A Reflection on Philosophy of Technology and Technological Determinism

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Abstract

Philosophy of technology emerged as a discipline that mostly been concerned with the impact of technology on society and culture, rather than with technology. Only recently a branch of the philosophy of technology has developed that is concerned with technology itself and that aims to understand both the practice of designing and creating an artificial processes and systems and the nature of the things so created. Philosophical reflection on technology is as old as philosophy itself. Technological determinism is the notion that technological change and development is inevitable, and that the characteristics of any given technology determine the way it is used by the society in which it is developed. Technological determinism focuses on causality - cause and effect relationships - a focous typically associated with 'scientific' explanation. Technological determinism is also referred to as 'The technological imperative' and universalism. Technological determinism stands in opposition to the theory of the social construction of technology. Hard determinists consider technology as developing independent from social concerns. Soft Determinism, gives a more passive view of the way technology interacts with socio-political situations.

Introduction

The philosophy of technology is a philosophical field dedicated to studying the nature of technology and its social effects. During the last two centuries, philosophy of technology emerged as a discipline that mostly been concerned with the impact of technology on society and culture, rather than with technology itself. According to C. Mitcham (1994) philosophy of technology is 'humanities philosophy of technology' because it is continuous with social science and the humanities. Only recently a branch of the philosophy of technology has developed which is concerned with technology itself and that aims to understand both the practice of designing and creating an artificial processes and systems and the nature of the things so created. This latter branch of the philosophy of technology seeks continuity with the philosophy of science and with several other fields in the analytic tradition in modern philosophy, such as the philosophy of action and decision-making, rather than with social science and the humanities. Philosophy of technology is the *systematic clarification of the nature of technology* as an element and product of human culture; it is a systematic reflection on the consequences of technology for human life .

It is also the systematic investigation of the practices of engineering, invention, designing and making of things.

Aim of the study

The purpose of the present study is to give detail information regarding the nature of philosophy of technology and various philosophers view on the origin and nature of philosophy of technology. It is found that philosophical reflection on technology is as old as philosophy itself. Technological Determinism is the belief in technology as a key governing force in society. Different philosophers view on technological determinism focuses the nature and subject matter of technological determinism. All these facts are reflected in my study in detail.

Discussion

Philosophical reflection on technology is as old as philosophy itself. Oldest testimony is found in ancient Greece. The western term 'technology' comes from the Greek term *techne* (art or craft knowledge) and philosophical views on technology can be traced in the very roots

of Western philosophy. A common theme in the Greek view of *techne* is that it arises as an imitation of nature, for example, weaving developed out of watching spiders. In Plato's philosophy he mentions that technology learns from or imitates nature[1]. According to Democritus, for example, house-building and weaving were first invented by imitating swallows and spiders building their nests and nets, respectively. Aristotle referred to this tradition by repeating Democritus' examples, but he did not maintain that technology can only imitate nature: "generally art in some cases completes what nature cannot bring to a finish, and in others imitates nature" [2]. Aristotle also argued in *physis* that nature and *techne* are ontologically distinct because natural things have an inner principle of generation and motion, as well as an inner teleological final cause. While *techne* is shaped by an outside cause and an outside *telos* which shapes it.[3] Natural things strive for some end and reproduce themselves, while *techne* does not. In Plato's *Timaeus*, the world is depicted as being the work of a divine craftsman (Demiurge) who created the world in accordance with eternal forms as an artisan makes things using blueprints. Moreover, Plato argues in the *Laws*, that what a craftsman does is imitate this divine craftsman. Greek craftsmen also became wealthy and often attracted women and men alike.

Aristotle's doctrine of the four causes-material, formal, efficient and final-can also be regarded as early contribution to the philosophy of technology. Aristotle explained this doctrine by referring to technical artifacts such as houses and statues [4]. These causes are still very much present in modern discussions related to the metaphysics of artifacts. Discussions of the notion of function, for example, focus on its inherent teleological or 'final' character and the difficulties this presents to its use in biology. Plato and Aristotle extensively employed of technological images in his *Timaeus*, Plato described the world as the work of an Artisan, the Demiurge. His account of the details of creation is full of images drawn from carpentry, weaving, ceramics, metallurgy, and agricultural technology. Aristotle used comparisons drawn from the arts and crafts to illustrate how final causes are at work in natural processes. Despite their negative appreciation of the life led by artisans, who they considered too much occupied by the concerns of their profession and the need to earn a living to qualify as free individuals, both Plato and Aristotle found technological imagery indispensable for expressing their belief in the rational design of the universe [5]. Although there was much technological progress in the Roman Empire and during the Middle Ages, philosophical reflection on technology did not grow at a corresponding rate. Comprehensive works such as Vitruvius' *De architectura* (first century BC) and Agricola's *De re metallica* (1556)[6] paid much attention to practical aspects of technology but little to philosophy.

In the realm of scholastic philosophy, there was an emergent appreciation for the mechanical arts. They were generally considered to be born of—and limited to—the mimicry of nature. This view was challenged when alchemy was introduced in the Latin West around the mid-twelfth century. Some alchemical writers such as Roger Bacon were willing to argue that human art, even if learned by imitating natural processes, could successfully reproduce natural products or even surpass them. The result was a philosophy of technology in which human art was raised to a level of appreciation not found in other writings until the Renaissance. However, the last three decades of the thirteenth century witnessed an increasingly hostile attitude by religious authorities toward alchemy that culminated eventually in the denunciation *Contra alchymistas*, written by the inquisitor Nicholas Eymeric in 1396 [7].

The Renaissance led to a greater appreciation of human beings and their creative efforts, including technology. As a result, philosophical reflection on technology and its impact on society increased. Francis Bacon is generally regarded as the first modern author to put forward such reflection. His view, expressed in his fantasy *New Atlantis* (1627)[8], was overwhelmingly positive. This positive attitude lasted well into the nineteenth century, incorporating the first half-century of the industrial revolution. Karl Marx did not condemn the steam engine or the spinning mill for the vices of the bourgeois mode of production; he believed that ongoing technological innovation were necessary steps toward the more blissful stages of socialism and communism of the future [9].
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A turning point in the appreciation of technology as a socio-cultural phenomenon is marked by Samuel Butler's *Erewhon* (1872), which he has written under the influence of the Industrial Revolution, and Darwin's *On the origin of species*. This book gave an account of a fictional country where all machines are banned and the possession of a machine or the attempt to build one is a capital crime. The people of this country had become convinced by an argument that ongoing technical improvements are likely to lead to a 'race' of machines that will replace mankind as the dominant species on earth.

During the last quarter of the nineteenth century and most of the twentieth century a critical attitude predominated in philosophical reflection on technology. The representatives of this attitude were, overwhelmingly, schooled in the humanities or the social sciences and had virtually no first-hand knowledge of engineering practice. Whereas Bacon wrote extensively on the method of science and conducted physical experiments himself, Butler, being a clergyman, lacked such first-hand knowledge. The author of the first text in which the term 'philosophy of technology' occurred, Ernst Kapp's *Eine Philosophie der Technik* (1877)[10] was a philologist and historian. Most of the authors who wrote critically about technology and its socio-cultural role during the twentieth century were philosophers like Martin Heidegger, Hans Jonas, Arnold Gehlen, Günther Anders, Andrew Feenberg. They had a general outlook or had a background in one of the other humanities or in social science. Like literary criticism and social research (Lewis Mumford), law (Jacques Ellul), political science (Langdon Winner) or literary studies (Albert Borgmann). The form of philosophy of technology constituted by the writings of these and

others has been called by Carl Mitcham (1994) 'humanities philosophy of technology', because it takes its point of departure in the social sciences and the humanities rather than in the practice of technology. Humanist philosophers of technology tend to take the phenomenon of technology itself almost for granted; they treat it as a 'black box', a unitary, monolithic, inescapable phenomenon. Their interest is not so much to analyze and understand this phenomenon itself but to grasp its relations to morality (Jonas, Gehlen), politics (Winner), the structure of society (Mumford), human culture (Ellul) the human condition (Hannah Arendt) and metaphysics (Heidegger). [11] In this, these philosophers are almost all openly critical of technology: all things considered, they tend to have a negative judgment of the way technology has affected human society and culture, or at least they single out for consideration the negative effects of technology on human society and culture. This does not necessarily mean that technology itself is pointed out as the direct cause of these negative developments. In the case of Heidegger, in particular, the paramount position of technology in modern society is a symptom of something more fundamental, namely a wrongheaded attitude towards *Being* which has been in the making for almost 25 centuries.

`*The Dilemma of Technological Determinism* (1994)[12] Merritt Roe Smith describes technological determinism as "The belief in technology as a key governing force in society". Smith goes on to identify the roots of technological determinism beginning during the industrial revolution. With the evolution of technology, technological determinism has continued to evolve and expand and, along with enframing, seems incredibly appropriate in modern society. The adoption of new technology often occurs with little consideration for its impact. This technological evolution is changing how we learn, how we socialize, and how we approach our daily lives.

Heidegger, in his article *The Question Concerning Technology*, refers to enframing as both a saving power and danger to humanity. This relates to the idea of technological determinism mentioned in his book *Does Technology Drive History.*[13] Heidegger argues that the essence of a thing or its "being" does not necessarily need to be something permanent, that the world around us is filled with instances of things existent in there "essencesness"; moreover, humans can initiate and participate in the process of "bring forth" things and that this "bringing forth" or "enframing" has a number of important implications, not only for humans, but, perhaps, for all things. Technology affects the process of "enframing" and the "bringing forth" of things. It affects the manner, scale, and rate of "enframing" and, consequently, it affects those elements that make-up or participate in the "enframing" process. According to Heidegger, the essence of technology is a way of revealing. He considers the origin of the word "technology", referring to both technique and knowledge. This understanding of technology extends the definition of the word from merely instrumental, to revealing. In contrast to the revealing definition of technology, Heidegger presents modern technology as a "challenge" to world's resources through exploitative methods; however he

states that it also reveals a form of the philosophy of technology that can be regarded as an alternative to the humanities philosophy of technology. It emerged in the 1960s and gained momentum in the past fifteen to twenty years. This form of the philosophy of technology, which may be called 'analytic', is not primarily concerned with the relations between technology and society but with technology itself. It expressly does not look upon technology as a 'black box' but as a phenomenon that deserves study. It regards technology as a practice, basically the practice of engineering. It analyzes this practice, its goals, its concepts and its methods, and it relates its findings to various themes from philosophy. It was not until the twentieth century that the development of the ethics of technology as a systematic and more or less independent sub discipline of philosophy started. This late development may seem surprising given the large impact that technology has had on society, especially since the industrial revolution.

Technological determinism is the notion that technological change and development is inevitable, and that the characteristics of any given technology determine the way it is used by the society in which it is developed. The concept of technological determinism is dependent upon the premise that social changes come about as a result of the new capabilities that new technologies enable. Technological determinism is a reductionist theory that presumes that a society's technology drives the development of its social structure and cultural values. The term is believed to have been coined by Thorstein Veblen (1857-1929) an American sociologist and economist. The most radical technological determinist in the United States in the twentieth century was most likely Clarence Ayres who was a follower of Thorstein Veblen and John Dewey. William Ogburn was also known for his radical technological determinism.

German philosopher and economist Karl Marx gave the first major elaboration of a technological determinist view of socioeconomic development and his theoretical framework was grounded in the perspective that changes in technology. For him specifically productive technology, are the primary influence on human social relations and organizational structure, and that social relations and cultural practices ultimately revolve around the technological and economic base of a given society. Marx's position has become embedded in contemporary society, where the idea that fast-changing technologies alter human lives is all-pervasive.

There are two important features of technological determinism:

1. The development of technology itself follows a predictable, traceable path largely beyond cultural or political influence, and
2. Technology in turn has "effects" on societies that are inherent, rather than socially conditioned or produced because that society organizes itself to support and further develop a technology once it has been introduced.

Strict adherents to technological determinism do not believe the influence of technology differs

based on how much a technology is or can be used. Instead of considering technology as part of a larger spectrum of human activity, technological determinism sees technology as the basis for all human activity. Technological determinism has also been defined as an approach that identifies technology, or technological advances, as the central causal element in processes of social change (Croteau and Hoynes). As a technology is stabilized, its design tends to dictate users' behaviors, consequently diminishing human agency. This stance however ignores the social and cultural circumstances in which the technology was developed. Sociologist Claude Fischer (1992) characterized the most prominent forms of technological determinism as "billiard ball" approaches, in which technology is seen as an external force introduced into a social situation, producing a series of ricochet effects. Karl Marx is often interpreted as a technological determinist on the basis of such isolated quotations as: 'The windmill gives you society with the feudal lord: the steam-mill, society with the industrial capitalist' [14] and determinism certainly features in orthodox Marxism. But several apologists have insisted that Marx was not a technological determinist.

Isaac Asimov suggested that the whole trend in technology has been to devise machines that are less and less under direct control and more and more seem to have the beginning of a will of their own. The clear progression away from direct and immediate control made it possible for human beings, even in primitive times, to slide forward into extrapolation, and to picture devices still less controllable, still more independent than anything of which they had direct experience.[15] The sense that technology may be out of control is also influenced by the way in which technical developments can lead to unforeseen 'side-effects'.

The most famous theorist adopting this perspective was the sociologist Jacques Ellul in his book *The Technological Society.* Ellul says that 'Technique has become autonomous; it has fashioned an omnivorous world which obeys its own laws and which has renounced all tradition'. He presented complex interdependent technological systems as being shaped by technology itself rather than by society. He maintains that 'there can be no human autonomy in the face of technical autonomy'[16]. He insisted that technological autonomy reduces the human being to 'a slug inserted into a slot machine'.[17]

Other adherents to the doctrine of technological autonomy have included Thomas Carlyle, Charles Dickens, Ralph Waldo Emerson, Nathaniel Hawthorne, Henry Thoreau, Mark Twain, Henry Adams, John Ruskin, William Morris, George Orwell and Kurt Vonnegut [18]. Significantly, 'autonomy' is a key concept in Western liberalism: autonomous individuals are capable of directing and governing their own behaviour. But even in the context of this political ideal for the individual, autonomy is always limited by social conditions and circumstances. Indeed, the notion of an individual as 'a law unto himself' is a nightmare.

Neil Postman links the notion of technological autonomy closely with the notion that 'a method for doing something becomes the reason for doing it'[19]. Referring to standardized human behaviour and to what he calls the 'invisible technology' of language as well as to machines, Postman argues that 'Technique, like any other technology, tends to function independently of the system it serves. It becomes autonomous, in the manner of a robot that no longer obeys its master'[20]. Elsewhere he defines 'The Frankenstein Syndrome: One creates a machine for a particular and limited purpose. But once the machine is built, we discover, always to our surprise - that it has ideas of its own; that it is quite capable not only of changing our habits but... of changing our habits of mind'.[21] Although Postman denies that that 'the effects of technology' are always inevitable, he insists that they are 'always unpredictable'. [22]

Leslie White offers a clear example, declaring that 'we may view a cultural system as a series of three horizontal strata: the technological layer on the bottom, the philosophical on the top, the sociological stratum in between... The technological system is basic and primary. Social systems are functions of technologies; and philosophies express technological forces and reflect social systems. The technological factor is therefore the determinant of a cultural system as a whole. It determines the form of social systems, and technology and society together determine the content and orientation of philosophy'.[23] This bears some similarity to Marx and Engel's theory of historical materialism according to which the institutional 'superstructure' of society (which includes politics, education, the family and culture) rests on an economic (some say techno-economic) 'base' or foundation, and major historical change proceeds from base to superstructure. The issue actually divides modern Marxists. According to some crude Marxist accounts the character of the base determines the character of the superstructure (a stance not shared by Marx and Engels): this is the doctrine of economic determinism which critics dismiss as *economism.* Other Marxist theories tend to stress more interaction between base and superstructure, the relative autonomy of the superstructure, or divers Technological Autonomy

Technological determinism focuses on causality - cause and effect relationships - a focus typically associated with 'scientific' explanation. Any exploration of communications technology has to recognize the difficulty of isolating 'causes' and 'effects', or even in distinguishing causes from effects. As an explanation of change, technological determinism is 'monistic' or *mono-causal* (rather than 'multi-causal'): it offers a single cause or 'independent variable'. It represents a simple 'billiard ball model' of change. It thus makes strong claims which many people find attractive, and which, if justified, would make it a very powerful explanatory and predictive theory. As a mono-causal explanation, technological determinism involves reductionism, which aims to reduce a complex whole to the effects of one part (or parts) upon another part (or parts). Sociological reductionism is widely criticized, but it is intimately associated with the quantitative paradigm of science. The philosophers Democritus (6th century B.C.) and Rene Descartes (1596-1650) had both taught that the way to knowledge was through separating things into component parts. It is a feature of reductionist

explanation that parts are assumed to affect other parts in a linear or one-way manner, and interpretation proceeds from the parts to the whole. Technological determinists often seem to be trying to account for almost everything in terms of technology: a perspective which we may call technocentrism. To such writers we are first and foremost *Homo faber* - tool-makers and tool-users. The American Benjamin Franklin apparently first coined the phrase that 'man is a tool-using animal'. Thomas Carlyle echoed this in 1841, adding that 'without tools he is nothing; with them he is all. 'The oldest tools - deliberately shattered stones - date back to about 2.4 million years ago. A recent commentator has suggested that the symmetrical flint tool known as the 'Acheulian hand-axe', which first appeared around one and a half million years ago, may even have appeared before language [24]. Such tools are presented by archaeologists as both shaping and reflecting the social nature of *Homo sapiens* [25].

Closely associated with reification is another feature of technological determinism whereby technology is presented as *autonomous* (or sometimes 'semi-autonomous'): it is seen as a largely external – 'outside' of society, 'supra-social' or 'exogenous' (as opposed to 'endogenous'). Rather than as a product of society and an integral part of it, technology is presented as an independent, self-controlling, self-determining, self-generating, self-propelling, self-perpetuating and self-expanding force. It is seen as out of human control, changing under its own momentum and 'blindly' shaping society. This perspective may owe something to the apparent autonomy of mechanisms such as clockwork. But even texts are autonomous of their authors once they leave their hands: as published works they are subject to interpretation by readers, and beyond the direct control of their authors. The notion that technological developments arise to 'fill needs' is reflected in the myth that 'necessity is the mother of invention'. It presents technology as a benevolent servant of the human species. But as Carroll Purcell puts it, 'many modern "needs" are themselves inventions, the product of an economy that stimulates consumption so that it can make and market things for a profit'.[26]

Technology which no-one seems to control seems to have 'a will of its own'. This stance involves *anthropomorphism* or technological animism in its crediting of an inanimate entity with the consciousness and will of living beings. Technologies are seen as having 'purposes' of their own rather than purely technical functions. Sometimes the implication is that purposiveness arises in a device from the whole being greater than the sum of the parts which were humanly designed: unplanned, a 'ghost in the machine' emerges. Animistic accounts are particularly applied to the complex technologies, and to reifications of technology as an interdependent 'system'. Some authors may indulge in deliberate ambiguity about animism as an evasion of commitment. But people commonly refer to particular machines or tools in their daily lives as having 'personalities'.

Some critics who use the term 'technological determinism' equate it simply with this notion of inevitability, which is also referred to as '*The*

technological imperative'. Another feature of technological determinism is *universalism*: a particular technology (such as writing, print or electronic media) - or its absence - is seen as universally linked to the same basic social pattern. Universalism is 'asocial' and 'ahistorical': presented as outside the framework of any specific socio-cultural and historical context. But particular technologies are not universally associated with similar social patterns. 'The same technology can have very different "effects" in different situations'[27]. The implications of the use of a particular communication technology vary according to different historical and cultural circumstances. Even within cultures, the use of such technologies varies amongst individuals, groups and sub-cultures.

Hard determinists consider technology as developing independent from social concerns. They would say that technology creates a set of powerful forces acting to regulate our social activity and its meaning. According to this view of determinism we organize ourselves to meet the needs of technology and the outcome of this organization is beyond our control or we do not have the freedom to make a choice regarding the outcome (Autonomous Technology). The 20th century French philosopher and social theorist Jacques Ellul could be said to be a hard determinist and proponent of autonomous technique (technology). In his 1954 work *The Technological Society*, Ellul essentially posits that technology, by virtue of its power through efficiency, determines which social aspects are best suited for its own development through a process of natural selection. A social system's values, morals, philosophy etc. that are most conducive to the advancement of technology allow that social system to enhance its power and spread at the expense of those social systems whose values, morals, philosophy etc. are less promoting of technology.

Soft Determinism, gives a more passive view of the way technology interacts with socio-political situations. Soft determinists still subscribe to the fact that technology is the guiding force in our evolution, but would maintain that we have a *chance* to make decisions regarding the outcomes of a situation. This is not to say that free will exists but it is the possibility for us to *roll the dice* and see what the outcome is. A slightly different variant of soft determinism is the 1922 technology-driven theory of social change proposed by William Fielding Ogburn, in which society must adjust to the consequences of major inventions, but often Media determinism is a form of technological determinism, a philosophical and sociological position which posits the power of the media to impact society.

Conclusion

Thus philosophy of technology as the *systematic clarification of the nature of technology* is an element and product of human culture, philosophy of technology as the systematic reflection on the consequences of technology for human life it is the systematic investigation of the practices of engineering, invention, designing and making of things. Critics of the notion of technological autonomy argue that technology is itself shaped by society and is subject to human control. Technological determinism is a term that encompasses a wide range

of ideas in practice, from technology-push or the technological imperative to a strict sense that human destiny is driven by an underlying logic associated with scientific laws and their manifestation in technology. Most interpretations of technological determinism share two general ideas: that the development of technology itself follows a path largely beyond cultural or political influence, and that technology in turn has "effects" on societies that are inherent, rather than socially conditioned. Technological determinism stands in opposition to the theory of the social construction of technology, which holds that both the path of innovation and the consequences of technology for humans are strongly if not entirely shaped by society itself, through the influence of culture, politics, economic arrangements, and the like. Technological determinists interpret technology in general and communications technologies in particular as the basis of society in the past, present and even the future. They say that technologies such as writing or print or television or the computer 'changed society'. In its most extreme form, the entire form of society is seen as being determined by technology: new technologies transform society at every level, including institutions, social interaction and individuals. At the least a wide range of social and cultural phenomena are seen as shaped by technology. 'Human factors' and social arrangements are seen as secondary.

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