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What Is Philosophy of Technology?

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Our subject today is philosophy of technology. I'm going to approach this subject from two standpoints, first of all historically and then I'll look at the contemporary options in the field, the various different theories that are currently under discussion.

Before I begin, I would like to situate the field for you briefly. You may already have some familiarity with philosophy of science as this is one of the most prestigious fields of philosophy. It is concerned with the truth of science, the validity of theories and experimentation. We call these "epistemological" issues, issues in the theory of knowledge. Science and technology share the same kind of rational thinking based on empirical observation and knowledge of natural causality, but technology is not concerned with truth but with usefulness. Where science seeks to know, technology seeks to control. Nevertheless, there is more to the story than this simple contrast.

In traditional societies, the way of thinking of the people is formed by customs and myths that cannot be explained or justified rationally. Traditional societies therefore forbid certain kinds of questions which would destabilize their belief system. Modern societies emerge from the release of the power of questioning against these traditional forms of thought. The European Enlightenment of the 18th century demanded that all customs and institutions justify themselves as useful for humanity. Under the impact of this demand, science and technology become the new basis for belief. They reshape the culture gradually to be what we think of as "rational." Eventually, technology becomes omnipresent in everyday life and technical modes of thought predominate over all others. In a mature modern society such as Japan, technology is taken for granted much as were the customs and myths of the earlier traditional society. One might say that scientific-technical rationality has become a new culture.

This culture is clearly "useful" in all its details in the sense the Enlightenment demanded, but it is now so all encompassing that larger questions can be asked about its value and viability as a whole. We can judge it as more or less worthy, more or less ethically justified, more or less fulfilling. Modernity itself authorizes, even demands such judgment. This is how it came into being. Now we have moved beyond usefulness in the narrow sense to the question of the kind of world and the way of life that emerges in a modern society. Insofar as such a society is technological at its basis, the issues raised in this larger questioning concern the field of philosophy of technology. We need to understand ourselves today in the midst of technology and technical knowledge itself cannot help us. Philosophy of technology belongs to the self-awareness of a society like ours. It teaches us to reflect on what we take for granted, specifically, rational modernity. The importance of this perspective cannot be over-estimated.

Japan is a uniquely suitable place to pursue philosophy of technology although it is my understanding that the field is so far very small here. In the Meiji era Japan was a kind of test case for the universality of Western achievements. Its rapid modernization brought modernity itself into question almost immediately as thinkers contrasted the fast disappearing traditional ways with the new ways imported from the West and consequent on technological advance. Today Japan faces the same problems as other modern societies but potentially with more distance from modernity given its history as a non-Western country. I am hopeful that that difference will prove an Archimedean point for an original reflection on technology.

Having introduced you briefly to the field, let me turn now to the historical perspective on its origins. For this we must go back to ancient Greece. As you will see, the question of technology is raised at the very origins of Western philosophy, not as I have just described it of course, but at a deeper level. Philosophy begins by interpreting the world in terms of the fundamental fact that humanity is a laboring sort of animal constantly at work transforming nature. This fundamental fact shapes the basic distinctions that prevail throughout the tradition of Western philosophy.

The first of these is the distinction between what the Greeks called physis and poiêsis. Physis is usually translated as nature. The Greeks understood nature to be that which creates itself, that which emerges from out of itself. But there are other things in the world, things which depend on something else to come into being. Poiesis is the practical activity of making in which human beings engage when they produce something. We call these created beings artifacts and include among them the products of art, craft, and social convention.

The word techne in ancient Greece signifies the knowledge or the discipline associated with a form of poiêsis. For example, medicine is a techne that aims at healing the sick; carpentry is a techne that aims at building from wood. In the Greek view of things each techne includes a purpose and a meaning for the artifacts the production of which it guides. Note that for the Greeks, technai show the “right way” to do things in a very strong, even an objective sense. Although artifacts depend on human activity, the knowledge contained in the technai is no matter of opinion or subjective intention. Even the purposes of things made share in this objectivity insofar as they are defined by the technai. The word techne is at the origin of the modern words for technique and technology in every Western language, although these have a somewhat different meaning as we will see.

The second fundamental distinction is that between existence and essence. Existence answers the question whether something is or is not. Essence answers the question what the thing is. That it is and what it is appear to be two independent dimensions of being. In the tradition of Western philosophy, existence becomes a rather hazy concept. It is not really clear how to define it. We know the difference between what exists and what does not, for example, as immediate presence or absence, but there is not much more to

say. Most of the attention is given to essence and its successor concepts as developed by the sciences because this is the content of knowledge.

These distinctions are self-evident. They form the basis of all philosophical thought in the West. I'm sure there are equivalent distinctions in traditional Asian thought as well. But the relation between these two distinctions is not obvious, is in fact puzzling. The source of the puzzle is the Greek understanding of technê, the ancestor of modern technology. Of course the Greeks did not have technology in our modern sense, but they did have all sorts of techniques and crafts that were the equivalent for their time of what technology is for us today. And strange though it seems, they conceived nature on the model of the artifacts produced by their own technical activity.

To show this, I will analyze the relation between the two basic distinctions that I've introduced, physis and poiêsis, and existence and essence. In poiêsis, the distinction between existence and essence is real and obvious. The thing exists first as an idea and only later comes into existence through human making. But note that for the Greeks the idea of the artifact is not arbitrary or subjective but rather belongs to a technê. Each technê contains the essence of the thing to be made prior to the act of making. The idea, the essence of the thing is thus a reality independent of the thing itself and of the maker of the thing. What is more, as we have seen, the purpose of the thing made is included in its idea. In sum, although humans make artifacts, they do so according to a plan and for a purpose that is an objective aspect of the world.

On the other hand, the distinction between existence and essence is not obvious for natural things. The thing and its essence emerge together and exist together. The essence does not seem to have a separate existence. The flower emerges along with what makes it a flower: that it is and what it is "happen," in a sense, simultaneously. We can later construct a concept of the essence of the flower, but this is our doing, not something essential to nature as it is to artifacts. Indeed, the very idea of an essence of the things of nature is our construction. It lies at the basis of science, episteme in Greek, the knowledge of things. Unlike the knowledge that is active in technê, which is essential to the objects the essences of which it defines, episteme, knowledge of nature, appears to be a purely human doing to which nature itself would be indifferent. Or is it? Here is where the story gets interesting.

This difference between the relation of essence to physis and poiesis is important for an understanding of Greek philosophy and in fact the whole philosophical tradition precisely because philosophers have tried so hard to surpass it. You may recall Plato's theory of ideas, the foundation of the tradition. For Plato the concept of the thing exists in an ideal realm prior to the thing itself and allows us to know the thing. Note how similar this theory is to our analysis of technê in which the idea is independent of the thing. But Plato does not reserve this theory for artifacts; rather, it is applied to all being. He relies on the structure of techne to explain not only artifacts, but nature as well.

Plato understands nature as divided into existence and essence just as artifacts are and this becomes the basis for Greek ontology. This has many important consequences. In this conception there is no radical discontinuity between technical making and natural

self-production because they both share the same structure. Technê, you'll recall, includes a purpose and a meaning for artifacts. The Greeks import these aspects of technê into the realm of nature and view all of nature in teleological terms. The essence of natural things includes a purpose just as does the essence of artifacts. The world is thus a place full of meaning and intention. This conception of the world calls for a corresponding understanding of man. We humans are not the masters of nature but work with its potentials to bring a meaningful world to fruition. Our knowledge of that world and our action in it is not arbitrary but is in some sense the completion of what lies hidden in nature.

What conclusion do we draw from these historical considerations on ancient Greek philosophy? I will be provocative and say that the philosophy of technology begins with the Greeks and is in fact the foundation of all Western philosophy. After all, the Greeks interpret being as such through the concept of technical making. This is ironic. Technology has a low status in the high culture of modern societies but it was actually there at the origin of that culture and, if we believe the Greeks, contains the key to the understanding of being as a whole.

Now we're going to skip to modern times and talk about the status of technology in our era. You are probably familiar with the founders of modern thought, Descartes and Bacon. Descartes promised us that we would become "the masters and possessors of nature" through the cultivation of the sciences, and Bacon famously claimed that "Knowledge is power." Clearly we are in a different world from the Greeks. We have a very different common sense from the Greeks so things that seemed obvious to them are not obvious to us. Of course we share with them the fundamental distinctions between the things that make themselves, nature, and the things that are made, artifacts, and between essence and existence. But our understanding of these distinctions is different from theirs. This is especially true of the concept of essence. For us essences are conventional rather than real. The meaning and purpose of things is something we create not something we discover. The gap between man and world widens accordingly. We are not at home in the world, we conquer the world. This difference is related to our basic ontology. The question we address to being is not what it is but how it works. Science answers this question rather than revealing essences in the old Greek sense of the term.

Note that technology is still the model of being in this modern conception. This was particularly clear in the 18th century Enlightenment, when philosophers and scientists challenged the medieval successors to Greek science with the new mechanistic worldview of Galileo and Newton. These thinkers explored the machinery of being. They identified the workings of the universe with a clockwork mechanism. Thus strange though it may seem, the underlying structure of Greek ontology survived the defeat of its principles.

In the modern context technology does not realize objective essences inscribed in the nature of the universe, as does technê. It now appears as purely instrumental, as value free. It does not respond to inherent purposes, but is merely a means serving subjective goals we choose as we wish. For modern common sense, means and ends are independ-

ent of each other. Here is a crude example. In America we say “Guns don't kill people, people kill people.” Guns are a means which is independent of the ends brought to them by the user, whether it be to rob a bank or to enforce the law. Technology, we say, is neutral, meaning that it has no preference as between the various possible uses to which it can be put. This is the instrumentalist philosophy of technology that is a kind of spontaneous product of our civilization, assumed unreflectively by most people.

Technology in this scheme of things encounters nature as raw materials, not as a world that emerges out of itself, a physis, but rather as stuff awaiting transformation into whatever we desire. This world is understood mechanistically not teleologically. It is there to be controlled and used without any inner purpose. The West has made enormous technical advances on the basis of this understanding of reality. Nothing restrains us in our exploitation of the world. Everything is exposed to an analytic intelligence that decomposes it into usable parts. Our means have become ever more efficient and powerful. In the 19th century it became commonplace to view modernity as an unending progress toward the fulfillment of human needs through technological advance. It was this notion that captured the imagination of the Japanese in the Meiji era and led to the modernization of Japanese society in the 20th century.

But for what ends? The goals of our society can no longer be specified in a knowledge of some sort, a techne or an episteme, as they were for the Greeks. They remain purely subjective arbitrary choices and no essences guide us. This has led to a crisis of civilization from which there seems no escape we know how to get there but we do not know why we are going or even where. The Greeks lived in harmony with the world whereas we are alienated from it by our very freedom to define our purposes as we wish. So long as no great harm could be attributed to technology, this situation did not lead to serious doubts. Of course there were always literary protests against modernization. In Japan you have Tanizaki and his wonderful essay “In Praise of Shadows.” But as the 20th century proceeds, from world wars to concentration camps to environmental catastrophes, it becomes more and more difficult to ignore the strange aimlessness of modernity. It is because we are at a loss to know where we are going and why that philosophy of technology has emerged in our time as a critique of modernity. I want to turn now to the contemporary perspective on philosophy of technology I promised at the start and sketch the sorts of debates in which philosophers engage today.

I will organize my comments around the following chart:

Technology is:	Autonomous	Humanly Controlled
Neutral (complete separation of means and ends)	Determinism (e.g. modernization theory)	Instrumentalism (liberal faith in progress)
Value-laden (means form a way of life that includes ends)	Substantivism (means and ends linked in systems)	Critical Theory (choice of alternative means-ends systems)

As you can see, technology is defined here along two axes reflecting its relation to values and human powers. The vertical axis offers two alternatives: either technology is value neutral, as the Enlightenment assumed, or it is value-laden as the Greeks believed and, as we will see, as some philosophers of technology believe today as well. The choice is not obvious. From one perspective a technical device is simply a concatenation of causal mechanisms. No amount of scientific study will find in it anything like a purpose. But from another perspective this misses the point. After all, no scientific study will find in a 1000 yen note what makes it money. Not everything is a physical or chemical property of matter. Perhaps technologies, like bank notes, have a special way of containing value in themselves as social entities.

On the horizontal axis technologies are signified as either autonomous or humanly controllable. To say that technology is autonomous is not of course to say that it makes itself. Human beings are still involved, but the question is, do they actually have the freedom to decide how technology will develop? Is the next step in the evolution of the technical system up to us? If the answer is "no" then technology can rightly said to be autonomous in the sense that invention and development have their own immanent laws which humans merely follow in acting in the technical domain. On the other hand, technology would be humanly controllable if we could determine the next step in its evolution in accordance with our intentions.

Now let me turn to the four boxes defined by the intersection of these axes.

We have already discussed instrumentalism, the occupant of the box in which human control and value neutrality intersect. This is the standard modern view, according to which technology is simply a tool or instrument of the human species through which we satisfy our needs. As noted in the chart, this view corresponds to the liberal faith in progress which was such a prominent a feature of mainstream Western thought until fairly recently.

The next box over to the left is entitled "determinism." This is the view so widely held in social science since Marx that the driving force of history is technological advance. Determinists believe that technology is not humanly controlled, but that on the contrary it controls humans, that is, it shapes society to the requirements of efficiency and progress. Technological determinists usually argue that technology employs advancing knowledge of the natural world to serve universal features of human nature such as basic needs and faculties. Each worthwhile discovery addresses some aspect of our nature, fulfills a basic need or extends our faculties. Food and shelter are such needs and motivate some advances. Technologies like the automobile extend our feet while computers extend our brains. Technology is rooted on the one side in knowledge of nature and on the other in generic features of the human species. It is not up to us to adapt technology to our whims but on the contrary, we must adapt to technology as the most significant expression of our humanity.

These two views, instrumentalism and determinism, have an interesting history in Japan. The Meiji state started out with a firm instrumentalist conviction that it could adopt Western technology to enhance its power without sacrificing traditional values.

The technological means imported from the West would serve Eastern goals. This was the famous idea of "wakon yosai." But technology soon appeared to be undermining the values it was supposed to serve, confirming the thesis of technological determinism. It is still unclear what has happened since Japan has a somewhat distinctive society based largely on Western technology. But just how distinctive it is, just how significantly it has retained its originality, is in dispute. On this issue depends the contest between instrumentalism and determinism.

The box on the lower left of the chart is titled "substantivism." This is a more complex and interesting position than those we have reviewed so far. The term "substantivism" was chosen to describe a position which attributes substantive values to technology in contrast with views such as instrumentalism and determinism which view technology as neutral in itself. The contrast here is actually between two types of value. The neutrality thesis does attribute a value to technology but it is a merely formal value, efficiency, which can serve any number of different conceptions of the good life. A substantive value on the contrary involves a commitment to a specific conception of the good life. If technology embodies a substantive value, it is not merely instrumental and cannot be used for the different purposes of individuals or societies with different ideas of the good. Using technology for this or that purpose would be a specific value choice in itself, and not just a more efficient way of realizing a pre-existing value of some sort.

This distinction can be clarified best with examples. Take the extreme difference between a religion such as Buddhism or Christianity and money. Religions are based on substantive value choices, choices that reflect a preferred way of life and exclude other disapproved alternatives. Money is a purely formal basis of social action. It can be used to buy an infinite variety of different things and integrated to different and contradictory ways of life without prejudice. In principle, it seems as though money carries no particular substantive value in itself but can serve any value system. The question posed by substantive theory is whether technology is more like religion or more like money, as I have just described it.

Substantive theory replies that technology is more like religion. When you choose to use technology you do not simply render your existing way of life more efficient, you choose a different way of life. Technology is thus not simply instrumental to whatever values you hold. It carries with it certain values that have the same exclusive character as religious belief. But technology is even more persuasive than religion since it requires no belief to recognize its existence and to follow its commands. Once a society goes down the path of technological development it will be inexorably transformed into a technological society, a specific type of society dedicated to values such as efficiency and power. Traditional values cannot survive the challenge of technology.

Actually, this vision of technology can be extended to money as well. Although it seems as though money is a neutral instrument of our purposes, on closer examination we realize that it is much more than that. We say there are things money can't buy such as love and happiness. Yet people do try to buy them all the time with disappointing results. Bought love is after all something quite different from the real thing. Those who

base their whole lives on the power of money have poor lives. Money is fine in its place, but outside its place it corrupts and diminishes people and things. So in a sense money too has a substantive value and basing a way of life on it is a positive choice and not the best one at that.

You will have noticed the similarity between substantive theory of technology and determinism. In fact most substantive theorists are determinists as well. But the position I have characterized as determinism is usually optimistic and progressive. Both Marx and the modernization theorists of the post-War era believed that technology was the neutral servant of basic human needs. Substantive theory makes no such assumption about the needs technology serves and is critical rather than optimistic. In this context the autonomy of technology is threatening and malevolent. Once unleashed technology becomes more and more imperialistic, taking over one domain of social life after another. In the most extreme imagination of substantivism, a Brave New World such as Huxley describes in his famous novel overtakes humanity and converts human beings into mere cogs in the machinery. This is not utopia—the "no place" of an ideal society, but dystopia—a world in which human individuality has been completely suppressed. Huxley has people produced on assembly lines for specific social purposes and conditioned to believe exactly those things that adapt them to their function. People have become, as Marshall McLuhan once said, the "sex organs of the machine world."

The most famous substantive theorist was Martin Heidegger, a major 20th century German philosopher. Heidegger argued that modernity is characterized by the triumph of technology over every other value. He noted that Greek philosophy had already based its understanding of being on technical making and argued that this starting point culminates in modern technology. Where the Greeks took technê as the model of being in theory, we have transformed being technically in practice. Our metaphysics is not in our heads but consists in the real technical conquest of the earth. This conquest transforms everything into raw materials for technical processes, including human beings themselves.

Not only are we constantly obeying the dictates of the many technical systems in which we are enrolled, we tend to see ourselves more and more as devices regulated by medical, psychological, athletic, and other functional disciplines. I do not know if you have so many of these books in Japan as we do in America, but in our bookstores you can find the equivalent of operating manuals for every aspect of life: love, sex, raising children, eating, exercise, making money, having fun, and so on and so forth. We are our own machines.

But, Heidegger argues, although we may control the world through our technology, we do not control our own obsession with control. Something lies behind technology, a mystery we cannot unravel from our technological standpoint. Where we are headed is a mystery too. The West in Heidegger's view has reached the end of its rope. In his last interview, he stated, "Only a God can save us."

We come now to the last box, the one I have entitled “critical theory.” This is where I place myself. Critical theory of technology holds that human beings need not await a God to change their technological society into a better place to live. Critical theory recognizes the catastrophic consequences of technological development highlighted by substantivism but still sees a promise of greater freedom in technology. The problem is not with technology as such but with our failure so far to devise appropriate institutions for exercising human control over it. We could tame technology by submitting it to a more democratic process of design and development.

Consider the parallel case of the economy. A century ago it was believed that the economy could not be democratically controlled, that it was an autonomous power operating according to inflexible laws. Today we assume the contrary, that we can influence the direction of economic development through our democratic institutions. Critical theory of technology argues that the time has come to extend democracy to technology as well. It thus attempts to save the Enlightenment values that have guided progress for the last several hundred years without ignoring the threat to which that progress has led.

As you can see from the chart, critical theory shares traits of both instrumentalism and substantivism. It agrees with instrumentalism that technology is in some sense controllable, and it agrees with substantivism that technology is also value-laden. This seems a paradoxical position since precisely what cannot be controlled in the substantivist view are the values embodied in technology. According to substantivism the values contained in technology are unique to technology as such. They include efficiency and power, goals which belong to any and every technical system. Insofar as we use technology, we are engaged with the world in a maximizing and controlling fashion. This approach to the world determines a technological way of life. Obviously human control would have little significance if every way of life based on technology realized the same values. The element of human control would be like the choice between soaps in the supermarket, trivial and delusory. How then does critical theory conceive the value-ladenness of technology such that human control matters?

According to critical theory the values embodied in technology are socially specific and are not adequately represented by such abstractions as efficiency or control. Technology frames not just one way of life but many different possible ways of life, each of which reflects different choices of design and different extensions of technological mediation. I use the word “frame” here purposely. All the pictures in the museum have frames but they are not in the museum for that reason. Frames are boundaries and holders for what lies within. Similarly, efficiency “frames” every possible technology but does not determine the values realized within that frame.

Does this mean that technology is neutral, as instrumentalism believes? Not quite: modern societies must all aim at efficiency in those domains where they apply technology, but to claim that they can realize no other significant values besides efficiency is to overlook the obvious differences between them. What is worse, it overlooks the difference between their current miserable state and a better condition we can imagine and for which we can struggle. One must look down on mankind from a very great height indeed

not to notice the difference between efficient weapons and efficient medicines, efficient propaganda and efficient education, efficient exploitation and efficient research! This difference is significant socially and ethically and so cannot be discounted as thinkers like Heidegger would claim.

Nevertheless, the substantivist critique of instrumentalism does help us to understand that technologies are not neutral tools. Means and ends are connected. Thus even if some sort of human control of technology is possible, it is not instrumental control. In critical theory technologies are not seen as tools but as frameworks for ways of life. The choices open to us are situated a higher level than the instrumental level. We cannot agree with the instrumentalist that "Guns don't kill people, people kill people." Supplying people with guns creates a social world quite different from world in which people are disarmed. We can choose which world we wish to live in through legislation either making the possession of guns legal or illegal. But this is not the sort of choice the instrumentalist claims we make when we control technology. This is what you might think of as a meta-choice, a choice at a higher level determining which values are to be embodied in the technical framework of our lives. Critical theory of technology opens up the possibility of thinking about such choices and submitting them to more democratic controls. We do not have to wait for a god to save us as Heidegger expostulated but can hope to save ourselves through democratic interventions into technology.

You will no doubt want to know more about these democratic interventions. Clearly, it would not make much sense to hold an election between devices or designs for technologies. The public is not sufficiently concerned, involved, and informed to choose good politicians at this time, much less good technologies. So, in what sense can democracy be extended to technology under current conditions? Admittedly, this is a problematic hope. But not an absurd one. People affected by technological change sometimes protest or innovate in ways that promise greater participation and democratic control in the future. Where it used to be possible to silence all opposition to technical projects by appealing to progress, today communities mobilize to make their wishes known, for example, in opposition to nuclear power plants in their neighborhood. In a rather different way the computer has involved us in technology so intimately that our activities have begun to shape its development. Consider that email on the Internet was introduced by skilled users and did not originally figure in the plans of the designers at all. Yet today email is the most used function of the Internet and one of the most important contributions of the computer to our lives. I could show you similar examples from medicine, urban affairs, and so on. Each one seems a small matter but perhaps all together they are significant.

Critical theory of technology detects in examples such as these a trend toward greater participation in decisions about design and development. The public sphere appears to be opening slowly to encompass technical issues that were formerly viewed as the exclusive preserve of experts. Can this trend continue to the point where citizenship will involve the exercise of human control over the technical framework of our lives? We must hope so for the alternative appears to be certain destruction. Of course the problems are not only technological. Democracy is in bad shape today on all fronts, but no one has

come up with a better alternative. If people are able to conceive and pursue their intrinsic interest in peace and fulfillment through the political process, they will inevitably address the question of technology along with many other questions that hang in suspense today. We can only hope this will happen sooner rather than later.