal writes :

> The intellectual roots of ANT are rather tangled, incorporating, for instance, Marxian,
> social constructionist and ethnomethodological traditions in sociology; the influence of

Whitehead, Kuhn, Serres[1] and Foucault from history and philosophy; elements of Greimas[2] and arguably Barthes from semiotics. Inevitably, some lineages are more obvious than others (Micheal 2017: 10).

Latour is a revolutionist, however, and does not adopt others' approaches without revision. He calls for a fundamental modification of both sociology and philosophy. His contention is that society is not that we have long been engaged with and accordingly we were so far just projecting our prejudices onto society. Society is not just the aggregate of humans and in this sense there are more individuals within society. That is to say, the boundaries of things to which we have long appealed, are not real, Latour contends. Most important is the demarcation of humans from non-humans. The winner of Nobel Prize in physiology or medicine has to spend a long time not only at her lab, in hospitals and on academic conferences, but also in the meetings, to discuss her project with patent lawyers, representatives of pharmaceutical firms and government officials (de Vries 2016: 2). Why should one respect then the boundaries between different disciplines if scientists themselves don't respect boundaries? Engineers negotiate with politicians from time to time for their profession, climate scientists discuss ecological problem with statesmen, scientists, working in various disciplines, do cross the boundaries, except 'sociologists and philosophers' that insist on preserving the demarcation of such disciplines. When Latour was speaking about Pasteur's accomplishment, he wrote:

In the year 1881, the French semi-popular and scientific press is full of articles about the work being done in a certain laboratory, that of Monsieur Pasteur at the Ecole Normale Supérieure. … journalists, fellow scientists, physicians and hygienists focus their attention on what is happening to a few colonies of microbes in different mediums, under the microscope, inside inoculated animals, in the hands of a few scientists. The mere existence of this enormous interest shows the irrelevance of too sharp a distinction between the 'inside' and the 'outside' of Pasteur's lab (1983: 143).

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[1] Michel Serres (1930 – 2019) a French philosopher, theorist and writer.
[2] Algirdas Julien Greimas (1917 –1992), was a Lithuanian literary scientist who wrote most of his body of work in French while living in France.

The role of non-humans in developing scientific knowledge – especially technology- is such important that Latour speaks of 'technoscience' instead of science (Latour 1987). If so, Latour claims, sociology has to be revised. According to him, the rigid distinctions underlying the sociology, between nature and society on the one hand and facts versus values, on the other, are fundamentally misleading. On the subject of philosophy too, Latour, in harmony with Wittgenstein's views, believes that it is not the philosophy's business to offer *explanation*, rather *description* of what really is going on.

This leads Latour to a new direction for doing an *empirical* philosophy; 'to do philosophy, to actually trace the connecting links and to learn to see what we see, Latour got engaged in empirical field studies, in ethnography'. Ethnomethodology is the study of the accounts people give of their lives to make sense of their actions and relations and to organize their everyday life (de Vries 2016: 14). ANT aims to bring into light above all the role of laboratories as well as scientific papers, in the development of the scientific theories. Laboratories make a great contribution to the production of knowledge. Over there many factors, both humans and non-humans, work together to ultimately get to what scientists call *facts*. Scholarly papers, on the other hand, are the sources scientists speak about while meeting their colleagues, politicians, law makers, fund agencies, patent lawyers and so on.

In a work Latour talks about Paris and the way one can see it at a glance through Paris' map (quote from de Vries 2016). We may see the whole city through a representation of it this way. But representing Paris on a piece of paper has not been that easy. It needed a lot of work to have gone into it beforehand. From mapmakers, geographers, civil servants, technicians, municipal officials to road-maintenance workers all needed to pull their weight to represent Paris on a piece of paper. It means, and here lies the crucial point, that Paris reality cannot be captured unless it is already 'made visible' (de Vries 2016: 10). We have to invest first in the world to understand it in this sense. Furthermore, it is not sensible to differentiate social affairs from natural ones with the pretext that the latter is only *brute fact*. To report of reality too, i.e., the aim of the natural sciences, one should go through a more or less similar process; at first, and above all, the world should be *made* visible.

Latour, along his meticulous ethnographical observations in a variety of labs across world recorded how things play out in the labs. On one occasion, he observed that for making visible the activity of a single neuron in a rat's brain huge preparatory works should get done in prior. A rat should

be decapitated first, its brain gets extracted then, and next slices of brain need to neatly be prepared by using a microtome. In the next stage these slices should be looked into using a microscope. Then a neuron must be recognized accordingly and finally the electric activity needs to be recorded by an oscilloscope and so on. In order to understand what is going on in a brain of rat all these processes should be gone through in order, and this implies that, the reality should be prepared before it may be observed. The reality is not out there, it is not a given, awaiting to be *discovered* by scientists. Practicing science, therefore, is not a *passive* process in any sense. In fact, according to Latour, science is not the matter of portraying an *independent reality*, rather the course of *construction* of facts. However, the notion of construction is tricky, and Latour takes it is to be different than that within relativist accounts.

If Latour's depiction of the process of science is true, the philosophical issues germane to science would not be exclusively *epistemological*, rather, more importantly, they are *ontological*. It is the matter of 'what is going on?' and not 'what is the relation of our representations and reality'. Ethnomethodology would shift the attention of social science away from questions about explanations, that is, questions about why something happens, to ontological ones, that is, questions about what is going on (de Vries 2016: 14). I will return to this point later.

Context of ANT

Social Studies of Science was one major movement that paved the way for the emergence of ANT. On this approach, the way controversies within a scientific community become settled and scientific facts become accordingly established can be explained, far from referring to the available evidence and methodological rules, in terms of *social* causes and processes (de Vries 2016: 15). Society and social environment then came to be given a pivotal weight in advancing scientific knowledge. Latour's concern however was not that of social studies of science movement. He was not much into those concerns, e.g., how scientists' disagreements, debates and interests play a role in driving various trajectories of scientific endeavor. Rather he was in pursuit of far more radical a vision. His ambition was not epistemological but ontological, and as said before, he was not much concerned with the fact that 'how science is impacted socially', instead, with 'how science is made' ontologically. He was seeking an 'empirical metaphysics' to realize the practice of science (de Vries 2016: 16). While 'the old system allowed shortcuts and acceleration, but it did

not understand dynamics' Latour posits, an experimental metaphysics 'aims at slowing things down' to follow more carefully the movements of the objects themselves (Latour 1988: 123). In his methodological 'actualism' one needs to 'replace the singular with the plural everywhere' (Latour 1988: 29). The latter implies that all a scientist needs to do is tracking down actors within their broader context, that is, the network of relations within which they exist. This view will be explained in more details in the chapter.

The Trajectory of Philosophy of Science

Latour is an *anthropologist* of science and technology. The history of evolution of the philosophical studies of science has witnessed different perspectives throughout twentieth century. To some point the philosophical issues taken up were predominantly semantic and epistemological in nature. Philosophy of science in this sense focused on the 'context of justification' while leaving the 'context of discovery' with psychologists, sociologists or historians (de Vries 2016: 22). At first, one of the earliest influential schools, logical empiricism, took scientific theories to be nothing but *sets of statements* and, at the same time, the meaning of these statements to be their method of *verification*. Quine, however, argued that the very ground upon which logical empiricism is established is shaky, and it commits what he called 'dogmas'. Later Wittgenstein within analytical tradition however started to draw attention to *practice*. According to him 'no longer could philosophers restrict themselves to study only the settled products of science, the statements one finds in textbooks. They had to also examine lab-journals, notebooks, correspondence and discussions before results had reached the state of textbook knowledge' (de Vries 2016: 23).

This turn to practice then raised a question; which method should be employed to lay bare the practice of science? How to pick the best or the right one, out of all competing practices of science? Given that scientific development involves *innovations* in both its method and style, it seems difficult to talk about a *standard* method. We are not able, it appears, to single out a particular method as a benchmark to evaluate this way all possible methods. Here come the remarks of authors such as Kuhn and Feyerabend. Kuhn claimed that the flow of science not only depends on agreement among scientists on the standards of appraisal, but also on the kind of problems which is taken worthy to be tackled (de Vries 2016: 25). It means that the evolution of science is highly

dependent on *social* variables. In this way a 'social turn' took place in philosophical studies of science (de Vries 2016). Feyerabend even went farther and proclaimed that in scientific work 'anything goes'. The latter is meant to be indicating that scientific developments is not constrained by certain rules and methods. Rather unpredictability is inherent in the scientific work.

Here the *Strong Program in the Sociology of Knowledge* (SSK) movement came into existence. It was a sociology of knowledge which was supposed to be based on four principals;

> Causality. The aim of SSK is to work out which conditions lead to beliefs or states of knowledge. These conditions could be psychological, economic, political, professional, social. the notion of interests was pivotal here.
>
> Impartiality. SSK analysts should select case studies irrespective of their perceived truth or falsity, rationality or irrationality. All cases should be subject to the same analytic rigor.
>
> Symmetry. When analyzing a particular case of scientific controversy, one should apply symmetrically the same form of social explanation to all sides of the dispute.
>
> Reflexivity. The form of explanation – and the sorts of factors that are deemed to influence the resolution of a controversy – apply as much to SSK as they do to science (Micheal 2017: 15).

'Strong program' focused on the role of 'external factors' in the development of science, the factors like *interests* and *ideologies* (de Vries 2016: 26). Parallel to this there arose also another group to study the social grounds of science. More importantly, Collin's *Sociology of Scientific knowledge* intended to show how epistemological questions may be translated into sociological ones (de Vries 2016: 26). According to him, coordinated perception, correct language use and production of knowledge are all based on social institutions in a given community (de Vries 2016: 27). In such a view reference to what world really is like cannot *fully* explain theory-choice and scientific development, because both rules and observations are subject to 'interpretative flexibility' (de Vries 2016: 27). So, what science textbooks contain are not statements about 'brute facts', but statements of 'institutionalized facts', that is, facts that have been germane to the human

institutions, beliefs and social processes. In other words, scientific facts are 'socially constructed' in this sense (de Vries 2016: 30).

Society and Technology

*Science and Technology Studies (*hereafter STS*)* furthered the forgoing trends and studied not only science, but also technology, in a sociological fashion. Under the label of STS also a further division occurred, and an especial project emerged, namely *Social Construction of Technology* (hereafter SCOT), whose primary goal was studying the role of society in technology development. On the latter's account, technology, far from being value-free, was thought of as being value-laden. To bring social variables into relief, SCOT scholars managed to explore particular technologies against their social context.

I will postpone the details of SCOT movement to the last chapter since it will play a prominent role for my contribution. Here just suffice to briefly refer to their iconic case study which is the history of bicycle. Pinch and Bijker (1984) and later Bijker (1995) provide an account of the evolution of bicycle. They throw light on the long path contemporary bicycles had to go through to take on ultimately the contemporary's configuration. According to their narrative, primarily there were two variants of designs of bicycle around; bicycles with wheels of the same size and those with a higher front wheel. While the latter was deemed to be fit for racing the former conformed to the transportation aims. Besides, the bicycle with the larger front wheel enjoyed a higher speed though lesser stability. The same-sized wheel bicycle, in contrast, was considered perfectly safe. These two versions were in competition in order to prevail for quite some time. Ultimately however safety defeated speed and excitement and today's bicycles came to proliferate. In retrospect, one may assume the evolution of a technology as linear and smooth, but this picture is too naïve, SOCT scholars insist. The same-sized wheel bikes underwent fights and had to struggle to survive. The nature of a technology is not just a matter of efficiency in this sense. Rather, social and political factors are as decisive as technical ones[3]. According to Pinch and Bijker, technology is a matter of *construction* within a specific society in a given timeframe. Many social and political factors play a role for a specific technology to prevail. Such under-determinism

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[3] On this subject one may find the observations of Feenberg illuminating. His ideas of technology as being the result of social and technical components are insightful. See, for example, Feenberg 1999.

of technology, which is called *interpretive flexibility* in the vocabulary of SCOT, implies the contingency of technology and the fact that technology does not follow an internal logic in its development (Bijker 2010: 71).

Viewed from a *constructivist* point of view, there are three stages requiring explanation in development of a technology (Pinch and Bijker 1984). The first stage is accounting for its interpretive flexibility, that is, how a specific technology has been subject to different meanings. In case of bicycles, for example, we need to account for how bicycles embodied a variety of meanings, ranging from safety, transportation, racing, speed, style and such. Next, we need to account for why a specific design and meaning came to prevail finally. How all other alternatives went away in case of bicycles for example? Finally in the third stage - which they take it to be underdeveloped - we need to explain how the structure of a society is and how the different groups of society came to a particular conclusion. The trend of technologies may spell out the distribution of power within a society and all relevant issues.

Bijker (2001) is clear to show how an array of social factors are featuring along the way of development of technology, when he writes:

> Technical artefacts are described through the eyes of the members of … [various] groups. The interactions within and among relevant social groups can give different meanings to the same. Thus, for example, a nuclear reactor may exemplify to a group of union leaders an almost perfectly safe working environment with very little chance of on-the-job accidents compared to urban building sites or harbors. To a group of international relations analysts, the reactor may, however, represent a threat through enhancing the possibilities of nuclear proliferation, while for the neighboring village the chances for radioactive emissions and the (indirect) employment effects may strive for prominence. … This demonstration of interpretive flexibility is a crucial step in arguing for the feasibility of any sociology of technology. It shows that neither an artefact's identity, nor its technical 'success' or 'failure', are intrinsic properties of the artefact but subject to social variables (Bijker 2001: 26).

Such a standpoint seems to be quite at odd with the popular 'standard' understanding of technological development where the latter is deemed to be merely a matter of efficiency, efficacy,

rationality and productivity. In contrast, Bijker pursues an 'alternative' account according to which technology needs to be both politicized and democratized (Bijker 2001: 21). We need to take the political facets of technology into our consideration. If 'the stabilization of an artefact is a social process, and hence subject to choices, interests, and value judgments' then it is germane to 'politics' (Bijker 2001: 27). If so, we, as 'citizens', need to participate in the processes of democratic control of technology' (Bijker 2001: 27).

SCOT's privilege, as mentioned earlier, seems to be its bearing on an empirical approach to technology. Although still vibrant, the movement has lost part of its momentum lately, provided the criticisms against its narrow understanding of technology. According to SCOT, technology is nothing but a slave in the society's clutch. Society may affect technology, without being affected. There is no room for technology to impose its power over society within SCOT's framework. Put in the common vocabulary, *mediation* of technology is left out in SCOT's conception of technology and in this sense, SCOT's conception of technology is an instrumentalist account.

ANT emerged to mitigate SCOT's shortcomings. However soon it turned out that proponents of ANT had aspirations far beyond merely covering the SCOT's defects. In the next section I will take up elaboration of ANT.

Actor-Network-Theory

Now I am in a position to go into the details of ANT. As the foregoing history indicates, twentieth century has witnessed a growing interest in social dimensions of scientific and technological development. Latour comes into play in such a matrix. He takes this history seriously[4] then and pushes things even one step further. He observes that what usually is talked about in scientific circles, far from *nature* or *facts,* concerns predominantly to papers, journals, texts, handbooks, graphs, numbers, conference and the like. He then decided to study science in an anthropological way, leaving France for San Diego Salk Institute in the U.S. He spent some time over there to study scientists' life to see how the so-called facts emerge in science.

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[4] In fact Latour did not accept all the teachings uncontestably, rather fine-tuned things. But going into such discussion is beyond the purview of this writing.

He noticed what he called 'inscription device' is of a pivotal standing in advancing scientific facts. Inscription device is taken to be any tool which relates a material substance, like chemicals, lab animals and so on, to figures and diagrams; tools like NMR spectrometers or bioassays (Latour 1987). These inscriptions, namely contents on a piece of paper, next can be transported, stored, discussed or compared. They are *immutable* and combinable *mobiles* (Latour 1987: 227-236). Unlike materials within a lab, immutable mobile could travel durably across time and space. They *translate* the conditions of the experiments into figures, text , numbers, graphs and such.

Latour also cognized that scientific world is fraught with a variety of victories, failures, and contingencies. But once a dispute is settled and a fact is established all those failures and coincidences become split, and tales come to be narrated as if this conclusion is exactly what scientists have long been pursuing to get to. Along with Woolgar he held then that facts are constructed out of texts by this '*process of splitting and inversion*' (Latour and Woolgar 1986: 177). The latter process tends to pretend that the long rout a scientific fact had to travel to ultimately be constructed, is seamless and smooth. But it is far from being the case, Latour maintains.

Such remarks might evoke teachings that were already prevalent in SSK and one could conceive Latour's work subsequently to be simply offering a *sociological* reading of science again. But it is not a precise impression. ANT is far more radical than SSK, as we will see. Latour's concern is not epistemology, rather ontology. According to him, not only constructing scientific facts needs both interpretation and reaching an agreement about statements – which are social elements - it also needs capitalizing on reality, a prior investment into world – which is associated with world's make up. Along the way of what comes to be called *reality*, represented by statements and texts, there have been a whole bunch of *translations* in the make-up of the world, that is to say, changes and reductions imposed on the world. 'To know reality, scientists have to intervene, manipulate and change reality. Doing science means being engaged in both epistemological and ontological work' (de Vries 2016: 36). To observe the reality, reality needs to be *made visible* first.

Later I will deal extensively with the key notion of translation. Here suffice to provide a rough idea of it;

> all the negotiations, intrigues, calculations, acts of persuasion and violence, thanks to
> which an actor or force takes, or causes to be conferred on itself, authority to speak or

act on behalf of another actor or force. 'Our interests are the same', 'do what I want', 'you cannot succeed without going through me'. Whenever an actor speaks of 'us', s/he is translating other actors into a single will. … S/he begins to act for several, no longer for one alone. S/he becomes stronger. S/he grows (Callon & Latour 1981: 279).

According to Latour there are two ways to read every text, including scientific papers; as a report of world outside, as we read report of a suicide in a newspaper, and as a script of a play (Latour 1999a: 113-133). The former raises epistemological questions as to whether the story is right or wrong for example or how faithful the reporter has been and so on. By contrast, the latter also raises ontological issues; what role every actor should perform? How to rehearse in prior for enacting the recast roles? How the stage should be prepared? So far, Latour says, scientific papers were meant to be read in the former way provided that the authors intended the readers to read so. But it is not plausible an account. It is the second scenario which truly shows how things work in reality.

To illustrate, Latour appeals to the terminology of semiotics. Here one may differentiate the 'real author' from the 'inscribed author', as well as 'real reader' from 'inscribed reader' (Latour 1992). While the real author and readers are those who are real in the literal sense, the inscribed counterparts are characters who should be performed in the play. Moreover, an 'action' in semiotics is not that which is exercised via intentionality and free will, rather 'any enunciation or performance that has an effect' count as an action, that is, any 'movement' that 'makes a difference to the state of situation'. Crucial point to follow here thus is that semiotics dose not constrain itself only to human beings' moves. Rather both human and non-human may take actions on the ground that they both may bring about a difference.

Furthermore, to analyze the roles involved, far from *a priory* classifications, we need to identify different roles in *practice*. If so, we will have three kinds of roles; operative subject, passive subject and the object. In a football game, for instance, player A, the operative subject, may pass the ball, the object, to the passive subject, namely player B. Along these moves, further, a chain of translations takes place. All the three roles involved would take on new meanings, i.e., new characters via performing such actions.

Now, if one aims to make sense of what is going on over here, one has to track the translations of all actors, or rather all actants[5] as Latour calls them. In doing so, one needs to place especial attention on the object which is circulating among actants, that is, the ball. The same is true for the scientific practice, Latour claims. In order to figure out the scientific work one needs to follow the relevant *circulating object*, namely scientific texts, to see how operative subject, namely the author, and the passive one, namely the readers, inter-define or translate one another. All actants are interdependent on the other, no matter if they are human or non-human. Along such a performance, all players including the writer, the reader and the writing, come to take on new natures. This is what Latour means when he goes after an ontological reading of the practice of science.

After examining Pasteur's discovery and his finding about the cause of lactic fermentation, Latour discerns that Pasteur needed more than just his intelligence for such a great achievement. He therefore boldly speaks of 'biological agent' which brought about the phenomenon of fermentation (Latour 1999a). On Latour's account, from microbes, hygienists to lab equipment would have been required to actively take part in Pasteur's discovery. Many translations in various agents should have been in place to such an accomplishment comes along. It was not then simply a *discovery* of a pre-given fact; a phenomenon being somewhere out there to be known by Pasteur. A lot of work was needed to make the cause visible, to be unfolded.

Latour tries also to remove a further misunderstanding. All the foregoing does not imply that science lies simply in a process of fabrication. What is accomplished, as a scientific fact, is both fabricated and real at the same time. Scientific contents are constructed, but not simply, socially constructed. Things cannot be reduced merely to humans. Neither of two extremes, namely realism and constructivism, may do justice to the process of science. He is clear on this when he writes:

> If we ignore Pasteur's [i.e. the experimenter's] work, we slip into [logical empiricist's] naive realism from which twenty-five years of science studies have tried to extract us. But what happens if we ignore the lactic acid's [i.e., the nonhuman's] delegated automatic autonomous activity? We fall back into the other pit, as bottomless as the first, of social constructivism, ignoring the role of nonhumans, on whom all of the

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[5] To protect actors to connate a humanistic meaning, Latour prefers the word 'actant' over 'actor' to hinder anthropocentrism. Actants can be both human and non-human. Here, however, I will use them interchangeably.

people we study are focusing their attention, and for whom Pasteur spent months of labor designing his scenography (Latour 1999a: 132).

On Latour's account, none of the phenomena claimed to have been discovered by scientists would have been open to the direct observation. Both scientists and the world would have needed to be translated first. There should be a chain of intermediaries, ranging from the world into the text and figures on the desk of the scientist, for an alleged scientific fact to arise. All stages need to be neatly linked to the subsequent one, step by step. All actants need to be translated, reformed, changed, redefined and ultimately settled in a *network*. Eventually these events and phenomena should be translated into figures, numbers and tables on the papers. Inscriptions, or put it in Latour's word, immutable and combinable mobiles, are needed to translate matters into figures and text (Latour 1986: 65). There is nothing, therefore, as brute facts around, awaiting to be known by scientists. Realism therefore is wrong. As the case of Pasture's discovery demonstrated, a number of translations in the side of world is needed. Here a thing is 'changed from being barely visible to being clearly visible – it has changed its name – from 'grey material' to 'lactic yeast' to 'a clade of bacteria' – and it has changed identity – from an unknown substance to a particular family of microbiological organisms' (de Vries 2016: 60). Everything happens in a *network*, and more significantly everything *is* a network. The network of actants will sustain, moreover, so long as it survives what Latour calls 'trails of strength'. 'Whatever resists [these trials] is real' (Latour 1988: 158). Real, in this sense, means networks which provisionally are operative, until the they collapse, in the way I will explain shortly.

Social constructionism, on the other hand, contends that facts are fabricated merely through a social process, that is, scientific facts are nothing more than *interpretations* or models of the world. In this sense, there is nothing around as un-interpreted facts according to constructivism (de Vries 2016: 30). Latour takes issue with the latter too, as said. Science concomitantly is both real and constructed. It follows that both knowledge and reality are co-produced along scientific practice. To disclose the practice of science translations and *negotiations* implemented in the process of production of theories need to be explored. Here circulating objects are of integral significance, as mentioned earlier (Latour 1999a: 118). To see the way things have undergone translations one needs further to trace circulating objects to identify how they have brought about such translations.

In doing so, however, non-humans should be treated on an equal footing to cognize their contribution to the scientific knowledge.

Here lies the misunderstanding of SCOT. They tend to think that all that deserves to be scrutinized lies on the side of scientists and in general the society. There is nothing opaque on the side of reality to be explained, in their eyes. But Latour diverges here on the score that this description is too crude. Translation is not limited just to the human side, rather it is all around, in both society side and the reality pole. Constraining the attention merely to interpretation is untenable and misleading, since it neglects all ontological work which has been required to be exercised.

If translation is all around, we, therefore, are surrounded by ontological issues. According to Latour, sociology needs a substantial revision. Interest, power, ideologies and institutional structures need explanation themselves; they are *explananda* and not *explanans* (de Vries 2016: 54). In this sense, the notion of society cannot mean just the aggregate of humans. As Latour puts 'there are more of us than we thought' (Latour 1988: 35). Non-humans as well are involved in the society. Prior to Pasteur, 'farmers and veterinarians were weaker than the invisible anthrax bacilli'. But later, and after his finding, 'man could become stronger than the bacilli'. Pastor managed to transforming them from an unknown, invisible, dangerous enemy into something recognizable and manageable, or even more; he could ultimately manage to defeat them using the vaccine. This is all brought about by a heterogeneity of entities, ranging from humans as scientists and hygienists as well as non-humans as laboratory equipment, microbes and farms. Latour challenges the approach where science is reduced to a 'few authorities', instead, 'what reappears is not only the crowds of human beings' (Latour 1988: 149-150). Sociology needs to be reorganized, according to him;

> If sociology wishes to be the science of 'social facts', then it cannot understand this period [of the Pasteurian revolution]. If . . . we still call ourselves sociologists, we must redefine this science, not as the science of the social, but as the science of associations. We cannot say of these associations whether they are human or natural, made up of microbes or surplus value, but only that they are strong or weak (Latour 1988: 40).

As Micheal observes, within ANT, the social on Latour's account is 'flat', made up of a single layer of associations amongst human and nonhuman entities in such a way that 'categories as class,

or gender, or ethnicity have been largely eschewed' (Micheal 2017: 4). According to Latour, what appears as 'the macro', is neither 'above' nor 'below' the interactions but added to them as another of their connections, feeding them and feeding off them (Micheal 2017; Latour 2005: 177).

Each network should be studied empirically in its specificity; therefore, no macro-sociological notion may be assumed on the outset. Even the extent and length of networks will be known *a posteriori* and there is nothing certain here. There is nothing beyond networks to animate the actors. Rather everything emerges out of networks and from locals. The simple and favored slogan of ANT is this; 'follow the actor' (Callon 1986; Latour 1987).

But how a network comes into existence and how it might disintegrate? Actants, of a multitude of forces engaged in trails, *enroll* each other to become stronger. Those actants which can resist the respective trials, i.e., the translations, would sustain for some time, otherwise they would disappear. To study networks, a sociologist must not differentiate humans from non-human in advance, rather she should remain 'as agnostic and as fair as it is possible' (Latour 1988: 236). Actants take shape in networks, through their relations to other members, nothing can remain out of relations, nothing is meaningful outside the networks. In this way Latour gives relations pride of place over essences (de Vries 2016: 65). The nature of an entity, depends exhaustively upon its relations within the other elements of the network[6], on the web of translations. If an actant cannot establish a solid relation to other actants, or equally if it cannot survive through the chain of translations, it will die. Existence amounts to be embedded in a web of relations, translating and being translated simultaneously. The more an actant can make links the more strength it may develop. Along every single relation an actant undergoes a new translation. This is what one may describe as a 'relationist ontology'[7] (de Vries 2016: 66). Any notion ascribed to human may equally be assigned to non-humans as well; notions like force, interest, strategy and action (de Vries 2016: 67). Latour avoids talking notions like 'subject' and 'object', since they imply traditional distinctions between human and non-human, or put simply, they 'will set us on the course of epistemology' (de Vries 2016: 67).

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[6] And actually here lies a crucial difference between ANT and postphenomenology. While for the former there is nothing outside the relations for the latter the fundamental different nature of technology and humans is recognized from the beginning.

[7] Note that postphenomenology, too, was described with the same term as we saw in the previous chapter. But as explained there is a difference in the way they conceptualize the term.

The meaning of an entity is not given, rather it emerges through this chain of translations within associations. To identify the quiddity of a fish 'biologists, the fishing industry, and consumers, all have to set up trials. For each of them, moreover, fish is something different. While for the one a fish *is* a vertebrate, for the other it *is* a commodity, or *is* food. This divergence is not simply matter of different 'interpretations' (de Vries 2016: 67). Rather it implies different ontological states. Different practices would generate different identities. To know the meaning of the thing on your plate at dinner you don't have to interpret it, you should eat it, you should enjoy it, you should put it in a course of actions, it needs to be enacted, and in sum, you need to do something with it. Practice takes precedent over theory within ANT[8]. On ANT's account, knowledge is not coming about as unveiling, rather knowledge is achieved via actants which set up trails. The knower herself needs to be enacted and accordingly be translated within a network to gain knowledge of it.

This way, Latour seems to have added a fifth principle into the four methodological principles which were advanced before; treating human and non-humans equally and symmetrically. Importantly, this means a new turn, after the 'social turn' in science studies; that is, 'ontological turn' (de Vries 2016: 76). We must, once again, get back to the world and attend to the ways world is translated, Latour argues.

A point needs to be clarified here. By equating human and non-humans, ANT does not aim at shedding all probable differences among them. Of course, there is a lot one can identify about the dissimilarities. Humans may show faculties which non-humans are not able to exercise after all. But non-humans too may exercise faculties that human beings are unable to perform. In prior, and the point lies here, one cannot suppose a radical difference which gives rise to any classification. All actants should be treated therefore, 'methodologically on a par' (de Vries 2016: 77). If there was any real difference between them, we would certainly recognize it during our investigation, i.e., in the course of practice.

Latour this way complains that in the dominant sociology 'something is missing, something that should be strongly social and highly moral. Where can [sociologists] find it? Everywhere, but they too often refuse to see it' (Latour 1992: 227). Mundane artefacts constitute what he calls 'missing masses' which should be taken into social considerations. Society emerges out of a wide range of assemblies of human and non-humans. Instead of putting emphasis on humans, sociology should

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[8] One may identify an echo of the so-called *enactivism* movement in cognitive science according to which in order to know the environment one has to perform an action towards the environment.

track how the collectives get together and sustain. Rather than 'sociology of social' (where the word social implies only humans), Latour recommends, we need a 'science of associations' (Latour 1988: 40).

Before going into further notions in next section I need also to highlight Latour's stance on his own theory. Although Latour's theory came to be called 'Actor-Network-theory', he does not seem happy with the name: 'There are four things that do not work with Actor-Network theory'; the word actor, the word network, the word theory and the hyphen!' (Latour 1999b)[9]. Eventually, however, he decides to accept the name because it is 'so awkward, so confusing, so meaningless that it deserves to be kept' (Latour 2005: 9).

Latour, in sum, is after a sort of 'ANT-ethnography' to trace the associations of human and non-humans and the way collectives are constituted. In such an approach one needs to let actors talk on their own and express themselves. A sociologist needs to stay undecided as far as possible. In an ANT-oriented account, as in semiotics, agency means anything that makes 'some difference to a state of affairs, transforming some As into Bs through trials with Cs' (Latour 2005: 52–53). 'So an actor can be anything: Bush Jr, the US Army, the United States, imperialism, a drone, or the couch on which someone sits watching the horrible news from Afghanistan; and as we have seen before, also microbes, a doorbell or a key. Actants can be concrete or abstract, artificial, structural, anything' (de Vries 2016: 90). Within the framework of ANT, existence means *doing* something, making a difference. Otherwise, one cannot speak of a thing. 'A good ANT account is a narrative or a description in which all the [actants] do something and don't just sit there' (Latour 2005: 128).

Mediator and Intermediary

So far, we have familiarized ourselves with the general description of ANT and its central notions like translation, network, negotiation and so on. In this section we will keep going into further details concerning the types of actors involved in networks. We will also be exposed to more notions, such as black box and centers of circulation.

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[9] Later he came to the conclusion that a better label for actor-network theory would be 'actant-rhizome ontology'. Network metaphor for him did not reflect adequately the 'fluidity' and 'messiness 'of assemblages. In spite of this, here I use the more widespread 'network' metaphor (Latour 2005: 9)

Latour distinguishes between two types of actors; intermediary and mediator. While an *intermediary* is 'what transports meaning or force without transformation, *mediators*, on the other hand, transform, translate, distort, and modify the meaning or the elements they are supposed to carry' (Latour 2005: 39). An intermediary actor may be taken as a *black box*; it takes its internal structure out of notice, it hides what is going on inside it (Latour 2005: 39), or put simply, it may act like a 'single man' (Callon & Latour 1981: 299). The process of black boxing, in turn, takes place normally in 'centers of circulation' (Latour 1987). Laboratories are the iconic places where networks get settled and black boxes are built. In this sense, one may thus predict the output of the intermediary actor whereas the mediator's work is unpredictable. The role of intermediary actor might be taken for granted; it is uncontroversial. Intermediaries may not embody any kind of authorship, one might think. The door of a house may be an intermediary. Once we come to a friend's house we take it for granted, we know that we don't need to make a hole in the wall for example to enter the house. Door is an intermediary, in this sense, and may be relied on. This state of being intermediary is exactly what helps social order to be stablished. Intermediaries contribute to make things predictable, enabling actors to count on them (Latour 2005: 39). These intermediaries however, contrary to mediators, are not much prevalent, rather when mediators 'are transformed into faithful intermediaries it is not the rule, but a rare exception that has to be accounted for' (Latour 2005: 40).

The foregoing feature, namely consistency of intermediaries, has its own tricks though. It may cause the ANT analyst to forget about them and take them for granted accordingly. Because they tend to withdraw from attention, and this way they may go unnoticed along our investigation. Latour gives some clues to bring the intermediaries into fore once more. Here are some hints (Latour 2005: 80-82):

The first way is to study innovation, meaning that when an artifact is invented and introduced, but not stable yet. That is to say, one should bring intermediaries to light before they turn into black box, before they start to be taken for granted. In doing so one has to notice the 'artisan's workshop, the engineer's design department, the scientist's laboratory, the marketer's trial panels, the user's home, and the many socio-technical controversies' to see things before transforming into black boxes.

Second way is to take distance. It refers to situations that one has to reinvent the use of an artefact to make sense of it. Roughly, the same way as a situation where one is puzzled as to how to use a

complicated electronic tool without a well-designed manual. Here one has to decode it by the latter's reinvention. By distancing, one may mean 'distance in time as in archaeology, distance in space as in ethnology, distance in skills as in learning'.

The third way is to notice 'accidents, breakdowns and strikes'. Once an artefact starts to malfunction for instance or not serving its function it would be an opportunity to explore its role. Fourth, by bringing into relief the record of something, or studying the history of something. 'Using archives, documents, memoirs, museum collections, etc.' are of pivotal importance here.

The last way finally is, appealing to imagination to see what would have happened in the absent of a particular artefact and generally attending to the counterfactuals. Imagination may occur through a variety of tricks ranging from 'counterfactual history, thought experiments, to 'scientifiction'.

To study networks is not investigating something out there, rather it is a tool for description of what is going on in both society and the world. One needs to track links, joints, uncertainties and translations to understand the world. Everything is a network, according to Latour, explicitly or tacit, in one way or another. A scientific paper, for instance, is not a single object, rather it is a network, a network of translations, consisting of various players. There is a lot of work which has gone into it to take on the current arrangement. A heterogeneous network has generated it. In order for a network to become settled it needs to first grow as much as possible. In order to grow in turn 'we must enroll other wills [make durable associations] by translating what they want and by reifying this translation in such a way that none of them can desire anything else any longer' (Callon & Latour 1981: 296). The 'growth' of actors pertains to how they translate more and more actors, craft more and more associations, collect more and more wills. Key to the 'growth' is rendering those translations and associations 'obvious', that is to say, becoming black box to the point where they cannot be *problematized* further (Micheal 2017: 33)

Even the most obvious mundane entities are networks, a network of an array of things. An occurrence as simple as a face-to-face interaction consists in enrolling non-humans into a network. As Latour emphasizes even 'face-to-face interactions should be taken as the terminus point of a great number of agencies swarming towards them' (Latour 2005: 196). It has to happen in a place, surrounded by walls, behind the doors etc.

Translation within ANT

Central to ANT is the notion of translation, as discussed . We have already exposed its gist, yet since the notion is paramount and will play a central role in the last chapter, we need to scrutinize it a bit further. Micheal Callon (1986) is a great source to use as over there he tries to throw light on the notion along a case study. In this section I will draw upon his study to enlighten also further dimensions of ANT.

In an application of ANT, Callon explored the 'domestication of scallops and fishermen' where it occurred somewhere in France. On his narrative three researchers come to explore the extinction of a particular kind of scallop in a neighborhood to see if a successful manner which Japanese employed before would work in France as well. Through what Callon calls 'four moments of translation' he comes to describe this endeavor. Four moments comprises;

1. Problematization,

2. Interessement[10],

3. Enrollment,

4. Mobilization.

However, he concedes that these four may overlap in reality (203). Callon adds that 'translation is a process, never a completed accomplishment, and it may … fail' (196).

The particular scallops in the region are a bit different than those in Japan. Research begins with a query where researchers wonder 'is this experience transposable to France and, more particularly, to the Bay of St. Brieuc? Can enough larvae be anchored to the collectors in order to justify the project of restocking the Bay?'

To find the answer researchers would have to go through all four stages. In the first phase, i.e., problematization, they not only get engaged with setting out the problems about scallops, but also need to look into other players involved as well as an outline of the latter's preliminary roles. Researchers spot three main actors involved accordingly; 'the scallops (Pecten maximus), the fishermen of St. Brieuc Bay, and the scientific colleagues' (204). The fishermen of the region are an integral part of the inquiry since they would care about their main source of economic income. Researchers' colleagues, on the other hand, have to be included because they are the ones who are going to confirm researcher's findings as a fact or discovery. Finally, the scallops are engaged

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[10] A French-English word, roughly, means interposing.

since they 'will accept a shelter that will enable them to proliferate and survive' (205). As one may notice, no specific identity is imposed on actors in prior, except what is required for the trial. Scallops, for example, are treated in pretty same way as the other two. The stage of problematization is not finished yet because also assigning roles to the actors is required. The researchers also need to

> Show that the interests of these actors lie in admitting the proposed research program. If the scallops want to survive (no matter what mechanisms explain this impulse), if their scientific colleagues hope to advance knowledge on this subject (whatever their motivations may be), if the fishermen hope to preserve their long term economic interests (whatever their reasons) then they must: 1) know the answer to the question: how do scallops anchor?, and 2) recognize that their alliance around this question can benefit each of them (205).

It means that finding the result of this issue should be proven to be of a vital importance for each party. Everything passes through this central issue, that is to say, it is 'an obligatory passage point' (206). Researchers then need to show that all players share a common concern. To this end, the interests of all parties have to be translated. Schematically Callon draws the problematization phase as follows:

The three researchers | Pecten maximus | The fishermen | Scientific colleagues

Obligatory passage point
does pecten maximus
attach itself
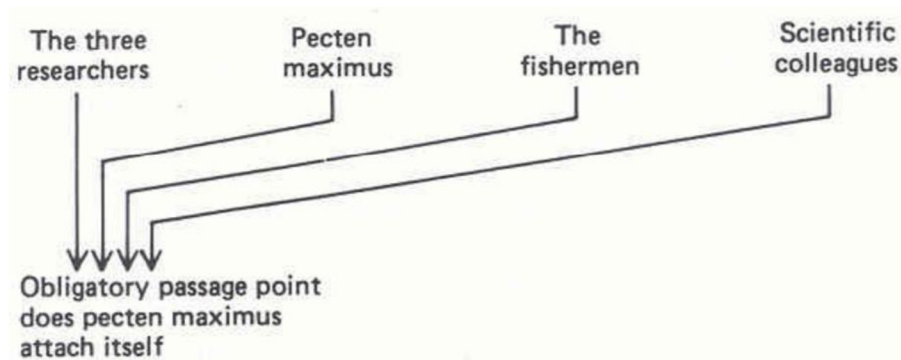
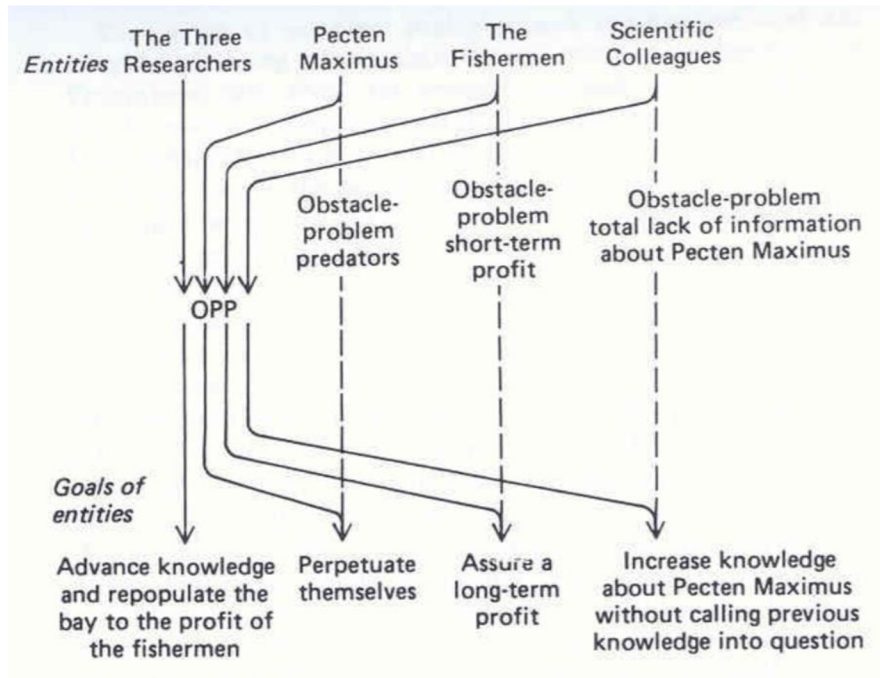As discussed earlier, there is no vantage point external to the network to conduct a study. Instead, scientists themselves are involved in the network as well. They, too, need undergoing translation. This is reflected in the diagram of Problematization, where it turns out that we have four actors, and not just three.

Next, the moment of interesment comes into play. Problematization is quite theoretical, implemented on a piece of paper, but interesment needs trial in reality (207). We need to know how solid, how grounded, has been the researcher's Problematization. Some trials of strength would come about then. During series of trails, along the negotiations and translations, one would find out if the actors were willing to be enlisted in this association. On the course of an interessement process, actor A tries to interest B, not only by encouraging the latter to enter a relationship with it, but also by trying to cut off its previous relationships with others. Depending on how loose or firm the previous relationships of B were, A may need to use argumentation, seduction or even coercion to cut off the previous links (209). One may imagine this process of negotiation as follows:
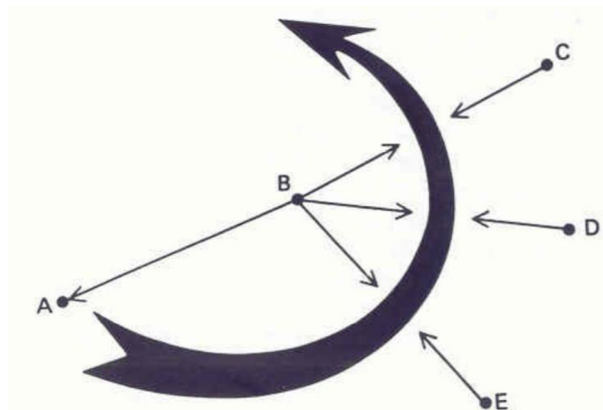
And for the moment of interessment Callon schematically draws this:

| | The Three | Pecten | The | Scientific |
| Entities | Researchers | Maximus | Fishermen | Colleagues |

Obstacle-problem predators

Obstacle-problem short-term profit

Obstacle-problem total lack of information about Pecten Maximus

OPP

Goals of entities

Advance knowledge and repopulate the bay to the profit of the fishermen

Perpetuate themselves

Assure a long-term profit

Increase knowledge about Pecten Maximus without calling previous knowledge into question

In the next stage we enter the moment of enrolment. Success in the interessment device does not necessarily guarantee the enrolment; it does not lead to alliance necessarily. Network still needs more to become settled. So far, the actors have accepted the role on the ground of a general description. But now we need to bring more details into work as to picture specific duties for each. To fulfil their roles, they need to meet some codes of behavior towards other actors as well. The stage of enrolment, as Callon observes,

> designates the device by which a set of interrelated roles is defined and attributed to actors who accept them. Interessement achieves enrolment if it is successful. To describe enrolment is thus to describe the group of multilateral negotiations, trials of strength and tricks that accompany the interessements and enable them to succeed (211).

The process of multilateral negotiations also contains negotiation with those actors which are *not* already involved in the network yet they may affect network's actors. Not only actors need to be associated with the new network, but their links to the pre-existing networks should be weakened.

In this sense the process of network-building is concomitantly the process of crippling other networks. There are many enemies to which an actor might be inclined. Among all, Callon points to the current of water and parasites; 'the larvae anchor themselves better in the innermost parts of the Bay where the tidal currents are the weakest'. And also 'all sorts of parasites' were observed to be 'obstacle to the capture of the larvae'. Actors then, both in the network and outside of it, need to enter a series of negotiations to interdefine one another and solidify the current relations in the moment of enrolment.

Finally, we get to the last device, moment of mobilization. Here the problem grounds on the question that 'who speaks in the name of whom? Who represents whom?' (214). 'Will the masses … follow their representatives?' Callon continues. The experiment, after all, is being conducted by just a few representatives, i.e., a selection of scallops (and not the all), few fishermen, few colleagues present in the conference to endorse the three researcher's result and so on. This randomness of selection may raise the question of legitimacy of these delegates. Along the long way we have been through so far, namely problematization, interessement and enrolment process, few actors were involved. How would things play out with these representatives? Will the masses support them?

According to Callon, situation is the same with all parties. All of them need to elect their delegates to speak on their behalf. Pretty much the same when people place their votes into the ballot box in an election to choose their representatives. Scallops have to first select a few of them to speak on their name. Researchers then would put them into play and start counting to see how many of delegates have anchored their larvae in the collectors in the water. Subsequently researchers would bring the respective information on a piece of a paper, turning them into numbers, graphs, tables and the like. Hereafter it is not just those delegates who speak on behalf of scallops, rather researchers by their papers, that is, they have taken over.

Things play out along the same direction with fishermen. First, they are required to choose their porotypes, and then through some intermediators, researcher would take over again. Like a cascade, all intermediators came gradually to be replaced by the researchers. The community of scientists as well, represented by a few individuals attending the respective seminar, would soon

choose the researchers as their spokesman[11]. The diagram of the moment of mobilization then may be sketched like this:
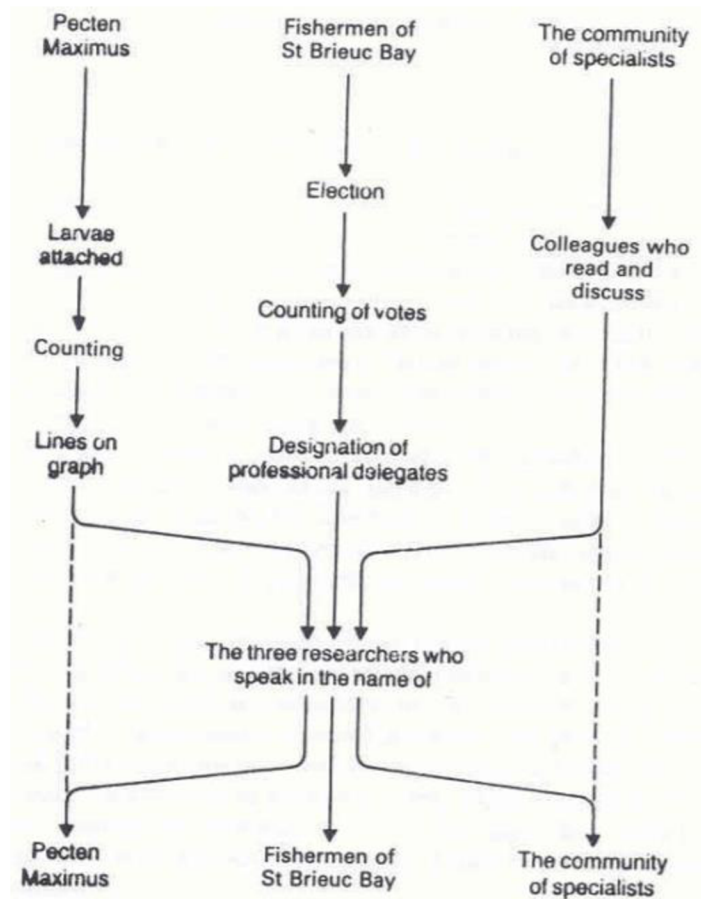
Callon describes this 'chain of intermediaries', as a 'progressive mobilization of actors' (216). As the figure illuminates,

[11] As an example of this process of 'cascading' into simpler and simpler inscriptions, Latour speaks of GDP in economics (Latour, 1990: 38). lists of receipts, tax returns, company records, ministerial reports, all processed and combined into an index like GDP which economists may look into 'it' to gauge the economy.

a handful of researchers discuss a few diagrams and a few tables with numbers in a closed room. But these discussions commit uncountable populations of silent actors: scallops, fishermen, and specialists who are all represented at Brest by a few spokesmen. These diverse populations have been mobilized. That is they have been displaced from their homes to a conference room (218).

From here on things seem quite clear. If three researchers could persuade their colleagues, a scientific 'fact' would grow constructed[12]; the fact that 'Pecten maximus exists as a species which anchors itself'. It becomes established as a 'reality' thereafter in case of succession. It implies that the network has been successfully built; a network of a heterogeneous players, both of humans and non-humans. The network will subsist for a while accordingly. But it is not perennial, it is just provisional, since never any network can sustain forever. It may turn contestable any time soon. Until that moment, though, it would be taken as a fact, as a reality out there.

Callon refers to three basic principals in every inquiry which have to be satisfied in all studies (Callon 1986); first, the principle of 'generalized symmetry' demands a symmetrical approach towards all elements, and more importantly adopting a neutral 'symmetrical vocabulary'. Second, the principle of 'generalized agnosticism' implies an impartiality to the multiplicity of actors. It commits researchers to treat not only human winners and losers in the same way, but also so should be treated technical and natural actors. And finally, the pillar of 'free association' demands to refuse from assuming any *a priory* distinction between human actors and non-humans in experiment.

This way, Callon hopes to have elucidated how scientific facts are generated out of a complicated process of translations, negotiations and associations. Nature and society, human and non-human, weave into a complex network to bring about a result which we then would call a scientific fact. Within such a narrative, as is clear, we were as agnostic as possible to the nature of actors involved. Moreover, we used the same vocabulary for all actors. Our treatment was symmetrical. It also should be noted that the narration of the conducted research was akin to a script rather than a report, put in Latour's words.

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[12] As Callon narrates this network ultimately failed. Both peer scientists and fishermen 'betrayed'. The latter could not resist their greed and the former were not convinced by the number of scallops which were supposed to cultivate.

In sum, by Callon's in-depth elaboration one may come to grasp notions like mediation and network. In this sense, along the way of mediation, actors first would identify a problem with the existing condition, coming then to become interested in an alternative arrangement through negotiations, and next become committed to a configuration, and ultimately become black boxed to be immutable, i.e., durable for a long time.

ANT, Philosophy of Technology and Ethics

ANT theorists do not purport to deal primarily with normative affairs. Nor even do they are in pursuit of a theory about technology as such. Rather they are willing to develop, as discussed earlier, simply a sociology of 'social', or in their words an *experimental* metaphysics. That being said, ANT proves a great fertility to make a contribution to ethics of technology. In this vein many scholars have already construed ANT as though it was a philosophy of technology[13].

As discussed earlier, Latour does not draw any boundary between different types of actants in prior, be them human or non-human. If so, technology is upgraded to be treated in a par with humans within ANT. If human agents are able to inscribe certain scripts into technology, technology too, may in turn seduce, encourage, discourage, coerce, force, invite, ask or command humans. Put differently, the material environment may structure human behavior. Latour (1992) takes the example of a groom or door-closer to expound how humans inscribe part of their burdens into technology and how technology subsequently direct human's behavior in turn. In a public place, say a hotel, a manager might hire a disciplined concierge to close the door behind the guests. But alternatively, she may also install a door-closer to practice the same job. In the latter option she has in fact inscribed the concierge's duty into a piece of metal, a groom. But is that the whole story? If it was, the groom would have been simply a neutral tool. But such a picture is quite downplaying the function of the artifact. Since the door closer would start to impose its force immediately on the guests. In order to open the door, they would need to bring energy, more than normal, to push it. They would need also to take a specific comportment, a specific bodily position, and meet an array of prerequisites accordingly to be able to enter. Employing technology then

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[13] Among others one may refer to Verbeek (2005) in this respect.

comes at cost. Technology embodies what Akrich (1992) calls *script*, or prescription; that is to say, special rules of use embedded in it in advance.

Latour (1991) also alludes to the manager's trick to discourage costumers from taking the keys of rooms with themselves by placing a bulky ring attached to the keys to making them heavy to carry. Costumers then would probably prefer to leave the keys behind with the reception once they are going out. The manager could have alternatively asked people to leave the keys with the reception. But she chose a more efficient way through inscribing her request into the keys. Technology then may facilitate working 'at distance'. Both humans and technology can consolidate their power through making networks. In the latter example for instance the manager made a network with the bulky ring to exercise her power across different times and spaces. In doing so the *program of action* of the client as to 'taking the keys' is neutralized, as it were, with an *antiprogram* of the manager as to 'leave the keys here or carry otherwise a heavy thing with you'. As a result, one would prefer to leave the keys rather than carrying them. Manager's network empowered her to command at distance without any need to a face-to-face interaction.

It should be noted however that networks cannot fully determine the future. The possessor of the keys could have also bitten the bullet and taken the keys consequently. What people would ultimately do can go to unforeseen routes. In Latour's words: 'we are exceeded by what we create' (1996: 237). Akrich, in a similar vein, documents how French people exceeded from what had been prescribed into photoelectric lighting kits. The latter were supposed to work automatically to decrease the consumption of electricity as well as bringing comfort. Due to some emergent difficulties however (e.g., the fact that for saving the battery the current would cut off if the battery fell under a certain threshold) people disobeyed the script and installed a circuit in parallel with the control device to shortcut the deficiency. Here the reaction of citizens was not foreseeable for the designers and things went differently than what anticipated. Negotiations might not go so well sometimes and the respective network may come to disintegrate accordingly.

As a further example articulating how the unit of the inquiry has to be hybrids of human and technology, rather than individuals, Latour (1993) brings up the ongoing discussion in the US as to legitimacy of holding gun. On the one hand there are those who claim 'people don't kill, rather guns do' advocating the restrictive regularities. On the other hand there are the rivalries who believe 'guns don't kill, humans do' to argue for liberal rules. Latour contrasts with both parties and calls subsequently for revision of the perspective of analysis from individuals to what he calls

'citizen-gun'. Neither technology works in isolation, detached from the network, nor human beings do. Once civilians hold a gun a network of an individual and a gun is black boxed, and accordingly actors would develop new ontological statuses. In this sense 'citizen-gun' is not an equivalent to citizen plus gun. Things are far different when actors are translated in a network.

In contemporary ethics, scholars tend to ignore networks and take accordingly human 'individuals' to be the ultimate block of analysis. But it is a gross misunderstanding in light of ANT teachings. We never are isolated, divorced from the material environment.

A paradigmatic example may come as instructive to demonstrate how modern sociology as well as ethics fall short of the reality of things. Think of a whole bunch of players who are playing soccer. There are some lines where players should not let the ball cross. Most important is a ball which players need to keep chasing it. The ball here is the most fundamental actor to animate players in the sense that it regulates all player's moves. Moreover, there might be other factors in place to affect players' behavior; the grass of the field for instance may cause players to play more daring to physically interfere with other players, to tackles and jumps. If one aimed to analyze the moves within the society of players, that would be absurd, it seems, to preclude the existing materials from the investigation. Materials are of critical significance for exploring the way players behave. A heterogeneity of actants are playing part in a football game. A portrait containing just human actors seems to be handicapping the reality; it falls short of depicting of what actually is going on. The empirical metaphysics of ANT is nothing but a call for impartially following what is really happening. And in this sense, ANT seems to remedy some of the shortcomings of modern thought.

Closing Remarks

ANT, as said earlier, has proven influential and has penetrated into many other fields of research. But how are the advantages and disadvantages of ANT? A thorough evaluation of ANT is beyond the scope of my writing and since I am not going to commit myself to the whole framework I will be very brief in this section. ANT seems open to objection on two grounds while may be praised on three fronts.

The divergence of ANT and contemporary ethics probably culminates in their conception of the notion of agency. Agency, in its modern sense, is usually formulated in a fashion that it would be

hard, if not impossible, to conceive non-humans as agent. As Passoth et al. note 'anthropocentric concepts such as human independency, contingency, reflexivity, volition, free will, imagination, self-consciousness, personhood, have placed the notion of agency at the very center of humanist social theory' (Passoth et all. 2012: 1). But Latour calls for a substantive revision of the current formulation of the word. All fabricated borders should be discarded according to ANT; demarcation between social and technical, culture and nature, subject and object are breached by ANT. ANT in this sense 'criss-cross[es] between the two cultures, smuggling agency into the world of things and bringing back things to the world of people' (Latour 1988; 1992).

On the one hand we have rigorous reasons to think that agency is an exclusive terrain of human beings. After all humans seem to be the sole species possessing the faculty of forming beliefs, desires and intentions. Accordingly, one can argue that the notion of agency should be preserved as a humanly concept. On the other hand, however, we have evidence that non-humans in general, and technologies in particular, can exceed their instrumental status. In light of ANT teachings we might have come to believe that non-humans too partake in creating state of affairs. Technology is such intertwined and coupled with us that we hardly can imagine taking any action where technology is removed from the scene. Technology in this sense can massively translate our life pretty much similar as we are able to translate technology.

How is it then the evaluation of the *symmetrical* approach of ANT? Even though I admit the active role of technology ANT goes too far, I believe, in its radicalism. As I also argued in the previous chapter such a burden seems too heavy for technology to bear and technology in this sense cannot be moral agent. I would not iterate my objections posed before, but put briefly, technology should not be given such a prerogative.

Moreover, things with ANT are far more complex than with postphenomenology . If in the latter the radical difference of technology and human was recognized from the outset, with respect to ANT we are required to take a symmetrical attitude from very beginning. In this sense, difficulties faced in the context of ANT is far less prone to amend than in postphenomenology. If Verbeek spoke only implicitly for the agency of artefacts, under the banner of 'distributive agency', where neither human nor technology was agent in isolation, Latour is outspoken enough to proclaim agency for both humans and non-humans in his symmetrical approach.

My second objection is that ANT seems to be blind to the nuances of actors. Within ANT actors are nothing but forces that impose translation along bearing relations with others. Latour is explicit

when he posits that everything making a difference is an actant. Consequently, it does not matter if the resulting difference is huge and executed intentionally or it is brought about blindly. In this sense, ANT cannot differentiate a human from a microbe, a pen, a sophisticated robot or an organization. All are taken to be equal as far as they generate a force. If so, ANT seems to be a reductionist approach, that is to say, things are reduced to the differences they make. If postphenomenology was privileged on the basis that through an empirical approach it could differentiate different technologies depending upon the effects they create, ANT is by far insensitive, not only to the differences among technologies, but to the divergences among all entities.

All that being said, ANT also enjoys some advantages specially when it comes to moral outputs. I will draw out three prominent merits which will play a central role in my approach in the last chapter.

First, ANT seems quite compelling when it enunciates how technology is much more effective than instrumentalists would imagine. Artifacts are not those inactive objects that are taken to serve as slaves to humans. In agreement with Latour I consider artefacts to be the 'missing masses' of modern ethics. From this point of view ANT is on the same page with postphenomenology to highlight the active role of artifacts.

Second, the notion of translation proves helpful to delineate the role of technology. The notion is a key, as I discussed, within ANT. More importantly, Collon's contribution on four moments of translation might play a major role in moral discussions. The notion of translation might square with that of mediation within the context of postphenomenology. Both terms will be prominent in the last chapter.

Third, and the final point to make, is the benefit of the notion of network and the associated terms like program of action and antiprogram and such. Conceptualizing the world in terms of networks rather than individuals is illuminating on some occasions. We might need to appeal to *collective affairs* sometimes to account for moral dimensions of life. It implies that we need the concepts as novel as *collective responsibility* and *collective action*, next to *individual responsibility* and *individual action*, where collectives are perceived in a way not reducible to individuals. To exemplify, consider a network of individuals generating a morally unpermitted outcome collectively while they have not been free enough not to undertake the task. The head of the organization, for example, with a gun to her head by the outsiders, might have put pressure on

employees to pull their weight without questioning the whole project. Here no one seems to have had freedom to evade fulfilling the task. No one may be subject to moral condemnation accordingly. Yet the whole structure may be taken to be blameworthy. Or, as another example, one may imagine a situation where an evil project is split into bits in such a way that each piece is going to be taken over by an individual – be it human or technology. But no one has any clear idea of the evil nature of the whole vision. Every player is engaged with a bit of it which does not look unethical *per se*. Here one may take the network to be morally responsible and deserving to be blamed yet no individual may be assumed to be practicing something evil due to the lack of knowledge (Arzroomchilar Forthcoming)[14].

In spite the fact that postphenomenology too had revealed the role of collectives –through the notion of distributive agency- ANT seems to have advantage over that. The reason is that while for the former the interaction of a sole technology on an individual is the focus in the latter a network of many players is stressed. Accordingly, ANT is able to address the interactive relationships of all players at the same time. In the last chapter, I will use the notion of network to make a convincing case for my schema.

In sum, though questionable in many respects, I find ANT teachings insightful. To suggest my approach, I will draw upon some of its lessons albeit without committing myself to metaphysics behind it. I will bring ANT to supplement postphenomenological approach to ethics of technology. I will have more to say in chapter four concerning the role ANT can play in augmenting postphenomenology and therefore I close the current expository chapter.

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[14] To see how an ANT-oriented ethics of technology may look like one may look into Rammet (2012). There he calls for a 'practical turn' with respect to moral agency, where we need to note things in practice to identify which one is agent, and which one is not. He classifies the variety of possible technologies into five categories;
• Level 1 signifies a passive mode of operation: instruments are entirely moved from the outside, such as a hammer, a mechanical brake or a punch card.
• Level 2 indicates a semi-active mode of operation: any kind of apparatus falls into this category that shows some aspect of self-operating capacity, such as a machine tool, a record-player or a hydraulic brake.
• Level 3 refers to a re-active mode of operation: systems with feedback loops operate on this level of agency, such as adaptive heating systems, an automatic door opener or an anti-locking brake system.
• Level 4 relates to a pro-active mode of operation: systems with self-activating programs belong to this category, such as systems for car stabilization or brake systems in cars and high-speed trains designed to monitor and compute critical internal and external data and initiate operations as determined.
• Level 5 is called a cooperative mode of operation: systems with distributed agents and some form of self-coordination perform on this high level of agency, such as mobile robots playing football or multi-agent systems that control complex systems by communicating between different parts.
One may also refer to Brey's work 'From Moral Agents to Moral Factors: The Structural Ethics Approach' (2014), where he speaks of 'structure' rather than network, and 'factor' rather than actor. He rejects the idea of moral agency of artefacts, despite embracing the active role of the latter in moral sphere.

Chapter Four; a Schema for an Ethics of Technology

Introduction

By now it should have become clear how technology can mediate humans at both individual and collective levels. Now, the inquiry is how to cope with such massive, and usually unpredicted, impacts. Currently, in the literature associated with technology, safety, health, cost, environment, and other aspects have received a great deal of scholarly attention, the so-called 'quantifiable risks' (Kiran et all. 2015). Moral aspects, however, have not yet received much attention. While the former is what generally is called 'hard impacts' the latter falls under the title of 'soft impacts' (Kiran et all. 2015). Soft impacts of technology are associated with the moral ramifications of innovation, where identities, relations, norms and values are affected by a specific technology, in both long and short run (Kiran et all. 2015). For example, introducing an enhancement medicine, say a pharmaceutical product to significantly boost memory or to enhance cognitive abilities, in the short term may boost the level of happiness of individuals. In the long term, however, it may turn out to reinforce the existing inequalities within society, given that the gap between the privileged and the marginalized will deepen, both on the national and international levels (Brülde 2012). Hard impacts, in contrast, refer to those implications which are related to the *function* of a technology in one way or another[1].

Here, I am not concerned with the hard impacts, provided that it has sufficiently drawn attentions already. Morals and the way values undergo changes, in the wake of technology, is my primary goal in this chapter. Therefore, I will leave aside all discussions associated with the function of technology and will tackle merely soft impacts thereof.

Two Ethics

Concerning technology a point worthy of underscore is that morals and technology co-evolve (Kiran et all. 2015). To exemplify, we develop first technologies in accordance with our values. In the next stage, such human-made artefacts may affect our values in turn. Later we would come to

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[1] The distinction of hard and soft might be susceptible to objection given that even in case of hard impacts moral aspects are relevant. Yet as a preliminary distinction it would work.

evaluate technologies again under new mediated norms and this circle can go on continuously. This gradual evolution, or rather co-evolution, renders the business of ethical assessment of technology difficult as we evaluate technology by reference to a framework which already is affected by technology. We then have to work from within while technology is imposing its mediation simultaneously.

This brings us to a critical lesson which sometimes is overlooked. Technology requires a continuous oversight. Such a demand stems from two worries. First, as just mentioned, our values sometimes become mediated by technology and we would need to reassess moral dimensions of the respective technology in light of a mediated set of values. The second motive for iterative assessments is that technology, as discussed in the preceding chapters, is prone to exhibit a new behavior every now and then. Technology is not predetermined, instead, it is multistable. It requires to keep an eye on it all the time then. All this implies that not only technologies need to be assessed at their early stage of development, but they also need to be evaluated time and again in the course of action. Usually the former, i.e., ethics of innovation (design), receives much attention whereas the latter remains out of mind. One may call these two, *ethics of design* and *ethics of redesign* respectively. However, I will call both ethics of design. By an ethics of design, therefore, I will refer to normative evaluation of a technology from its infancy to the point it is becoming obsolete, except where I deliberately make explicit otherwise.

Next to these two, we may still identify a further type of ethical considerations as to how to *use* a technology. By this, obviously, I don't mean how to use a technology *efficiently* which probably is just matter of following the manual and developing habituation. Rather I mean something else which bears directly on morals. The concern here is how to use a technology to live well, that is, how to put technology into use to boost our well-being. We may dub such moral considerations *ethics of use*. Another way of putting this, as elaborated in chapter two, is to say that while an ethics of use has to do (mostly) with users of technology the ethics of design is associated (mostly) with producers. Hereafter I will be clear along which of these two veins I am working.

Ethics of use

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Concerning the *ethics of use* I don't have much to say. As already mentioned, I agree with Dorrestijn's treatment (Dorrestijn 2012; 2017). For an extensive treatment one can see his approach which was exposed in chapter two. Here I will just recapitulate his views in passing.

As said, his source of inspiration for an ethics of use is the Foucault's work. In Foucault, there seems to arise a shift from a 'critique of disciplinary power subjecting' the modern man to 'practical arts of living' where people come to 'govern and fashion themselves' (Dorrestijn 2012). Foucault's *Discipline and Punish* (1977) was a genealogical study to show how 'gentler' modern way of 'imprisoning criminals' took the place of 'torturing or killing them'. But the new method led to a more control over victims, Foucault claims. Such new methods of control, or power, over citizens included 'three primary techniques of control', Foucault observes: 'hierarchical observation, normalizing judgment, and the examination' (Gutting and Oksala 2019). Such an approach was more efficient to exercising power over humans; 'to punish less, perhaps; but certainly to punish better' (Foucault 1977). New ways of control were practiced through factories, hospitals, schools and modern prisons. Such external forces subjugating people, for Foucault, were exemplified in Bentham's *Panopticon* vision, an architectural model of modern disciplinary power as it is

> a design for a prison, built so that each inmate is separated from and invisible to all the others (in separate 'cells') and each inmate is always visible to a monitor situated in a central tower. Monitors do not in fact always see each inmate; the point is that they could at any time. Since inmates never know whether they are being observed, they must behave as if they are always seen and observed. As a result, control is achieved more by the possibility of internal monitoring of those controlled than by actual supervision or heavy physical constraints (Gutting and Oksala 2019).

Imposing of disciplinary power by the way of the surrounding material environment, like the case of Panopticon, was the very link joint to relate Foucault's disciplinary power to modern technology, for Dorrestijn and also for Verbeek. They read this way Foucault as if he was a philosopher of technology.

Such a gloomy picture of the modern subject, that is, a subject ever under disciplinary powers, however, was not meant for Foucault to imply a predetermined human. If it was the case, Foucault's approach to technology would have been nothing but a new conception of the classical approach to technology very much the same as Heidegger's treatment. In contrast, Foucault found a way out of such a disciplinary society by the way of what he put forward later as techniques of 'fashioning' or 'styling the self'.

That is true, Foucault argues, that modern subject is heavily controlled by the external forces, yet it does not render the human beings necessarily slaves of those powers. Modern subject is not mere a victim, instead, it can also 'cope with external influences' (Dorrestijn 2017). In this view, freedom 'is not a state of independence from external influences, but an experience that humans achieve through actively coping with circumstances' (Dorrestijn 2017). Foucault takes 'the arts of living in antiquity', that is to say, the 'striving for active mastery over one's own life' to be the culmination of such 'caring for oneself'. Modern technologies are the pinnacle of these external powers in our age, Dorrestijn says. We need to learn then how to go about technology, that is, how to 'cope with' it and how to strive for active mastery over our own life.

I will not continue Dorrestijn's elaboration any further and the reader is invited to go through the second chapter of the current work. Over there Dorrestijn, in light of Foucault's ideas, articulates how an ethics of use might be established. Here on therefore I will leave the ethics of use aside and take up establishing an ethics of design.

Ethics of Design

As elaborated, an ethics of design might take on two types of inquiries; moral assessment of the existing technologies and evaluation of the new technologies in the very early stage of their development. Things with the former are not so tricky on the ground that the respective technology is already in the market. The latter however raises some difficulties. The major obstacle here is that the mediation of technology is disclosed in the course of practice and in prior one hardly can identify all relevant mediations. It means that unless a technology is put into use its mediation will not be detected fully. Artefacts, after all, may mediate human beings in a variety of unanticipated

ways. And often, though not always, such unforeseen mediations are due to the unusual uses of users, and obviously designers cannot foretell every possible scenario.

As Akrich and Latour (1992) note, people often don't follow the instructions inscribed in a technology but rather modify, negotiate and bypass these scripts (cf. Akrich 1992). We might use a chair instead of a ladder to install the curtain and this way the former's usage does not match with what it is intended for. Almost every single artefact may be appropriated in a way diverging from its *proper function*, i.e., its primary envisioned function. Putting into different usages, moreover, amounts to different kinds of mediations. A well-known case of such unanticipated usages appears in 'rebound effect' (Tenner 1996). Think of energy-saving bulbs. Developed primarily for the purpose of a drop of electricity consumption, due to their low consumption, users started using them in places never illuminated before, places like gardens, backyards etc., that in the end gave rise to a jump of energy consumption.

Sometimes, however, unanticipated mediations of a technology are not simply due to the unforeseen novel functions, rather they are inherent in its proper function. For example, we use bank cards usually according to their proper function, namely for payment, but they might still bring about unwanted consequence, e.g., a consumerist attitude to spend more that may lead on some occasions even to a disorder[2] (e.g., Lo and Harvey 2011). Unpredicted mediations then, having been originated from various reasons, are quite prevalent in practice.

Such unpredictability of both usages and technology itself may trouble designers along taking responsibility for the design of technology. If the manner of appropriation and mediation of technology in the use stage are so elusive how then we can hold designers accountable for what happens in practice?

An irony about the ethics of design then is that on the one hand, in prior, anticipation of a technology's future behavior seems difficult and in this sense we need it first to be developed to identify its effects. However, on the other hand, shortly after its development, that would be often so hard to detach a technology from the social context, even when adverse consequences were huge. However, as said above, such a difficulty is associated mainly with new technologies, rather

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[2] Compulsive Buying Disorder (CBD).

than with the existing ones. And fortunately there are some solutions already proposed in the literature to cope with such difficulties, which I will elaborate shortly.

A Schema for Moralizing Technology

Now, I can set out to elaborate my schema of moralizing technology. It will comprise three stages; descriptive, evaluative and imperative. Here is a preliminary illustration of each stage. First, in the descriptive phase, I suggest, we need to provide a description of all impacts, both possible and actual ones, a given technology might have. The notion of mediation, as said before, is central here to describe the effects of a technology on users.

But we also need to accommodate the gap between new technologies and the existing ones. To find a way around with respect to these not-yet-launched technologies, we need some anticipatory methods to predict their mediations in future. As I will explain, such methods may include using virtual reality technologies as well as gaming software to foresee the future uses. In this sense, the gap between new technologies and the existing ones boils down to an extra step enabling us to provide an account of a new technology. Put simply, the only difference between these two categories of technology, i.e., the existing ones and new ones, is that for implementing the first stage of my schema, when it comes to the technologies which are at the early stage of development, we need one step more; a step to anticipate the future behavior of them. From this point onward everything is all the same with both categories.

Now, we are prepared to provide the descriptive account of a certain technology. Postphenomenology suggests a great framework to describe the fashion a technology affects users. Thus, we can draw on postphenomenology in this regard. However, as I will argue, postphenomenology needs to be improved if it is going to capture fully all impacts of a technology. In the current shape the description provided by postphenomenology will not cover everything we need associated with a technology. I will suggest then to enhance postphenomenology along two paths; 1. Methods to conduct a postphenomenological study may be extended drawing upon SCOT's teachings, and 2. Current conception of mediation within postphenomenology framework has a limited application and needs to be enhanced. The latter implies that it needs to be

supplemented to arrange a *comprehensive account of mediation theory*. ANT framework will be essential here. I will propose to integrate ANT into postphenomenology to set up a *comprehensive account*. I postpone working out my integrated framework until a later section and here I keep explaining the next stages of my schema.

After the descriptive phase and providing an account of a given technology, we will get to the second phase, the evaluative stage, where the descriptive account provided in the previous stage is supposed to be assessed from a moral point of view. Here, as I will elaborate, we need a framework of reference in light of which evaluation of the account can be exercised. I will then engage myself with the notion of well-being and draw from various views on well-being to provide such a framework.

And third, the last stage of my schema, the imperative stage, will comprise the practical instruction to help designers take care of all issues having arisen in the previous two stages. Below, I deal with these stages in more details.

A Descriptive Account; How Can Postphenomenology be Supplemented?

As said, for providing a descriptive account of technology we can utilize postphenomenology. However, posphenomenology, in the current form, is not able to prepare a satisfactory account. To unravel the black box of technology postphenomenology places its emphasis primarily on (1) the current configuration of a technology, (2) the immediate user of it, and (3) an inside-out approach towards its mediation. All three aspects, I argue, may, or rather need to, be strengthened. The first defect, to begin with, might be discarded by including a historical survey of a technology's trajectory of evolution. In this sense, the tradition of SCOT may serve as a basis, as I will explain. While there have been some attempts to improve postphenomenology on the ground of 2 and 3 the evolutionary trend of technologies hardly has been touched upon in the literature. Crucial here, as I will show, is linking two central notions, namely, *interpretive flexibility* within SCOT and *multistability* in postphenomenology. Technology's varying stabilities may be expanded on through SCOT's teachings. Not only the current variant needs to be accounted for, stabilities which have emerged in the past, too, need to be explored.

Besides, to enrich postphenomenology on the ground of the second and third points mentioned above, ANT may come as a great candidate. Given the divergence of the third-person approach of ANT from that of postphenomenology, integration of the former into the latter might seem tempting. Most importantly, as will be argued, the notion of mediation can be augmented with the notion of translation. Here I turn to each[3].

An Extension of the Variational Cross-Examination

The first arena I intend to draw attention to is the stage before the genesis of a technology and in particular a technology's trajectory of evolution. Postphenomenology takes the current shape of a technology for granted, starting subsequently from its relations with the user. As Verbeek points out, postphenomenolgy shifts away 'from the conditions of technology to technology itself, to the technological devices and objects that are virtually ubiquitous in our daily lives' (Verbeek 2005: 100). In this sense, attending to the historical context out of which a technology has emerged seems irrelevant within postphenomenology. Even though postphenomenology admittedly goes in the right direction when it places its focus on technology-in-use, such an approach, I argue, should not preclude the relevance of an artefact's history. There is a lot one may learn along the process of evolution of a particular technology. Discerning historical falls and rises of a technology, breakdowns, struggles, rivalries, and whatever it has been through along the way of its dominance, could provide a researcher with beneficial insights which would have gone unnoticed otherwise.

In this vein, the way Social Construction of Technology (SCOT) treats technology may be instructive. SCOT emerged as a movement to study the social context within which technologies come into being. As said in chapter three, SCOT's iconic case study is the history of the bicycle. Pinch and Bijker (1984) and Bijker (1995) suggest a narrative of the evolution of contemporary bicycles. There one can find the long path contemporary bicycles have gone to become dominant in contemporary societies. According to the narrative, there were primarily two competing designs of bicycle around at first; bicycles with wheels of the same size and those with the front wheel

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[3] The following sections associated with enhancing postphenomenology on both grounds (methodology and comprehensive account of mediation) are imported from two articles by the author. First and foremost Arzroomchilar 2022a is the source and also occasionally Arzroomchilar 2022b will play a role.

higher than the other. While the latter was deemed to be suitable for racing the former conforms with the transportation aims and commuting of average people. The bicycle with a larger front wheel enjoyed a higher speed with lesser stability. The same-sized wheel bicycle, in contrast, was considered safer. These two versions were in a competition to prevail for quite some time. Ultimately, safety defeated speed and excitement, and bicycles took on today's shape. In retrospect, one may imagine the evolution of a technology as linear and smooth, but the picture is naïve. The same-sized wheel bikes had to struggle to be able finally to achieve today's position. The final configuration of a technology in this sense is not just a matter of efficiency, or of mere technical factors. Rather, social and political factors are as decisive as technical ones.

As mentioned before, Rosenberger notes that the notions of multistability and variational analysis are 'not the end of the story, rather the openings'. To cure such shortcoming he puts forward his own contribution, i.e., variational cross-examination. I think he is doing great. However, one still needs to improve Rosenberger's own approach by going through the history of a technology. Rosenberger's case studies (e.g., his treatment of hostile design and the homeless; see Rosenberger 2017a) are quite insensitive to the prior variants of technologies, and he takes only the existing stabilities into account. I argue that SCOT's remarks would help extending such a cross-contrasting. I briefly show how Rosenberger's method, and in general postphenomenology's methods, may be enhanced by bringing in SCOT.

First of all, we may relate the notion of multistability in postphenomenology with that of interpretive flexibility within SCOT. The latter implies the under-determination of a technology (Bijker 2010: 71), i.e., the contingency of a technology's specific stability. The meaning of a technology is fluid in the sense that a technology may only receive provisional stabilities. The provisional stability given to a technology, moreover, is practiced by social factors. In our case, both the bike-for-race and bike-as-transportation were possible in the first place. Across time, however, the latter prevailed by ruling out the former. It was society that ascribed such a stability to bikes.

The next point to make is that SCOT's insights may enhance all three stages of the cross-examination in the following way. Concerning habituation and bodily comportment, the first element of Rosenberger's approach, one can notice the different bodily gestures associated with each specific stability of bikes, namely bike-for-race on the one hand and bike-for-transportation

on the other. Once bikes are designed and used for race, given the difference in size of the wheels, one needs first to be quite skilled in riding. Keeping such a bike balanced while riding requires a high degree of competence on the one hand and specific bodily comportment on the other. Riding transportation bikes, in contrast, does not take so much experience to be tamed. It requires, instead, a different bodily posing while riding. Pinch and Bijker even mention how sometimes diverging designs were devised for women to accommodate the moral challenges associated with women sitting on a bike, e.g., wearing skirts on a bike was thought to be inappropriate (1984: 28). It shows how the specific dominant etiquette and values in a society are ultimately connected with a certain stability. The reverse is also true. Different stabilities, i.e., different bodily engagements with technology, may trigger diverse types of mediation.

Concerning the second move of cross-examination, i.e., programs and antiprograms and in general networks involved, SCOT can offer again a great deal of insights. This is also underdeveloped in postphenomenology literature. Regarding bicycles, there appear to have been different competing networks. On the one hand, the network of those who 'viewed [their] activity primarily as an athletic pastime,' and on the other hand, those who would have taken it as a vehicle for 'transportation' (Bijker 1995: 37). Particularly 'professional men, clerks, schoolmasters or dons' were mainly using high-wheeled bikes for doing sport (Pinch & Bijker 1984). Moreover, there were a variety of firms, designers and related industries involved in both networks. All of them were in competition to promote their own preferable stability. Pinch and Bijker even identify the network of 'anticyclists' whose 'actions ranged from derisive cheers to more destructive methods' (1984: 24). It seems highly informative to get to know how the network of the bike-as-transportation defeated the rivalries. Including such networks, i.e., the network of bike-as-race and the network of anticyclists may remain hidden in Rosenberger's account. Such a historical travel may bring the interconnectedness of the networks within society and the artefact into view. Not only networks try to affect the technology, but the latter mediates the existing order of the society.

In another case study, Bijker (1995) sketches the trajectory of emerging the fluorescent lamp. As he notes, 'the introduction of the fluorescent lamp was held up because the electric utilities were more powerful than General Electric' (1995); or 'the fluorescent lamp finally appeared on the market because General Electric proved more powerful' (Bijker 1995: 11). It appears then that a historical narrative may also reveal the political dimensions of conflicting networks to show how

a specific stability came to be dominant. Power relations seem quite relevant in the development of a technology.

We may even compare the outputs of diverging attitudes towards a similar problem. A SCOT-based inquiry can illustrate, for example, how reactions of different societies to the privacy policies of WhatsApp have triggered different stabilities to appear. Among others, WhatsApp postponed the implementation of the privacy policy, after facing a pushback about Facebook data sharing and lack of clarity (Kharpal 2021). SCOT may also analyze how various societies may influence WhatsApp's policies differently. Some certain privacy policies, for instance, are not applied within EU, because of rules like GDPR within European countries. Along the way of such an investigation, furthermore, one may compare the dominant networks as well as relations of power in European countries with what is going on within other societies.

And finally, one may also expand on the third stage of the cross-examination drawing upon SCOT's remarks. Here one needs to focus on the specific materiality and the physical property associated with the competing stabilities. SCOT can lay bare how a change in the components of a single product may bring about diverging stabilities and mediations; changes ranging from a change in 'saddle,' 'steering bar,' to 'air tire' of bicycles (1984). As an example, it is shown how the meaning of the air tires for bicycles was gradually transformed from a 'crazy idea' to a solution to the 'vibration problem' and ultimately to 'how to go as fast as possible'. Contrasting such historical variants may reveal aspects which would have remained latent in a mere imaginative variational analysis, or by focusing just on the existing variations.

I believe, SCOT's approach, as a supplementary move for Rosenberger's method, may throw further light on the multistability of every technology and the respective mediation of each stability. In particular, as I elaborated, the notion of interpretive flexibility could be associated with the postphenomenological concept of multistability. While Rosenberger's approach takes its departure point the variants of a technology at the present time SCOT may bring a temporal dimension, and explore all variants across time. In this sense, with the help of the notion of interpretive flexibility, we would come to know further stabilities along with the role of society in bringing them about, and at the same time the notion of multistability would help us to cross-examine varying stabilities as well as explore the relevant mediation of these stabilities. In this

way, SCOT's approach may read as a sort of enhancing variational analysis in general, and cross-examination in particular.

Having enhanced variational analysis and the notion of multistability, now it is time to expand on the notion of mediation.

How to Provide a Comprehensive Account of Mediation?

Now we can get at the next move and try to improve postphenomenology on a further ground. Mediation is a key notion, probably the most central notion, within the framework of postphenomenology. Mediation theory, as discussed in chapter two, denies both utopian and dystopian conceptions of technology, and instead, stresses the role that *actual* technologies play in shaping our life. In the account of mediation theory one should not place technology in opposition to the human subject, provided what is taken to be a mutual evolution, constitution and interdependency. Subjectivity and objectivity are not sharply contrasted, rather they are entangled and mediation theory, in this sense, implies the role of technology in co-shaping the subject and object.

Before arguing against the sufficiency of the mediation theory in its postphenomenological sense, I also need to articulate its counterpart in the context of ANT. Within ANT framework, too, the notion of mediation plays a central role, however under the label of *translation*. Even though one may find remarkable divergences between ANT's notion of *translation* and postphenomenology's notion of mediation, both, in the large picture, refer to a similar capacity; the capacity of non-humans in general, and technology in particular, to transform other players.

The difference, furthermore, is rooted in the fact that while mediation implies the impacts of a technology on individuals the notion of translation, more generally, implies the impacts of any actor on other actors, be it human or non-human, individual or collective. And exactly here lies the rationale behind my suggestion as to integrate the notion of translation into postphenomenology; to expand the postphenomenological conception of mediation and bring into light accordingly a broader scope of effects of technology.

As I will argue in more details, a merely phenomenological approach cannot track all mediations a technology causes. We need also a third-person perspective to identify social dimensions of what might result from technology. And here is the advantage of ANT. Below, to make the case for my claims, and to show shortcomings of the postphenomenological understanding of mediation, I will narrate two cases which I will call *collaborative or collective mediation* and *casual chain mediation*. As will be explained shortly, both cases are brought about by technology, or at least technology has a central role to realize them, yet postphenomenology would fall short of detecting them. I will try then to make them sensible by an integration of postphenomenology and ANT.

Before beginning my narrative however there is a caveat I need to highlight. With my points made already concerning the advantages of the notion of translation over that of mediation, it might be thought that the former term is a better way to describe the impacts of technology. Moreover, it might be assumed that the notion of translation can subsume also that of mediation and in this way, we wouldn't need the latter anymore. But this intuition is far from being true. The notion of mediation is way more effective to shed light on the nuances of the relationships of human and technology. This would be quite evident when one recalls that the details of relationships within postpehnomenology are of such a great significance that scholars have consumed their focus to classify all possible relationships between human and technology. The reader is invited to go through chapter two once more where postphenomenology had much to suggest with regard to the relationships of human and technology. Whereas ANT seems quite insensitive to such details and many of these subtleties will be omitted in case one is engaged only with ANT. In this sense, neither the notion of translation nor that of mediation is sufficient on their own. Instead, we need an amalgamation of both[4].

Mediation beyond Individuals; Collaborative or Collective Mediation

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[4] My work is in line with several authors' works suggesting an amalgamation ANT and postphenomenology. Among others, one may look up Verbeek (2005) and Rosenberger (2018). Mine is different, I claim, on two grounds. First, I am suggesting an integration of STS (both SCOT and ANT) into postphenomenology rather than exclusively ANT, as has been proposed by the foregoing authors. Second, my work is more systematic than the others, I believe. By this I mean, I am drawing on a larger portion of ANT teachings than others. While for Verbeek, as an example, there are just a few relevant terms like translation, network, black box and … for me there are more notions to draw from.

An example to show how the notion of mediation falls short to articulate all technology brings about, is what I will call *collaborative or collective mediation,* and that is the resulting personality engendered by using the internet in general, and social networking platforms in particular, in a certain way. I will narrate a tale first and then will try to show to fully account for the impacts of technology we would need also ANT vocabulary.

Today, thanks to technological advancements, a growing number of activities are being replaced by online opportunities. We do not go shopping so often any more, rather, we receive whatever we need from Amazon. Amazon serves us even more. By its *collaborative filtering* it provides us with a collection of similar products that have been the preference for those who have already behaved like we do. In picking out a product, thus, this *filtration* may save our time by leaving aside goods that seemed irrelevant. As another shift brought about by online space, one may refer to the fact that we do not meet people face to face very often, instead, we prefer to hold our meetings through Skype or Zoom. We may also track news surfing the internet. We no more need to wait for news broadcasts via cable channels. The internet has brought great opportunities that could not have been imagined otherwise. We may even make use of its capability to *customize* our favorites, meaning that we can ask the internet to provide us with what fits our taste. Through the option of *personalization* or *customization* we can get rid of trashy or unpleasant contents in advance. We no longer need to bump into contents that do not appeal to us. It seems great that we do not have to waste our time figuring out our preferences. They are already there online, tailored for us in advance.

But technology is not innocent and silent, it mediates the way we live. And the internet, in particular, is no exception of course. Dealing with all the ways the internet affects us is beyond the purview of my concern. Here I would like just to bring an important aspect to the fore; the phenomenon called 'echo chamber,' 'information cocoon,' or 'group polarization.' In his book *republic.com 2.0*, Cass Sunstein (2007) extensively treats the phenomenon and warns about its threat for the society as a whole. Here I build upon his work to explore the way the internet may mediate behaviors to ultimately make my point.

Group polarization, in a general form, refers to the phenomenon that 'groups of like-minded people, engaged in discussion with one another, will end up thinking the same thing that they thought before—but in more extreme form' (Sunstein 2007: 61). It is more than obvious that, for

communication, people ordinarily tend to choose those who already are in the same political, ideological, or religious camp. We would prefer usually to avoid conflicts caused by opposing views, attitudes, and ideologies. As a consequence of this inclination, however, we may evade becoming exposed to objections. Far from a critique, one's enthusiasm for holding on to one's ideology might even be intensified by the admirations of agreeing fellows, resulting ultimately in adopting even more radical views. Of course, group polarization was not unprecedented before introducing the internet. And in this sense, it is a specific social dynamic that was operative even during our face-to-face communications. But it has been arguably augmented by the advent of the internet and social networking platforms, given the availability of productive technological tools, like filtering, customization, and censorship.

As Sunstein notes 'the most striking power provided by emerging technologies [is] the growing power of consumers to filter what they see'[5] (Sunstein 2007: 5). The internet in general, and social network platforms in particular, can function as a barrier in being exposed to rivalry views. People are deprived in this sense of getting to know other possible worldviews. As a result, 'people are likely to move toward a more extreme point in the direction to which the group's members were originally inclined' (Sunstein 2007: 60). This, in turn, can ultimately pose a threat to democracy and peace. According to Sunstein, a well-functioning system of free expression must meet two requirements;

> First, people should be exposed to materials that they would not have chosen in advance. Unplanned, unanticipated encounters are central to democracy itself... Second, many or most citizens should have a range of common experiences. Without shared experiences, a heterogeneous society will have a much more difficult time in addressing social problems (Sunstein 2007: 5-7).

By 'common experience' he implies 'general-interest intermediaries.' People relying on such intermediaries will have a range of chance encounters, involving shared experiences with diverse

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[5] Today, along with personal customizations, AI algorithms operative make us to see things based on various factors (e.g. maximum spending time on a website etc.).

others, and also exposure to materials and topics that they did not seek out in advance (Sunstein 2007: 7-9). With the internet, and particularly social media, both are in jeopardy. On the one hand, 'common experience' is reduced, and consequently *in-group/out-group* tensions are accelerated. On the other hand, due to the ability of filtering the content in advance, exposure to varying worldviews diminishes. Consequently, mutual understanding grossly become weaker.

In this vacuum of mutual understanding, fundamentalist leaders, as a result, use, or rather abuse, this social fragmentation in accordance with their goals, or, as Sunstein notes, as if they become 'polarization entrepreneur,' so to speak (Sunstein 2007: 74). In a sense, social networking platforms serve as mediators to drive those already-ideological-minds in more radical directions[6]. In sum, an ideological mind could grow more biased under the influence of the internet. It might happen due to the potentials brought about by the online sphere as elaborated.

How is all this connected to my concern? And more importantly, how is it going to serve as a ground to indicate that the notion of mediation needs an amalgamation with ANT? To answer this question at first I need to provide a postphenomenological account of the said phenomenon of growing fundamentalist, to realize how technology may play such an active role to impose these massive influences. Here is an outline of my account.

There is a lot one may say here, I think, which bear on the posphenomenology teachings. Filtration, customization and personalization tools for structuring the content *in advance* can *mediate* the way world is perceived by individuals (and this is the hermeneutical aspect of the mediation). Social media platforms transform the world of the like-minded extremist members of an online community into a world where *most* people have *identical* views. The reason is the simple fact that they have already expelled *others* from their *world*, consequently inhabiting a world where majority, if not all, are alike. This fake environment, in turn, would make these fundamentalists to take their mores to be rational, commonsensical and widespread, based on their observation that most people are, or rather they assume to be, so. Those *few* individuals who are not like them within their world seem to be others accordingly, described as deviants, infidels, evils, immoral and even unreasonable and abnormal. In this sense, their conception of the world, the people

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[6] For a more extensive treatment of the relationship between communication technologies (CT) and terrorism, see, for instance, Mahmood, R. and M. Jetter (2019). There they provide a model as to how the level of free flow of information through CT is tightly linked with the level of terrorism in different countries.

around, the normal life, the normal thought and rationality has substantially changed in the wake of using social media. Social platforms have built an illusory world for them wherein almost all, except probably a minority, are like them. As evidence for my assumption, Klausen (2015) observes that Twitter has been used by ISIS as a means to generate an 'illusion' that the group is much more powerful than its reality. Also Sageman's (2008) findings demonstrate that new form of interaction within the world, brought about by social media, helps establishing ideological relationships which would lead to *radicalizing* young people.

This *inverted* world, where the majority turn into minority and vice versa, moreover, complies precisely with the general structure of technological mediation, which is, a structure of amplification/reduction. In this sense social media platforms may markedly contribute to the creation of a uniform and non-plural world, by reducing, or even expelling, aspects of the world.

Next to the capacity of customization, also censorship is effective to keep the member's attention from all distractions outside. Censorship tools are integral during both the process of alignment of the members as well as building a parallel world. In this sense, censorship might serve as solidifying the customization of the content for radicals.

There are also additional factors to enhance the effect of echo chambers and the amplification/reduction make-up. Individuals, for example, are permitted usually to possess several accounts in most of social media platforms. This may be a source of consolidation for radical groups. By multiplying the number of accounts, they can pretend to be outnumbering the competing worldviews. This might by effective to seem more potent than reality to both insiders and outsiders. The latter may be bolstered in case of, for example, trolls attacking individual accounts, or the application of Hashtags by the members in a certain way (See for example Awan 2017).

Yet as another feature which may strengthen the mediation of social media one may point to the legitimacy of possessing an anonymous account. With it, individuals may share anything they want without any worry of being fully recognized. All these technical features may enhance mediation and subsequently might help the realization of a disfigured world for radicals. Put simply, social network platforms, with their technical possibilities, constitute a parallel world for ideological minds.

As noted before both facets of mediation (hermeneutic and existential side) are visible, however they might be packed together in the real-life situations. This also holds true in the case of group polarization. In the side of hermeneutical mediation, as discussed earlier, individuals increasingly would come to conceive a *misrepresented* world. But we can also detect existential aspects. Here we can think of the actions which the user is invited to take as following the norms embedded in a specific app. For example, after signing up in a social media platform, say Instagram, user is encouraged to follow another Instagram profiles. It seems difficult to resist such an invitation. Moreover, the accounts which are suggested to follow by the app itself, are selected through a certain dynamic which is based on, among others, the existing contact list of one or similarity of profiles. This, obviously, is the starting point to fall in an echo chamber. Another way of steering user's behavior by Instagram is suggesting to upload a photo, favorably one's own photo, for the profile. In an Islamic context, where the appearance of women has always been a matter of debates, as to post a personal photo or not, and if yes, how veiled it should be, such an instruction may bring about unforeseeable consequences. The list of such proceedings may still go on, and more important is the consequences of each. Furthermore, after a while of socializing in a platform, with like-minded friend, the user might be inclined to take fanatic actions. Due to living in an echo chamber, one may develop tendency for example to take violent action, as it is clear in case of web-driven lone wolf attacks. All this implies, once again, that, social media, can mediate both perception and behavior of individuals.

One precondition for creation of the said inverted world, obviously, is a certain level of transparency of the technologies involved. As postphenomenology notes, technology should not preoccupy the users' attention. It needs rather to be sufficiently embodied to engender fully the respective mediating role. A full-blown embodiment relationship with technology, requires a certain level of transparency in this sense. All technologies involved, ranging from the devices on which social media apps are installed to the applications themselves should become transparent first. If they were opaque, i.e., consuming the attention of users, they would impede emergence of the parallel world for the novices. Transparency of the operating technologies and holding an embodiment relationship with them, where individuals come to see the world through them, and not simply with them, requires habituation and a relevant bodily comportment in turn. If one was not well accustomed to such technologies, say elderlies not so skilled, one would not be sufficiently affected by the mediation of the social media.

In sum, radical groups domesticize social media platforms according to their own worldview, culture, needs and visions. Whatever westerners usually take social media to be, does not necessary apply in case of fanatic individuals in a Muslim-majority society[7]. In the latter's case, social media are not just communicative tools, rather a weapon which can be used against infidelity and unbelief. Radicals use digital media as 'wars' to win the hearts and minds of the people. Such an inclination for weaponizing the communicative technologies is evident even from original remarks of extremist leaders like Ayman al-Zawahiri (2nd General Emir of Al-Qaeda) who openly declared media to be an inclusive part of the battlefield (Carter et al. 2014).

So far, I have provided a phenomenological narrative to explain the phenomenon of radicalism accelerated by using the internet. But is that all? Have we brought into view the role of technology – in this case the social media- in an appropriate way? Yes and not, I think. The answer is yes since we have managed to account for how social network platforms are active to the extent that they affect the personality of individuals. In this respect, postphenomenology has been of great help to throw light on the details of the relationships individuals bear with technology.

The answer is no, on the other hand, because I think one might still feel that many things are not well settled. For example, the influences of other members within an extremist community are not accounted for in this tale. Granted, technology matters a great deal, but can social media platforms users be mediated if there is no one else using them? Other fellows are vital as well in augmenting radicalism. An *echo chamber* in this sense is brought about neither solely by technology nor by humans, rather it is grounded on a heterogeneity of human actors and non-human actors, namely a *network* of numerous of parties.

One should not overlook the effect of the featuring the like-minded peers when exploring the mediation of the internet. Similarly, one cannot underestimate the influence of technology either. Group polarization is not then traceable wholly by a solely first-person driven investigation. It requires more. Thanks to the advancements in telecommunication technologies, users could increasingly customize what to see in advance and what not to see, that is, they can filter out what they want to encounter quite ahead of time. This new condition calls for a more cosmopolitan

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[7] I am not claiming that in the west, or non-Muslim societies, radicalism through social media is not possible to emerge. Certainly it can, as it does indeed. But since the western mentality is ideologically less biased, it seems less likely to cultivate radicalism, at least as far as *religious* radicalism is concerned.

endeavor in order to unfold social media mediation. It demands a method capable of addressing both *individualistic* and *collective* behaviors. We need an approach, along with the postphenomenological one, to reveal what is going on at the level of collectives. Here ANT may come as a help to enrich our explanation.

ANT, as said in the previous chapter, denies any *a priory* distinction between humans and non-humans, that is to say, there is no difference between a social affair and a technical one. Both humans and non-humans need to establish associations and be linked to other actors to shape networks or collectives. This network, in turn, would exercise its power by bringing about certain effects. This attention to collectives, or the accumulative force, may be ANT's contribution to the envisioned comprehensive mediation theory. While postphenomenology tends to study the mediation of technologies over individuals, ANT investigates mediation as a phenomenon emerging out of collectives of technology and humans. Nothing outside the context of networks is sensible, that is, every entity emerges from, and is at the same time, a network consisting of a heterogeneity of relations. According to Latour's *symmetrical* approach, no actor has a priority or primacy over others, meaning that both humans and nonhumans should be treated on a par. Besides, the force of heterogeneous collectives is *irreducible* to individuals, it is distributed upon factors, irrespective of them being human or non-human. Drawing upon ANT, and of course postphenomenology, below I intend to provide a preliminary explanation of the process of generating a polarized radical community with a number of extremist individuals. This is an important step to take for showing how an amalgamation of postphenomenology and ANT, or rather of the notion of mediation and that of translation, works better a great deal, than each of the framework alone.

In the first step some like-minded individuals get together using a technological tool like a telecommunication technology (say, a particular end-to-end encrypted social network platform) giving rise to a collective of both humans and non-humans. The course of recruitment continues to invite new possible like-minded people through technical manners. Members may negotiate out-groups urging them to join the group for a consolidation in order to overcome a certain problem in the society which according to them needs a lot of effort. For example, according to religious radicals this alleged problem which needs effort may be infidelity or ignorance within the society. They might feel obliged to dissolve this problem. This might be tantamount to the state of

problematization and *interessement* in which people with some visibly potential extremist inclinations are encouraged to associate with the community, and at the same time are given a role. For doing this, members may go through similar forums, channels, groups in virtual space[8] to find potential individuals[9]. In the next step, leaders or ideologues might begin to educate members by certain teachings, by the application of some technological tools like podcasts, online courses and the like[10]. This means that individuals are being translated gradually. Technologies, too, need to be translated and enrolled. In case of online platforms, they need first to prove their faithfulness. Those platforms which does not meet necessary requirements, like meeting the standards of privacy through end-to-end encryption (E2EE) for example, or being ready to put into Islamic uses, cannot be enrolled.

Meanwhile the leaders might have banned members from joining other groups with diverging views, calling others infidels or unbelievers. But that recommendation would most likely not be enough. Many will not follow the leaders' message with a full loyalty. It means that senior members need to use some technological means to prevent members from exposing themselves to unbelief. This may be executed by tricks such as censorship. In this sense, leaders *delegate* a part of their *program of action* to technology, i.e., inscribing the rule 'don't listen to others' into technology. Along the way of all trains or discussions members gradually come to adopt more fanatic views.

Viewed from this perspective one may recognize how both humans and non-humans may take new shape, that is, how they are undergoing translation. Individuals get exposed to extremist views and are encouraged to take more radical stances towards outgroups. They may have been told about religious duties on their shoulders given by God. Along this line they have already started to be *translated*; their interests too are upgraded through *negotiations*. After *enrolment* into a new *network*, they develop new identity. Across time, and through the process of consolidation by developing more connections, the relationships between actors become solid and less likely to

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[8] According to studies, ISIS has recruited from around 85 countries across world through such endeavors. See e.g. Benmelech, E. and Klor, E. (2018).

[9] Shehabat and others (2017) observed that ISIS members have extensively been using Telegram for several purposes: (1) seeking encryption, (2) seeking a channel supporting platform, (3) enhancing ISIS's digital infrastructure against cyber-attacks, and (4) decreasing exposure to hacktivism and other information warfare counter-measures.

[10] Al-Anani explains how Muslim Brotherhood's members need to keep attending some socialization gatherings, which is called Tarbiyya among them. They need to stay in touch through socialization meetings in a regular timing (Al.Anani 2016: 87).

disintegrate. In this way the network is gradually transforming into a *black box* becoming *immutable* and sustainable.

One can still go on describing further details, but to my purpose this much suffices. My aim was to show how it would be worthwhile to account for the process of growing radical drawing in both individualistic aspects and collective facets in parallel. Put succinctly, in accounting for such a phenomenon we need to take the subtleties of both the *individual-technology* relationships and the *collective-technology* relationships into account. While the former is the specialty area of postphenomenology, for the latter ANT seems to be the best fit[11].

Mediation beyond Individuals; Casual Chain Mediation

I would like to continue and complete my sketch with pointing to yet another type of technological mediation where ANT may again prove helpful; I will call it *casual chain mediation*. While in the previous kind of mediation, i.e., collaborative mediation, I claimed that postphenomenology can be augmented by ANT, in the casual chain kind of mediation my contention is that on some occasions postphenomenology is crippled to the extent that it cannot address such types of mediations.

In a casual chain mediation, technology affects the first user, but soon after it passes through the direct user and gets to and mediate accordingly *non-users*. Moreover, the effect of mediation circulating among non-users may take on different shapes than the first user's. I appeal to a historical story to make my point; Galileo's telescope. Galileo's discovery made by his telescope was a seminal breakthrough in modern history; the one whose aftermath went far beyond astronomy. Here I focus on the role of his telescope to find out how deep its influences have proven to be.

Galileo's discovery would not have been imaginable, obviously, without his telescope, a discovery that changed the human worldview. As Latour points out in an interview[12] (Latour 2020), Galileo's

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[11] For an extensive treatment of radicalism and its relation to technology see Arzroomchilar (2022b)

[12] In his book 'Politics of Nature – How to Bring the Sciences into Democracy' Latour explicitly calls for a new politics for dealing with ecological problems. There he develops a new framework for politics within which one needs

telescope has contributed a great deal to the forming our outlook as to 'the earth is part of an infinite universe'. Galileo's telescope came to present the universe to us as 'infinite' thereafter, as Latour claims. In this sense, not only did the mediation of Galileo's telescope go beyond its first user, namely Galileo, but it lasted for a long time, far more than Galileo's life span. Crucially, it also affected unexpected realms like politics, as Latour argues (Latour 2020). Today one may trace its influences even within environmental problems where it is increasingly threatening human life. Here Latour asks 'what does it mean for politics if we are locked in and not in the infinite cosmology opened by Galileo?' and replies himself that 'it means we cannot behave in the same way. It means we cannot just endlessly extract resources and discard our waste' (Latour 2020). While the mediation of the telescope for Galileo himself is certainly worth exploring – as postphenomenology may take over the job – its mediation, one should notice that, has expanded since then to span politics. In the following lines I try to provide my analysis along two different, albeit supplementary, paths; drawing on postphenomenology and ANT respectively.

Let me first dwell on a phenomenological approach towards Galileo's telescope, to see how it might have transformed his experience of the world. Here Ihde's insights, laid down in his work (specifically Ihde 2011) may be of great help.

A scientific achievement, according to Ihde, would not be fully apprehended through a 'formalistic,' 'abstract,' 'generalized and virtually non-empirical' investigation, rather it requires taking into account the scientist's embodied practice (Ihde 2011: 71). Galileo, after all, was not only a theoretical physicist but, more importantly, a 'lens grinder, the user of telescopes, the fiddler with inclined planes, the dropper of weights from the Pisa Tower' (Ihde 2011: 78). A scientist is always situated in a certain body posture, utilizing specific instruments and constrained within certain conditions. A scientific discovery then, including Galileo's, is always embodied through her instruments, as Ihde writes: 'science is … essentially … embodied technologically in its instrumentation' (Ihde 1990; 1991: 103; 2011: 77). This implies that the instrument of a scientist,

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to reconceptualise how 'nature, science, and politics have to do with one another' (Latour 2004: 6). The new politics should not consider nature distinct from society, value from fact, he argues. That is to say, we need a cosmopolitics, a politics comprising a heterogeneity of entities rather than sole humans and their affairs. He even explicitly proposes that 'the question of democracy be extended to nonhumans' (Latour 2004: 223). For more, see the abovementioned book and also his 'We have never been modern.' In the latter, Latour speaks of 'a Parliament of Things' in this respect, to stress taking non-humans into our political considerations. The reader may find the ideas in his book interesting.

such as Galileo's telescope, is like the 'extension' to his perceptual and bodily activity (Ihde 1991: 75; 1979: 15). This might be reminiscent of Merleau-Ponty's blind person who uses a stick to find her way (2012). The stick here is not simply a thing, among other things, for her. Rather it is, as though, the extension of her body, i.e., it is incorporated into her sensorial system. She feels the surroundings, through the cane, in a direct and non-inferential way, as if she is really perceiving the environment. The telescope of Galileo enjoys exactly the same status; it is the extension of Galileo's body where it modifies bodily modalities and expands the domain of what can be immediately perceived. Putting in the terminology developed by Ihde, Galileo's relationship with his telescope is an embodiment relationship. In this sense, Galileo, with his mediating tool, managed to bring the until then unattainable things, e.g., 'mountains in the moon' or 'the spots of the sun,' to his experiential reach. Once the telescope made the moon perceptually available to Galileo, 'spots on the sun' were no less part of his Lifeworld than the 'Tower of Pisa' (Ihde 2011: 80). There is no longer any gap between the 'lifeworld' and the 'world of science,' since 'Galileo with a telescope is also a perceiver and a practitioner within a now technologically mediated, enhanced world' (Ihde 2011: 80).

However, such a technological instrumentation is not without cost, as noted before. Technology has transformative power as to impede as well as to promote certain dimensions. Galileo's telescope was to magnify the heavenly objects to grow observable, and this would have required, among other things, bringing things out of the context:

> the magnification of the Moon such that for the first time details of mountains, seas, and craters immediately are visible …. The Moon thus made visible now ceases to be placed in its normal, expansive location within the vault of the heavens (Ihde 2011: 80).

One implication of such displacement then was that Galileo had access only to a distorted and mediated image of the celestial objects; a picture that was, in part, technologically constructed. Galileo's telescope was not simply a neutral and innocent tool. By a postphenomenological perspective one may get acquainted how the Galileo's telescope provided a new universe for him;

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an 'enhanced lifeworld' that was 'not available to Aristotle, the Church Fathers or the Biblical editors' (Ihde 2011).

Postphenomenology may still keep up describing the Galileo's breakthrough, but for my purpose this much is enough.

Now does such a postphenomnological account, however rich, cover all the telescope's mediation? I don't think so. There should be also mediation occurring at the societal level. Yet postphenomenology tends to be silent when it comes to what is going on beyond the immediate user. Here, I propose, ANT may come as a help again. It may take over hereafter and nurture the postphenomenology's tale. Here is a preliminary description.

Latour, like Ihde, is appealed to the mediating role of the Galileo's telescope on a similar ground, namely, the impact of the telescope on the expansion of people's world. There is a point of divergence however here. While Ihde was predominantly concerned with the impacts of the telescope on Galileo himself, Latour is mainly curious about its social and political consequences.

The departing point here is the intuition that the mediational effects of an artefact may not be confined only to those individuals having a direct experience of it, rather its effects may sustain for a long time within different time and space. Thus pictured, the mediation of our outlook on the universe as deeming it 'infinite' might be said to have been causally dependent on Galileo's telescope. The spread of the mediation across the chain of audiences, after all, started from Galileo's observation. If this is the case, a direct experience of a technology, therefore, is not a necessary condition to being mediated by it. It seems to be a sufficient condition though. Mediation of a technology hence, by passing through the first user, may take on a social and political dimension.

The way mediation travels through time and space may be accounted for by the notion of different networks. I try to draw a picture so as to describe how technology's mediation may reach areas distant from direct users. Analog to the case of 'echo chamber' phenomenon, ANT's arsenal is fairly rich to address cases like Galileo's telescope. Latour (see Latour 1983; 1988) is an instructive example here. As elaborated, in his extensive study Latour represents Pasteur's laboratory and the role of both human and non-human components in Pasteur's success. When doctors, hygienists, regulators, microscopes, papers, and others were put in place and the alignment

was tight enough, on his account, it came to be a taken-for-granted truth that microbes were the real causes of diseases. Consequently, Pasteur was considered to have made a revolution in medicine and public health. The reality, however, is that it was not Pasteur alone, Latour argues, who caused the revolution, rather a network of heterogeneous entities did so. This network with its allied actors was sustainable enough to later come to be considered a fact. This transformation of the health system could never have happened if any single actor of the alleged network had not performed correctly.

Galileo's telescope plays a similar role as Pasteur's laboratory. Galileo is supposed to have established a network by enrolling both humans and non-humans to establish his discovery as a fact; ranging from the telescope and colleagues to newspapers spreading news. He seems to have succeeded to ally all actors through negotiation and translation of their interests, ultimately making what later came to be seen as a fact. The alleged fact since then came to travel across different times and spaces as a black box hiding all works that had gone into it by that network. It was sustained for a long time and at present the effect of Galileo's network is still mediating the behavior of many, politicians among others, as Latour notes. A clue in working at a distance—all the way from Galileo's telescope to twentieth-century politicians' mentality—is the notion of immutable mobiles. An immutable mobile is the actor which can remain stable throughout different networks. It is highly transportable, meaning that it is able to travel from one collective to another without losing its meaning. All these constituents, according to Latour (1987), are the effects of a precedent network and are only made visible within a particular network of relations. Immutable mobiles can be silent, ignored, or overridden by other elements. However, they have developed enough solidity to be able to move around and yet hold their relations in place. They perform their task as delegates of other remotely working networks, extending their power by working to translate entities to behave in certain ways. In the case of Galileo's telescope, a textbook could be deemed as an immutable mobile which is sustained from the network within which Galileo's telescope featured up to its work within networks out of which politicians and decision-makers grow. In this way, one may imagine how it is possible for an effect of a network to travel a long way to impact distinct networks in a different time and space. All these networks become mediated if the immutable mobile can circulate through networks properly and thus causally relate all networks in this chain.

It seems again that ANT proves promising in cases like 'casual chain mediation' to bring socio-political dimensions of mediation into the fore. We do not have to, therefore, limit ourselves to merely first-perspective phenomenal experience. Technological mediation crosses the boundaries between first user and the subsequent non-users. In some cases, such as the case of Galileo, non-users may be mediated by a technology if they have been in touch with the first user in a certain way. It means that while we need phenomenological vocabulary to make sense of mediated subjects we may also integrate an outside-in perspective to identify the societal consequences of mediation.

To wrap up the last two sections, through two cases, I tried to show how an integration of both postphenomenology and ANT might bolster a comprehensive account of mediation to bring into view the role of technology at both individual and collective levels. In this respect, I introduced two types of mediations of technology, i.e., collaborative mediation and causal chain mediation, to show how the integration of ANT into postphenomenology might come helpful. From now on I will take this integrated framework for granted and keep elaborating my schema.

Mediation of Not-Yet-Developed Technologies

The comprehensive account of mediation, introduced in the foregoing, was meant to be a tool to provide a descriptive account of technology. A descriptive account in turn was the first stage, prior to the evaluative stage and imperative stage, of the process of moralization of technology. Now, we are supposed to move to the second stage and explain how the description of technology provided so far is going to be evaluated morally. But, prior to that we need also to deal with another proceeding, and that is, the case of new technologies. By a new technology, as said, I mean those which are at the early stage of their design or development and in this way providing a descriptive account of them seems more difficult than of those which already are in the market. But as argued, things are not as hard as it might seem. Now, thanks to new technologies, we have access to some anticipatory methods through which we might come up with a rough idea of how a particular technology might play out in future. In the following lines I would like to lay down this query.

A good option here is to dissolve such a predicament by bringing in all stakeholders (e.g., designers, end-users, non-users[13]) in the process of design, and then involving all through technologies like VR, AR and gaming. Such technologies may simulate the future world for stakeholders to the extent that, through bearing interaction with the surroundings[14], they can *experience,* rather than simply imagine, things. The *embodiment* relationship with VR/AR, postphenomenologically speaking, serves users to feel as though they are really going through such experiences. This way, users may come to collect a grasp of the future mediation associated with technologies not-yet-developed[15].

Thalen and van der Voort (2012) have provided a framework to apply virtual reality as it is incorporated also by a serious game[16] and a scenario[17]. While authors are not primarily concerned with moral assessment, rather with the product development process (PDP) in the early stages of the design[18], I think one may expand their method to be also applicable for moral assessments. Through different case studies, ranging from urban planning to virtual nursery room, they set up a way to explore technology in practice while it is not yet in the market. To articulate the method, they introduce two variables; *design phase* and *the level of user engagement. Design phase* refers to the stage of which design stands, ranging from the infancy of an idea of a technology up to the point where a technology is fully prepared – note that all these are being practiced in a *virtual* world. In particular, design phase includes sub-phases of *specification*, phase of *generation* and phase of *evaluation*. We may choose this way in which phase stakeholders need to be involved. For example, we might be willing that they are supposed to be involved early, where designers

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[13] Including non-users as well, as stakeholders may seem a bit weird. The reason is that, as I discussed earlier in the case of Galileo's telescope, sometimes non-users also may be mediated by a technology along the way of a casual chain.

[14] It's not that easy though as this is mostly just audiovisual. There are people, however, trying to create also tactile experiences too.

[15] For more on the ways of anticipation of future uses see also chapter two and Verbeek's remarks.

[16] Gaming is generally described as a play with props following specific rules and often with an element of competition between players and decided by chance, strength, skill or a combination of these (Thalen and van der Voort 2012)

[17] Scenarios are explicit descriptions of hypothetical events concerning a product during a certain phase of its life cycle (Thalen and Voort 2012). A scenario can be expressed by displaying a prototype (either real or virtual) in an environment (either real or virtual). Within design processes, scenarios are used to address problems, needs, constraints and possibilities ... the use of scenarios facilitates explicit communication of design information among involved stakeholders.

[18] Even though here I am talking about an integration of games in connection with AR/VR, one may imagine of games not incorporated in VR/AR. For an example of such an approach to see how serious games might contribute to the process of design see Garde and van der Voort (2017)

have just crude ideas of a technology in the mind. Alternatively, we may let participants enter after a technology (virtually) is prepared, and not before.

Level of user engagement on the other hand is intended to show the degree to which end-users are intended to be involved. Here one may conceive of three levels of involvement for the laypeople; the first minimum degree of involvement is through surveys and interviews, the one to which one can refer as the level of 'design for'. Here we would first situate participants in a circumstance where a technology is in either of the foregoing phases, namely specification, generalization or evaluation. Then we would ask participants to fill a questionnaire or so to realize how they feel or what their experience is. The second higher degree of involvement for users, called 'design with', may be implemented where 'users are allowed to try, evaluate and/or select proposed product concepts'. Here they have power also to intervene in the process of design. The idea laying here is that by situating participants in a dynamic position, to ask them not just to passively sit there and look, but also to manipulate to get a realistic sense. And the highest level of involvement ultimately, is where 'users actually generate product concepts themselves' in the sense that they can *co-design* the product[19]. Here participants need to be involved from the very beginning.

I think such a method can be well applied in the context of moral evaluation of technology, in case of technologies-yet-to-be-developed. By the application of VR one can place all stakeholders in a virtual space to experience a particular technology as though the latter is already developed. Moreover, the foregoing variables, namely the design phase and the level of user engagement, may be conceived of as an expansion of *variational analysis* within the context of postphenomenology. While *variational analysis,* introduced by Ihde, implies putting a given technology in different uses, two aforementioned variables, i.e., design phase and the level of user engagement, allow for putting technology in different uses at different levels of both 'engagement of users' and 'design' (see chapter two for an overview of postphenomenology methodologies).

Then on we need to conduct anthropological as well as ethnographical surveys of all stakeholders to garner data (see chapter two and three). By the application of my comprehensive mediation theory now we can obtain a description, at least a rough idea, of the technology in question. To this end we, as researchers, would collect both detailed observations –to identify the collective

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[19] For an extensive treatment of the application of interactive technologies look Bendor (2018)

affairs drawing on ANT- and self-reports – to identify the individual aspects drawing on postphenomenology- to get an orderly characterization of the mediation of a new product in its early stage of design.

Moral Assessment of Technology

So far, we have been engaged with providing a descriptive account of the mediation of a certain technology. As noted, we needed both postphenomenology and ANT, and to some degree also SCOT, to account for all aspects of mediation. The trick however was that in case of yet-to-be-developed technologies we had to practice one step more, that is, anticipation of the future via VR and gaming methods.

Now we are in a position to move to the second stage of my schema and evaluate what we have obtained from the stage one. But the question arising here is how to evaluate such a pictured account? Given that we have already a descriptive account we need also a normative account to enjoin what *ought* to do. I think, to this end, we would need first of all an *ideal* model in light of which we can assess our account of the technology. Thus, if we have a framework of reference we would be able accordingly to revise the respective technology in a way to be kept away from undesirable outcomes. But how can we get at such a framework?

Here there is a lot we may learn from history of moral debates. Throughout history there have emerged a wide range of moral views. In general, one can divide different trends of ethics into three categories; those grounding morality in terms of *well-being*, virtues and good life, those grounding it on *duties* (deontological ethics) and those grounding it on the *consequences* of actions (consequentialist ethics). In chapter two, I discussed a little why the first one is perfectly compatible with postphenomenology. The ancient thought of well-being seems to fit to the situatedness of human beings implied in the mediation theory. If the relationship of humans and technology is so fluid and unpredictable it follows that the code-based morality of deontology falls short of capturing the normative sides of technology. In a similar way, if we are encountered with situational and dynamic relationships of human and technology how are we going to anticipate *consequences* to see whether the ultimate goods outweigh the evil? Especially with the flood of

new technologies every now and then where their mediation is far from clear in prior things are much more opaque. In this sense, neither deontological nor consequentialist account of morals can do justice to technology. Instead, such an ethics should be based on the notion of virtue and well-being to accommodate complexities. Here I take the latter point for granted and will not argue for that further. Therefore, I continue with a survey of views on well-being.

Historically speaking, there have arisen a wide variety of teachings under the umbrella of well-being. Which one is suitable for our purpose? One may roughly classify the multitude views on well-being into three categories (e.g., Crisp 2017; Fletcher 2012; 2016); *Hedonism*, *desire theories*, *objective list theories*. In the hedonist theories, pleasure (and accordingly pain) is taken to be the only prudential value (or disvalue) to the effect that the hedonic level of one is an indicator of her well-being. To acquire a good life, one needs to direct her life into a path wherein the maximum pleasure (and the least pain accordingly) is experienced. Things are valuable as long as they promote, or are translatable into, pleasure.

Within the second strand, desire theories, it is not the subjective feeling of pleasure which is going to be worthwhile. We need instead, proponents claim, to objectively satisfy an array of preferable desires in order to live well. Fulfilment of some of desires might not bring about immediate pleasure, yet in the long term, they may contribute to our overall well-being through satisfying our will. For example, one may think that gaining knowledge, although not necessarily generating pleasure, may make a contribution to our well-being. Importantly, these desires may be in principle anything and one does not have to defend her preferences. On this account desires are considered fluid and flexible and might be mutable from person to person. Therefore, the range of desires to be fulfilled theoretically is unlimited.

The last category, in contrast, distances itself from both said perspectives. On the one hand, it denies that there is only one prudential value, namely pleasure, and on the other hand, it renounces such a liberal attitude towards desire-satisfaction of the second perspective. Instead, exponents of the objective list theories hold that we are required to accomplish an array of values which are the same for all. Crucially, pleasure might be one of the desires one is going to fulfill, and in this sense, the last strand seems to be an extension of the first approach to well-being.

The next query then is to find the best approach to well-being in light of mediation theory. Which one of the abovementioned approaches squares with mediation theory and in general with assessment of technology? I cannot involve fully myself with the demanding task of the evaluation of different views of well-being, because of the simple fact that it would take us far afield. Well-being after all is a dependent topic on its own and there is fairly rich literature on the subject today. Nonetheless, I have to be engaged with the inquiry given that my concern is germane to choosing an approach to the notion of well-being. I will explore then, however very brief, all three to find my favorite approach.

My claim is that the hedonistic approach is too narrow as well as subjective to serve as the benchmark within the course of design of technology. Technology mediation cannot be articulated merely in terms of pleasure whatsoever. Many aspects of technology might be left out of evaluation this way provided that they don't bear upon pleasure (or pain), and in this sense, mediation might turn out irrelevant. Besides, even in case pleasure can play such a role, pleasure of whom should be taken into account? Users might be pleased, after all, with different and sometimes opposing outcomes. Hedonism, in this sense, seems too narrow and subjective and cannot serve as the ground of moral evaluations.

The second trend, i.e., desire theories, admittedly are not that narrow. They would cover after all a wide range of values. Yet, they are too diverse and fluid, rendering them ultimately impractical again. Provided that there is a list of unlimited options as the preferences of users, whose preferences should be taken into account? If the items in light of which we are supposed to evaluate a given technology are such excessive it seems then that desire theories too have to be excluded accordingly. Moreover, some of preferences might turn out to be silly and not plausible to be the basis of our evaluation. This approach never can be an option accordingly.

The last candidate, objective list theories, however, seems to well fit to our purpose. After all, they are not that narrow as hedonistic accounts were. Nor do they end up an unbridle list of options that turns the process of evaluation impractical. Subsequently, I will leave all other approaches out here and treat the process of evaluation of technology in terms of objective list theories of well-being.

Next predicament is that throughout history object list theories have come in a variety of fashions, and in this sense, various types of lists have been proposed so far[20]. However interesting a task it might be, here I am not in the position to go through all lists. Hence, I will be neutral to any argument and accordingly to any possible list. The only crucial task here is to pick one of the possibilities and set it as a reference against which a technology is going to be morally appraised.

Now, such prudential values articulated within a certain list, and this is the key, may serve as the ultimate objectives in the assessment of technology. It means that, in the design/redesign of a specific technology, one is instructed to assess the descriptive account, complied already in the stage one, in light of these objectives. If a given mediation is likely to violate either of the objectives, or breach at least a significant number of them, then designers have to fine-tune the artefact in accord to the objectives. I will go into more details later when I will be applying the schema on a case study. For now, I turn to the third stage of moralization, the imperative stage, to realize how things should be put into effect.

Practicing Moralization

So far, we have managed to provide a descriptive account of a particular technology drawing upon my integrated framework. Moreover, we have a ground upon which we can evaluate the technology in question, and in this sense, we have passed two stages of my schema. Now we are at the final stage where all the hints set forth already are going to be implemented.

To this purpose, we need to settle a puzzle framed in chapter two. That is, we need to decide to which extent we would like to intervene in the process of moralization of technology. As Verbeek (2011) formulates, and extensively treated in the second chapter, there are basically two levels of *moralization*. The first route, a minimal way, is to take just passive precaution in order to inhibit

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[20] Here are some of the lists having been put forward:
Finnis; Life, Knowledge, Play, Aesthetic Experience, Sociability (friendship), Practical Reasonableness, Religion.
Fletcher; Achievement, Friendship, Happiness, Pleasure, Self-Respect, Virtue.
Murphy; Life, Knowledge, Aesthetic Experience, Excellence in Play and Work, Excellence in Agency, Inner Peace, Friendship and Community, Religion, Happiness.
Parfit; Moral goodness, rational activity, development of abilities, having children and being a good parent, knowledge, awareness of true beauty.

immoral mediations of technology. Put simply, here designers are not going to do anything unless something hostile comes along. Once, within the account we have collected in the stage one of the schema, a moral threat was identified, designers would come into play accordingly to eradicate it.

There may be, however, an active role that designers might play, i.e., a maximal interference. Here, not only in case of hostile mediations, but they also are supposed to intervene further and deliberately inscribe their (preferred) ethical codes into technology. In this way far beyond expecting designers to eliminate the discerned moral problems, they are well prepared to positively turn technologies into moralizing materials. In this sense, technologies, in the active method, are taken as vehicles through which specific kinds of behavior are going to be promoted.

Take Philips company's product, the so-called *persuasive mirror* for instance. It is intended to induce users to adopt a healthy lifestyle by presenting them with an image of how they will look like in future if they keep up on their current pattern of life (Knight 2005). Here, designers have not simply been concerned with the removal of possible immoral outcomes of a technology. They have rather achieved something more. They seem to also have intentionally implanted a certain value into a piece of material, namely, encouraging users to reform their lifestyle. That is a crucial challenge then to decide first to which degree we wish to moralize technologies. Another way to put it is the question that how much morality is going to be delegated to artefacts?

Since I have already criticized extensively the maximal way of intervention in chapter two I will not reiterate my arguments here. Just I would like to briefly remind the reader that I took issue with the maximal approach to moralization on the ground that it would undermine the very foundation of morality ultimately which consists in human's freedom. Therefore, I will stick with a minimal method, albeit I try to articulate it through an alternative vocabulary. In this way, I suggest while in case of morally negative mediations we need to intervene maximally, in conditions where we are encountered with morally neutral, or presumably positive mediations, we have to stay passive. Schematically one can illustrate this in the following table;

	neutral/positive mediation	negative mediation
maximal intervention		
minimal intervention		

The Degree of Moralization of Technology

If a given technology is proved to be producing morally adverse results we need to intervene and eradicate subsequently the respective mediation *as much as possible,* i.e., maximally. In contrast, if a technology is considered to be generating nothing hostile – or presumably positive mediations- we should stay *passive*. Put simply, while we have to minimize the detriment of technology as much as possible, we don't need to, or rather we should not, maximize the desirable results. Consequently, in the table above, out of four quadrants, the left down as well as up right will be crossed, while the other quadrants will be left blank. This way, I believe, freedom of users is not infringed, yet we have managed to minimize the negative effects of the technology in question.

My suggestion, as said, is equal to the minimal intervention Verbeek elaborates. I just preferred to revise the vocabulary to eradicate any probability that this approach might reduce to the existing methods of *risk managements*. By stressing a maximal intervention in case of *any* evil mediation I try to highlight that designers' intervention is not limited to the cases a *fatal* outcome is going to come along. Rather all hostile mediations, irrespective to the degree of their threat, need to be mitigated as much as possible. The imperative instruction, accordingly, would be as follows:

In case of neutral or presumably positive mediations i.e., mediations which have been discerned not to be violating the objectives, we would remain passive. In case of negative mediations, in contrast, i.e., mediations which have been detected to be detrimental to the objectives, we will intervene maximally to remove the defect(s) as much as possible[21].

This way, I have managed to enunciate my schema for moralization of technology. To make it even clearer, now I would like to apply the schema on a case study to show how it works in practice. I will explore here a certain type of technology, that is, bank cards, to exemplify the process of moralization I have laid out in this chapter.

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[21] I will not go into the details of how all these insights are going to be load into technology. Yet my schema is abstract enough to be consistent with any approach. For instance, the practical stage of the schema may square with Verbeek's suggestions, e.g., using methods like *Value Sensitive Design* (VSD) and *moral inscription* (see chapter two).

An Application; Moralization of Bank Cards

In this section I will put my schema into practice to see how it might work. Credit/debit cards nowadays are the dominant fashion of payments and in this sense, we usually don't use cash for our purchase. Provided the facilitation of the bank cards for payment, using cash no longer is the preeminent method for payment. It appears then we are moving toward a cashless economy. But as mediation theory has taught us no artefact can be innocent. Every technology mediates our perception as well as behavior. Bank cards are of course no exception. Mediation of a technology furthermore is usually multifaceted. There is an array of alterations which might be brought about by a technology. Here I would like to explore the case of bank card in light of my schema.

To that purpose and in line with the schema I try first to provide a descriptive account of mediations of the cards. In particular, one specific possible mediation will be highlighted, namely the latter's invitation to an extravagant behavior[22]. My tool to provide such a description, as mentioned earlier, is the comprehensive account of mediation.

One may differentiate the way of mediation of cards from that of cash. Before going to specificities however a word about money, in general, is in order. Money may mediate the way world is perceived. It transforms the world from a collection of *things* into a collection of *goods,* as it were. From snacks in a café and cloths in a shopping store to lands, all seem to be *buyable* once money is involved. In this way, all methods of payment, ranging from coins, notes, cards and cryptocurrencies to check books, are the same when it comes to transformation of the world around into a collection of *products* present to us. Even human actions might be revealed as something tradable, as a *service,* in the wake of money. Money then seems to turn the whole world into a shopping center whose vitrine is filled with a diversity of products and services to satisfy human's appetite.

Money, in this sense, might be conceived of as an objective ruler to measure everything through assigning a monetary value, that is to say, it serves as a criterion to arrange things in order respective to their values. Moreover, it is not just things or actions which come to appear as goods

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[22] A body of literature suggests that cards for payment may incline users to overspending (e.g., Hafalir and Loewenstein 2009; Humphrey 2004; Prelec and Simester 2001).

and services to be bought. Imagine an artwork, say a painting. It appears as a good too, tradable in the wake of money. Here, it is not just a canvas, or the work having been put into it, as the object of trade, but, more importantly, the *beauty* or its *ethnicity* is the subject of trade. Money, therefore, may translate objects even as abstract as beauty, antiquity or authenticity into a *monetary value*, that is, a number[23].

What about particular methods of payment? When it comes to the particular methods of payment however each method imposes its specific force, dependent on its particular characteristics. Hereafter, things need to be studied in their specificity. More important is the physical configuration of coins and notes on the one hand, and cards on the other, which features. Think of cash first; coins or notes have first and foremost inscribed numbers on them. Numbers matter, they are signs anyway, they denote something beyond. Numbers imply a meaning for the possessor of the money. Numbers on the notes and coins are indications alluding to the values of things. If so, then the visibility of the numbers might affect the owner. Empirical findings too have documented that numbers play a significant role in the way one behaves (e.g., Amelie Gamble et al. 2002). According to a study, five notes of 10$, for example, don't have the same effect as with one single paper of 50$ (Gamble et al. 2002).

Besides numbers, one may also think of the bodily-sensorial contact with notes and coins, to identify how it might resonate with the possessor. Once one comes to pass on the cash while payment she might feel the money is shrinking. All these observable and tangible dimensions seem to be quite discernible while paying with notes and coins.

Now, coins and notes, with their specific configuration mediate human's behavior in a specific manner. As mentioned, tangible properties of notes and papers are integral in their mediation. A buyer, after all, is primarily encountered with the visual or sensorial properties of the coins and notes. Since then the physical characteristics of the coins and notes may cause the world to be revealed in a certain way, something as follows; a world where one has a carrier, that she is being paid in exchange of her efforts, that she has to meet a desirable efficiency to get paid, that the earnings are not unlimited requiring her accordingly to be thrifty, that she has to wait until the end of the month to receive her salary, that she may even be laid off once a global recession occurs,

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[23] For a classical treatment of money in its historical context, see Simmel (1991).

and the list may continuously go on. These all might be the underlying feeling of a buyer while paying and they might subsequently cause an immediate pain in her. Such a pain in turn might hinder her extravagance.

In fact, the key element in the mediation of cash, is *reading* or *interpreting* the signs, it seems; from numbers inscribed on the coins and notes to their weight, to the rest of the physical characteristics. Put in Ihde's notions, one seems to be holding a *hermeneutic* relationship with the coins and notes while the payment process is being implemented. Visible physical properties probably would persuade her to take signs into her considerations, and from here on, a mediated world may come into one's consciousness, as elaborated.

Things work differently though when it comes to the bank cards. There is no meaningful number printed on the cards for signification. There is no change in the weigh or the numbers on the artefact during payment, that is to say, the appearance seems to survive intact. Hence, there should be a distinct way of mediation so long as cards are involved. When someone is paying with a card the physical appearance of the card does not undergo any change to signify for instance the level of money in the respective bank account. Unlike cash, there is nothing on the outward appearance of the cards to indicate the purchasing power of the holder. In this sense, cards tend to veil the backstage. Cards dispose of what is behind the curtain, namely the amount of money both being spent and remaining in the respective bank account. Payment cards are *transparent* in this sense. They seem to withdraw themselves from attention of the owners, i.e., they fade away one might say. As habituation grows the use of card becomes unconscious and consequently the backstage starts to disappear. One also may speak of the degree to which *sedimentation* have occurred. Cards become merged with the owners, so to speak, where the latter are connected to the world *through* the cards. Postphenomenologically speaking, one seems to bear an *embodiment relationship* to the card while purchasing, in case a sufficient level of familiarity with it is developed already. During payment, purchased commodities and the accompanying euphoric, would rush stand in the foreground to the extent that the world behind the card comes to fade into background.

All these intuitions are in congruent with the corresponding empirical findings. According to some studies, the transformation of payment methods has led to a different pattern of purchasing behavior (e.g., Chatterjee and Rose 2012). More particularly, people using cards are more likely to overspend. Besides, such an alteration is not just quantitative, rather qualitative as well. It

implies that not only people engaged with card are more likely to waste resources, but they would fill their basket likely with a diverging selection than those paying in cash (Soman 2003). In this sense, the likelihood of purchasing unhealthy foods significantly surges once one is paying with cards (Thomas et al. 2011). Even Soetevent (2011) observes that in case of making donation debit cards usually would lead to more generous donations.

In sum, since bank cards are transparent enough to dispose of the world behind (mediation of the perception) they might invite to a consumerist style (mediation of the behavior) provided the embodiment relationship with the holders. In contrast, coins and notes with their visual and sensorial features (mediation of the perception) might invite to a thriftier attitude (mediation of the behavior) given the hermeneutic relationship with the owner.

As said earlier, mediation usually is not sole dimensional. There is an array of effects one may identify as the mediations of a given artefact. Therefore, we need to move forward and examine further dimensions. However, to put my schema into effect there arises a problem. As I said before, in order to exercise the schema I put forward, and in particular to provide a descriptive account of a technology, we need a collaborative endeavor with the participation of all stakeholders. Moreover, we need conducting experimental studies, to bring all dimensions into view. For instance, in case of bank cards, on the basis of my integrated framework, we need to go through the history of development of bank cards and in particular the way they have stabilized within society, as SCOT scholars suggest. But we lack all this information at the moment. Subsequently, my case study being explored in this section, should be taken just as a rough expression of the schema. Yet I will continue outlining the descriptive account of bank cards to finish the tale.

I try to speculate on some of other aspects of mediation of cards. However all these would need to be confirmed or rather extended through empirical and collaborative endeavor as said. Cards veil the amount of money each user owns at any given moment. This might also come as an advantage for non-wealthy individuals. They may have felt embarrassed if they had to pay in cash. While holding cash in hand or purse, standing in a queue, the differences between the poor and the rich would have grown visible most likely. While the rich may hold a huge amount of money in the hand or her purse the former wouldn't. This might have given a feeling of embarrassment in turn for the poor. Cards in contrast, make all owners to seem similar, that is to say, cards turn the queue

into a *classless* society. The poor, accordingly, might be granted a feeling of confidence this way. Cards, in this sense, might contribute to the feeling of equality in society.

As a further possible mediation, one may point to, evidently, the comfort which is brought about by cards. With a single card in the pocket one may travel without any worry for carrying cash all the way down to a place. Such phenomenological reflections may still go one to bring further details into view, however for my purpose this length suffices.

So far, all possible mediations have been outlined from a postphenomenological perspective. As made evident, drawing upon ANT, we can also go beyond the phenomenological approach to pinpoint other possible mediations. The trick laying doing an ANT-oriented research is placing the respective technology in a network, where all its actual connections are brought in to explore all transformations (mediations). For example, here one can point to the role of online platforms for purchase and their connection to the card payment. How do they reinforce one another? Would have online shopping been so pervasive if cards had not been developed? And the reverse, how accessibility of cards may promote online shopping? What is the role of ads as well as quick delivery services in promoting card usage? And again, the opposite, how availability of cards may affect ads and quick delivery services? What is the role of banks in such an immense usage of cards, in terms of, for instance, granting credit to the clients enabling them to spend future resources ahead of time? How may be the rules and regulations of the governmental organizations in terms of card usage? For example, how the prohibition of payment in cash in some organizations, aiming at restricting corruption, may affect the card usage? How a society may undergo modifications once a growing percentage of the individuals use cards, and not cash? How might it change the relationships among individuals? For example, it might be said that thanks to cards no longer people may be confused recalling if they have paid their debt to a friend since they can easily double check the payment history. This may in turn discard some misunderstandings among friends. Or, in a different vein, one may refer to the negative consequences as well. For example, thanks to card payments, the consumption of paper, in the form of receipts, might increase. Or it might happen casually that at the very moment of payment pin code of the card is not recalled by the owner, especially in case of elderlies. This may create difficulties in turn if the latter are in a queue at a shopping center having to face accordingly the complains of others. Growing accustomed to the cards also might cause problems in places where only cash is accepted.

Because we would probably forget in this case to take cash with us. This may also bring about complexities among people. Or an ANT-oriented observation may reveal that a cashless economy may have the advantage of a lower chance of spreading a contagious virus across people, due to interruption of the chain of cash transitions. This list as well, like the one associated with postphenomenology, may still go on. ANT has a great potential to place an artefact in a wider context wherein all connections grow visible. Through such a network-oriented approach one can detect societal aspects of a technology. Bringing in all stakeholders, along with all tools for anticipation, imaginations, brainstorming and empirical findings, may help designers to complete such a descriptive list; a list of all possible mediations of bank cards.

So, while I admit again that my list of possible mediations is far from perfect for the sake of simplicity one can assume now we have a descriptive account of all a certain technology might result in. Now, we need to move forward and get to the *evaluation* phase to see where, if any, morals are being infringed. Once a particular mediation is proven to be violating objectives designers would be required accordingly to start the healing process. In the foregoing case for instance, we realized how cards might promote, among others, consumerism, or how they might grant a feeling of equality (or equally feeling of comfort). If the latter, i.e., the feeling of equality, is going to be scored positive (or alternatively neutral) in light of our objectives, designers will do nothing. In contrast, if promoting a consumerist behavior, is proven negative and prone subsequently to violate, in one way or another, the objectives, then we would need to alleviate the artefact, as much as possible. Such a directive is the expression of our strategy of adopting minimal/maximal approach in moralization of technology.

To put things in a neat order we can draw a table as follows. Here, for the sake of argument, I have placed Fletcher's objective list as the ultimate objectives (Fletcher 2012). His list includes achievement, friendship, happiness, pleasure, self-respect and virtue. Basically, one can think also of another frameworks. My preference here is arbitrarily, and as said before, I would not take any position with regard to the existing lists in the literature. In light of his particular values a table can be drawn as follows;

	Achievement	Friendship	Happiness	Pleasure	Self-Respect	Virtue
Neutral/Positive mediation						
Negative mediation						

Classification of the possible mediations

In the top horizontal row we may put our basic values. In the first vertical row we can differentiate neutral/positive mediations from negatives. Now we should be able to fill the blanks. To this end we need to carefully associate all possible mediations with one of the alleged basic values[24].

For example, in our case, we may associate card's creation of ease or comfort positively with pleasure, its alleged the feeling of equality positively with self-respect, its role in discarding the misunderstandings among friends positively with friendship and so on. In contrast, we may locate card's consumerism promoting mediation negatively below the virtue, and again, the inquiry may go on.

	Achievement	Friendship	Happiness	Pleasure	Self-Respect	Virtue
Neutral/Positive mediation		Eradicating misunderstandings	Lower the chance of virus spread	comfort	Equality	
Negative mediation						consumerism

Classification of the possible mediations

This way we have managed to provide a thorough evaluation of possibly all mediations of a given technology. All we have gone through may be distilled in the table above. By the table, moreover,

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[24] I am assuming here all goods to be either *intrinsically* good, which already are included in the table, or *extrinsic*ally (instrumentally) goods. In the latter case goods may be associated, in one way or another, with one of the basic goods. Put simply, I am taking for granted that all goods may be *directly* or *indirectly* included in the table.
Both presumptions might be objected. However going through such debates are beyond the purview of the present writing.

designers' duty is surfaced. Now, it is clear what they need to do; leaving neutral or positive mediations alone and redesigning the artifact in a way to prevent creating the alleged negative mediations.

Now, interestingly, our integrated account can also provide designers with practical clues as to how to moralize the artifact in question, i.e., in this case bank cards. As said, in case of neutral or positive mediations we would do nothing whereas in case of negative results we have to take a maximal care of them. Here we did not find any neutral mediation thus we only need to start repairing the negative mediation we detected. Here is the trick.

To point just to one possibility to mitigate the promotion of consumerist attitude by cards, one might think of bringing back a hermeneutic dimension to the card usage, on the basis of what our comparison between card payment and cash payment implied. This might imply in turn inscribing observable indications on the cards which correlate with the realities behind. Cards, in order not to encourage extravagance, need to be disposed of its current transparency. Of course precluding transparency does not necessarily imply also disposing of their ease and comfort. As a possibility one may think of the following alleviative fine-tunings for cards.

Keeping the transactions on hold until the owner confirms a message receiving on her smartphone from the respective bank. The content of the message may come in a variety of ways. It might be for instance a colorful graph to signify both the amount of money being paid and the remaining. The content also may be just a single number signifying the percentage of the money being paid to the remaining. One may even think this ratio to serve also as the pin code required to be entered to implement the payment. Both security of the cards and hermeneutic relationship with them are provided at once this way. Probably one would be able to find a number of further methods to re-designing cards. Yet the idea remains the same; turning transactions non-transparent to bring back the attention of the user while paying.

As stressed several times, in my approach, eradicating the negative mediations is prioritized. In this sense, we would not be willing to deliberately embed positive mediation into technology, yet we would like to eradicate the negative mediations as much as it takes. This implies further that if to eradicate a certain negative mediation we had to neglect also a positive aspect of it we would not hesitate. In our case, if bringing back the hermeneutic aspect to the cards was not possible

unless we neglected one particular positive mediation brought about by cards, we should prioritize the former over the latter. Put simply, we don't have to positively contribute to the morals but we have to mitigate the negative sides as far as possible.

Back to our analysis, besides postphenomenological observations, ANT may also come as a help in re-designing cards. As pointed out, ANT analysis can be practiced, not in isolation but in terms of networks; networks of both humans and technologies. In case of bank cards our analysis would first place cards in a complex network comprising the owners, the respective companies, rules, respective banks and such. Next, ANT may inquire roots of all negative translations along the way of such relationships. Bringing all translations into view, ANT may discern where a hostile mediation lies. It might turn out that for example one major reason for acceleration of the consumerist behavior in human agents may be due to collaborative matrix of cards, ads, online shopping platforms and the quick delivery services. If we intend to mitigate such a negative translation then we have to intervene in either possible relationships among the said actors involved. For instance, as one possibility, banks might better to charge a bit more, consumers of online purchases, as the service fee. This might discourage overspend, to some degree, while still comfort of online shopping is not removed altogether. As the example implies there might be a whole bunch of fine-tunings to curb the negative aspects of using cards.

Conclusion and the Closing Remarks

Technology, as a mark of the contemporary world, is taken by some to be linked to particular modern values, such as productivity, efficiency, efficacy, functionality, instrumentalism, humanism and the like. Such values have been a ground as well as motivation for modern technologies to grow. But this is not all. Technology, more importantly, may also affect humans in return. Part of such effects moreover may come in unanticipated ways and thus may go unnoticed. While the context of emergence of modern technologies deserves to be explored in its own in this writing I tried to lay bare the second path, i.e., the power of technology to affect humans.

In this regard, I examined the ways technology can exercise its force to find a way consequently for moralization of technology. I went through two major frameworks of technology studies, namely, postphenomenology and STS, to find relevant pieces. Except minor dimensions prone to objection, I found the account of postphenomenology, overall, to be plausible. The notion of mediation introduced in the context of postphenomenology seemed quite fruitful. I went also through ANT as well as SCOT teachings to see if they may throw further light on technology's influence. While the ontology of ANT seemed untenable so long as all entities are going to be treated on an equal footing here one could still draw upon ANT *methodologically* (Arzroomchilar 2022a). Hence, even though I was interested in the notions like network and that of translation originated from ANT, I didn't commit myself to its flat ontology. Concerning SCOT, furthermore, while I objected its instrumentalism, I found notions like interpretive flexibility and more importantly its historical approach helpful. In this sense, I suggested to integrate the relevant notions of both frameworks into postphenomenology. As argued, this integration was necessary to explore the mediation of technology in its broadest sense. Postphenomenology, on its own, could not manage to account for everything with regard to technology's mediation. To demonstrate, I introduced two kinds of mediations in particular, i.e., collaborative mediation and causal chain mediation, where postphenomenology proved inadequate explanation. By incorporating relevant pieces of ANT and SCOT we could reach a more comprehensive account for enlightening the mediating role of technology.

Ultimately, in the last station, I came to propose a schema to exercise the task of moralizing technology. My schema could be distilled as consisting of three stages:

1. **Descriptive stage**: Describe all possible mediations of the technology in question by letting all stakeholders participate and through the application of the *comprehensive account.* If a technology is still in the early stage of its design, use VR and gaming to practise this stage.

2. **Evaluative stage:** Record all possible mediations and try to associate each with one of the foundational values in the *classification of the possible mediations* table.

3. **Imperative stage:** Intervene maximally to (re)design the respective technology, in case a specific mediation is *negatively* associated with a certain basic value. In contrast, leave the designing in case a specific mediation is *neutral* or *positively* associated with a certain basic good.

This study, I am hoping, will pave the way to enable designers to cope with the potential harms of technology and increase the benefits of it.

Bibliography

Aagaard J, Friis JKBO, Sorenson J, Tafdrup O, Hasse C (eds). (2018). *Postphenomenological methodologies: new ways in mediating techno-human relationships*. Lexington Books, Lanham.

Achterhuis, H. (ed.) (2001). *American Philosophy of Technology: The Empirical Turn.* Bloomington: Indiana University Press.

Akrich, M. (1992). The de-scription of technical artifacts. In: Bijker WE, Law J (eds), *Shaping technology/building society*. MIT Press, Cambridge, pp 205–224.

Akrich, M. and Latour, B. (1992) A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblies. In W.E. Bijker and J. Law (eds), *Shaping Technology/Building Society* (pp. 259–63). Cambridge, MA: The MIT Press.

aL-Anani, K. (2016). *Inside the Muslim Brotherhood: Religion, Identity, and Politics*. (Religion and Global Politics) 1st Edition.

Arzroomchilar, E. and Novotny, D. (2018). Verbeek on the Moral Agency of Artefacts. *F organon*, vol. 25, No 4, pp. 517-538.

Arzroomchilar, E. (2022a). Some Suggestions to Improve Postphenomenology. *Human Studies,* 45 (1):65-92.

Arzroomchilar, E. (2022b). Techno-Radicalism: An Account of Radicalism in the Technology Era. *International Journal of Cyber Warfare and Terrorism (IJCWT)*, Volume 12, Issue 1, Article 5.

Arzroomchilar, E. Forthcoming. 'Structural Ethics' As a Framework to Study the Moral Role of Non-Humans. *Techne´: Research in Philosophy and Technology.*

Awan, I. (2017). Cyber-Extremism: Isis and the Power of Social Media. *Society*, vol. 54, no. 2, 2017, p. 138 pp.

Barzilai-Nahon, K and Barzilai, G. (2005). Cultured Technology: The Internet and Religious Fundamentalism, *The Information Society*, 21:1, 25-40, DOI: 10.1080/01972240590895892.

Bendor, R. (2018). *Interactive Media for Sustainability*. Palgrave Macmillan. Springer English.

Benmelech, E., & Klor, E. F. (2018). What explains the flow of foreign fighters to ISIS? *Terrorism and Political Violence*. https://doi.org/10.1080/09546553.2018.1482214

Beyer, C. (2018). Edmund Husserl. *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2018/entries/husserl/>.

Bijker, W. E. (1995). *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change. Cambridge.* MA: MIT Press.

Bijker, W. E. (2001). Understanding Technological Culture through a Constructivist View of Science, Technology, and Society. In (eds.) S.H. Cutcliffe, C. Mitcham, *Visions of STS. Counterpoints in science, technology, and society studies* (19-34). Albany, NY: State University of New York Press

Bijker, W. E. (2010). How Is technology made?—That is the question! *Cambridge Journal of Economics*, 34, 63–76.

Borgmann, A. (1984). *Technology and the Character of Contemporary Life*. Chicago: University of Chicago Press.

Borgmann, A. (1992). *Crossing the Postmodern Divide*. Chicago: University of Chicago Press.

Brennan, A and Norva Y. S. Lo. (2022). Environmental Ethics. *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), forthcoming URL = <https://plato.stanford.edu/archives/sum2022/entries/ethics-environmental/>.

Brey, P. (2010). Philosophy of Technology after the Empirical Turn January. *Society for Philosophy and Technology Quarterly Electronic Journal*, 14(1). DOI: 10.5840/techne20101416.

Brey, P. (2014). From Moral Agents to Moral Factors: The Structural Ethics Approach. In P. Kroes & P. P. Verbeek (Eds.), *The Moral Status of Technical Artifacts* (pp. 125-142). Dordrecht: Springer.

Briggle, A., and Mitcham, C. (2012). *Ethics and science: An introduction*. Cambridge University Press.

Brülde, B. (2012). Human enhancement and well-being: In P. Brey, A. Briggle, och E. Spence (red.), *The Good Life in a Technological Age*. pp. 251-259. Routledge. New York.

Callon, M. (1986). Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay, in J. Law (ed.), *Power, Action and Belief: A New Sociology of*

Knowledge? London: Routledge and Kegan Paul, 96–233.

Callon, M. and Latour, B. (1981). Unscrewing the big Leviathan. In K.D. Knorr-Cetina and M. Mulkay (eds), *Advances in Social Theory and Methodology* (pp. 275–303). London: Routledge and Kegan Paul.

Carter, J. A., Maher, S., & Neumann, P. R. (2014). #Greenbirds: Measuring importance and infuence in Syrian foreign fghter networks. *Retrieved from the International Centre for the Study of Radicalisation and Political Violence.* https://icsr.info/wp-content/uploads/2014/04/ICSR-Report-Greenbirds-Measu ring-Importance-and-Infeunce-in-Syrian-Foreign-Fighter-Networks.pdf

Chatterjee, P., Rose, R.L. (2012). Do Payment Mechanisms Change the Way Consumers Perceive Products? *Journal of Consumer Research* 38, 1129-1139.

Crisp, R, (2017). Well-Being. *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/fall2017/entries/well-being/>.

Dorrestijn, S. (2012). Technical Mediation and Subjectivation: Tracing and Extending Foucault's Philosophy of Technology. *Philos. Technol*. 25, 221–241. https://doi.org/10.1007/s13347-011-0057-0

Dorrestijn, S. (2017). The Care of Our Hybrid Selves: Ethics in Times of Technical Mediation. *Found Sci* 22, 311–321. https://doi.org/10.1007/s10699-015-9440-0

Ellul, J. (1964). *The Technological Society*. New York: Vintage Books.

Feenberg, A. (1999). Questioning technology. Routledge, New York.

Feenberg, A. (2002). *Transforming technology: A critical theory revisited*. New York, N.Y: Oxford University Press.

Fletcher, G. (2012). The Locative Analysis of Good For Formulated and Defended. *Journal of Ethics and Social Philosophy (JESP)*, 6(1).

Fletcher, G. (2016). *The Philosophy of Well-Being: An Introduction*. Routledge.

Foucault, M. (1977). *Discipline and punish: The birth of the prison*. New York: Random House.

Foucault, M. (1992). *The use of Pleasure: The history of sexuality (Vol. 2).* London: Vintage Books.

Franssen, M, Gert-Jan, L, and de Poel, I.F. (2018). Philosophy of Technology. *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/fall2018/entries/technology/>.

Gamble, A., Gärling, T., Charlton, J., Ranyard, R. (2002). Euro Illusion: Psychological Insights into Price Evaluations with a Unitary Currency. *European Psychologist*. 7. 302-311. 10.1027//1016-9040.7.4.302.

Garde, j., and van der Voort, M. C. (2017). Could Lego Serious Play be a useful technique for product co-design? *Design Research Society 50th Anniversary Conference*. Brighton, UK, 27–30 June 2016.

Goldin, C and Katz, L.F. (2002). The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions. *Journal of Political Economy,* 110:730–70.

Gutting, G. and Oksala, J. (2019). Michel Foucault. *The Stanford Encyclopaedia of Philosophy*, Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/spr2019/entries/foucault/>.

Hafalir, E. I., Loewenstein, G. (2009). *The impact of credit cards on spending: a field experiment.* SSRN eLibrary.

Hansson, S. O. (2017). Theories and Methods for the Ethics of Technology. In (ed.) S. O. Hansson, *The Ethics of Technology Methods and Approaches*. Rowman & Littlefield Publishers; Annotated edition. USA.

Hasse, C. (2018). Studying the Telescopes of Others Toward a Postphenomenological Methodology of Participant Observation. In J, Aagaard, JKBO, Friis, J, Sorenson, O,Tafdrup, C, Hasse (eds), *Postphenomenological methodologies: new ways in mediating techno-human relationships* (241-258). Lanham, MD: Lexington Books/Rowman Littlefield PressKittler, F .(1986). *Gramophone, film, typewriter*. Stanford University Press, Stanford.

Heidegger, M. (1977). The Question Concerning Technology. In *The Question Concerning Technology and Other Essays*, trans. W. Lovitt. New York: Harper & Row.

Heidegger, M. (2000). *Being and Time* (trans: Macquarrie J, Robinson E). Oxford, Blackwell.

Huijer M. (2017). A Critical Use of Foucault's Art of Living. *Foundations of science*, 22(2), 323–327. https://doi.org/10.1007/s10699-015-9441-z.

Humphrey, D. B. (2004). Replacement of cash by cards in US consumer payments. *Journal of Economics and Business*, 56, 211-225.

Ihde, D. (1990). *Technology and the lifeworld: From garden to earth*. Bloomington: Indiana University Press.

Ihde, D. (1991). *Instrumental realism*. Bloomington: Indiana University Press.

Ihde, D. (1993). *Postphenomenology – Essays in the postmodern context*. Evanston: Northwestern University Press.

Ihde, D. (1999). Technology and Prognostic Predicaments. *AI & Society*. 13: 44–51.

Ihde, D. (2006). Forty Years in the Wilderness. In E. Selinger (ed): *Postphenomenology: A Critical Companionto Ihde*. State University of New York Press, Albany, 2006.

Ihde, D. (2008). Ironic Technics. New York: Automatic Press/VIP.

Ihde, D. (2009). *Postphenomenology and technoscience: The Peking University lectures*. Albany, NY: SUNY Press.

Ihde, D. (2011). Husserl's Galileo needed a telescope! *Philosophy of Technology*, 24, 69–82. https://doi.org/ 10.1007/s13347-010-0004-5

Ihde, D. (2016). *Husserl's missing technologies*. Fordham University Press, The Bronx.

Illies, C & Meijers, A. (2014). Artefacts, Agency, and Action Scheme. In Kroes, P. & Verbeek, P. P. (eds.) *The Moral Status of Technical Artefacts* (pp. 159-184). Dordrecht: Springer.

Kharpal, A. (2021). WhatsApp delays privacy update over user 'confusion' and backlash about Facebook data sharing. *CNBC*. Retrieved, January 18, 2021.

Kiran, A., N. Oudshoorn, P.P. Verbeek (2015), Beyond checklists: toward an ethical-constructive technology assessment. *Journal of Responsible Innovation* 2:1, pp. 5 – 19.

Kiran, A. H. (2016). Four Dimensions of Technological Mediation. In J, Aagaard, JKBO, Friis, J, Sorenson, O, Tafdrup, C, Hasse (eds), *Postphenomenological methodologies: new ways in mediating techno-human relationships* (pp. 123-141). Lanham, MD: Lexington Books/Rowman

Littlefield PressKittler, F .(1986). *Gramophone, film, typewriter*. Stanford University Press, Stanford.

Klausen, J. 2015. Tweeting the Jihad: Social Media Networks of Western Foreign Fighters in Syria and Iraq. *Studies in Conflict & Terrorism*, 38, 1–22.

Knight, W. (2005). Mirror That Reflects Your Future Self. *New Scientist*, no. 2485 (February 5, 2005): 23.

Kockelkoren, P. (2003). *Technology: Art, fairground, and theatre*. Rotterdam: NAI Publishers.

Kroes, P. (2012). *Technical Artefacts: Creations of Mind and Matter, A Philosophy of Engineering Design*. Springer publication.

Latour, B. (1983). Give me a laboratory and I will raise the world. In K. Knorr- Cetina and M. Mulkay (eds), *Science Observed* (pp. 141–70). London and Beverly Hills: Sage.

Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Cambridge, MA: Harvard University Press.

Latour, B. (1988). *The Pasteurization of France*. Cambridge (Mass.): Harvard University Press.

Latour, B. (1990). Drawing things together. In M. Lynch and S. Woolgar (eds), *Representations in Scientific Practice* (pp. 19–68). Cambridge, MA: The MIT Press.

Latour, B. (1991). Technology is society made durable. In J. Law (ed.), *A Sociology of Monsters* (pp. 103–31). London: Routledge.

Latour, B. (1992). Where Are the missing masses? The sociology of a few mundane artifacts. In: Bijker WE, Law J (eds), *Shaping technology/building society*. MIT Press, London, pp 226–258.

Latour, B. (1993). *We have never been modern*. London: Prentice Hall. (Original in French 1991).

Latour, B. (1996). On interobjectivity. *Mind, Culture and Activity*, 3(4), pp. 228–45.

Latour, B. (1999a). *Pandora's hope: Essays on the reality of science studies*. London: Harvard University Press.

Latour, B. (1999b). 'On Recalling ANT', in J. Law and J. Hassard (eds.), *Actor Network and After*. Oxford: Blackwell Publishers, pp. 15–25.

Latour, B. (2004). *Politics of Nature*. Cambridge (Mass.): Harvard University Press.

Latour, B. (2005). *Reassembling the social: an introduction to actor-network-theory*. Oxford University Press, Oxford.

Latour, B. (2020). Interview by Guardian. https://www.theguardian.com/world/2020/jun/06/bruno-latourcoronavirus-gaia-hypothesis-climate-crisis

Latour. B. and Woolgar, S. (1986). *Laboratory Life: The Construction of Scientific Facts.* Princeton University Press.

Li-Hua, R. (2009). The Definition of technology. In (eds.) K.B. Olsen, S.A. Pedersen and V.F. Hendricks, *A Companion to the Philosophy of Technology*. Oxford, UK: Blackwell.

Lo, H., & Harvey, N. (2011). Shopping without pain: Compulsive buying and the effects of credit card availability in Europe and the far east. Journal of Economic Psychology, 32, pp. 79-92.

Mahmood, R., & Jetter, M. (2019). Communications technology and terrorism. *Journal of Conflct Resolution*. https://doi.org/10.1177/0022002719843989.

McLuhan, M. (2003). *Understanding media: The extensions of man* (Critical edition by W.T. Gordon). Corte Madera, CA: Gingko Press.

Merleau-Ponty, M. (2012). *Phenomenology of perception (D. A. Landes, Trans.)*. Routledge. Prior translation, 1996, Phenomenology of Perception, Trans. Colin Smith. London and New York: Routledge. From the French original of 1945.

Micheal, M. (2017). *Actor-Network Theory: Trials, Trails and Translations*. SAGE Publications Ltd.

Oudshoorn, N. (2003). *The Male Pill: A Biography of a Technology in the Making*. Durham, NC: Duke University Press.

Passoth, J. H., Peuker, B., & Schillmeier, M. (Eds.). (2012). *Agency without Actors?: New Approaches to Collective Action (1st ed.)*. Routledge. https://doi.org/10.4324/9780203834695.

Peterson, M. & Spahn, A. (2011). Can Technological Artefacts Be Moral Agents? *Science and Engineering Ethics*, 17(3), 411-424.

Peterson, M. (2017). *The Ethics of Technology: A Geometric Analysis of Five Moral Principles.* Oxford: Oxford University Press.

Pinch, T. J., & Bijker, W. E. (1984). The social construction of facts and artifacts: Or how the sociology of science and the sociology of technology might benefit each other. *Social Studies of Science*, 14(3), pp. 399–441.

Pinch, T. J., & Trocco, F. (2002). *Analog Days: The Invention and Impact of the Moog Synthesizer*. Cambridge, MA: Harvard University Press.

Postman, N. (1985). *Amusing Ourselves to Death: Public Discourse in the Age of Show Business*. NY: Penguin Books.

Prelec, D., Simester, D. (2001). Always leave home without it: A further investigation of the credit-card effect on willingness to pay. *Marketing letters,* 12, 5-12.

Preston, B. (2009). Philosophical theories of artifact function. In A. Meijers (Ed.), *Philosophy of technology and engineering sciences* (Vol. 9, pp. 213–233). Amsterdam: Elsevier.

Rivers, T.J. (2005). An introduction to the metaphysics of technology. *Technology in Society*, 27(4).

Rosenberger, R. (2013). The Importance of Generalized Bodily Habits for a Future World of Ubiquitous Computing. *AI & Society* 28: 289–296.

Rosenberger, R. (2014a). The Phenomenological Case for Stricter Regulation of Cell Phones and Driving. *Techné: Research in Philosophy & Technology,* 18(1/2): 20–47.

Rosenberger, R. (2014b). Multistability and the Agency of Mundane Artifacts: From Speed Bumps to Subway Benches. *Human Studies* 37: 369–392.

Rosenberger, R. (2017a). *Callous Objects: Designs Against the Homeless*. Minneapolis: Minnesota University Press.

Rosenberger, R. (2017b). On the hermeneutics of everyday things: Or, the philosophy of fire hydrants. *AI & Society*, *32*, 233–241.

Rosenberger, R. (2018). Why It Takes Both Postphenomenology and STS to Account for Technological Mediation The Case of LOVE Park. In J, Aagaard, JKBO, Friis, J, Sorenson, O,Tafdrup, C, Hasse (eds), *Postphenomenological methodologies: new ways in mediating techno-human relationships* (pp. 171-198). Lanham, MD: Lexington Books/Rowman Littlefield Press

Rosenberger, R., & Verbeek, P.-P. (2015). A field guide to postphenomenology. In R. Rosenberger & P.-P. Verbeek (Eds.), *Postphenomenological Investigations: Essays on Human-Technology Relations* (pp. 9–40). Lanham, MD: Lexington Books/Rowman Littlefield Press.

Sageman, M. (2008). *Leaderless Jihad*. Philadelphia: University of Pennsylvannia Press.

Searle, J.R. (1995). *The Construction of Social Reality*. Free Press.

Selinger, E., Ihde, D., Van De Poel, I., Peterson, M. & Verbeek, P. P. (2012). *Er-ratum to: Book Symposium on Peter Paul Verbeek's Moralizing Technology: Un-derstanding and Designing the Morality of Things*. Chicago: University of Chi-cago Press, 2011. Philosophy & Technology 25(4), 605-631.

Seubold, G. (1986). *Heideggers Analyse der neuzeitlichen Technik*. Freiburg-München: Alber, 1986.

Shehabat, A., Mitew, T., Alzoubi, Y. (2017). Encrypted Jihad: Investigating the Role of Telegram App in Lone Wolf Attacks in the West. *Journal of Strategic Security* , Vol. 10, No. 3, pp. 27-53.

Simmel, G. (1991). Money in Modern Culture. *Theory, Culture and Society*, sage, 8, pp. 17-31.

Steger, M., Shin, J, Y. (2012). Happiness and Meaning in a Technological Age: A Psychological Approach. In P. Brey, A. Briggle, och E. Spence (red.), *The Good Life in a Technological Age*. pp. 92-108. Routledge. New York.

Soetevent, A.R. (2011). Payment choice, image motivation and contributions to charity: evidence from a field experiment. *American Economic Journal: Economic Policy,* 3, pp. 180-205.

Smith, D.W. (2018). Phenomenology. *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2018/entries/phenomenology/>.

Soman, D. (2003). The effect of payment transparency on consumption: Quasi-experiments from the field. *Marketing Letters,* 14, pp. 173-183.

Sunstein, C. R. (2007). republic.com 2.0. Princeton University Press.

Sørensen, K. (2005). Domestication: the enactment of technology. In T. Berker et al. (Eds.), *Domestication of media and technologies* (pp. 40–61). Maidenhead: Open University Press.

Tenner, E. (1996). *Why Things Bite Back: Technology and the Revenge of Unintended Consequences*. New York: Vintage Books.

Thalen, J. P., & van der Voort, M. C. (2012). Facilitating User Involvement in Product Design Through Virtual Reality. In Xin-Xing Tang (Ed.), *Virtual Reality - Human Computer Interaction* (pp. 17-22). InTech. https://doi.org/10.5772/3333.

Thomas, M, Desai, K. K., Seenivasan, . (2011). How Credit Card Payments Increase Unhealthy Food Purchases: Visceral Regulation of Vices, *Journal of Consumer Research*, Volume 38, Issue 1, pp. 126–139, https://doi.org/10.1086/657331.

Verbeek, P. P. (2001). Don Ihde: The technological lifeworld. In H. Achterhuis (Ed.), *American Philosophy of Technology: The Empirical Turn* (pp. 119–146). Bloomington, IN: Indiana University Press.

Verbeek, P. P. (2005). *What things do: Philosophical reflections on technology, agency, and design*. Pennsylvania: Pennsylvania State University Press.

Verbeek, P. P. (2008) Obstetric Ultrasound and the Technological Mediation of Morality: A Postphenomenological Analysis. *Hum Stud* 31, 11–26. https://doi.org/10.1007/s10746-007-9079-0.

Verbeek, P. P. (2009). Let's Make Things Better: A Reply to My Readers. *Human Studies,* 32(2), pp. 251-261.

Verbeek, P. P. (2011). *Moralizing technology: Understanding and designing the morality of things*. Chicago & London: The University of Chicago Press.

Verbeek, P.P. (2014). Some Misunderstandings About the Moral Significance of Technology. In Kroes, P. & Verbeek, P. P. (eds.) *The Moral Status of Technical Artefacts* (pp. 75-88). Dordrecht: Springer.

Veehoven, R. (2012). Quality of Life in Technological Society: A Macrosociological Approach. In P. Brey, A. Briggle, och E. Spence (red.), *The Good Life in a Technological Age*. pp. 55-76. Routledge. New York.

de Vries, G. (2016). Bruno Latour. Polity Press.

Waelbers, K. (2011). *Doing Good With Technologies: Taking Responsibility for the Social Role of Emerging Technologies*. New York: Springer.

Waters, B. (2006). *From Human to Posthuman: Christian Theology and Technology in a Postmodern World*. Burlington, VT: Ashgate Publishing Limited.

Winner, L. (1980). Do Artifacts Have Politics? *Daedalus*, 109 (1), pp. 121-136.