

The following texts are excerpts from *Tools for Conviviality* by Ivan D. Illich (1973). They are arranged in a subjective order and into four sections:

1. Introduction and results from *Deschooling Society*
2. Tools: means to an end or convivial?
3. Power and tools' energy output
4. Two Watersheds

During the next several years I intend to work on an epilogue to the industrial age. I want to trace the changes in language, myth, ritual, and law which took place in the current epoch of packaging and of schooling. I want to describe the fading monopoly of the industrial mode of production and the vanishing of the industrially generated professions this mode of production serves.

Above all I want to show that two-thirds of mankind still can avoid passing through the industrial age, by choosing right now a postindustrial balance in their mode of production which the hyperindustrial nations will be forced to adopt as an alternative to chaos. To prepare for this task I submit this essay for critical comment.

In its present form this book is the result of conversations at CIDOC in Cuernavaca during the summer of 1972. Participants in my seminar will recognize their ideas, and often their words. I ask my collaborators to accept my sincere thanks, especially for their written contributions.

This essay has become too long to appear as an article and too intricate to be read in several installments. It is a progress report. I respectfully thank Ruth Nanda Anshen for issuing this tract as a volume, in *World Perspectives*, published by Harper & Row.

For several years at CIDOC in Cuernavaca we have conducted critical research on the monopoly of the industrial mode of production and have tried to define conceptually alternative modes that would fit a postindustrial age. During the late sixties this research centered on educational devices. By 1970 we had found that:

1. Universal education through compulsory schooling is not possible.
2. Alternative devices for the production and marketing of mass education are technically more feasible and ethically less tolerable than compulsory graded schools. Such new educational arrangements are now on the verge of replacing traditional school systems in rich and in poor countries. They are potentially more effective in the conditioning of job-holders and consumers in an industrial economy. They are therefore more attractive for the management of present societies, more seductive for the people, and insidiously destructive of fundamental values.
3. A society committed to high levels of shared learning and critical personal intercourse must set pedagogical limits on industrial growth.

I have published the results of this research in a previous volume of *World Perspectives*, entitled *Deschooling Society*. I clarified some of the points left ill defined in that book by writing an article published in the *Saturday Review* of April 19, 1971. Our analysis of schooling has led us to recognize the mass production of education as a paradigm for other industrial enterprises, each producing a service commodity, each organized as a public utility, and each defining its output as a basic necessity.

Introduction and results
from *Deschooling Society*
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We found that the industrialization of any service agency leads to destructive side effects analogous to the unwanted secondary results well known from the overproduction of goods. We had to face a set of limits to growth in the service sector of any society as inescapable as the limits inherent in the industrial production of artifacts. We concluded that a set of limits to industrial growth is well formulated only if these limits apply both to goods and to services which are produced in an industrial mode. So we set out to clarify these limits.

I here submit the concept of a multidimensional balance of human life which can serve as a framework for evaluating man's relation to his tools. In each of several dimensions of this balance it is possible to identify a natural scale. When an enterprise grows beyond a certain point on this scale, it first frustrates the end for which it was originally designed, and then rapidly becomes a threat to society itself. These scales must be identified and the parameters of human endeavors within which human life remains viable must be explored.]

Tools: means to an end or convivial?
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Our vision of the possible and the feasible is so restricted by industrial expectations that any alternative to more mass production sounds like a return to past oppression or like a Utopian design for noble savages. In fact, however, the vision of new pos-

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sibilities requires only the recognition that scientific discoveries can be used in at least two opposite ways. The first leads to specialization of functions, institutionalization of values and centralization of power and turns people into the accessories of bureaucracies or machines. The second enlarges the range of each person's competence, control, and initiative, limited only by other individuals' claims to an equal range of power and freedom.

To formulate a theory about a future society both very modern and not dominated by industry, it will be necessary to recognize natural scales and limits. We must come to admit that only within limits can machines take the place of slaves; beyond these limits they lead to a new kind of serfdom. Only within limits can education fit people into a man-made environment; beyond these limits lies the universal schoolhouse, hospital ward, or prison. Only within limits ought politics to be concerned with the distribution of maximum industrial outputs, rather than with equal inputs of either energy or information. Once these limits are recognized, it becomes possible to articulate the triadic relationship between persons, tools, and a new collectivity. *Such a society, in which modern technologies serve politically interrelated individuals rather than managers, I will call "convivial."*

The symptoms of accelerated crisis are widely recognized. Multiple attempts have been made to explain them. I believe that this crisis is rooted in a major twofold experiment which has failed, and I claim that the resolution of the crisis begins with a recognition of the failure. For a hundred years we have tried to make machines work for men and to school men for life in their service. Now it turns out that machines do not "work" and that people cannot be schooled for a life at the service of machines. The hypothesis on which the experiment was built must now be discarded. The hypothesis was that machines can replace slaves. The evidence shows that, used for this purpose, machines enslave men. Neither a dictatorial proletariat nor a leisure mass can escape the dominion of constantly expanding industrial tools.

The crisis can be solved only if we learn to invert the present deep structure of tools; if we give people tools that guarantee their right to work with high, independent efficiency, thus simultaneously eliminating the need for either slaves or masters and enhancing each person's range of freedom. People need new tools to work with rather than tools that "work" for them. They need technology to make the most of the energy and imagination each has, rather than more well-programmed energy slaves.

I believe that society must be reconstructed to enlarge the contribution of autonomous individuals and primary groups to the total effectiveness of a new system of production designed to satisfy the human needs which it also determines. In fact, the institutions of industrial society do just the opposite. As the

power of machines increases, the role of persons more and more decreases to that of mere consumers.

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As an alternative to technocratic disaster, I propose the vision of a convivial society. A convivial society would be the result of social arrangements that guarantee for each member the most ample and free access to the tools of the community and limit this freedom only in favor of another member's equal freedom.

At present people tend to relinquish the task of envisaging the future to a professional élite. They transfer power to politicians who promise to build up the machinery to deliver this future. They accept a growing range of power levels in society when inequality is needed to maintain high outputs. Political institutions themselves become draft mechanisms to press people into complicity with output goals. What is right comes to be subordinated to what is good for institutions. Justice is debased to mean the equal distribution of institutional wares.

The individual's autonomy is intolerably reduced by a society that defines the maximum satisfaction of the maximum number as the largest consumption of industrial goods. Alternate political

arrangements would have the purpose of permitting all people to define the images of their own future. New politics would aim principally to exclude the design of artifacts and rules that are obstacles to the exercise of this personal freedom. Such politics would limit the scope of tools as demanded by the protection of three values: survival, justice, and self-defined work. I take these values to be fundamental to any convivial society, however different one such society might be from another in practice, institutions, or rationale.

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Each of these three values imposes its own limits on tools. The *conditions for survival* are necessary but not sufficient to ensure justice; people can survive in prison. The *conditions for the just distribution* of industrial outputs are necessary, but not sufficient to promote convivial production. People can be equally enslaved by their tools. The *conditions for convivial work* are structural arrangements that make possible the just distribution of unprecedented power. A postindustrial society must and can be so constructed that no one person's ability to express him- or herself in work will require as a condition the enforced labor or the enforced learning or the enforced consumption of another.

A convivial society should be designed to allow all its members the most autonomous action by means of tools least controlled by others. People feel joy, as opposed to mere pleasure, to the extent that their activities are creative; while the growth of tools beyond a certain point increases regimentation, dependence, exploitation, and impotence. I use the term "tool" broadly enough to include not only simple hardware such as drills, pots, syringes, brooms, building elements, or motors, and not just large machines like cars or power stations; I also include among tools productive institutions such as factories that produce tangible commodities like corn flakes or electric current, and productive systems for intangible commodities such as those which produce "education," "health," "knowledge," or "decisions." I use this term because it allows me to subsume into one category all rationally designed devices, be they artifacts or rules, codes or operators, and to distinguish all these planned and engineered instrumentalities from other things such as basic food or implements, which in a given culture are not deemed to be subject to rationalization. School curricula or marriage laws are no less purposely shaped social devices than road networks.

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Tools are intrinsic to social relationships. An individual relates himself in action to his society through the use of tools that he actively masters, or by which he is passively acted upon. To the degree that he masters his tools, he can invest the world with his meaning; to the degree that he is mastered by his tools, the shape of the tool determines his own self-image. Convivial tools are those which give each person who uses them the greatest opportunity to enrich the environment with the fruits of his or her vision. Industrial tools deny this possibility to those who use them and they allow their designers to determine the meaning and expectations of others. Most tools today cannot be used in a convivial fashion.

Hand tools are those which adapt man's metabolic energy to a specific task. They can be multipurpose, like some primitive hammers or good modern pocket knives, or again they can be highly specific in design such as spindles, looms, or pedal-driven sewing machines, and dentists' drills. They can also be complex such as a transportation system built to get the most in mobility out of human energy—for instance, a bicycle system composed of a series of man-powered vehicles, such as pushcarts and three-wheel rickshas, with a corresponding road system equipped with repair stations and perhaps even covered roadways. Hand tools are mere transducers of the energy generated by man's extremities and fed by the intake of air and of nourishment.

Power tools are moved, at least partially, by energy converted outside the human body. Some of them act as amplifiers of human energy: the oxen pull the plow, but man works with the oxen—the result is obtained by pooling the powers of beast and man. Power saws and motor pulleys are used in the same fashion. On the other hand, the energy used to steer a jet plane has ceased to be a significant fraction of its power output. The pilot is reduced to a mere operator guided by data which a computer digests for

him. The machine needs him for lack of a better computer; or he is in the cockpit because the social control of unions over airplanes imposes his presence.

Tools foster conviviality to the extent to which they can be easily used, by anybody, as often or as seldom as desired, for the accomplishment of a purpose chosen by the user. The use of such tools by one person does not restrain another from using them equally. They do not require previous certification of the user. Their existence does not impose any obligation to use them. They allow the user to express his meaning in action.

Some institutions are structurally convivial tools. The telephone is an example. Anybody can dial the person of his choice if he can afford a coin. If untiring computers keep the lines occupied and thereby restrict the number of personal conversations, this is a misuse by the company of a license given so that persons can speak. The telephone lets anybody say what he wants to the person of his choice; he can conduct business, express love, or pick a quarrel. It is impossible for bureaucrats to define what people say to each other on the phone, even though they can interfere with—or protect—the privacy of their exchange.

Most hand tools lend themselves to convivial use unless they are artificially restricted through some institutional arrangements. They can be restricted by becoming the monopoly of one profession, as happens with dentist drills through the requirement of a license and with libraries or laboratories by placing them within schools. Also, tools can be purposely limited when simple pliers and screwdrivers are insufficient to repair modern cars. This institutional monopoly or manipulation usually constitutes an abuse and changes the nature of the tool as little as the nature of the knife is changed by its abuse for murder.

The amount of physical power available to old societies can be estimated. It can be expressed in multiples of the average man's working time and metabolic energy. He can burn 2,500 calories a day, four-fifths of them just to stay alive. They go into making his heart beat and his brain pulse. The remainder can be externalized, but this does not mean that all of it can be transformed into work. A large portion of the lifetime capacity of a man to act on his physical and social environment is burnt running around while he grows up. More is spent for chores that lie beyond his personal choice—but also beyond other men's reach. He consumes energy in getting up, in preparing food, in seeking protection from the cold, or in avoiding the slavedriver's whip. If man is deprived of the use of this power, he becomes useless for work. Society can give shape to these personal activities, but it cannot appropriate the energy used on them for other tasks. Custom, language, and law can determine the form of the slave's pottery, but the master cannot take the last pots or the roof away from his slaves, not if he wants them to go on slaving for him. A small energy parcel from each man was the major source of physical power with which temples were built, mountains were moved, cloth was woven, wars were waged, and kings were carried around or amused.

Power was limited. It was proportional to the population. Its major source was the muscles of individual men. Its efficient use depended on the stage of development which hand tools had reached and the distribution of necessary tools throughout the population. Tools all matched the impedance of manpower to the task. Except by redirecting the forces of gravity and wind they did not and could not act as amplifiers of this power. To control more power than others in his society, a man had to lord it over his fellows. If a ruler could draw power from sources other than men, his control over this power still depended on his control over men. Each pair of oxen required a man to lead them. Even the forge needed a boy to blow into the fire. Political control coincided with the control over physical power, and the control of power depended entirely on authority.

Equal power and equal direct control of power were both features of preindustrial societies, but this did not guarantee an equal autonomy in the exercise of this control. On a very primitive level the physical predominance of one person made him into the lord of others. A slight advantage in organization or weaponry made one people the master of another. The appropriation of resources and tools created the basis of class societies and fostered the rituals and myths that shaped men to fit into the class to which they were assigned.

Power and tools' energy output
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From the High Middle Ages to the late Renaissance, new social tools developed that ensured the protection of the worker's self-image and dignity, although he was now sometimes dwarfed by the size of machines. The guild system did indeed give the worker a new claim to the monopoly over tools specific to his trade. But the mill had not yet grown out of proportion to the miller. His monopoly over grain-processing protected the guildsman, provided him with extra holidays, and still maximized the services that he could render to his town. Guilds were neither unions nor professional associations.

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Lewis Mumford in his *The Myth of the Machine: The Pentagon of Power* points out that one particular enterprise, namely mining,

set the pattern for later modes of mechanization by its callous disregard for human factors, by its indifference to the pollution and destruction of the neighboring environment, by its concentration upon the physico-chemical process for obtaining the desired metal or fuel, and above all by its topographic and mental isolation from the organic world of the farmer and the craftsman, and the spiritual world of the Church, the University and the City. In its destruction of the environment and

its indifference to the risks to human life, mining closely resembles warfare—though likewise it often, through its confrontation of danger and death, brings into existence a tough, self-respecting personality . . . the soldier at his best. But the destructive animus of mining and its punishing routine of work, along with its environmental poverty and disorder were passed on to the new industries that used its products. These negative social results offset the mechanical gains.

This new attitude toward gainful activity is well reflected in the introduction of a new term to designate it. *Tripaliare* meant to torture on the *trepalium*, which was first mentioned in the sixth century as an instrument of impalement made out of three wooden sticks. By the twelfth century the word in both French and Spanish expressed a painful experience to which man is subjected; only in the sixteenth century did it become possible to use the verb *trabajar* interchangeably with *laborar* and *sudar* on the job. Equally significant is what happened in the English

According to Mumford, it was this capitalistic devotion to repetitive order that helped undermine the unmeasurable personal balance between the workman and his tools.

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It is not strictly necessary to this argument to accept 1913 and 1955 as the two watershed years in order to understand that early in the century medical practice emerged into an era of scientific verification of its results. And later medical science itself became an alibi for the obvious damage caused by the medical professional. At the first watershed the desirable effects of new scientific discoveries were easily measured and verified. Germ-free water reduced infant mortality related to diarrhea, aspirin reduced the pain of rheumatism, and malaria could be controlled by quinine. Some traditional cures were recognized as quackery, but, more importantly, the use of some simple habits and tools spread widely. People began to understand the relationship between health and a balanced diet, fresh air, calisthenics, pure water and soap. New devices ranging from toothbrushes to Band-Aids and condoms became widely available. The positive contribution of modern medicine to individual health during the early part of the twentieth century can hardly be questioned.

But then medicine began to approach the second watershed. Every year medical science reported a new breakthrough. Practitioners of new specialties rehabilitated some individuals suffering from rare diseases. The practice of medicine became centered on the performance of hospital-based staffs. Trust in miracle cures obliterated good sense and traditional wisdom on healing and health care. The irresponsible use of drugs spread from doctors to the general public. The second watershed was approached when the marginal utility of further professionalization declined,

at least insofar as it can be expressed in terms of the physical well-being of the largest number of people. The second watershed was

Two Watersheds
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Other industrial institutions have passed through the same two watersheds. This is certainly true for the major social agencies that have been reorganized according to scientific criteria during the last 150 years. Education, the mails, social work, transportation, and even civil engineering have followed this evolution. At first, new knowledge is applied to the solution of a clearly stated problem and scientific measuring sticks are applied to account for the new efficiency. But at a second point, the progress demonstrated in a previous achievement is used as a rationale for the exploitation of society as a whole in the service of a value which is determined and constantly revised by an element of society, by one of its self-certifying professional élites.

In the case of transportation it has taken almost a century to pass from an era served by motorized vehicles to the era in which society has been reduced to virtual enslavement to the car. During the American Civil War steam power on wheels became effective. The new economy in transportation enabled many people to travel by rail at the speed of a royal coach, and to do so with a comfort kings had not dared dream of. Gradually, desirable locomotion was associated and finally identified with high vehicular speeds. But when transportation had passed through its second watershed, vehicles had created more distances than they helped

to bridge; more time was used by the entire society for the sake of traffic than was "saved."

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Take another tool—transportation—as an example. Under President Cárdenas in the early thirties, Mexico developed a modern system of transportation. Within a few years about 80 percent of the population had gained access to the advantages of the automobile. Most important, villages had been connected by dirt roads or tracks. Heavy, simple, and tough trucks traveled over them every now and then, moving at speeds far below twenty miles per hour. People were crowded together on rows of wooden benches nailed to the floor to make place for merchandise loaded in the back and on the roof. Over short distances the vehicle could not compete with people, who had been used to walking and to carrying their merchandise, but long-distance travel had become possible for all. Instead of a man driving his pig to market, man and pig could go together in a truck. Any Mexican could now reach any point in his country in a few days.

Since 1945 the money spent on roads has increased every year. It has been used to build highways between a few major centers. Fragile cars now move at high speeds over smooth roads. Large, specialized trucks connect factories. The old, all-purpose tramp truck has been pushed back into the mountains or swamps. In most areas either the peasant must take a bus to go to the market to buy industrially packaged commodities, or he sells his pig to the trucker in the employ of the meat merchant. He can no longer go to town with his pig. He pays taxes for the roads which serve

the owners of various specialized monopolies and does so under the illusion that the benefits will ultimately spread to him.

In exchange for an occasional ride on an upholstered seat in an air-conditioned bus, the common man has lost much of the mobility the old system gave him, without gaining any new freedom. Research done in two typical large states of Mexico—one dominated by deserts, the other by mountains and lush growth—confirms this conclusion. Less than one percent of the population in either state traveled a distance of over fifteen miles in any one hour during 1970. More appropriate pushcarts and bicycles, both motorized when needed, would have presented a technologically much more efficient solution for 99 percent of the population than the vaunted highway development. Such pushcarts could have been built and maintained by people trained on the job, and operated on roadbeds built to Inca standards, yet covered to diminish drag. The usual rationale given for the investment in standard roads and cars is that it is a condition for development and that without it a region cannot be integrated into the world market. Both claims are true, but can be considered as desirable only if monetary integration is the goal of development.

Bureaucratic medicine spread over the entire world. In 1968, after twenty years of Mao's regime, the Medical College of Shanghai had to conclude that it was engaged in the training of "so-called first-rate doctors . . . who ignore five million peasants and serve only minorities in cities. . . . They create large expenses for routine laboratory examinations . . . prescribe huge amounts of antibiotics unnecessarily . . . and in the absence of hospital or laboratory facilities have to limit themselves to explaining the mechanisms of the disease to people for whom they cannot do anything, and to whom this explanation is irrelevant." In China this recognition led to a major institutional inversion. Today, the same college reports that one million health workers have reached acceptable levels of competence. These health workers are laymen who in periods of low agricultural manpower needs have attended short courses, starting with the dissection of pigs, gone on to the performance of routine lab tests, the study of the elements of bacteriology, pathology, clinical medicine, hygiene, and acupuncture, and continued in apprenticeship with doctors or previously trained colleagues. These "barefoot doctors" re-

main at their work places but are excused occasionally when fellow workers require their assistance. They have responsibility for environmental sanitation, for health education, immunization, first aid, primary medical care, postillness follow-up, as well as for gynecological assistance, birth control, and abortion education. Ten years after the second watershed of Western medicine had been acknowledged, China intends to have one fully competent health worker for every hundred people. China has proved that a sudden inversion of a major institution is possible. It re-