

Technology and Anti-Technology

Theoretical Reflection on the Information Age

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초록

여러 가지 학문의 관점에서 다양하게 시도된 과학기술에 관한 비평들에서 가장 큰 문제거리로 등장한 것이 바로 정보과학 기술이다. 특히 컴퓨터 과학기술은 인간의 생활과 사고를 계산기 기능 수준으로 낮추는 경향이 있다고 비평받았다. 이제까지 비평인들이 주로 관심을 가진 면은 정보의 과부하, 인간의 고용기회 축소, 컴퓨터 과학기술을 거의 종교적인 대상으로 격상시키는 과학기술 신앙 등이다. 이 논문은 반과학기술적 비평들 자체에 대한 평가도 시도되었는데, 그 결과 이들 역시 이론적인 면과 실제적인 면에서 모두 심각한 약점을 갖고 있음이 드러났다.

I. Introduction

Technology has impacted most areas of society. We live in a world saturated by machine and information technology. On a daily basis, people around the world watch television, send a message on a fax machine, correspond with a friend by E-mail, obtain information on the Internet, take a trip by car, record a family re-union with a camcorder, and fly to a meeting in an airplane. It has been argued that modern society, in fact, has been and is being erected on the foundation of various technologies. In other words, automobiles, industrial machinery, airplanes, television, spaceships, and computers have been at the forefront of shaping economic, political, social, and family life.

In the 1990's, we seem to be intensifying our reliance on the world of technology. For example, much of life is already computerized. Secretarial and assembly line work are increasingly determined by computer programs available for information processing and for manufacturing. We experience the presence of computer technology when we withdraw money out of a cash machine, buy food at a grocery store, pump gas into our cars, and use our credit cards to make a purchase. Some would argue that the widespread use of computer technology "has been the most significant event in the history of technology." (Koelsch, 1995:2) Despite various reservations, Egbert Schuurman, a philosopher of technology, regards the computer as a "fascinating technological achievement" which is full of potential for socio-cultural good (Schuurman, 1995:14).

Technology in its various forms, then, has been praised for its major accomplishments in the nineteenth and twentieth centuries. Clearly medical technology has increased human health and life expectancy. Technology in agriculture has increased food production and prevented mass starvation in various areas of the world. Transportation and communication technology have significantly increased the ability of family members, government officials, and business managers, for instance, to stay in close contact with each other on a regular basis. In light of such impressive achievements, it is not difficult to understand why many individuals in our global society are highly enthusiastic about modern technology. They are

convinced that the way into the future must be led by technology. Problems encountered along the way can and will be solved by the systematic application of technological knowledge.

Not everyone, however, is convinced of the essentially positive impact of modern technology(Stoll, 1995; Rifkin, 1995; Sale, 1995). Voices have been raised over the years that advanced technology has created major environmental and social disasters. The threat of nuclear war and pollution in the air, water, and soil are some of the many negative consequences which are seen as the direct result of overreliance on technological solutions. It is typical of those committed to progress through technology to write off critics of technology as neo-Luddites who want to live in the past. In this article, however, I will argue that it is important that we hear what social scientists, philosophers, historians, and others have been saying about the advance of technology. Although I will finally be critical of the critics of technology, we need to listen to the concerns and warnings expressed. Therefore, we will first take a detailed look at two of the most prominent critics of twentieth century technology. Then, we will evaluate this criticism based on a recent research and reflection on the place of technology in society.

II. Information Society

Theodore Roszak has written an important critique of information

technology in his book entitled *The Cult of Information*. This book was first published in 1986 and appeared in a second revised edition in 1994. Roszak is a Professor of History at California State University, Hayward. He is concerned about the "megahype" that surrounds the world of information technology in general and computer technology in particular. Roszak argues that the frenzy is created by something like the Internet is not an accidental event. Rather computer manufacturers, computer scientists, and academics in the area of computers, to name a few, have their funding and livelihood tied up with the success and growth of computer technology. Given this reality, it is understandable why the information technology industry conveys the attitude that, in principle, there is nothing that the computer can not do(pp. 30-31). Also, futurologists like John Naisbett and Alvin Toffler have played a major role in exciting the public and government officials about the value of the "computer revolution." They present an uncritical, glitzy view of how positive high-tech innovation will be for our society and for individuals. This kind of megahype can be highly influential. In the United States, for example, Clinton and Gore have strongly sponsored the idea of an information superhighway. Newt Gingrich and his Republican followers seem convinced that economic growth promoted by high technology is the key to social survival and international dominance(pp. 21-25). In short, Roszak argues that the computer revolution has been overhyped and oversold. This situation has produced some major negative consequences in numerous areas of society. In fact, high tech hype

has the potential to radically alter how we envision what it means to be human.

1. High-Tech Reductionism

In this vein, Roszak is extremely concerned about a massive reductionism in high tech thought and publications. Humans tend to be seen as nothing but advanced computers, on the one hand, and computers are, in turn, elevated to the level of human life and functioning. Roszak argues that there is a definite trend in the information technology sub-culture to anthropomorphize the computer. The computer's functions are systematically compared to and deemed comparable with human functioning. As a historian, Roszak states that this trend began after World War II when computer storage capacity was first called "memory." (p. 36) It is commonplace now to talk of computers understanding something, remembering things, teaching and correcting, asking and answering questions. We also refer to a "generation" of computers. Using anthropomorphic language to talk about computers is not inconsequential. Language is a deep part of human self-understanding. Many social scientists and philosophers have argued that as we define things with our words, so they are. Such anthropomorphic language is also not accidental. Roszak notes that by the early 1960's influential scholars like John Pfeiffer of MIT wrote about the computer as human-like with its own evolutionary journey which will eventually place humans in a dependent relation to computers. In 1972, John Kemeny of

Dartmouth who invented the BASIC programming languages, spoke of the computer as a species evolving in symbiotic relation with the human race(pp. 41-42).

Roszak observes that there is a desire among some "technophiles" to create a computer that will replace human thinking. Such computer enthusiasts talk developing an ultra-intelligent computer which will be far superior to human intelligence and will be able to make all major political and economic decisions. In fact, one widely accepted goal of the artificial intelligence and cognitive science movements has been to substitute computer-based technology for any and all human functions. Individuals within these two scientific fields are convinced that in time the computer will surpass human intelligence in every area of functioning(pp. 39, 121-123, 223).

Roszak is concerned about another reductionism--the reduction of human knowledge to "information." He maintains that there is a vast difference between raw data or information and insight, judgement, imagination, and wisdom. In other words, we must not equate a telephone directory with Plato's Republic(p. xix) Information, even if it moves at the speed of light, still remains information. Roszak argues that fundamentally the mind thinks with ideas or concepts. Concepts linked together provide understanding of an aspect of reality. Huge quantities of information are not needed to generate concepts. In fact, according to Roszak, ideas or concepts actually create facts or information in the sense that humans need to have an

idea or concept of something before we can recognize that thing as a fact. This reality is what philosophers call *a priori* knowledge. Such concepts are often taken for granted and, therefore, are not in consciousness. However, the conceptual apparatus possessed by human beings is what makes knowledge possible. Roszak maintains, therefore, that the human mind with its rich conceptual complexity is qualitatively different from a computer which can only process binary data. Therefore, more and more information, as the Internet and other computer services promise, is not the key for understanding our world. Understanding, knowledge, and wisdom are rooted, to the contrary, in the human ability to conceptualize rather than to process information. Technophiles seem unwilling or unable to recognize this epistemological reality(pp. 87-110).

2. Information Overload

Furthermore, Roszak maintains that our society hardly suffers from lack of information. With television, newspapers, magazines, radio, libraries, and now the Internet, we have huge amounts of information. In fact, the problem is information overload or what Roszak calls "data glut". The assumption behind much of the hype about the value of the Internet, for example, is that more information produces better understanding. But computers with all their databases do not answer the questions of what is relevant, insightful, and true. Information has to be shaped into issues and ideas about justice, freedom, equality, responsibility, peace, compassion, etc. Reducing

knowledge to information makes this type of thinking extremely difficult to accomplish and, even worse, makes it appear unnecessary. As Roszak observes, one good idea informed by one good piece of information can be worth more than thousands of trivial details about a topic of inquiry. A well written article of two pages can be more incisive and helpful than volumes of collated data(pp. 161-166).

In a more cynical vein, Roszak contends that the barrage of facts and figures which bombard us on a daily basis is not accidental. Rather it is the result of a strategy by governments, interest groups, advertisers, for example, to impress, intimidate, and overwhelm the public so that difficult and critical questions are not raised. The hope and goal of such institutions and groups are to numb citizens and consumers into acquiescence. Reams of information, facts, and figures have the aura of scientific accuracy and expertise. Roszak dubs this information abuse the "politics of information"(pp. 163-164).

Roszak does admit that some forms of communication and information such as found on the Internet can be of significant value. The many discussion groups on the Internet have the potential to keep alive dialogue, debate, analysis, and critique. The Internet is a somewhat unique way of interchanging ideas and opinions across a world-wide spectrum. Granted Internet communication does not have the immediacy and dynamics of face to face communication.

However, for some individuals and topics emotional and geographic distance may be an asset. Cyberspace allows for a form of social interaction which is not hampered, for instance, by race, gender, age, social class, and physical appearance. Of course, such communication can degenerate into racist, sexist, and profane content. It can also keep individuals from a broader spectrum of ideas if they remain completely focused on a few discussion groups. But these potential problems are not inevitable(pp. 168-171)

Roszak does worry, however, that reliance on the Internet for information will further reduce the public's ability to read weighty and substantive articles in solid journals of opinion. This situation will make it increasingly difficult for such journals to survive financially, and, more tragically, will continue to debase political, economic, and social understanding among a national population. Related to this concern, Roszak is distressed over the systematic neglect by most of the computer industry of public libraries which for decades have been the major source of information for people from every social class and geographic location. He maintains that, since libraries provide information free, they are not an appealing market for the "merchants of high technology". In fact, public libraries can be seen as a source of competition, especially if a library has computers for people to use free of charge(pp. 166-174).

3. Information Technology as Religion

Foundational to a number of problems mentioned above is the reality that information technology has become a form of religion for many in our society. In Roszak's mind, information has obtained a cultlike status which explains the title of his book - *The Cult of Information*. For techophiles, more information is always better than less. Information processed by the computer will supposedly lead us into a bright political and economic future. With such a Messianic mindset, the computer itself takes on the role of a sacred object - an object that brings joy, awe, and security. This religious fervor is promoted, according to Roszak, by the computer industry itself which, in making outlandish claims about what the computer can and should do, attempts to turn the computer into an object of veneration. Even a cursory review of advertisements in the various computer magazines will verify the religious tone and substance of the hype which Roszak is talking about (pp. xix, xx).

Someone like the computer enthusiast Robert Jastrow believes that it is possible for the computer to even provide a form of immortality for the human race. In the future, a person may be able to transfer the contents of his mind into the computer so that now, in effect, the person dwells in the computer for eternity.

When the brain sciences reach this point, a bold scientist will be able to tap the contents of his mind and transfer them into the metallic lattices of a computer. Because mind is the essence of being, it can be

said that this scientist has entered the computer, and that he now dwells in it.

At last the human brain, ensconced in a computer, has been liberated from the weakness of the mortal flesh ... It is in control of its own destiny. The machine is its body; it is the machine's mind..

It seems to me that this must be the mature form of intelligent life in the Universe. Housed in indestructible lattices of silicon, and no longer constrained in the span of its years by the life and death cycle of a biological organism, such a kind of life could live forever(Jastrow cited in Roszak pp. 112-113).

From the above comments and quote, it becomes rather clear why those holdings such values and beliefs do not take lightly any criticism of the world of computers. Such critique strikes at the foundation of their techno-faith. Therefore, they are quick to brand any critic a Luddite who is a "mindless enemy of progress"(p. xvii).

4. Social Impacts of Computer Technology

We have looked at some of Roszak's central concerns about the impact of information technology. Throughout his book, however, he mentions other areas of society that are being negatively affected by the use or abuse of computers. For example, in the area of education, Roszak points to the situation of many school boards wanting their students to be computer literate. But some school boards have much less money than others. The end result, all too often, is to find schools in low income areas with few computers and, therefore, minimal

ability to introduce students to the computer. This reality produces students who are part of a technological underclass which serves to intensify the difficulty for these students to find employment. Related to this issue is the fact that computer companies and enthusiasts clearly are not going after the poor in their promotion of information technology. But, ironically, it is the poor who need the most basic kind of information just to survive - information about medical care, child care, employment training, housing availability, abuse shelters, etc. Such information is often available on computers, but youth and adults living in poverty have no way of accessing it(p. xxxvii, 175).

Raszak also expresses concern about the impact of computer games on youth. Many of these games are centered on "ruthless competition and willful destruction"(p. 119). Winning is everything and often killing is the way to victory. Games exist which teach children how to eviscerate dinosaurs, practice martial arts, and kill goblins in a dungeon, trolls in the forest and evil wizards in a haunted castle(p. 198). Neo-Nazi computer games exist in which player is able to run a death camp and put inferior races in gas chambers(p. xxv). In addition, many computer games are rooted in a sexist worldview in which the heroes are macho males who win out through violence.

Another related concern is what hours spent in front of a computer does to print literacy and analytical thinking. According to Roszak, there is a "quality of attention and intellectual plasticity that

derives from the habit of reading.”(p. 196) Many computer games and other computer software tend to undermine the already reduced attention span and power of concentration of youth. Hypertext surfing on the Internet, for example, increases the attitude among many youth of grab my attention now or I’m moving on. This kind of restless searching for visual experience and emotional thrill is obviously not conducive for thoughtful reflection and considered judgement(pp. 196-197). Furthermore, as a person becomes heavily involved in computer games, it is possible and even likely that he or she builds a private universe by avoiding the messy unpredictability of actual reality. In simulation exercises, for example, one can build into a computer program all of the parameters. This results come out neatly and clearly. This provides a sense of control, security, and predictability. It is easy for such a person to forget that simulation exercises are in fact a simulation of reality which inevitably have ignored or factored out the full complexity of empirical reality(pp. 68-70).

The impact of information technology on work is a massive project. Roszak only makes a few comments on this topic, but his remarks point to a widely recognized consequence of the computerization of work. Since World War II, information technology has been substantially under the control of governments and especially the military. This research and the technologies created were freely shared with the business community. Also, much money has been provided by governments for research and

development by business of CAD/CAM systems(computer aided design and manufacturing) and for robotics. The end result of this activity, of course, has been the substitution of machines for human labour. With the transition of national economies into high tech production, thousands of skilled, union workers have been unemployed and now work, if at all, in low paying, low skill service jobs(pp. 28, 127-129, 202-206).

With regard to the impact of computer technology on politics, Roszak argues that, with the aid of computers, pollsters have turned elections into a numbers game. All too often, politicians formulate their ideas and shape their images based on what computerized polls and surveys determine will sell. Roszak calls this phenomenon "a drastic cheapening of the democratic process."(p. 126). Issues of substance are pushed to the background as an election becomes more like a horse race with statistical odds about who will win. After elections, computers again are used to continually survey the population about the issues which government needs to decide on. In this context, political decision making becomes a process of tabulation favourable versus unfavourable responses. The traditional idea of providing political leadership based on a vision and on a political philosophy is clearly out of fashion(pp. 212-217).

In conclusion, Roszak states that there is really no need for techno-merchants and technophiles to fear his criticism or the criticism of others. Governments, their military forces, and the

business community are nationally and internationally behind the advance of high technology. They are pouring billions of dollars annually into the development of information technology. Any criticism, even of the severest kind, is unlikely to have any negative impact. "The computer establishment is the Goliath in the confrontation; before it even the most militant critic stands like David without his slingshot."(p. xx)

III. The Domination of Technology

Not everyone feels as unhelpful about the importance and influence of negative criticism of technology. Neil Postman, Professor of Communication Arts and Sciences at New York University, has written a highly critical work on the direction which technology is pushing our society. In his 1992 book entitled, *Technopoly: The Surrender of Culture to Technology*, Postman carries out a sustained criticism of the negative impact of technology on numerous areas of our social and personal life.

Postman classifies human cultures into three types : tool-using culture, technocracies, and technopolies. He maintains that tool-using cultures used tools to accomplish some task important for physical survival or to enrich social life. Tools were embedded in and directed by values, beliefs, and social traditions. Generally, tools did not undermine or threaten the social fabric of these cultures(pp.

22-23). In contrast to a tool-using culture, tools play a central role in the thought for a technocratic culture (p. 28). Tools are not only integrated into such a culture, but they become the major integrating force within the culture. Social, political, economic, and religious life become subject to the development and direction of technology in a technocracy.

According to Postman, technocracy had its early beginnings in England in the last half of the eighteenth century. Major technological inventions began to appear. In 1765, James Watt invented the steam engine. Ricard Arkwright created the factory system for his cotton spinning mills in the 1780's. By 1806, the power loom introduced by Edmund Cartwright revolutionized the textile industry by eliminating skilled workers and replacing them with people who kept the machines running. The photograph and telegraph were invented in the 1830's. By 1850 machines capable of making machines were used in the machine tool industry. The typewriter and transatlantic cable in the 1860's, and the telephone in 1876 substantially enhanced the ability of people throughout the world to communicate with each other (pp. 40-42).

All of these technological inventions, of course, intensified admiration for the wonders of technology and also deepened Western society's dependence on technology. As Postman notes, people had learned to invent things, and the question of why these things should be invented in the first place was not a central question. There was

a common attitude that if something could be done, it should be done. As Alfred North Whitehead wrote, "the greatest invention of the nineteenth century was the idea of invention itself." (Whitehead cited in Postman p. 42) Furthermore, in the nineteenth century, many of the values and principles basic to a capitalist mode of production and technological innovation emerged. Efficiency, expertise, standardization, measurement, objectivity, and progress, for example, became common ideas and goals in Western culture. Much of the theoretical underpinning for these values and goals was provided by Adam Smith(1723~1790) in his *Wealth of Nations* written in 1776. Smith strongly argued for moving from small scale skilled labour production to large scale, mechanized production. The objective was to produce goods efficiently and at low cost for a self-regulation, competitive market. Technology would have a central place in this economic advance(pp. 40-42).

Not everyone applauded the emergence of a technological society, however. William Blake denounced the "dark Satanic mills" which dehumanized people. Matthew Arnold warned against "faith in machinery." Carlyle, Ruskin, and William Morris attacked the "spiritual degradation" brought about by industrialization. Between 1811~1816, workers, who came to be known as the Luddites, destroyed machines in the garment and textile industry. They protested wage cuts, child labour, and the elimination of skilled labour. In France, Balzac, Flaubert, and Zola wrote novels documenting the spiritual emptiness of "economic man" and the

poverty of consumerism(pp. 42-43).

Postman argues that the technocracy of the nineteenth century, however, did not completely destroy the worldview of the tool-using culture that it replaced. "Industrialism was too new and as yet too limited in scope to alter the needs of the inner life or to drive away the language, memories, and social structures of the tool-using past." (p. 47). Tradition, family, and religion still had a important place in nineteenth century culture. With the coming of the twentieth century, however, technocracy was replaced by technopoly. Postman describes a technopoly as a total philosophy of culture, a philosophy of life in which human life finds its purpose and meaning in machinery and technique. A technopoly promotes the idea that "society is best served when human beings are placed at the disposal of their techniques and technology." (p. 52) Technopoly is the "submission of all forms of cultural life to the sovereignty of techniques and technology." (p. 52) Postman refers to technopoly as a totalitarian technocracy. It does not make other worldviews like the traditional one illegal or immoral. Rather it makes them invisible and, therefore, irrelevant. In other words, in a technopoly, there is a philosophic-religious commitment to technology which determines that technology will be the central driving force in a given culture.

Postman dates the emergence of technopoly in the early twentieth century in the United States. He argues that a central turning point and major influence in the origin of a technopoly in the USA was

the introduction and commitment by government and the business community to the principles of scientific management formulated by Fredrick W. Taylor. Taylor's book published in 1911 entitled *The Principles of Scientific Management* "contains the first explicit and formal outline of the assumptions of the thought-world of Technopoly."(p. 51) Central principles of this scientific management of labour included:

- efficiency is the primary goal of human labour
- human judgement is inferior to technical calculation
- what cannot be measured does not exist or is irrelevant
- labour and all societal institutions should be directed by technical experts(p. 51)

In Taylor's approach, then, the judgement of the worker is to be replaced by laws, rules, and principles of scientific management. Workers are not to think for themselves but rather conform to the technical system in place. Over the years, Taylor's principles were applied in one form or another to various social institutions including government, the military, education, the legal profession, and even the home.

Postman points out that the ideas and principles of Fredrick Taylor did not arise *de novo* but rather were rooted, as expected, in the eighteenth and nineteenth century technocracies in England and France. In particular, Auguste Comte, a nineteenth century French philosopher, was of crucial importance in promoting the centrality of

empirical scientific principles. In his writings, Comte formulated ideas which were foundational for positivism and sociology. He wanted to construct a science of society using the methods of the natural sciences which for Comte meant empirical observation and measurement. This preoccupation with observation and measurement became a crucial assumption for the more specific ideas of someone like Taylor as he was formulating his principles of scientific management(p. 52).

1. The Information Deluge

A major characteristic of the technopoly that emerged in the twentieth century, according to Postman, is that information has taken on an almost god-like status. Similar to Roszak's evaluation, Postman believes that acquiring information has been elevated to a quasi-religious status. People seem to be more and more driven by the need to acquire as much information as is humanly possible. Tragically, however, few people are interested in asking the question, "What is the meaning or purpose of all this information?" Postman argues that information disconnected from theory, meaning, and purpose is dangerous.

when there is no theory to which it applies, no pattern in which it fits,
when there is no information is dangerous when it has no place to go, is no
higher purpose that it serves.

Information without regulation is lethal(p. 63)

Clearly, in Postman's mind, a person needs a worldview and value context in which to place information so that it is meaningful. He also asserts that the lack of information is often not the cause of most personal and social problems in the first place. The hatred, racism, violence, and war in the Middle East, the former Yugoslavia, and South Africa, for example, are not due to lack of information. Rising crimes rates, the decay of inner cities, and the high divorce rate are not caused primarily by a dearth of information. But technophiles give the impression that all one needs to do is to access more information to realize full personal and social potential. In fact, according to Postman, Western civilization is not suffering from a scarcity of information but from an information glut. In the United States alone there are over 250,000 billboards, 11,520 newspapers, 11,506 periodicals, 27,000 video outlets, 500 million radios, 100 million computers, 40,000 new books published yearly (300,000 books worldwide), and 60 billion pieces of junkmail produced every year. Ninety-eight percent of Americans have at least one television (p. 69).

Postman claims that information overload can actually create problems rather than solve them. Too much information can overwhelm people and create anxiety and the inability to decide and act. It can de-stabilize social institutions like the family, church, school, and state. Unlike religion, technopoly led by information technology provides no coherent worldview. Technopoly does not answer questions of meaning and purpose. Rather it replaces the

narrative of the Bible with the narrative of Progress brought about by science and technology. It should be obvious at this point in history that more and more information has not solved the massive problems of poverty, crime, environmental pollution, racism, and war(pp. 59-71).

2. The computer-Human Reductionism

Similar to Roszak, Postman maintains that the computer has become the dominant metaphor of our age, and the fundamental metaphorical message of the computer is that humans are machines or, at least, machine-like. In the context of this computer metaphor, humans are viewed as information processors. People in our culture speak of programming and de-programming themselves, for example. Some individuals think of their minds as basically like computer hard drives from which they can retrieve data. Such terminology points to one of the common problems with metaphorical language - people forget that a metaphor is used to indicate the similarity of two things in some respects but not their metaphysical identity. According to Postman, the human as computer and computer as human metaphor is a sad example of a metaphor "gone mad."

From the proposition that humans are in some respects like machines, we move to the proposition that humans are little else but machines and, finally, that human beings are machines(p. 112).

On the computer as human side of the metaphor, we speak of

computers infected with a "virus" which is contagious so that the computer involved needs to be "quarantined" in order to "sterilize the network" by developing a "vaccine to inoculate the system" against future attacks. Postman does not believe that this kind of language is accidental or a harmless anthropomorphism. Rather this type of language "reflects a profound shift in perception about the relationship of computers to humans."(p. 114)

In the light of this computer-human reductionism, Postman strenuously asserts that humans are not computers and computers are not human. Computers cannot feel and cannot understand in the sense of human understanding. Human understanding involves more than recognition of a set of symbols. It involves meaning, and meaning includes feeling, experiences, and sensations which cannot be captured or reduced to a set of binary symbols. Artificial intelligence does not and cannot lead to a meaning-making, understanding, and feeling creature which is what a human being is. Furthermore, this reductionism can have major negative consequences when, by talking about a computer "thinking", people begin to lose confidence in human judgement and decision making. Such a trend devalues the uniquely "human capacity to see things whole in all their psychic, emotional, and moral dimensions."(p. 118) Postman adds an historical note that the idea of reducing humans to machines did not originate with computer technology. This reductionism is part of a long tradition of industrial societies which has viewed workers as cogs in the wheel of machine production.

3. The Structure and Impact of Technology

A common attitude about technology exists in Western society that technology is neither good nor bad, it depends on how its is used. Postman argues that this idea fails to understand that "the uses made of any technology are largely determined by the structure of the technology itself - that is, that its functions follow from its form."(p. 7) In other words, no technology has limitless applications but rather each technology has fairly well defined parameters as to what it can and cannot do. A nuclear bomb, a computer, and an automobile do not have interchangeable functions. The structure of each technology leads to certain specific uses.

The structure of a technology not only determines how it will be used, but also shapes the identity, thinking, and behaviour of the individuals using this technology. For example, the invention and use of the telescope changed the self-understanding of Medieval society. It was no longer possible to believe that the earth was the center of the universe. The invention of the printing press changed the way people learned. Rather than rely on oral tradition conveyed by each generation, it was now possible to rely on the printed word as the storehouse of knowledge. Even something as seemingly insignificant as the invention of the stirrup can have major consequences. The invention of the stirrup in the eight century by the Franks under Charles Martel made possible warfare on horseback. Up to this time, horses only transported soldiers to a battle. These mounted soldiers, later to be called knights, grew in military importance to the point

that wealthy nobles and landlords became dependent on this knightly class of warriors. In other words, a significant aspect of feudal society had changed. Today, the invention of television has produced people who learn through visual imagery. The computer is powerfully shaping people who see themselves as global Internet citizens and who demand instant response to their questions and concerns(pp. 16-29).

Built into every technological tool, then, is a certain structural inclination to see the world and to live in the world in one way rather than in another. It should also be said that technological change permeates all of society. It is not just added to everything else but changes everything to which it is added. The printing press, television, airplane, and computer have not just been added to our culture but have profoundly shaped the way humans work and think at school, on the job, and at home. As Postman writes, "technology creates its own imperatives and, at the same time, creates a wide-ranging social system to reinforce its imperatives."(p. 105)

Postman includes another related observation about the impact of technology on society which is a well-known in the social science - the effects of a given technology are seldom anticipated by even the inventors of that technology. A classic historical example would be the invention of the mechanical clock by the Benedictine monks in the twelfth century. This clock was used to regulate activity in the monastery, especially the seven periods of the day for prayer. When

the mechanical clock left the monastery, it began to be used to control and regulate the activity of everyone in society. In 1370, King Charles V ordered all citizens of Paris to "regulate their private, commercial, and industrial life by the bells of the Royal Palace clock, which struck every sixty minutes."(p. 27) All churches were also ordered to structure their activities according to the Royal Palace clock in disregard of the canonical hours of prayer. In other words, Christian monks invented a technology which threatened to undermine the religious practice of their own community. Late in time, the mechanical clock was used by capitalist entrepreneurs to regulate production and their work force in order to enhance their profits. Once again, we see the irony of an invention that was intended to regulate religious life being used by men much more concerned with profit than with prayer(pp. 14-27).

In our own time, we might witness an analogous situation with regard to the invention of the computer. One of the original intents of the development of computer technology was to enhance communication and, therefore, understanding between people. But, as Postman points out, computer technology is creating an elite group of people who know how to use this technology. This elite group with its "knowledge monopoly" earns a high income and gains prestige and power(p. 9). The benefits of computer technology, in other words, are not distributed equally which creates a computer elite and everyone else in society. A social situation like this is ripe for envy, alienation, bitterness, and even social disorder. In such a

social development, we would find the opposite consequences originally intended for computer technology - instead of enhanced communication and understanding between people in a society, we would find a breakdown of communication, serious misunderstanding, and the threat of social conflict.

IV. An Evaluation of Anti-Technological Thought

A number of concerns raised by Roszak, Postman, and other critics of technology appear to be legitimate and need to be taken seriously. A substantial amount of megahype does surround computer technology. Anyone reading magazines like *PC World*, *Byte*, and *Wired* or a book such as Nicholas Negroponte's *Being Digital*(1995) is immediately struck by the unqualified exuberance of the pro-tech world. This enthusiasm reveals a deep confidence and trust that information technology will lead all of humanity into a bright future. Environmental and socio-cultural problems are usually ignored or seen as minor irritants that will be eliminated by ever more technology.

Furthermore, there is a tendency among information technology specialists, such as those in artificial intelligence research, to reduce human functioning to the level of computer functioning. Humans are viewed as nothing more than advanced computers which will be replicated in the laboratory eventually. This attitude and commitment

are part of a broad evolutionary and materialist philosophy which reduces human life to biochemical properties. In this philosophic context, human knowledge, wisdom, and insight are also reduced to what can be handled by computers, i.e., digital data. Such a reductionism reveals a philosophically naive position that somehow so-called "facts" provide their own meaning and interpretation. There is no need supposedly for human reflection.

Other issues raised by anti-technology scholars deserve attention. Concerns about information overload, and negative impact of information technology on education, politics, and the workplace need careful analysis. Postman presents an important insight that the structure of a particular technology powerfully shapes how that technology can and will be used.

However, there are some weaknesses in the arguments of Roszak, Postman, and other critics. Many of their statements need more extensive empirical support. Substantially more systematic, comprehensive research is needed to confirm the arguments presented. For example, the negative impact of computers on youth and on their education needs more evidence than is provided. The argument that computers have had an essentially negative impact on work is a controversial position which demands more empirical verification. Postman's central thesis that individual, social, economics, and political life are totally dominated by technique and technology is much easier to state than to substantiate.

Lack of empirical evidence, however, is not the only weakness in the anti-technology approach of scholars like Roszak and Postman. More fundamentally, there seems to be a technological determinism at the root of their critique and concerns. We are left with the understanding that the negative impact of technology is inevitable and that there is no way to control the advance of technology. Once in place, technology supposedly has a life of its own and nothing can change the direction of this powerful force unleashed on society. I would argue that this technological determinism need to be challenged.

It is important to understand that all technology including information technology is shaped by social forces in its origin, development, and use. Failure to understand that social forces shape the emergence of a technology is to look at technology as an uncaused reality in society which exists only by its own internal logic. Any careful reflection on the origin, economic, political, and cultural context(Edge, 1995). For example, many decisions made in the research and development of a technology are shaped by economic realities and political expectations. Tight research budgets due to a weak economy or government regulations may completely suppress the emergence of a particular technology. Numerous governments are imposing rigorous constraints on genetic engineering and reproductive technologies, for instance. International political conditions can powerfully shape how extensively and what kinds of military technology are developed. The ideology of national

superiority has strongly influenced the development of aerospace technology over the past decades. High rates of crime stimulate research and development in the areas of video surveillance and alarm systems for office buildings, homes, and automobiles(McGinn, 1990).

Not only external social forces but the internal dynamics of a particular company producing a technology will powerfully shape what is actually produced. Human decision making is involved at each stage of bringing a product to the consumer. The marketing department, for example, may determine that a particular invention is innovative but it will not sell. Numerous technological innovations never see the light of day because others in a business firm decide that it can not be marketed. In other words, the creation of a technology does not mean that it now has a life of its own which is not subject to any human control. Human choice and decision making are present at every stage of the development of a technology. Obviously, human decision making is also continually present in determining which technological products will actually be used by governments, businesses, and consumers(Mackay, 1995).

Technological determinism, then, is not a convincing position. It seriously underestimates or even ignores the socio-cultural context and the internal realities of the origin, development, and use of technological products. Technology has been defined as "the activity by which people give form to nature for human ends, with the aid

of tools.”(Schuurman, 1980:5) It is important to stress, then, in contrast to anti-technological critique that technology is and remains a human activity. Human technological activity is part of human cultural activity. Decisions and choices are and can be made. Technology is not a force that is autonomous from human thought and action.

V. Conclusion

Critics of technology point to serious issues related to the advance of information technology. The implicit reduction of human thought and life to computer functioning should be a matter of grave concern. Information overload can undermine thoughtful and careful decision making. More fundamentally, any elevation of information technology to an unquestioned, almost cult-like status will be alarming for all religious faiths including Christianity.

However, evaluation and criticism of information technology need to avoid at least two basic errors. Firstly, general statements about the negative effect of information technology on political, economic, and social life must be supported by evidence. It is not sufficient to make a broad statement about the harmful impact of a particular technology such as computers and, then, cite a few examples to illustrate the point. Much more extensive and intensive social science research from psychologists, sociologists, political

scientists and economists is required. This type of research data is often lacking in the writing of anti-technology critiques.

Secondly, critics of information technology, ironically, often make the same error that they accuse pro-technology advocates of making, i.e., technological determinism. Instead of technology being inevitably good as in technicistic thought, technology is assumed to be inevitably bad and not subject to human decision making.

In contrast to both forms of determinism, we should understand technology as one of God's good gifts to humanity that can be used in responsible and constructive ways. A normative understanding of technology allows us to use information technology as a creational tool that can enhance areas such as communication, transportation, family life, and health care. With our God-given human freedom to make decisions, we are able to provide a helpful, even redemptive, structure and direction to this creational force that we call technology.

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