The Myth of Technological Progress

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THE MYTH OF TECHNOLOGICAL PROGRESS

Chuang Tsu, the Taoist author of the second century A.D., tells this story:

Tsu-Kung, the disciple of Confucius, after travelling to Ch'u in the south, came back by way of Ch'in. When he was passing through Han-yin he saw an old man who was engaged in irrigating his vegetable plots. The way this old man did it was to let himself down into the well-pit by footholes cut in the side and emerge clasping a pitcher which he carefully emptied into a channel, thus expending a great deal of energy with very small results.

"There exists," Tsu-Kung said to him, "a contrivance with which one can irrigate a hundred vegetable plots in a single day. Unlike what you are doing, it demands a very small expenditure of energy but produces very great results. Would you not like me to tell you about it?" The gardener raised his head and gazed at Tsu-Kung. "What is it like?" he asked. "It is an instrument carved out of wood," said Tsu-Kung, "heavy behind and light in front. It scoops up the water like a bale, as quickly as one drains a bathtub. Its name is the well-sweep."

A look of indignation came into the gardener's face. He laughed scornfully, saying, "I used to be told by my teacher that where there are cunning contrivances there will be cunning performances, and where there are cunning performances there will be cunning hearts. He in whose breast a cunning heart lies has blurred the pristine purity of his nature; he who has blurred the pristine purity of his nature has troubled the quiet of his soul, and with one who has troubled the quiet of his soul Tao will not dwell. It is not that I do not know about this invention, but that I should be ashamed to use it."

The attitude of the old gardener is even more alien to us than to the Confucians 2000 years ago. We have made progress, everyone agrees.

"Progress is Our Most Important Product," the advertisements assure us. "In my administration," pleads the politician, "our free enterprise system has made unprecedented progress." And the police-statesmen defend their invasion of Czechoslovakia with essentially the same argument: "More than ever the cause of progress demands strengthened unity of the socialist camp." In this universal chorus, even the bulldozer joins, roaring "You can't stop progress," as with fine impartiality it levels everything in its path.

Progress is the arch-shibboleth and the central myth of the industrial state everywhere. Whatever their differences in political structure or in
ideology, all industrial societies honor the very same notion of progress. For all, the idea of progress necessarily implies that technological cunning represents the highest value, that the end of human existence is to exercise ever increasing technological power, that such power is the greatest good. Stated forthrightly, this is an idea to which few would give their allegiance; it would seem absurd or at least too exclusive, too negligent of other values. But in fact, even though we may explicitly repudiate undisguised absurdity, we may also accept it, implicitly, unconsciously, practically. That unconscious acceptance may operate at the most profound and practical levels. Working covertly, it may yet dictate our behavior while those other more consciously held values — religious, ethical, aesthetic — are inevitably subordinated. The idea of progress courses in our veins and it takes a deliberate cerebral act to recognize it in its subtle and pervasive manifestations.

We might start with words. The word progress connotes goodness; the affirmative associations which we spontaneously make, upon hearing the word, indicate how firmly the myth grips us. In debate, everybody claims that his position is progressive. (His opponent's is regressive.) If he makes the label stick, he has practically won the debate. The only opposing argument might be that progress costs too much. But even that argument concedes that if it didn't cost too much it would be desirable.

The word progress suggests movement in one direction. Earlier, less naive, more critical times knew that not all such movement is towards something good. Nowadays, however, phrases which should be more apposite than ever, like "The Rake's Progress" or "The Harlot's Progress," sound archaic or paradoxical. When we say "You can't turn the clock back," we mean that no one would want to, for "Forward!" is the good direction.

The reason we unconsciously equate progress with technological with directed movement toward the good is that we are all products of a technological society. We operate with a particular paradigm of progress: the seemingly unidirectional movement of scientific technology. Social life, we are conditioned to believe, is about power, and the quintessence of power is the ability to control and manipulate that which we imagine to be an "external world." This is the definition identically of scientific technology and of technological science.

If we see that science and progress are organically one, the yoke and white in the same shell, then we are getting close to the level at which we accept the absolute primacy, even the sacredness, of the two.

This general attitude among people of all ideological persuasions can be held to be the triumph of the ideology which can be called Vulgar Marxism.
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All ideological persuasions can be called Vulgar Marxism — what Jean-Paul Sartre once termed "la philosophie indépassable de notre époque." Now Marx was not a Vulgar Marxist, but he was responsible for the Vulgar Marxists and a great deal of what he wrote produced this ideology, this outlook on the world. "Scientific socialism" is a very good catch phrase, a shibboleth which will identify the Vulgar Marxist. The central point in the doctrines of scientific socialism, starting with Marx's Critique of Political Economy of 1859, is that the key mission of any form of society is the development of productive forces. Societies give way to other societies only when they are unable to continue this historical mission of developing their productive forces. Historical change is progress towards the communist society as the highest stage possible in human evolution. The key moving principle of historical progress is technological progress.

It is right there in the philosophy of historical materialism, in the socialist ideal which nobody wishes to dispute. (Some may indeed dispute the socialist means of achieving it, but the end, the ideal, remains, high and inviolate. Krushchev wanted to bury the U. S. in a battle of the GNP, but the U. S. still prides itself on being Number One in this respect; both societies worship the same god. Both will readily compromise more explicit ideals and ideologies but both ultimately justify their rightness by reference to their productive capacities.)

Does the slogan of Saint-Simon and Engels, "The power of man over nature is to replace the power of man over man," alter this? No, it confirms it in the strongest terms, for the Baconian power over nature can by no well-meaning words be distinguished from power over human beings. It is not only that for man other humans are necessarily natural objects. The crucial fact is that the technological means of controlling nature are equally the direct means of controlling people and the ultimate means by which human behavior is determined through the social environment.

We may reflect on that famous passage from the Communist Manifesto:

The bourgeoisie has been the first to show what man's activity can bring about. It has accomplished wonders far surpassing Egyptian pyramids, Roman aqueducts, and Gothic cathedrals; it has conducted expeditions that put in the shade all former Exoduses of nations and Crusades.

It takes no research in the vanished wonders of 1847 to discover what Marx had in mind; we have greater wonders today. The cathedral of Chartres cannot compare in height to the Empire State Building, nor can the numbers killed before Troy compare to the statistics of Viet-Nam. To make such comparisons suggests how convincingly technological progress imposes itself as the criterion of human value.
But even if we reject the forthright contention that technological progress is itself a good, there are several subtler variants of the same notion that are a little harder to deal with. Is technology, for instance, a means necessary to good ends? Should we not admit that just as every technique of doing something is a means, with the thing to be done as end, so scientific and technological progress itself may have positive instrumental value? Further, it may be argued that technological progress creates new possibilities for human accomplishment — like going to the moon or putting ourselves in deep freeze for centuries. Isn’t this broadening of our range of possibilities in itself something of positive human value?

This last argument is to be denied for all reasons. Broadening the range is not itself of positive value if it includes possibilities with negative value. It’s like saying that we prefer to play on a roulette wheel with fifty numbers instead of thirty-five, the additional fifteen all being double zeros. But technological progress does not in fact broaden our range of choice; it only replaces certain possibilities with others. In effect, the horse-drawn carriage is killed by the horseless carriage. (And so are pedestrians, in several ways. For the car so changes the scale of the city that walking anywhere is unthinkable.) Certain fellow creatures are destroyed forever; no one, ever, will be able to say whether he prefers a world with the great auk in it. What has happened in the course of technological progress is a radical change in all the situations that confront people — not the increase of options but a change of conditions. Choices — even technological choices — possible in a world whose inhabitants number fifty million are irrevocably closed in a world which has five thousand million people in it. Now the one thing inevitably linked with technological progress is the exponential growth of population. Progress serves as cause and as effect: as cause, since to feed a growing population forces the adoption of new technologies; as effect, since every improvement in means of subsistence increases the survival rates. The point here is not that survival is bad or that an early death is good but simply that the experience of history shows that technology changes the nature of our choices; it does not broaden them nor make them intrinsically better.

Now, what about the proposition, widespread among enlightened people, that progress or science as such is neutral? It is neither good nor bad. It is unfortunate that it has happened to go too fast to handle. But if we knew how to use it, then it would be perfectly all right. Its value, this argument runs, depends on our uses. Well, to test this contention, we have to look at the possible uses and decide whether they are good or bad.

Where do we get standards and criteria for distinguishing the good from the bad uses of science? We have to be counting new possibilities. And asking whether it gives people the popular desires, whether it increases happiness. We cannot do this — taken up and expounded in his book — the technology of a society determines what people regard as necessary to them that they learn by growing up in its structure. The desire for an automaton technological structure which has haunted the technological basis of society is an end which is to justify the function of the means in question of the thing to be valued.

In order to know the good objective social values. Underlying stratum of objective human needs object to any depreciation of the literary turn of mind, they will When Lear’s daughters propose a ground that he had no need of it Lear replies:

O reason not the need! Our bas
Are in the poorest thing super:
Man’s life is cheap as beast’s.
If only to go warm were gorge
Why, nature needs not what t
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for distinguishing the good from
the bad uses of science? We have seen that we cannot get standards merely by
counting new possibilities. And we certainly cannot get such standards by
asking whether it gives people the things they want, whether it satisfies
popular desires, whether it increases people's estimates of their own
happiness. We cannot do this — and here is a valid point in Marxist philosophy,
taken up and expounded in his own terms by Marshall McLuhan — because
the technology of a society determines the conceptual and experiential modes
generally acceptable within that society. What people expect from the world,
what they regard as necessary to them or desirable for them is something
that they learn by growing up in a certain society with a certain technological
structure. The desire for an automobile, for example, is a function of the
 technological structure which has made the automobile not only possible but
has vaunted its desirability and created the necessity for it. Subjective
estimates — what people believe they want — are determined essentially by
the technological basis of society. But logically and practically, if something
is an end which is to justify the means, that end cannot be the dependent
function of the means in question. The standard of value must be independent
of the thing to be valued.

In order to know the good or bad uses of progress, we have to look for
objective social values. Underlying the subjective is indeed a clearly visible
stratum of objective human needs. Yet many — especially economists — will
object to any depreciation of their precious subjectivity. And if they are of a
literary turn of mind, they will protest in the words of the mad King Lear.
When Lear's daughters propose to take away his retinue of bodyguards on the
ground that he had no need of it — he had his daughters for protection —
Lear replies:

O reason not the need! Our basest beggars
Are in the poorest thing superfluous.
Allow not nature more than nature needs,
Man's life is cheap as beast's. Thou art a lady:
If only to go warm were gorgeous.
Why, nature needs not what thou gorgeous wear'st.

There are two objections here. The second (beginning with "thou art a
lady . . .") says you do not need the things that make you gorgeous. The
argument may be generalized thus: you the arguer, who are the critic of
technology, who claim there are objective needs, are yourself perfectly glad
to use all the comforts and luxuries provided by a technological society;
therefore, you have no right to speak of needs. The argument is not only ad
hominem; it is also absurd. For it is logically as well as factually impossible
to live in a society but outside its technology. Moreover, those conditions,
however obligatory, may be bad or irrelevant. And Lear recognizes this as
he concludes:
Why, nature needs not what thou gorgeous wear'st
Which scarcely keeps thee warm.

His daughter is a queen and must go in luxury. But her royal magnificence is unkind to her humanity nonetheless.

Lear's conclusion undercuts his first and basic argument which is, of course, that there exist no objective or merely natural human needs. It is this argument to which most economists, in their professional capacities, subscribe. For them, as for the mad old king, physical subsistence is necessary to both man and animals and hence reveals nothing particularly human. In so far as human needs define humans, they must be distinguished from animal needs. And since humans are the only ones who can judge what they need, therefore all human needs are subjective needs. So runs this perverse argument.

The answer to that is that the essential and specific physical nature of the human animal is written in the genetic code and is present in each of us, no matter when or where we live. That which makes us human is constant and abiding, whether we are born 5000 years ago in what is now the Gobi desert or born today in what will be the Gobi desert tomorrow, say Los Angeles. It does not change with technological and social conditions.

We can judge technological progress by asking whether it serves man's essential needs. What are those needs? I contend that health is the most simple and adequate definition of human needs. Now, maximal vitality, the conceptual definition of health, is rather hard to deal with, but we can use the obverse of that definition: minimal morbidity, or the least degree of what can be recognized as sickness or impaired functioning. (True, it would be better to have an idea of the optimal, but proceeding by indirection we may still arrive at a satisfactory notion of health.)

Minimal morbidity is not to be confused with minimal mortality. Maximal vitality is surely not mere length of years. Any increase in life expectancy is worse than meaningless if it signifies only the general protraction of terminal illnesses. Further, humans are animals possessing complex nervous systems whose state is reflected in every aspect of their functioning. Health is in every sense psychosomatic. When we talk of health, we necessarily talk of happiness or fulfillment. Our criterion of need is that as animals we need all those things which promote health; and since this is a definition, we need only those things.

But what are the requirements of such a notion of health? They are easy to set forth. Each individual needs adequate nutrition, an individually specific and determinate quantity and quality of light, water, air, calories, roughage, amino acids, vitamins, minerals and trace elements. Everyone needs, depending on climate and clothing and medicaments to prevent disease. We have our own special vocabulary: acculturation, or integration in the environment. Like other mammalian needs, there is a social and affection of parents and the like. We need to be protected and to be brought into the case in being.

We also need activity, both mental and physical, a balance among work, leisure, and the like. For harmony, it can scarcely be maintained that we are born for it. We need to feel protected and to be brought into the case in being. And we need a sense of harmony which is not mere tranquil light, but the variable consequences of frustrating the circuit.

Where are values higher than the material? Certainly not, as we have seen, by owning the material needs. Values must be of a spiritual nature to be brought into the case in being. Of the possible such value which can be brought into the case in being in the guise of "science" is a notion of the knowledge of the world we make of it. Divorced from all technical and social conditions. Epistemological reservations concern the changing material world, its less arcane matter — concern the responsibility of the scientist for researches. But even waiving the spiritual, surely only the tiniest portion of the innovation and diffusion. Science is really not the tiniest portion of the material life; it is power that coexists with the spiritual values, the tiniest portion of the material life, as its basis and prerequisite. The physically specified above rather than in the tiniest portion of the material life as its basis and prerequisite. The physically specified above rather than in the spiritual values. The condition stated above as the standard for any society which specifies the spirit of science. That any society is deceiving itself.
needs, depending on climate and conditions, particular sorts of shelter, clothing and medicaments to protect him from hazards present in the natural environment. Like other mammals, we need nurture, including both the love and affection of parents and the social group, and education. For education we have our own special vocabulary and method, which can be called acculturation, or integration into the symbolic structures of human society.

We also need activity, both physical and mental. We need a proper balance among work, leisure, and repose. Further, if health is indeed an inner harmony, it can scarcely be maintained in the teeth of external disharmony. We need to feel protected and supported by an outer world that makes sense. And we need a sense of harmony with our natural habitat. These needs may appear rather subtle but the vast incidence of mental disease shows that the consequences of frustrating these needs are not very subtle.

Where are values higher than these objective needs to be found? Certainly not, as we have seen, in the realm of wants and desires! Any such values must be of a spiritual nature. Can there be values of this sort that might be brought into the case in behalf of scientific progress? The most evident possible such value which can be portrayed as an end for which technology in the guise of “science” is a means, is knowledge. If by an increase in knowledge of the world we mean “pure science” (scientific work which is divorced from all technical applications whatsoever), then the point can be conceded, though there are still epistemological and ethical reservations. Epistemological reservations concern the reasons for considering knowledge of the changing material world as true knowledge. Ethical reservations — a less arcane matter — concern the uses to which science may be put and the responsibility of the scientist for the consequences of his spiritually satisfying researches. But even waiving these reservations, the point at issue concerns only the tiniest portion of the activity now devoted to technological innovation and diffusion. Scientific knowledge is loved for itself alone by only a few; it is power that compels the many.

There are other and higher values — those usually associated with such words as wisdom, beauty, love. While these are yet to be located in any material aspect of life, they are obviously rooted in the animal needs specified above rather than in the power which technology offers. As spiritual life has material life as its basis, so our spiritual needs have health as prerequisite. The physically sick person is not able to realize substantial spiritual values. The conditions for health are an adequate and objective standard for any society which has not achieved them. There exist other values, independent of and higher than the essentials already set forth; but any society is deceiving itself if it pretends to honor them before it has
provided for the condition on which all values depend: health.

We can now ask whether, as a matter of historical fact, technological progress has served human needs well. The U. S. prides itself on being the wealthiest and most progressive country in the world. Then surely the case for technology can be best made by reference to the American experience. So let us look at the level of satisfaction of human needs in the U. S.

Over ten million Americans suffer from clinical malnutrition. Scores of millions, of course, are overweight. The diet of most is unbalanced, typically excessive in refined and empty carbohydrates and animal proteins, deficient in fresh fruits, vegetables, and whole grain cereals. The foods are almost universally grown with chemical fertilizers on exhausted soil and sprayed with poisonous chemical pesticides and fungicides; they contain residues which are certified as being palatable even though they are cumulative poisons. They are preserved generally with chemical additives of which the best that can be said is that nobody knows what their effects are. Water in every city of the country is taken from polluted sources and then treated with chlorine and other chemicals so that it won't kill you immediately. Air, as we know, has been chemically polluted to the point where it is a source of chronic respiratory diseases and becomes, in temperature inversions, an actual and frequent contributing cause of death. Our food, air and water were not in this state or anything close to it a century ago: the correlation between technological progress and the deterioration in the most essential requisites of life is very clear.

Though Americans are indeed well-clothed, housing is miserable on a mass scale, as every middle-class citizen can prove to himself if he dares to visit his neighborhood slum. Hospitals in the U. S., except the more expensive ones, are inadequately staffed and overcrowded at best and at worst are an abomination. Infant mortality rates are higher than in many poorer countries. The cost-of-living statistics show that the cost of medical care goes up faster than almost anything else. This indicates two things: one, that health problems continue to increase and become more serious; two, that there is a great unsatisfied need for health care.

Of education, little need be said; the failure of the U. S. public education system is a public scandal and the primary agency of acculturation has become the TV screen.

TV has also become the mass American leisure activity as jobs have less and less intrinsic meaning and are more and more sedentary.

Environmental and social harmony has all but vanished. It is disharmony that predominates and grows ever louder. From the “law and order” mass psychosis to the noise pollution spread over the countryside, the U. S. can boast every form of technological cacophony imaginable.

Is there really anyone so naive as to imagine technological progress will somehow solve all our problems? The clear implication which technology testifies against this is that all we need is the 2000 billion dollar per year technology to improve health, to eradicate poverty, to remove pollution, etc. But if you add the proviso that we must accept greater and vaster technological damage as well, then the simple fact that everything is possible is the simple fact that everything is being done. We are paying a fraction of our present national income for technological progress that will take place, is taking place, for the very simple fact that everything is possible.

The material resources required to permit the citizen amount to much less than the wealth of a country, to be sure. These human needs are relatively few, modest, and do not relate to the level of our technological progress. The material needs of the U. S. are conclusive and must be met; the demand for technological progress is amorphous and unfulfilled. The clear implication which technology testifies against this is that the satisfaction of human needs is less than the wealth of the U. S. could be due to a colossal waste and devolution.

The clear implication which technology testifies against this is that the degree to which human needs are satisfied is limited in some manner to the relative level of our technological progress. What is shown is that this is not a mere coincidence, but that one are convincing reasons for this.

Most visible of all is the system of health care. If the American GNP did not expand would the health care system have expanded? Not under present social priorities — our priorities show in the present economy. For example, what would the automobile industry? What would the drug industries which produce the medicines we use and the poisons we take? Is it possible that the only things we can possibly expand are those things that are directly related to the level of our technological progress? It is quite possible to some extent, but this is not a satisfactory answer.
s depend: health.

A historical fact, technological progress as such. We pride ourselves on being the most advanced society in the world. Then surely the case must be made in favor of the American experience, human needs in the U.S.

Clinical malnutrition. Scores of people in the U.S., except the more expensive treated at best and at worst are an embarrassment to many poorer countries. Most medical care goes up faster than the present GNP; the problem is to produce different things and make sure that there is equitable and proper distribution. These human needs are relatively simple and modest. The mere existence of poverty and disease in a society half as rich as ours, half as developed as ours, could be due only to a colossally perverse allocation of resources.

The clear implication which follows the facts cited above is that the degree to which human needs are satisfied in our society is somehow inversely related to the level of our technological sophistication. What remains to be shown is that this is not a mere accident but is systematically the case. There are convincing reasons for this assertion.

Most visible of all is the systematic requirement of our economy for permanent expansion; it is quite likely that even a decade during which the GNP did not expand would be at least as great a catastrophe as the last such period, the Great Depression. As Marx demonstrated and Keynes popularized, income and employment depend on net investment which is itself both cause and result of industrial expansion. But we can't now expand by directing expansion to meeting human needs, for clearly needs are not only finite but so small compared to potential productivity that even if they were satisfied under present social priorities — which I contend is impossible — no further growth in that direction would be open. Worse, much worse, if needs were satisfied it would be destructive to huge dynamic sectors, growing sectors, of the present economy. For example, what would radical elimination of noise and air pollution, or radical safeguards against accidental death or injury — the minimum required to preserve the health of the population — do to the automobile industry? What would a proper diet mean for the chemical and drug industries which produce chemicals added to our foods and drugs to cure the diseases we get because we live on an unhealthy diet? When trees are
more important than cars, how much cement will we need?

Our economy is in fact geared not to satisfying needs but to creating wants through psychological and social conditioning. The role of the mass media and advertising in conditioning people to demand ever more products is quite obvious, but further than that social policies, priorities, planning are designed to compel people to follow this pattern. American transportation planning in the postwar period is the classical example. To compel people to buy enough automobiles, it was necessary merely to structure urban and inter-urban transportation patterns so that most people must choose not between a car and some other form of transportation but between a car and no transportation at all; of course, most people are obliged to live in a situation in which they must have transportation.

The general response of the economy to real needs and created wants, and the general attitude, for that matter, of the economic profession, might be expressed quite well in the words from Stravinsky's L'Histoire du Soldat, in which the devil answers the soldier who complains that he has been cheated of his birthright:

Alors de quoi te plains-tu?
Tu as plus que le necessaire
puisque tu as le superflu.

“So what are you complaining about? You have more than you need since you have all the luxuries you can possibly desire?”

But the antagonism between induced wants and natural needs, and the systematic favoring by society of induced wants at the expense of needs, is only part of the picture. Of more importance is the systematically destructive effect of technological progress on the ecology. Our progress in befouling the environment is even more damaging to our fellow creatures than it is to ourselves directly. This is an unavoidable part of the technological complex since any sudden, massive change in part of an interdependent system is disruptive to the system as a whole. Other animals, plants, insects who are not favored, as we are, in being able to survive on some terms in any possible environment die out as a result of changes which have no immediate bearing upon them. Never in history have the ecological effects of changes in technology, particularly those associated with a rapid increase in population, even been considered. So when as seeming "side effects" of progress we confront the consequences of ecological disruption, we automatically grasp for a technological "solution" which then combines with the destructive consequences of economic growth to cause new, unforeseen side effects, and so on ad mortem omnium. When the soil becomes depleted through the use of technological innovation such as more intensive cultivation, the common solution is to use fertilizers, which implies that the plants mono-cultivated in very large quantities are highly needed, that the natural predators of the subagricultural pattern, that water and choke up streams with flood cycle and provides breeding ground is that stronger and stronger people further depleted as a result of chemical fertilizers are needed, until the deserts are early examples of a technological complex.

But of course we haven't stopped of the actual ends for which technological progress is militarily always been so. But whether or not this generation that we confront the destruction of human beings and the application of atomic, chemical designs for infernal purposes. The fact speaks for itself.

In sum, then, our argument that technological progress in fact的技术 to us as human beings, range the absolutely evil. By any rational So the Luddites were right after all.

What is the alternative? The absolute priority to individual, technological means really required technology except what is destructive.

Of course this does not make quite unthinkable - even the best. It means lowering the general standard of living, if you will. This does not mean technologies in specific areas will be lost. For example new technologies of means of composting sewage, or much needed. But we do not need sewage, and anything which will reduce the quantity is itself a good change.

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in very large quantities are highly subject to insect pests and insecticides are needed, that the natural predators of the so-called pests are eliminated by the subagricultural pattern, that the soil and the fertilizer run off into the water and choke up streams with blooms . . . This brings about a different cycle and provides breeding grounds for a new set of insect pests. One result is that stronger and stronger pesticides are needed. Again, as the soil becomes further depleted as a result of chemical fertilization, more and more fertilizers are needed, until the soil is a dead loss. The Gobi and Sahara deserts are early examples of a similar process.

But of course we haven't said everything yet, for this short description of the actual ends for which technology serves as a means has left the best for the last. And that is the spectacular fact that the primary purpose of technological progress is military. It can be persuasively argued that this has always been so. But whether or not this has been generally true, it is only in this generation that we confront the immediate menace of universal destruction of human beings and of other higher animals through the application of atomic, chemical, and bacteriological technologies specifically designed for infernal purposes. As lawyers would say, res ipse loquitur, the fact speaks for itself.

In sum, then, our argument allows no other conclusion than that our technological progress in fact tends to produce results virtually all of which, if judged as human ends, range from the valueless through the harmful to the absolutely evil. By any rational standard it has been in and of itself bad. So the Luddites were right after all.

What is the alternative? The rational alternative is quite simple: give absolute priority to individual, social, and ecological health; determine the technological means really required to maximize it; and exclude all other technology except what is destined for pure science and innocent toys.

Of course this does not mean the elimination of technology, which is quite unthinkable — even the bucket of Chuang Tzu's farmer was a technology. It means lowering the general scale of technology. It means technological reaction, if you will. This doesn't exclude, indeed it demands, new health technologies in specific areas where the criteria we have adapted require it. For example new technologies of waste disposal are imperative; an economical means of composting sewage, of re-using solid wastes of various sorts, is very much needed. But we do not need anything that increases the quantity of sewage, and anything which without other consequences can reduce the quantity is itself a good change.

How can this purification of technology be accomplished? Obviously it is not going to happen. That is quite plain. People at the start are brought up in a technological society, their desires are conditioned by technology. They
are not about to adopt any utopian solutions that merely have rational arguments and rational persuasions in their favor. That's not the way the world works. For what ground are there to imagine that technological society can live by any law other than the iron dictates of progressive technology? Of course it cannot — not unless it ceases to be technological, and that means a restructuring not of institutions but of deeply inculcated mental and behavioral determinants inside the nervous systems of hundreds of millions of humans. One by one.

You tell me it's the institution?
Well you know
You'd better free your mind instead.