

philippine studies

Ateneo de Manila University • Loyola Heights, Quezon City • 1108 Philippines

Re-Tooling Society

Ivan Illich

Philippine Studies vol. 21, no. 1-2 (1973): 125–186

Copyright © Ateneo de Manila University

Philippine Studies is published by the Ateneo de Manila University. Contents may not be copied or sent via email or other means to multiple sites and posted to a listserv without the copyright holder's written permission. Users may download and print articles for individual, noncommercial use only. However, unless prior permission has been obtained, you may not download an entire issue of a journal, or download multiple copies of articles.

Please contact the publisher for any further use of this work at philstudies@admu.edu.ph.

<http://www.philippinestudies.net>
Fri June 30 13:30:20 2008

Re-Tooling Society*

IVAN ILLICH

THE DOUBLE WATERSHED

Around 1913 modern medicine went through a watershed year. In that year a typical patient began to have more than a 50% chance that a typical western doctor would identify his illness correctly and provide him with specifically effective treatment — so long of course, as he was suffering from a typical disease recognized by medical science. Witch doctors can claim an equal rate of success for a different set of diseases they have learned to treat.

Since then medicine has gone on to define what constitutes disease and its treatment. The westernized public learned to demand effective medical practice in the terms in which medical services were defined by the progress of medical science. For the first time in history medical practice made *measurable* progress. Infant mortality was lowered; common forms of infection prevented or treated, work attendance was raised, and more people survived longer months imprisoned in iron lungs and years hooked on kidney machines.

During this period the tools used to obtain these measurable results began to have surprising side-effects, such as those associated with the use of anti-biotics against the flu and of anti-histamines against a running nose. But medicine has always had surprising side-effects, and it took until the mid-fifties for the general public to understand that the new iatro-genetic diseases

**Editor's note:* This article is a draft of several chapters of a forthcoming book. Copyright by the Centro Intercultural de Documentación (CIDOC), Cuernavaca, Mexico. Published here with permission of CIDOC and the author.

were of a different kind than those which Bernard Shaw had described in the "Doctor's Dilemma".

During the last 15 years it became increasingly obvious that medicine had passed another watershed. More than 50% of medicine consisted now in remedies for suffering which in one way or another was the result of new applications of science to the improvement of "health". The extension of sick life, the discovery and creation of new sickness and the exclusion of mothers, aunts and non-professional nurses from the care of the suffering (be they pregnant, abnormal, hurt, sick or dying) resulted in new demands for medical service faster than the medical establishment could generate more professional treatment. Medicine began to affect populations rather than individual men. The rich now became older, and with their added years they needed more medicine. The population of poor countries became younger, at least in part because their unhealthy members survived, and they began to outgrow their environment. Western medicine men abused drugs for the treatment of diseases with which native populations had learned to cope. As a result they bred new strains of disease, with which neither modern treatment, nor natural immunity nor traditional culture could cope. On a worldwide scale — but especially in the USA — medical care started to breed a human stock which was fit only for a type of domesticated life which happens only under clinically set conditions. Medicine became more and more concerned with the scientific prolongation of sick life and with the preservation of unhealthy population pyramids. Costly prevention and costly treatment became a privilege of those who through previous consumption of some medicine had established a claim to more of it.

The second watershed still lies in the very recent past, and therefore it is more difficult to see it in perspective as well as the first, but this does not make it impossible to recognize its existence.

It is, of course, not necessary to accept 1913 and 1955 as the two watershed years in order to recognize that at some point medical practice emerged into the era of scientific verification of

its results, and at another point medical science became an alibi for obvious though *unmeasurable* damage. There was a time when the poor were neither helped nor really damaged by medical science, while a few — who were well off — were served quite well. Increasingly, modern medicine hurts the rich and the poor alike — and does so in definable, though unmeasurable, ways. All get hurt, yet only the rich gain access to remedies for the damage doctors do. Antibiotics are taken equally by the rich and the poor in Mexico, but only the rich can get attention for their side-effects. Rich and poor are referred from the clinic to specialists — but only the rich (and in some countries the unionized) can get treatment from him. At some point in time medical practice acquired a legitimate claim to scientific evaluation, and at another point medical practice lost this claim.

An analogous divide can be observed in the history of other institutions which have reorganized according to “scientific” criteria during the last 150 years. It can be easily described in the road travelled by such diverse branches as civil engineering, education, the mails, social work, wireless communications, or travel. At a first point new power is applied to the solution of a problem and scientific measuring sticks are applied to account for the new efficiency; at a second point the progress which has been made is used as a rationale for the exploitation of a gullible clientele.

For example, late 19th century mail was organized as a true public utility. It provided the utmost efficiency for conveying personal messages to rich and poor alike — at a cost which was insignificant for both. The totality of contemporary means of communication provides an incalculable privilege to the very few who can employ teletype, shortwave, telephone and private messenger services.

In transportation it took almost a century to pass from an era which was served by motorized vehicles to the era at the service of the cars. During the American Civil War steam power on wheels became effective. A new economy in transportation enabled many people to travel by railroad at the speed of a royal coach and to do so with a comfort of which they had not

dared to dream. Then, gradually, desirable locomotion was associated — and finally identified — with high vehicular speeds. Traffic began to create more distances than it helped to bridge, more time was consumed in traffic than “saved”. And finally, systems engineers have to spend most of their energy incurring (for a tiny minority) the damage inevitably created for a majority, who have to live in a human geography structured for high speed.

It is sufficient to recognize the existence of these two watersheds in order to understand the sense of crisis which now prevails. Other institutions have reached the second critical stage more or less at the same time. Education and schools; professional health care and medicine; transportation and high-speed locomotion; housing for nuclear families and the building industry — these and other large sectors of enterprise arrive simultaneously at the point where they serve their managers more than their clients. Since these are worldwide institutions, the effect of this multiple crisis is felt throughout the western and westernized world. In this essay I exclude any reference to China, on which I am incompetent to speak, and to certain traditional societies, such as Burma or Mali, where the problems which I am dealing with have not yet arisen. With these restrictions there seems to be general agreement about the fact that society is facing a serious crisis. The symptoms of the crisis are recognized and multiple attempts are made to provide an explanation for them. But most people still believe that a further escalation of production can overcome this crisis, while the evidence accumulates that more of the same leads to utter defeat. I propose that we understand these crises as a multiple threat to the “balance of life” which is the result of the use of tools of extraordinary range, scale and power in ordinary everyday human circumstances.

For this purpose I believe that society must be reconstructed to enlarge the contribution of autonomous organizations and of individuals to the total effectiveness of a new economic system, designed to satisfy the human needs which it also determines.

In fact, the institutions of industrial society in their present form do just the opposite. As the power of machines increases,

the role of man more and more decreases to that of a mere consumer.

I will suggest how this trend can be reversed and how modern science can be used to endow labor with unprecedented effectiveness. The result would be the evolution of a life-style which I shall call "convivial", and of a political system which gives priority to the protection, maximum use and enjoyment of the one resource which is almost equally distributed among men, namely their human energy. I will try to show that we can no longer live and work effectively without public controls, and that we need procedures to insure that these controls be established and governed by political process. I believe that the crisis of our institutions can be solved by insight into their nature and by majority action.

If this does not happen the crisis will be managed in a belated technocratic response to disaster: freedom and dignity will dissolve in an unprecedented fascist nightmare.

A CONVIVIAL SOCIETY

A convivial economy 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 labor is creative; while the growth of tools beyond a certain size of power 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, which produce tangible commodities such as cars or electric current, and production systems for intangible commodities such as those which produce "education", "sick-care", "conflict resolutions" or which "make" decisions. I use the term "tool" for lack of any other which would be equally general and simple.

Tools are intrinsic to social relationships. An individual relates himself in action to his society through the use of tools which

he actively masters or by which he is shaped. Most tools today cannot be used in a convivial fashion. The gradual loss of active participation in the convivial use of tools goes hand in hand with their movement towards the second watershed. Some tools now are simply too large to be used in a convivial fashion such as office buildings, or continental, not to speak of world markets. Other tools fit into only one program such as the parts for a 1972 car or any curriculum component in a university. Other tools, again, can be operated only as a hobby such as the commercial components for self-built housing, or most of the items listed in the Whole Earth Catalogue. Many tools may be handled only by people with a degree or other union card, such as the hypodermic needle now restricted to use by nurses or the Merk Manual restricted to use by doctors. Tools have been given a shape which submits men to their demands.

Tools foster conviviality to the extent to which they can be used easily by anybody, as often or as seldom as necessary. Tools can fit a convivial society if they are simply designed so that their use can be learned with ease, that they are small enough to be used by individuals or by adhoc groups of laymen. Most important, and finally, is that one can freely decide what to do with a tool — and that one can abstain from its use altogether.

It is obvious that not every means of production would ever fit these criteria. Steel or electricity cannot be commonly produced in the backyard. But large-scale production of some commodities is not excluded in a convivial society. What is fundamental to such an economy is the overall balance between two forms of energy: the proportion between the input of human and of mechanical energy into the total product of society describes one side of this balance. The other side of the balance is given by the difference between the per capita mechanical energy available and the amount used by the median person. A reasonably equal use of energy tools by all people is an essential characteristic of a convivial society rather than the futile attempt to distribute equally the things made by tools.

Criteria of access and smallness cannot be applied to every tool. But they can be applied as guidelines for the structuring of

the totality of tools. While the mere public ownership of the tools of production almost inevitably leads to Stalinism, the application of these criteria to a society's tools almost inevitably leads to the enactment of the ideals proclaimed by most socialists: a classless and productive society.

Instead of simply guaranteeing a legal title to tools, new politics could in fact guarantee the right of each member of the public to use the available means of production. The ownership by the people in a community of their own tools could have two opposite effects: it could subordinate social relations to the demands of tools even more effectively than private ownership could; that is, socialism can become the rationale for the totally efficient use of people at the service of the tools they own. This is the essence of Stalinism. Or the public ownership of tools could subordinate the use of the tools to the overarching commitment of the community to shape its social relations in a convivial fashion. This, of course, requires a commitment on the part of the community to *renounce* — at whatever cost and whenever possible — the benefits of efficient and large scale production whenever such efficiency would destroy conviviality; that is, the socialization of tools can be used to proscribe the existence of publicly owned tools of a nature, size or power which do not fit a convivial lifestyle.

POST-INDUSTRIAL TOOLS

Tools for a convivial yet scientifically efficient society could not have been designed at an earlier stage. During the last 150 years the more effective use of science seemed to demand an increasing specialization and division of labor. To be powerful, tools had to be large and assembled on an industrial scale. Science has just now made it possible to choose between two modes of production in a scientific age: one in which the further promotion of specialized workers (plumbers, brain surgeons or TV performers) constitutes the criterion according to which more scientific knowledge will be applied to shape the production process — and another in which the most widespread use of tools by the largest number of people will define what use of science

is desirable for the common good. Limited resources can be used to feed millions on the color image of one performer, or to provide many people with free access to the record of their choice. If the first choice is made, there will be a further increase of useful things for useless people. A second choice is now possible. Science has now provided us with the possibilities to construct tools in medicine, building, and teaching, for example — which can be taken out of the hands of professionals just as the pen was taken out of the hand of the scribes during the Reformation. Most curable sickness can be diagnosed and treated today by laymen. People from developed countries do not accept this statement because medical ritual has hidden from them the simplicity of healing, and a psychological commitment to progress has made it impossible for them to distinguish between curable and incurable disease. People from poor countries do not discuss this statement because they do not make fundamental differences between the doctor and the witch. Therefore, this statement must be clarified on two accounts.

First, to claim that laymen can easily grow up to become “General Healers” rather than “GPs” does not mean that every man ought to be “taught” to heal, just as the claim that laymen can easily learn how to read and write does not mean that every man ought to be compelled to the use of the three R’s. The enabling of the layman to exercise functions which are now monopolized by professionals does not mean that more para-professions, which are hierarchically dependent on each other, are needed. It simply means that given the proper social arrangements, a sufficient number of ordinary people will grow up as readers, writers or healers and make their competence so plentiful that it well becomes near impossible to turn their service into a monopoly and sell it as a commodity. Second, the claim that *most* “curable” sickness can be “healed” by laymen implies that society must again recognize — and now with scientific clarity — the distinction between a curable and an incurable disease, and provide a place for the cripple, the idiot and the dying in the mainstream of everyday life.

The call for a re-tooling or re-structuring of society is neither

a romantic hankering after a pastoral ideal, nor a new form of Luddism. It is obvious to the historian that technology is usually used most "for the good of the whole society if it is applied by non-specialists outside of industry". On the other hand, the sophisticated recognition of nature's balance is at the opposite pole of a primitive truce with nature and the recognition of an optimal use of machines is a sign of respect for both the beauty of tools and each individual's creative endowment. Not only in Vietnam and for the purposes of war is the use of labor-intensive (though modern) tools — such as bicycles and portable rockets — far more effective than the powerful planes and computers of the USA. The same type of simple technology constitutes the only sound approach to transportation or housing in peacetime. This is almost beyond belief for people who now live in modern cities, but it becomes evident from the effect on poor countries of technology "made in USA". Two examples will illustrate my point.

Since the time of President Cardenas, public expenditures for the improvement of rural transportation in Mexico have gone into cars and into the public support of a road system. By the late thirties 90% of villages with more than 2,000 inhabitants were connected by dirt roads and served by trucks, unfit for speeds above 20 miles, simply made and almost indestructible. This generation of trucks is now dying out, and more and more money goes into the building of paved roads between major population centers which accommodate more fragile vehicles though made for speeds above thirty miles. The development of this tool for high-speed mobility has decreased the transportation available for those who live away from highways. The new tool also compounds the traditional lack of motorized vehicles with a new form of discrimination. The poor continue to work harder than the rich and, in addition, they travel slowly in comparison with a minority which travels rapidly. In the two typical Mexican states I studied, less than 1% of the population ever in their lives had moved in one hour over a distance of more than 15 miles. Appropriate pushcarts, mechanized when needed, would have presented a technology more valuable to the major-

ity. Such pushcarts could have been constructed and maintained within the region, with personnel trained on the job, operated on roadbeds built to Inca standards, yet covered by a modern substance to diminish drag.

The usual defense for investments in standard roads and cars is, that they are a condition for "development" and that without them a region cannot be integrated into the world market. The promotor of development does, of course, admit that cars are inefficient. But the blame for the inefficiency of present high-speed vehicles is laid to the fact that they are now designed for the benefit of a tiny majority which owns them instead of being planned and managed by bureaucrats for the common good. In fact, the basic inefficiency of modern vehicles is due neither to their unreasonable construction, nor to their ownership by a few, nor to the choice of individual capsules rather than trains, but to the speeds for which they are built. It must be conceded that a standard road system built for high-powered vehicles does promote development. It develops dependence on cars and puts classes of people into their respective place on the world market by teaching that a speedometer measures both locomotion and social class. Privilege comes to depend not so much on access to vehicles, but on vehicular speeds. It was much easier for a peasant to accompany President Cardenas as an equal on horseback than it is now for anybody to accompany a governor on his helicopter. Speed is one of the means to stratify a consumer society. One measure for the dependence of populations on professionally defined "efficiency" is the percentage of the total cash budget of a community which is spent on a specific service. Transportation in its various forms now swallows 23% of US gross expenditures. The US might be rich enough to allocate one-fourth of its resources to the luxury of high speeds. Unfortunately, transportation exacts an even higher percentage of the cash spent within many a Latin American municipality. This proportion imposes sacrifice on the poor by forcing on them the vehicles designed for the rich.

Housing can serve as another example for the industrial production of a new type of poverty. Mexico adopted quite re-

cently a new set of minimum standards for the construction industry. These standards are far below those applicable in the US, and they were intended to protect the consumer of "housing" against exploitation by the respective industries. Even so, the rent or payments for quarters built within the law are beyond the total monthly income of 80% of Mexican wage-earners.

By defining dwellings which fall below industrial standards as improper housing, public funds can be monopolized by the building industry, and denied to the overwhelming majority who "house" themselves by taking over in some way, or creating, a dwelling for themselves. The setting of maximum per-capita shares of public funds earmarked for housing would permit the majority to "modernize" their building activities and encourage industry to market an entirely different set of tools and components. To provide houses in poor countries, the only possible approach might be a set of policies which make it impossible for industries to deliver finished houses on the market. In rich countries it might be desirable to move at least partially into the same direction, if the growing frustration with housing is to be overcome. Most people do not feel at home in their house, unless a significant proportion of its total value is the result of input of their own labor. The declining satisfaction with housing in Massachusetts might be related to the fact that in 1945 32% of all one-family units were still self-built (either foundation to roof, or just constructed under the full responsibility of the owner) while by 1970 this proportion had gone down to 11%. Tools and materials which favor self-building had increased in the intervening decades, but social arrangements — like unions, codes, markets — had turned against the choice.

JUST TOOLS

The decision for a desirable social order comes to depend increasingly on the choice of limits for the tools and social arrangements which are available within the community, rather than on the professional definition of common needs which cannot be met except through large-scale organized production. This is true not only in medicine, transportation and housing, but also

in areas as diverse as the administration of justice or agriculture. High-powered justice or agriculture can be as destructive as medicine, speed and housing. The production of any commodity can be so organized that only major quanta of it start to be desirable. Mechanical transportation is worthwhile only at certain speeds, conflict resolution is effective only when the issue is of sufficient weight, the planting of mutant strains is productive only if the acreage and capital of the farmer are beyond a certain size, and schooling provides privilege only after 12 years of it. Powerful tools created to achieve preconceived social goals, deliver their output in quanta which are beyond the reach of a majority. At the same time they tend to market them on a world-wide scale, and thereby each unit or quantum appearing on the market frustrates more people than it satisfies. The choice of a social order that would be made by a sensible and reasonable man who was ignorant of the particular endowments and opportunities, advantages and disadvantages that he himself would possess in that social order depends increasingly on the protection of access to equal tools rather than on the guarantee of an equal delivery to each of his share in a finished social product.

In an epoch in which "nature" does not set its traditional limits on lifetime, speed or available information, what is good, and good enough for everybody must be the result of a political decision. Injustice remains an arbitrary inequality in the distribution of liberty. But the principal source of injustice in such an epoch is the political approval for the existence of tools which by their nature restrict to a very few the liberty to use them to full advantage.

THE POLITICS OF TOOL-MAKING

The design of a convivial society can be realized only by means of a political program which places under the control of the ordinary population not only the ownership of tools but the limits of their use. This means that politics in a post-industrial society must be mainly concerned with the development of design criteria for tools rather than, as now, with the choice of production goals. Such a demand for renewal amounts

to an "inversion" of political purpose which will remain when we show that it is necessary for the survival of all classes, rather than just desirable for one group of people.

It is not enough to show that a convivial lifestyle is possible, or that it is more attractive than the present one, or even that it would be more effective in achieving some of the goals stated as those of our major institutions. It is not even enough to show that a just or socially equal order can become a reality only through a convivial reconstruction of tools. Most people have everything staked in the present structure, and are unwilling to lose their ground. They feel compelled to push the progress on which they are hooked. They long for and expect increased production with less input of human energy. The ideal of a more labor-intensive — yet modern — production seems quixotic and anachronistic to them. Politicians have pledged themselves to increased outputs and better distribution of goods and services among their constituents; the possibility that a majority of voters anywhere would choose limits for all rather than promises of equal consumption is contrary to their experience and therefore seems absurd to them. Most economists still evaluate institutions by the increase of their output, or their ability to externalize internal diseconomies in an unobtrusive manner.

Nixon's advisors clearly stated in their last report to the President "that economic output is a good thing, and therefore by definition there cannot be enough of it." As a sop to environmentalists the Council does admit that "growth of GNP has its cost, and beyond some point it is not worth paying", but instead of raising the obvious question "What determines this point of optimal GNP, and how do we know that we have reached it?" — the Council merely pontificates that "the existing propensities of the population and the policies of the government constitute claims upon the GNP itself that can only be satisfied by rapid economic growth. . . . the existing propensities and policies are beyond discussion". Brezhnev, Castro and Franco receive much the same advice from their respective Councils of Economic Advisors (Daly). Consumers demand, politicians promise, and economists measure institutional outputs which

create by definition more demands than they satisfy. Economists like Georgesou-Roegen, Boulding, Daly, Linden, Mishan for several years have tried to point out that growth of "output" can be used as a measurement for value only within very narrow limits. Until recently they were either belittled or passed over in silence by their peers, who prescribed escalating production of goods and services, which would justify inevitably more measurement of unsatisfaction and therefore more production. Quite recently the new economists have finally been noticed and attacked as dangerous heretics, mostly because of their claim that higher total efficiency can be reached in a stable-state economy with more pleasurable labor and less dominant tools.

To translate the theoretical possibility of a post-industrial convivial lifestyle into a political program for new tools, it must be shown that the prevailing fundamental structure of our present tools menace the survival of mankind. It must be shown that this menace is imminent and that the effects of compulsive efficiency do more damage than good to most people in our generation. For this purpose a standard will be needed to identify the range within which our present institutions have become counterproductive to their stated purposes and a touchstone to determine another range within which our tools become destructive of society as a whole.

A FRAMEWORK FOR THE DEBATE ON UPPER LIMITS

If the politics of tool-making are to take the place of our current politics of goal-setting, the public must become aware of the need for a bounded society. For this purpose there are two sets of bounds which must not be confused. Medical practice which is unhealthy for some patients must be distinguished from medical practice which systematically prolongs suffering. The useless use of roads in the US of the twenties must be distinguished from the compulsory use of roads today. Repressive schools (as were all schools throughout history) must be distinguished from a worldwide compulsory school system which reproduces a society graded into classes of dropouts. In other words, the standards which a community can apply to recognize

an optimum level of efficiency in the tools it desires is of a different nature than the standard which it will use to prescribe those tools which provoke Armagedon.

One important difference in the nature of these two standards is the manner in which they work. Murderous over-efficiency can be proscribed for the sake of survival; optimal efficiency is best not proscribed, but left to culture, taste, and common sense. The upper limits to growth are inescapable and will be imposed by nature unless they are respected by man. The optimum levels of self-chosen public frugality will be more austere as a society treasures high levels and wide ranges of personal freedom. Traffic rules become unnecessary when the allowable speed limit drops below a certain point.

One of the major changes in US society the last few years is a beginning towards willingness on the part of the public to face the eventuality of limits to growth. Debates about the SST, DDT, school taxes and welfare have prepared a growing minority of Americans to see Vietnam in context: they are now prepared of envisage the possibility of a defeat of the American way of life. To initiate a debate on the fundamental threat to any type of humane life which unlimited production poses, it will be necessary to expose the palliatives now employed to disguise the reasons for which systems of transport, health, education, housing, among others, are not working. And to pursue such a debate in a form which could generate political consensus, it will be necessary to identify the classes of persons who are hurt by further growth, and to define juristic principles — shared by our societies — according to which they could seek redress. To facilitate discussion I will distinguish six major forms in which, at present, tools threaten men.

Damage to the Environment

Environmental pollution is the most dramatic result of over-efficient industry. It is so impressive because of the suddenness with which the symptoms appear. For years car traffic in Mexico City increased steadily under a sparkling sky. Then, suddenly, in

1968 smog descended and became more dense than in Los Angeles.

For years a lake can digest sewage, and in one month it suddenly chokes and suffocates. Poisons of unknown potency are constantly discharged into the biosphere. There is no way to retrieve them, not any means to predict how some of them will suddenly combine their action so that the whole earth, like Lake Erie or Baikal, will die.

Anti-pollution devices are no panacea. They tend to shift garbage out of sight, to push it into the future or to dump it onto the poor. The relocation of refineries overseas is a good example. Making anti-pollution devices compulsory increases unit costs. This may conserve some fresh air for all, because fewer people can afford to drive cars.

Political action cannot result in effective conservation policies, unless the general public recognizes the fragile balance between the biosphere and the expanding cancer of industrial artifacts. Common sense and aesthetic sensibilities must combine with scientific information to identify the danger.

Costeau has shown that half of the marine life he filmed in "The Silent Sea" (1956) had disappeared by the time he made his next great movie of the ocean in 1964. Science could not predict this slaughter. For most of the species which disappeared science has not even proved the cause of death. Scientists can only measure how poisons work once they have maimed and killed; they usually cannot predict how the synergy of various substances will affect an organism; they can, much less, make scientific statements about the way in which food-additives, insecticides and birth control pills will combine to act on the genes of children. It is therefore unreasonable to rely on scientific measurement as the sole or the main criterion to indict intervention in the ecological balance.

Return to reason implies a new public attitude towards innovation: an agreement that a new type of product, a new production process or a new scale of organization cannot be tolerated if its risks to human life cannot be calculated in advance, and of

course, much less if their negative biological impact can be proven to be significant when applied on a large scale.

To accept such a traditional view of innovation, it is necessary to recognize the difference which scale makes. The marriage of brother and sister in the Pharaoh's family had an impact on the Pharaoh's family — but not on the health of the common fellow. Pill-taking will probably maim a large part of the US population of the future, but this is still disaster and suffering on a limited scale. The heralded birth control with hormone injections will probably be experimented with on a worldwide scale. Worldwide adoption of standard behavior has entirely different results than innovation which is of a self-limiting scale.

Since the present scale of the market, of communication systems, of road systems, school systems, data systems and standards to which components for them are built are in principle world-spanning, innovation almost inevitably is potentially powerful and destructive. Only about 9% of the world's population uses soft tissue toilet paper. If the entire growing world population were to become committed to this habit this would create new problems for forestry and raise the levels of mercury pollution which is almost inevitable in the making of toilet tissue.

Physical inventions must be suspected until proved inoffensive, even though this is not a popular stance among people born in the first half of this century. For them the inventor is still the model of success, the frontiersman, if not hero.

Attitudes towards the inventor are now changing. Children today are less childish than their parents. In their poetry and art work the scientist again plays the traditional role of the archetype which was formerly played by the black magician. This incipient return to rational integrity ought soon to make it politically feasible to burden the inventor with the proof of the inoffensiveness of his brainchild. More than half of all complex medicines which arrived on the US market since WW II have been withdrawn before their 17 year patent protection ran out: usually because they were either ineffective, or worse than simpler products, or dangerous to health. With good reasons Chileans now seriously discuss the proposal that no new medicines

will be introduced in Chile unless they have been first approved by US doctors for human experiments and then tested for 17 years on North American patients.

Return to reason also requires the ability to face a change in living standards so serious that it seems unreasonable to people brought up in a modern city. Neither soft-tissue nor tin-cans nor plastic wrappers are feasible -- much less air-conditioning, skyscrapers or airplanes. To visualize the level on which men would have to live in peace with the earth -- and in equality among themselves, it will be necessary to calculate the resources which may be "claimed" by each man on the basis of present world population, known deposits and known levels of tolerance of the biosphere. The quotas thus obtained will prove to be incompatible with the minimum amounts of consumption which are absolutely needed by the poorest of the poor to survive in a rich country. But not only people in rich countries are destructive over-consumers. Unionized workers in poor capitalist countries by definition belong among those who earn more than twice or three times median income. Workers in Chile and Venezuela will find that their style of consumption places them into that upper bracket (not only within their nation but of the world's population) which destroys and pollutes beyond its share.

The impending ecological crisis provides some poor nations with a special challenge. They are uniquely situated to provide the leadership which is now needed to set international policies in ecological matters. What a country could do might be illustrated by the example of Chile.

As long as Chile continues to produce at present rates, it must maintain one sector of its economy on a level of internationally standardized efficiency which makes a convivial life-style impossible for the entire nation. To produce copper at the present rate, either US or Czech smelters must be used, and these in turn require the existence of airlines to fly in emergency repairmen or parts for machineries; the maintenance of a road system and of an industrial park. Either these "infrastructures of development" are relegated to the mining districts -- and the

rest of the country is "deprived" of them — as happened in many colonies before the mines were nationalized — or cars, planes and ITT's multiple services begin to be used by the people as the visible tokens of progress of the nation. The operation of the copper mines for sales on the world market, not only places Chile among the profiteers of the Vietnam war, but also among the nations which deplete scarce resources at top speeds to purchase a place as Johnny-come-lately among the rich.

Three ethical considerations might now militate in favor of closing the copper mines: the incompatibility of their operation with a convivial lifestyle for most Chileans; the desire to disengage the nation from a world conspiracy to subject itself to tools and, thirdly, the insight that Chile has also a responsibility to preserve some semblance of ecological balance. None of these three arguments now carries political weight. All of them will acquire more importance with the rise of the politics of conservation.

Soon the Chilean control of its own copper depletion rates will transform this tiny nation which owns 19% of known resources into a major power. Soon very significant reductions in copper output will be seen as a most sensible form of the long-range management of the nation's resources. Once national accounting periods are extended over a time-horizon of 100 years conservation and investment policies will tend to converge. A government which foresees this crisis could begin now to educate its people to the real options left to the country. For instance, Chile would take the initiative at Stockholm and propose research on meaningful depletion and pollution rates which ought to serve as guidelines to determine a nation's aggression against the international community. If new Guinea or Papua proposed such guidelines and indicated the criteria to which these ought to be set, the statement would hardly be credible. The quotas would be so high that they would effect the lifestyle of few people in primitive villages. But the same quota or criteria proposed by Chile could be low enough to constitute a true guideline for ecological balance, so low that no government of a rich country would have to justify it to its own

citizens, and stringent enough to obligate Chileans to retool very seriously their own society. Retooling means to redistribute access to energy: the amount of energy which is available for use to humanity is limited, and its equal distribution is a major concern of justice. But this energy tends to come in either of two forms: as highly determined energy, such as the heat which was used in the factory and is now incorporated in the bread purchased by a housewife; or as gas in the oven, which she can use to bake bread or a cake or roast a pig. As people become aware of the limited amount of energy which can be safely used per person, they also tend to recommend that tools be used in the largest and most efficient assemblies, so that the maximum amount of bread or steel can be produced with the least energy input and pollution output. This argument is of course valid for an industrial society, but it can also be used as the most effective objection against convivial tools.

This argument could lead — for instance — to the recommendation that only rich countries be allowed to engage in the production of stable goods, because they alone possess the competence to save energy and keep pollution low. How such an increase in colonial exploitation could work, might be illustrated by the following example. Let us assume that international pollution quanta were agreed upon. Let us further assume that mercury pollution of the sea remains associated with paper production. I could well imagine that the Canadian pulp industry come to an agreement with the Chilean government which could run on the following terms: Chile transfers to Canada a certain share of its mercury pollution rights. In exchange an amount of paper equal to that which Chile could produce with such concomitant pollution will be delivered free of charge (or at a low cost) by Canada to Chile. The surplus which Canada — thanks to its high technology — can produce on this allowance is then sold on the world market. Retooling of international industries on the interest of conservation can mean more rather than less exploitation.

The same argument can also lead to further denial of tools to individuals. If individuals are to compete with industry in the

production of a certain item designed for industrial production, they can never achieve the same economies in raw materials and energy which large-scale operations would permit. On this basis only increased industrial production of goods and denial of tools and access to materials for people seems to be consistent with a social policy which would provide the maximum number of goods to the largest number of people.

This argument must be conceded, as long as two of its assumptions stand: one is that people's needs can best be satisfied by products designed for industrial production, and second that the total amount distributed to the largest number of people is that which counts. In the ensuing arguments I will address myself to both these assumptions and point out that they are based on illusion. I believe that justice demands more than a promise of equal finished products, be these shoes, places in vehicles, or curricula. I believe that justice demands above all an equal access to tools. And for this reason I believe that justice demands the most equal possible distribution of BTU (British thermal units — a measure for energy transfer) in its most general, least determined form. This principle is valid equally when distribution is discussed on large scale units such as nations or regions, or when it is discussed as justice to individuals.

Radical Monopoly

Just as man-made devices can first tame and then destroy nature, so systems, designed to service man, can first supplement and then subvert his natural ability to care for himself. Over-efficient production results not only in pollution but also in a general form of monopoly, which I shall call radical or general monopoly. By radical monopoly I mean the dominance of a type of product rather than that of a particular brand. I speak about radical monopoly when a production process exercises exclusive control over the realization of public needs by restricting the market to one type of commodity or one profession. Cars shape cities in their image, practically ruling out locomotion on foot or bicycle. This is radical monopoly, not the fact that more people may drive Chevrolets than Chryslers.

Schools monopolize learning by redefining it as "education". People who learn outside of schools are still officially "un-educated". Doctors deprive the ailing of all access to cures for illness which were not prescribed by doctors. They define the incurable as standing in need of institutional care until the public feels incompetent to care for its members who are not fully "normal": the pregnant, neurotic, old or sick. General monopoly excludes natural competence by imposing consumption.

The individual's autonomy is threatened and abridged by compulsory consumption: the obligatory attendance in schools, hospitals, churches, and the funeral parlor. The monopoly of morticians over the dead has been described by Jessica Mitford at a time when only politicians were occasionally embalmed in South America, and almost every family took care of the burial of their family members at best with the help of a carpenter. Now legislation is passed to make the morticians ministrations compulsory.

Against radical monopoly people need protection of their freedom on the exercise of their natural activities. This protection is needed whether consumption is imposed by private interest, by government for the "public good" or by the self-destructive collusion of producers and brainwashed consumers.

It is, of course, not easy to determine what constitutes compulsory consumption. The monopoly held by schools is established by discrimination against the unschooled, by the centralization of books and laboratories in schools, and by restricting most public funds available for baby-sitting to people who have graduated from a normal school. The compulsory consumption of what schools define as "education" is thus more effectively imposed than if laws compelled people to attend.

Even more effectively and subtly, institutions impose their general monopoly by pruning the social imagination. People begin to feel incompetent to "do their thing" and feel in need of "having" or "acquiring" something. This shift from an active to a passive world view is well reflected in language: people do not so much want to learn as they feel the need for "an education"; they do not consider housing or dwelling verbs

which express an activity, but rather nouns which designate a commodity; they are concerned about having a drink or sex. This functional shift from verb to noun has been observed in several European languages during the last generation and reflects what Jacques Ellul calls the progressive institutionalization of values.

Protection against this general monopoly is so difficult, because it is elusive, intimate and also because, like pollution, it is usually discovered only when it is firmly entrenched. When monopoly has already littered society with roads, schools, or hospitals, it has already paralyzed alternative initiatives and frozen the shape of the physical world. Like pollution, it is hard to get rid of. Commercial monopoly can be broken at the cost of the few who profit from it. The cost of breaking radical monopoly is born by the majority, whom an institution has lured into service and disability. In rich countries with a free market system, the illusion of choice between alternate doctors, schools, cars or means of transportation — the apparent liberty — frequently serves as a re-enforcement of the need for service. People become so conditioned to paying money for being frustrated by the particular brand they get, that they are blinded to the fact that they are being exploited and disabled by the habits of consumption of the same product under some other brand name that is forced on them.

Three types of reforms for the present system are now distracting attention from the general nature of this multiple radical monopoly. The more these reforms correct superficial abuses, the better they serve to re-enforce the monopoly I am trying to describe.

The first such supposed reform is consumer protection. It leads to better and more priceworthy cars on safe roads. More confidence in cars only increases societies' dependence on personal vehicles and frustrates even more those who lack them.

Corporations which produce vehicles which satisfy their many owners can claim political protection much more effectively than those which are run for their stockholders — who are fewer in number. Cars which are designed to fit the most dis-

cerning shoppers permit a larger elite to shape the decisions according to which the world's landscape is shaped to facilitate travel. All this enhances the protection of consumers and the discrimination of those who either cannot or do not want to depend on cars.

A second supposed reform is public ownership of the means of production. As I said before, though, in an economy in which the emphasis continues to be on growth and more production, public ownership only reinforces the more efficient and disciplined exploitation of people by their tools. Once transportation, education, or medicine is offered by a government, free of cost, the underconsumer can be blamed for his anti-social behavior. In a free market economy a man who wants to cure his flu by staying in bed will be penalized only through loss of income. In a society which uses socialism as a whip for higher production, his "unscientific" behavior, that is, his failure to take medicine, becomes an issue of public morality.

The third remedy frequently proposed is the control of markets by consumer cooperatives on the Swedish model. These large-scale consumer cooperatives do give the client a voice by which he can determine which particular brand will be used to establish the general monopoly of one industry over society; but never does it challenge this radical monopoly, nor does it protect the nonconsumer, nor does it usually extend to the service sector.

Protection against radical monopoly depends on political consensus opposed to growth. Such a consensus is diametrically opposed to the issues now raised by political oppositions which converge in the demand to increase growth to satisfy more people. The new political consensus can be reached only if we succeed in stating very clearly how "progress" has in many cases restricted — rather than enhanced — constitutional freedoms.

To break radical monopoly means, first, to stop its progress and then to enable people to do much more with fewer things. To give an example, the progress of the medical conspiracy must be brought to a standstill. This is precisely the contrary of what presidential candidates now promise to the US electorate. Each promises more funds to doctors, hospitals and drugstores.

More funds will strengthen the hold of the medical industry over public resources. Each promises to do away with the present unequal access to medical services (which still depends on personal resources of the patient) and to substitute for it a system in which doctors alone decide who will get the more expensive treatment. Taxes spent under the control of one profession will heighten its prestige and its arbitrary power. Each candidate also makes out of sick-care a burning public issue, and thereby relegates health-care to the area about which politics have nothing important to say. Thus Kennedy's plan for national insurance, no less than Nixon's program for professional health maintenance, will lead to an increase in suffering and a decrease in personal self-reliance. Either plan will spread disability (iatrogenetic sick-roles). Both plans will further heighten the paranoia structured into our institutions. More money will go for the postponement of unavoidable death in a society which already spends half of its resources on military defense by overkill. And finally both platforms tend to abridge even further the civil rights of those who want to heal each other. More money spent under the control of the "health" profession means that more people are operationally conditioned into playing the role of the sick. And once they fall into this role, their most trivial needs can be satisfied only through commodities which by definition are scarce.

Each candidate in his own way re-enforces the need for sustained growth rates of the US economy which must pay for costly services. All candidates conspire in a sales campaign for doctors. Opponents of further economic growth are branded as merciless people insensitive to the suffering of the poor. The current campaign presents "health" as if it were the result of medical equipment, just as earlier campaigns have presented peace as the result of a larger stock of atomic bombs. The insistence on the "delivery of health" which parallels the "delivery of weapons" pushes any meaningful discussion about health or peace off the political arena. People get organized to fight for their personal share in the scarce resources doctors produce, and their leaders do not want them to be distracted from this struggle.

The political goals of opposing parties and systems have in common their drive for more large-scale industry, which inevitably produces not only pollution but also monopoly.

Overprogramming

So far I have dealt with two of six major balances which tools can irrevocably upset. The first is the balance between life and its place in the cosmos. This balance, the biosphere, is endangered by pollution. The second is the balance between autonomous activity and institutional energy, which complement each other in the making of things which man needs. This balance, namely culture, is endangered by the monopoly of organized power. It is now necessary to explain why most people are either blind or helpless in facing this double threat. I believe that the reason for this blindness is an upset in the balance of knowledge, and the reason for this impotence, an upset in the stratification of power.

I will now deal with each of these separately.

Let me call "balance of learning" the proportion in a society between knowledge which is the result of a primary integration of men into their culture and the countervailing knowledge which is the result of purposeful and programmed training. Speaking in the US is still learned in the first way, while writing is learned in the second. Until very recently no sane person would have said that the former is the result of education, while most people agree that education is the proper word to designate the second. When tools are very primitive, the balance of learning is low and stable. Limited and tightly integrated knowledge is shared quite equally among most members within a tribe. As the tools of a society become more refined, this balance is lifted for a while: the circle of spontaneous learning expands, and the number of things taught increases. There are, on the one hand, more opportunities to share in different activities or to meet strangers, and on the other hand, the witch doctor loses his monopoly on initiation as each trade organizes apprenticeships. When tools grow even further, they skew and then upset the balance of learning. Spontaneous learning loses its value. The

city child is locked into a man-made world, in which each element has meaning for the designer — but probably not for him. The inhabitant of the city is in touch with thousands of systems, but only peripherally with each. He knows how TV or telephones can be operated, but not how they function. Learning by primary experience for him is restricted. Domestic economy, courtesy and sex become subject matters. Formal education (through schools, screens or other forms of simulation) becomes a prerequisite for appropriate behavior. And yet the level of shared learning declines. In a primitive and even a classical society most people, most of the time, had an intimate acquaintance with the facts and tools which determined their lives. Such sharing of societies' meanings has become impossible in a world which, at the demand of its tools, has become opaque, immense, and inaccessible.

It must now be understood that the "balance of learning" sets structural limits to the scale of tools which are possible within a society. As tools grow, people need increasing educational inputs not only to operate the tools in a productive fashion, but also to fit as consumers into the market. The cost of "education" turns into the most expensive form in which the internal diseconomies of modern industries are unloaded.

One specific and one general illustration will clarify this point. Modern housing can be constructed at a very low dollar cost per square foot, but it can be occupied only by tenants on whose schooling much money was spent. The Super-bloques of Caras are a good example. They were built to house many people, and the cost of their construction was much lower than the cost of supplying roads, water, sewage and electricity to the same population dwelling in self-built shacks spread over a hillside. Not even the use of force would bring people to move there unless they were first submitted to rather expensive schooling. People who felt competent to house themselves and to raise their animals found that pigs do not do well on a bathroom on the eleventh floor. Architects know how to build cheap apartments for expensively conditioned populations. Ford has learned how to make cars more complicated and still keep prices down

by making them so that they can be repaired only by expensively trained mechanics. Agricultural engineers know how to reduce the costs and increase the yields of new crops, but this requires farm-managers who have survived an expensive school-race. Progress of tools requires more and more educational inputs for producers alike.

Everywhere — outside of China — the cost of training rises faster than the GNP. Even if the GNP were a valid measurement for progress or development, the increased productivity of a society is not a sufficient rationale for the cost of manpower-capitalization which rises even faster.

In poor countries during the sixties the cost of schooling has risen faster than that of any other commodity: this is true both for the cost of per-capita education of a university graduate and for the total amount of formal education provided by the nation. This high investment of public funds certifies a tiny percentage of society as shareholders in the international knowledge-stock. Access to tools — and to their best products — is restricted to these knowledge capitalists. Under the leadership of the educated elite, the nation makes long-term investments in a type of tools which require high levels of "education"; he who lacks "education" remains poor, and in addition can now be defined as a burden on the economy.

In the preceding sections it has been shown that on the approach of the second watershed, large tools become destructive of nature and autonomy. It now appears that they also tend to render the education for their use unfeasible. The "balance of learning" sets limits on the amount of compulsory education (as opposed to spontaneous learning) which can be tolerated in a society; and this limit also constitutes a design criterion for tolerable tools. It is important not to confuse the limits which societies' capacity for formal education imposes on tools, with the limits inherent in the school system as a tool used in this compulsory education.

The overgrowth of the school system used as a means to achieve universal education has by now been well understood. The right of individuals to protection against this particular tool

has been recognized in several court cases during 1971. *Griggs vs. Duke Power Co.* recognizes the right of a citizen against disability to prove his "education" by passing a school-related test. *Serranto vs. Paies* recognizes directly the right of protection against unequal treatment due to unequal background within schools. But its implications have brought before the US public the inherently discriminatory nature of learning redefined as "schooling", and therefore redefined as a commodity which by its very nature is scarce. The case of the Amish, now before the Supreme Court, should vindicate the right of citizens not to submit to publicly appointed teachers. Three years ago it took courage to question the value of schools, and by now it has become a fad to do so. But unfortunately, the loss of legitimacy of the tool has only increased concern with the achievement of the goal for which the tool has proven to be ineffective. The decreasing reliance on school as the choice instrument to condition men for life among modern tools has led to a search for less hypocritical, more ruthless and more effective ways to tool men for their tools all during their lives. The public has now become aware of a need for protection against school-teachers. Protection against other "educators" is even more important.

The conservation of the balance of learning depends above all on the re-establishment of the balance of culture; that is, of a society-wide tool-kit made to the size of man — a diagnostic kit with which a society can grow up, and a motor and a radio which remain unchanged over generations, so that even as junk they still serve as educational tools.

But in a very special sense the protection of the balance of learning depends on limiting the scale and power of certain educational tools. It depends on the ability of individuals and groups to defend themselves against conditioning through media, industrial design, advertising and other forms of large-scale assaults on the shape of their world-view. The contrast between a hyper-industrial set of tools and a post-industrial convivial one can perhaps be visualized best in this area of "media".

Learning has always depended on the availability of records, especially more advanced forms of self-motivated learning and

liberal teaching. The invention of the alphabet has certainly been the greatest factor in lifting the balance of learning. Methods for recording and duplicating recordings made a major jump forward when printing was invented and then again during our time.

Erasmus of Rotterdam could not have dreamt about photo-offset, microfilms, or sound and video tapes. The tools needed in these processes consume little energy. They are relatively simple. If they are designed for long-term use, high repair-intensity and employment by non-specialists, and do not have to compete on a stylish consumer market, they can be produced regionally, and according to designs which are already well-tested. They can provide any Andean village with a library, a concert hall and a theater repertory beyond any which were available to the majority of masters.

Professional teachers laugh at the idea that people would profit from unguided access to books and records. They cite as proof for their skepticism the declining use of libraries. They forget that libraries are not used because they are formidable and impractical, because people have gotten rich and books cheap, and finally, because many people have learned to demand that they be taught and have unlearned how to make a personal effort towards learning.

The use of the new forms of recording does provide teachers with the ability to create a world-wide classroom. The micro-film and the tape can be co-opted by new educational programs as easily as books were co-opted within the program of schools. The protection of the balance of learning depends on limiting the programmed use of records and stimulating their autonomous and therefore random use.

When the balance of learning is upset, people come to value instruction over personal discovery, and learning by simulation over learning from primary experience. Education for them is a commodity which must be acquired *for* real life. Underconsumption of education rationalizes the exclusion from the most valuable aspects of life. The level of education which a person has accumulated established his value as a producer in the eyes of the community — and in his own.

People who measure their own worth in terms of consumption of "knowledge" become increasingly blind to alternative ways of learning. They have become consumption addicts in the most intimate sense, and can be easily hooked on other staples. Consumption addicts need ever higher doses and more costly wares to maintain the rush of "progress". They have become incapable of questioning the values of *more* education, or, for that matter, more speed, medical services or TV. They feel compelled to share the euphoria of progress by gaining new addicts in poor countries. They behave like pushers in Harlem, except that their traffic is protected by the Army. US development experts and systems analysts do everything in their power to increase the number of higher schools and VWs in Brazil.

One argument in favor of more formal education must be dealt with apart. There is an inverse correlation between educational inputs and progeny when a population reaches a certain stage of development. This leads some people to believe that it would be impossible to spend too much money on the preparation of professionals who can teach contraception. Now, it is true that women tend to produce fewer children if they consume more hours of instruction, but this correlation is not even as significant as that between the number of electric outlets available and the number of children born in a population. The fact that such a correlation exists between birth-rates and either schools or agencies or dynamos is neither an argument for more schools (which are very expensive) nor for more clinics staffed by professionals (which are more effective than teachers) nor for more plugs (which would be quite cheap). What is significant, to the contrary, is the frightening ineffectiveness of all attempts to stem the growth of populations in the last thirty years.

Universal and effective contraception is now absolutely necessary. If such contraception is not practiced in the very near future, humanity is in danger of being crushed by its own size rather than by the power of its tools. But this universal *practice* cannot possibly be the result of either increased educational or medical *services*, nor can it be made to depend on some miracle

tool. A new practice can be only the result of a new relationship between people and their tools.

The universal practice of effective contraception is a necessary premise for any limitation of tools. But equally, the psychological inversion which will accompany a limitation of tools is a premise for effective contraception. It is an illusion to expect effective contraception outside of a convivial mode of production.

The tools needed for birth-control are a paradigm for the incorporation of high levels of science in instruments which can be handled by any reasonably prudent person. They provide new modes to engage in the millenary practice of contraception, sterilization and abortion. They are so cheap that they can be made universally available. They are made to fit alternate tasks, beliefs, and situations. They are obviously tools which structure the relationship of each individual to his own body and to his next of kin. To be effective today, they must be used by every adult, and many of them must be used every day. Birth control is an immense task which must be accomplished within one decade, and it can only be accomplished in a convivial mode.

It would be an illusion to expect that this one huge task can be undertaken with convivial tools in a convivial approach to society, while at the very same time the same population is further conditioned by formal education to fit more effectively into a corporate state. Only the convergent use of convivial tools applied to the many problems which we face can render their use in each sector truly effective.

Social Polarization

The declining balance of learning distorts societies' perspective on tools, and renders their overefficiency invisible. In an analogous way the declining balance of power renders the majority impotent to control the tools which are supposedly operated for their benefit.

In every society people have different degrees of access to power. In simpler societies some have horses and even carriages, and others have to walk; some have swords and others have pitchforks; some know how to write and others have to pay the

public scribe. But never has the spread between the powerful and those bereft of power been comparable to that which exists today. It is true that more people can use carriages — but to use a carriage has ceased to be a privilege; while the airlines are run to shuttle the same 1% of the population back and forth between convention hotels.

Every American might have a pistol, but only the National Guard has tanks. Many people own a typewriter, but only a few can print what they write, or can speak to millions of others on TV. Technological progress, unmitigated by political action, concentrates the control of powerful tools in the hands of a few and makes the majority more dependent on their use. The best of tools have always tended to gather in the hands of a few. The doctor, the lawyer, and the parson each had books and carriages and were the first to get electric light. But never before have tools of equal power existed, and never before have they been so integrated at the service of a small elite.

This concentration of power is both veiled and fostered by the popular illusion that tools must only become larger to provide more equality: that one day there will be equal colleges, airplanes and homes for all. It is important to make people understand that a satisfactory minimum quantum for all depends on an upper limit for all.

As tools become large, the number of potential operators declines. There are always fewer operators of cranes than of wheelbarrows. As tools become more efficient, more scarce resources are put at the service of the operator. For example, on a Guatemalan construction site, only the engineer gets air-conditioning in his trailer. He is also the only one whose time is so precious that he must be flown to the capital, and whose decisions are so important that they are transmitted by short-wave radio. He has naturally earned his privileges by cornering the largest amount of tax money and used it to acquire a university degree. The Indians who work on the gang do not notice the relative increase in privilege between him and their former Ladino boss. But the geometricians and draftsmen and crane-operators who work under him feel the heat and the

distance from their family in a new and acute way. Their relative poverty has been aggravated by their boss's claim to efficiency.

When powerful tools are used on a scale at which their output can be defined as a first necessity, then every further concentration of power which increased their efficiency can be justified as being for the public good. Only when "education" comes to be defined as a basic staple can teachers claim the privileges they had in the US of the sixties. People who hold positions of power in one institution inevitably can claim that the power of other institutions be put at their service.

University executives need air-travel — and the Russians openly justify their SST as a means to economize the most valuable resource in their economy, namely the time of their scientists. US executives need their expense accounts just as USSR executives need their datcha to relax and do a better job. Some of the degrading effects of concentrated power can be obviated by income supports and welfare benefits equal for all. Keeping maximum close to minimum incomes is an even tougher way to decrease the possibility of personal enrichment through the management of corporate power. But curbs on incomes are ineffective as means to guarantee equal access to the choice privileges of a society in which what happens at work becomes more significant than what happens at home. As long as some workers are considered immensely more productive than others, they will be able to claim jet travel, closed circuit TV, limousines and executive clubs. The existence of these will define that which others get as only second rate. And as long as voters and clients hold their managers accountable above all for growing production and efficient distribution of staples, the growing polarization of power and privilege on the side of producers and the sense of dependence and lag on the side of consumers cannot be checked.

When the scale of an industrial institution exceeds a certain range, the benefits produced accrue inevitably to one class of people. This remains true, also, when the new scale of production permits to incorporate a vastly greater number of people among the clientele of the institution; and further, even in those cases in which a higher percentage of the population can be served by

the institution. The expansion of the school system provides again an excellent example: as more people, and a higher percentage of all people go to school, the privilege of those who finish school is more acutely taught to the enormously increased number of those who started out on the school-race and then had to drop out of it. But there is something which is even more painful — only those who finish schools usually have access to high speeds, extended medical treatment, and desirable location of their apartment or office.

A society of very large tools must rely on multiple devices by which a majority can be excluded from claiming the most costly packages of privilege. These must be reserved to individuals to whom a high level of productivity can be imputed. Until very recently the most prestigious way to define a person's level of productivity was the price-tag of his educational consumption; the higher a person's knowledge-capital the greater the value which was imputed to the decisions he "made". If hot-lines in executive suites are scarce, then they are placed at the disposal of the makers of productive decisions rather than at the service of lovers.

With the breakdown of legitimacy under which formal education is laboring, other more primitive forms of discrimination assume renewed importance; people are imputed relatively lower productivity because they are born in the third world, because they are black, and above all, because they are women.

The balance of power in a society must be lost when the privileges desired by all come to be reserved to those to whom the key role in their production is imputed.

When rising productivity and scale begin to increase the power of producers faster than the controls which can be exercised over them by the consumer, then the balance of power in an industrial society comes close to being lost for good.

Devaluation

Earlier I have shown that a convivial society depends on the balance between tools for large-scale production and tools which increase each man's power to make things on his own. The choice

of a convivial mode of production thus does not mean a return to primitive tools, but rather the development of more tools which increase individual autonomy. It must equally be shown that a convivial society is not equivalent to a stagnating one, but depends on a new balance between more durable and repair-intensive and re-usable items on the one hand and a wider distribution of the power to initiate changes on the other. Conviviality depends on the replacement of our present scheme of large-scale devaluation which is imposed on the entire society by a few corporate centers of decision-making and on the development of protections of the power of individuals and communities to choose their own style of life through effective small-scale renewal.

Devaluation is a result of an excessive rate of change while social polarization is the result of an excessive size of the product. Social polarization — as I have shown depends on the fact that industrial output comes in quanta, and that the cost of a minimum quantum is beyond half of the world's population. Devaluation, on the other hand, can become intolerable, even though the unit-value of the obsolescent commodity were quite small. These are two distinct dimensions of over-efficiency, but it must be recognized that they both create and re-enforce a society of hierarchically layered privilege.

Forced obsolescence is a characteristic of our present capitalist society. Products cannot be improved unless huge machines are retooled. To make this pay, huge markets must be created for the new model. This is most effectively done by identifying ownership of what is new as an important privilege. If this identification succeeds, the old model is devalued, and the self-interest of the consumer is wedded to the ideology of never-ending and progressive consumption. Individuals are socially graded according to the number of years the bill of goods they use is out of date. Thus some people can afford to keep up with the Joneses, who buy the latest model. Others have cars and stoves and radios which are 5 or 10 years old. Their bill of goods is that many years out of date; they probably spend

their vacations in places which were in vogue that many years ago. They know where they fit on the social ladder.

The social grading of individuals by the age of the things they use is not practiced only in capitalist societies. It is inevitably anywhere, if the economy is built around large-scale staple production. Only the privileged group will have access to the newest model of services and goods; only a few nurses will have "gotten" the most recent courses in anesthesiological nursing, and only a few a seat on the first SST. The members of this minority within a minority will recognize each other by the recent date at which the products they used came onto the market; and it makes little difference if they use them at home or at work.

Industrial innovations are costly and managers must justify their high cost by producing measurable proof of their progress. Some objective superiority must be claimed for the new model. In a socialist economy, pseudo-science will have to provide this alibi, while in market economies appeal can be made to a survey of consumer opinion. In any case, periodic innovations in consumer goods foster the belief that something new can be proven to be better.

This belief has become an integral part of the modern world view, to the point that it is forgotten that whenever a society lives by this faith, each unit which reaches the market generates more wants than it satisfies. If new things are better, than the things which most people use are not quite desirable. Industrial innovation modernizes poverty: multiplication and renewal of staples compound for the majority of consumers the sense of lacking much of what is necessary with the belief that there is a lag between what they have and the model which they ought to have. Elsewhere I have shown that the compulsory competition of constantly re-designed curricula trains the modern student for compulsive and frustrating consumption. Once a society has accepted the illusion that products can be measurably improved and people measured by tests, it loses the ability to agree on the common *good*. The commitment to the better at all costs makes the good impossible at any cost. Constant progress by renewal

of the bill of goods becomes the public goal. When a society reaches this point, frustration overwhelms all satisfactions.

A lack of renewal of the bill of goods frustrates the expectation of what is possible, and any renewal of the bill of goods intensifies the expectations of unlimited progress, which is impossible. What people have and what they are about to get are equally exasperating to them. Accelerating change has become both addictive and intolerable. At this point the balance between stability, change, and tradition has been upset; society has lost both its roots in tradition and its bearing for innovation. Judgment on precedents has lost its value.

One of the major objections against a stationary-state economy is the fear that the production of a limited and durable number of goods would set intolerable limits on the freedom of innovation and of scientific exploration. Both fears are justified if the retooling of society is understood as a shift from the present large-scale production of obsolescent and competing commodities to a production of equal or larger quantities of industrial outputs which cannot be thrown away and clutter the landscape.

Both fears are irrelevant to a convivial society. In a society of limited tools, products are bound to incorporate a large amount of bounded, autonomously used human energy. They are bound to be varied, constantly renewed, of limited size and number of copies, incapable of monopolizing the market. Constant small-scale and regional renewal, surprise, and variety would be the rule. Today innovation is a periodically planned event, as it is now in a society dominated by industrially produced staples and expectations.

Scientific progress is equally restricted rather than enhanced by the present identification of research with industrial development. Most of the cost of research derives from its competitive nature and pressure; most of its tools are restricted to people who have been first carefully programmed where and how to look at the world; most of its goals are set by the need for more power and efficiency. Leisurely scientific research does not exclude some large-scale tools; removal of access-restrictions now created by schools would again admit the curious, rather than

the orthodox to the alchemists vault; and study for its own sake should produce more surprises than team-research on how to eliminate a production snag.

Far from restricting innovation and science, limits on the power of tools would change their character and enhance pluralism.

NEGATIVE RETURNS

We have reviewed five criteria which define the scale at which any tool becomes a danger for the continuation of human life. By growth beyond this scale, tools destroy nature, society or the psyche. These criteria enable us to define the bounds of feasible growth. Presently, research is mostly concerned with breaking these barriers. For lack of a better word I have formerly used the expression of "counterfoil research" to designate the research we need, which is research on bounded growth.

It is important to distinguish a set of barriers to feasible growth from another set of characteristics which define what constitutes a desirable scale within these bounds of the feasible. There is a form of malfunction in which growth does not yet tend towards destruction of the "balance of life", but at which it renders one specific tool antagonistic to its specific aims. The scale of tools can reach the range of negative though tolerable returns.

Transportation can illustrate this. Anywhere in the world where the maximum speed of any one type of commuter vehicle grew beyond a certain MPH, the travel time and the cost of transportation for the median commuter increased. If the maximum feasible speed at one point of a commuter system lies beyond a certain value, most people will be obligated to spend more time locked in their vehicles or earning to pay for the transportation system they are forced to use.

This critical speed depends to a certain extent on a variety of factors: geography, culture, market-controls, level of technology and money-flow. With these and more variables affecting a quality, it would seem that its value could vary in a very wide range. Just the contrary is true. Once it is understood that we

speak about any vehicular speed for the transportation of people within an area in which most commute to work, we find that the range within which the critical speed can vary is very narrow. It is, in fact, so narrow and low that it seems improbable and not worth their time for most traffic engineers to focus attention on its existence.

Commuter transportation seems to lead inevitably to negative returns when it admits, anywhere in the system, speeds above thirty miles. In most circumstances the speed-barrier is much lower. Once that barrier is broken at any point in the system, the total per capita monthly time spent at the service of the travel industry increases. This happens somewhere between the speed at which bicycles can run and the speed of a vehicle running twice as fast. In the case of transportation, negative returns show up when tools reach a power which lies considerably below that which we can prove would produce pollution or monopoly.

Negative returns also show up in other institutions. Ninety percent of all medical care provided to patients with terminal illness cannot be scientifically supported; furthermore, the net effect of such treatment is usually in the direction of increased suffering and disability without resulting in demonstrable lengthening of life. In Medicine it is probable that the maximum of feasibility discussed earlier and the optimum service to the individual patient lie within the same range. Beyond this level medical bills measure the health of a patient in the same manner in which the GNP measures the wealth of a nation; both add on the same scale to the market value of benefits and add to them the defensive expenditures which have become necessary to offset the unwanted side-effects of their production. Medical tools cease to be used primarily for healing or even life-prolongation and are simply deployed in the death-denying ritual of terminal care.

The research on bounded growth must be complemented by research on optimal growth. Tools grow beyond their optimum when they begin to serve illusions — when transportation provides ritual prolongation of youth or lifespan rather than restoring health.

OBSTACLES TO THE POLITICAL USE OF A HOMEOSTATIC MODEL

I have chosen six dimensions on which the "balance of life" depends. In each I have indicated a couple of tendencies which must be kept in an equilibrium to maintain the homeostasis which constitutes human life. I have shown that the control of natural forces is functional only so long as the use of nature does not make nature useless for man. I have shown that institutions are functional only as long as they promote a delicate balance: the equilibrium between what man can do for himself and what tools at the service of anonymous institutions can do for him. Formal education also depends on a balance: education liberates only insofar as it equally enhances independent learning. An increase in social mobility can render society more humane, but only if at the same time there is a decrease in the difference of the power held by the few against the many. Finally, an increase in the rate of innovation is of value only when with it, rootedness in tradition, fullness of meaning and security also are strengthened.

In terms of any of these six dimensions, major social tools can grow out of man's control, first to become his master and finally to become his executioner. In a first range of growth, tools make man increasingly master over nature, but sooner than expected tools grow against man, first to enslave and then to strangle him.

These two ranges can be described in simple words and discussed by simple people. The fundamental decisions which relate tools to men ought to be the basis of political life. This is particularly true in our age, in which for the first time in history it has become possible to design and construct tools of any size, scale and power desired.

To keep the size of tools near the optimum which is indicated by the first range can only be the result of an evolving culture. But to keep the tools of society below the maximum at which they become destructive is a necessity which can be stated, tested, and legislated.

For each major tool the maximum takes a different expression: a basic community cannot have more than a maximum

number of politically active members; transportation cannot exceed a certain speed; a dwelling ought not to contain more than a certain percentage of pre-fabricated parts; electric consumption per capita in a certain range, maximum bandwidth in the electronic spectrum allowed for the transmission of any message.

Together these maxima form a set of parameters which describe the conditions within which human life can flourish. It is the prime task of politics to preserve this milieu for life. It is therefore mandatory to express this model of a homeostasis between man and his tools in politically effective language.

Three difficulties militate against this task: the idealism of science, the corruption of ordinary language and the loss of respect for the fundamental structure of law and politics.

The Test of Desirable and of Feasible Limits

The first difficulty stems from overconfidence in science, and the tendency to have scientists define the parameters for life. This expectation rests on a fallacy. The conditions within which human survival is possible cannot be operationally verified. What some individuals will endure can be scientifically measured. When such measurements are conducted by Germans, they are defined as crimes. Under other skies they can be defined as medical service: such as measurements which were made under my eyes in the intensive care unit in Columbia Medical Center in NYC. What groups will endure is much more difficult to measure. We can tell what happened to men under extreme circumstances in a prison, on an expedition or during the pest. But this is history, not science. But about the end of humanity there is neither science nor history. It is by definition impossible to verify operationally under which circumstances we know mankind will disappear: who would remain to judge whom or what?

To determine the set of upper limits, confidence cannot be placed either in systems analysis or in the measurement of pollution. The correct discussion about "levels of tolerance", "genetic engineering" and "impact calculus" is neither scientific nor political. Systems engineers who apply themselves to model-

ing the extreme conditions of human survival remind me of seventeenth century theologians who anathemized others for using the wrong stick to measure divine grace. Just as it is impossible to verify operationally the scale at which a tool becomes destructive of society, it is unfeasible to measure in any meaningful fashion what size of tool is most desirable for a society. What people do for themselves does not fit the yardstick by which the industrial output for their benefit can be measured. The aggregate value of pedal-pushing in a crowd which bicycles back and forth through a car-less city can be compared with the cost of machine-powered transportation by putting a figure on the diseconomies which are not produced. It is impossible to measure the limits to growth which must be enacted. And yet it is inevitable to enact them in quantitative terms. It is equally meaningless to compare the well-being of an industrial and a convivial society; and yet it is necessary to set quantitative limits to the size of industrial tools. The test by which society determines what is enough for each man — whoever he might be — can be based on scientific data, but is itself not scientific. What is good and good enough must be the result of the application of a test in the juristic sense of the word. It must be measured by the prudent person of reasonable intelligence deciding on a political matter. The prudent man — rather than the scientist's stick — is the measure for the level of pollution, powerlessness, compulsory education or social polarization which ceases to be tolerable within a community. Science can provide evidence in the court of public opinion, but neither scientists nor computers can be entrusted with the decision about what is "good enough".¹

1. Plato, *Statesman* 284.

Length and shortness, excess and defect; with all of these the art of measurement is conversant . . . The Art of measurement has to be divided into two parts, one having regards to the relativity of greatness and smallness to each other; and there is another without which the existence of production would be impossible . . . Is there not also something exceeding and exceeded by the principle of the mean? . . . the comparison of the great and the small with the mean or ideal standard.

If we assume the greater to exist only in relation to the less, there will never be any comparison of either with the mean. And would not this doctrine be the ruin of all the arts and their creations; would not the art

Neither the optimum nor the maximum power of a tool can be set by reference to a standard. Both are indeed quantitative landmarks: one determining what is fit and opportune and due and the other defining where immeasurable damage threatens.

The Recuperation of Languages

The second obstacle to translate the need for a bounded society into political language stems from the corruption of ordinary language. I have earlier described one way in which words lose their power, when the difference between nouns and verbs is blurred. When this has happened, and only then, do we speak about the "right to education", which might mean the claim to a schoolbench, or also a college degree, and could — but hardly ever does mean — a man's claim to learn from living in a society which is transparent, open and participatory.

Even more shocking is the corruption of words, when it manifests a paralysis of the imagination. The problems created by the word "speed limit" are a good symbol for the way public fantasy is crippled. "Speed limits" must be discussed in the context of a bounded society. It is impossible to speak about the upper limits of power in tools without referring to a political action which leads to set an upper limit on speed for a region and over a wide time-horizon. It is also nearly impossible to raise this issue without losing the attention of an audience. It makes no difference if the concrete limit mentioned is 15 or 30 or 50 miles. Even people who lead the political battle to ban the

of the statesman and the aforesaid art of weaving disappear? . . . for if there are arts, there is a standard of measure, and if there is a standard of measure, there are arts . . . The next step is to divide the art of measurement into two parts and to place in the one part all the arts which measure number, length, depth, breadth, swiftness, with their opposites; and to have another part in which they are measured with the mean, and the fit and the opportune and the due and with all those words which denote a mean or standard removed from the extremes.

There are many accomplished men, who say, believing themselves to speak wisely, that the art of measurement is universal and has to do with all things. But these persons are not accustomed to distinguish classes according to the real form; they jumble together two widely different things, relation to one another and to a standard . . .

SST are unwilling to entertain the notion that the undesirability of the SST had something intrinsically to do with speed. Somehow people forget grandfather's enthusiasm about the Orient Express in 1913 which travelled 1000 miles in forty hours and which was twice as fast as the vehicles available to Phileas Fogg on his trip around the world in 80 days. Today the discussion of a world-wide speed limit sounds somehow obscene. It is implausible to the rich and irrelevant to the poor. People who are born next to highways cannot grasp that the world could function without more rapid transit and the people of the Andes cannot grasp why anyone should travel so fast.

Very ordinary words are thus utterly conditioned by their use in the defense of institutions. The use of Aunt Jennie's "mortal sickness" in medicine or the recommendation of a "slowdown" to improve transport sounds almost as shocking today as the mention of sex would have sounded in the discussion of marriage a hundred years ago.

Today, whoever questions the fundamental structure of institutions in ordinary language is very likely to be ruled out of order. Language used in public discussions has been restricted to expressing the ideology of the institutions we know. Correct use of language is easily treated as misuse. The recuperation of language is the second task necessary to make the politics of upper limits possible.

The Recovery of the Legal Structure

The support of an ever expanding productive society has become the principal purpose for which our existing structure of politics and law is used. This perversion constitutes the third obstacle to the translation of the need for a bounded society into actual social process.

Political parties, legislatures and the juridical system have been consistently used to foster, protect and privilege the growth of schools, unions, hospitals, road systems, not to speak of industries. Gradually not only the police but even the courts and the legal system itself have come to be thought of as tools which were made for the service of an industrial state. The fact that

sometimes they still serve for the protection of individuals against industrial claims has become an alibi for the habitual service they perform in legitimizing the further concentration of power. Along with the idolatry of scientific measurements and the corruption of language, this loss of confidence in the political and legal process is the major obstacle to new politics.

I will deal later on with the inversion of politics. I will show that the existing political structure can be used for purposes opposed to those which it now serves. At this point I focus on the potential usefulness of the formal juridical system, and claim that — next to language — it is the only available major tool for the inversion of society. To make my point concrete I will illustrate it with examples taken from the formal system of common law.

Two objections are generally made whenever law is proposed as a tool for the inversion of society. One of them is rather superficial: Not everybody can be a lawyer, and so not everybody can operate this tool on his own. This is of course true only to some degree. It would be easy to establish communal para-judicial systems for particular communities and incorporate them into the overall structure. It would be equally possible to give a much wider scope to various forms of arbitration. But insofar as this objection is valid, it is also irrelevant to my point. We have already seen that there are some large-scale tools which are equally necessary in a convivial society and in an industrial state, and which must be operated by experts: telephone, power or steel mills. The law, so far as it deals with overall social concerns, is just such a tool. Some social concerns are, and will always remain, complex and some of them of very vast range. The law as the process of regulating these concerns is and will remain a tool which needs experts to operate it.

The other objection is completely relevant and it is much more profound: persons who now operate the law as a social tool are deeply infected with the myths which pervade a growth society. Their imagination of the possible and of the feasible is determined by the lore of industry. This fact is of critical importance because the juristic system is not simply a set of written

laws: it is a continuing process by which those laws are made and then applied to actual situations. The resulting content of the law embodies the ideologies of lawmakers and judges. The mythology "established" in society becomes visible in the laws which they make and apply. The body of laws which regulate an industrial society inevitably reflect the myths and enforce the ritual which supports these myths: "more" is always in the common good and more power to institutions.

While this objection does point out a fundamental difficulty against the use of law in an inversion of society, it also misses the point. I carefully distinguish between a body of laws and the purely formal structure by which it was made, just as I earlier distinguished the use of slogans by which our institutions operate from the use of ordinary language. It is the latter and not the former which are the tools we need, we have, we share, and which we have to use.

Two major complementary features of the Common Law make it particularly applicable for the needs which arise in a profound crisis. One is the inherent continuity of the system, and the other is adversary procedure.

The continuity built into the lawmaking process does in one sense conserve the substance of a body of laws. This is less obvious in the legislative stage. Legislators are free to innovate at their own discretion, so long as they stay within a constitutional framework. But they do also have to fit any new law into the context of existing legislation; and this tends to insure that new legislation will not vary too widely from the overall tradition of existing law.

The function of the courts in providing continuity to the substance of the Law is more obvious. A court applies existing law to actual situations. The law represents the sovereign authority of the past over a present controversy. In the process the social experience of the past is readapted to present needs. It will in turn serve in determining the decisions of future cases.

But the continuity of the formal structure used in this process is of a different order from the continuous embodiment of one set of prejudices to a set of laws. Considered in this formal

sense, the system of continuity is not designed to preserve the content of any existing set of laws. It could be used just as effectively to challenge any one of them. It could even be used to preserve the continuous development of a set of laws which fit an inverted society as that which I propose. There is nothing in the constitution that prevents the legislation of laws setting upper limits to productivity or efficiency. Technically the existing legislatures and courts are well equipped to make and apply such law.

The adversary nature of the common law is equally important. The common law is not concerned with what is ethically or technically "right". It is a tool for the resolution of actual conflicts, and leaves to those directly concerned with a social interest the task to insist on the protection of their rights. This works both in legislation and in jurisprudence.

An interested party can propose a new law to a committee of the legislature. The committee hears them, but also others whose interests could be damaged by the passage of a new law. In theory this leads to a conflict resolution: legislation is the act of balancing the conflicting interests in the way which is best for all. It is obvious that during the last generations this balance was wholly distorted in favor of productive society. But the current misuse of the juristic structure is not a valid argument against its use for precisely the opposite purpose. Interests wholly opposed to such a society, free from the illusion that growth can overcome injustice and concerned with limits, can in principle use the same tool. It is of course true that it is not sufficient that new types of plaintiffs appear; it is equally true that the growth-illusions of legislators would have to fade equally, and that parties in interest must be brought forward to represent a convivial society. But I do know that it will appear later that this seems politically feasible.

Not only the legislative but also the judicial process depends on the presentation of conflicting social interests by interested parties to be decided by disinterested tribunals. These tribunals operate in a continuous way. Ideally judges are prudent men

indifferent to the substance of the issue which they are expected to reconcile and experts in the application of due process.

In practice, tribunals also have come to serve the concentration of power and the increase of production. Not only do judges, like legislators, perceive that a conflict is best balanced if the balance favors the overall interest of corporations, but society has conditioned also the plaintiffs to consider it the plaintiffs' principal function to demand more. A larger share of institutional output constitutes much more frequently the substance of a claim rather than protection against an institution which limits a person's freedom to do something on his own. But this abuse of the formal structure of common law does not corrupt the process itself. The law still offers a process by which the ordinary citizen can present to society his own practical interest in a convivial society. He is free to state his interest in some limit on productivity, education, rate of change or power, no matter if this favors or opposes any functioning or proposed program.

Like ordinary English, so "due process" is a convivial tool. People can defend it as inherently theirs; they can find in its inalienable nature the confidence to use its unchanged formal structure for the purpose of expressing contents opposed to those for which they learned to use it in their childhood.

BUREAUCRATIC VS. POLITICAL LIMITS

If man cannot set limits to the productivity of his tools within the very near future, the next generations will experience the gruesome disasters that the Club of Rome has predicted. If these disasters are to be avoided, society has available two kinds of remedies. One is survival within limits set and enforced by bureaucratic dictatorship. The alternative is a political solution: the use of due process, based fundamentally on a democratic tradition. It becomes feasible only if the fundamental structure of western societies is clearly recognized and recovered for use.

The bureaucratic management of human survival cannot be accepted on either ethical or judicial or political grounds. This, of course, does not mean that a majority would not easily submit to it. People could be so frightened by the increasing

evidence of danger, that they would put their destiny into the hands of big brothers. Technocratic caretakers could be mandated to set limits on growth in every dimension, and to set them just at the point beyond which further production would mean utter destruction. Such limits would maintain the industrial age at the highest level of output which man can endure. They would also insure man's maximum service to tools, both as a producer and as a consumer.

Man would live in a plastic bubble that would protect his survival and make it worthless. Since man's tolerance would become the most serious limitation to growth, the alchemists' endeavor would be renewed: the attempt to produce a type of man fit for the still. A major function of engineering would become the psychogenetic tooling of man himself as a condition of further growth. Man would be confined from birth to death into a worldwide schoolhouse, a worldwide hospital, a worldwide television screen, which would be distinguishable in name only from a worldwide prison.

The alternative to this managerial fascism is a political process, by which people decide how much of any scarce resource is the best any member of society can claim. It will also mean an agreement to keep limits stationary over a long time and to set a premium on the constant search for new ways to have an even larger percentage of the population join in doing even more with ever less. Such a political choice of a frugal society remains a pious dream unless it were possible:

- (1) to define concrete procedures by which more people are enlightened about the nature of our present crisis, and come to understand that limits are necessary and a convivial lifestyle desirable.
- (2) to bring the largest number of people into now suppressed organizations which claim their right to a frugal lifestyle and to keep them committed to convivial life, and
- (3) to discover and revalue the political or legal tools which are accepted within a society and to learn how to use them to establish and protect convivial life where it emerges.

Such procedures may sound idealistic at the present moment. This is no proof that they cannot become effective when the present crisis deepens.

Public Research

The enlightenment of the public requires above all public research. By public research I mean an inquest initiated and directed by the people, which clarifies and dramatizes the relationship of the people to the tools of society. Public research holds before the public the resources which are available and the consequences of their use in several ways. It impresses on the people the existence of any trend which threatens one of the major balances on which life depends. It identifies the classes of people who are most immediately hurt by such trends. It helps people to identify themselves as members of such classes. It points out the cause on which a particular freedom is threatened for the members of various groups which have otherwise conflicting interests. And finally, public research makes it evident to the majority that the demands for freedom of any group or alliance can be identified with the implicit interest of all.

By defining this research as "public" I want to say that it is so structured that the ordinary citizen can take a maximum part in it, and this maximum part must preclude the initiation of research.

This is something very different from research initiated and carried on by bureaucrats and scientists. Their procedures may take place in public and their findings may be published. The trouble with their research is not that it is intentionally secret, but rather that it is initiated by specialists for purposes proposed by specialists. Presidential Commissions produce at best critical contributions to political platforms. Studies initiated by doctors reflect the doctors' and not the public's idea on what society needs to know and to act upon. Also the technique of investigation is determined by the doctors' view on health and sickness. It tells doctors how to be better doctors, but this might be just the opposite of what the public would want to know. These Commissions are staffed by professionals and by people who

have made citizenship a profession. Their conclusions are couched in terms which are certain not to discredit the signatories. The language which would invert and upset the institution under study would sound obscene in the context of these reports. This is not public research, it is bureaucratic research.

This research is used to create the comfortable illusion that black and chicanos are participating in fact-finding about discrimination against women; it advertises the synthetic concern of the President for violence or the necessity of regressive taxation to make schools less discriminatory. But such research has little to do with the participation of the public in the process of legislation.

Effective public research can reverse this trend. To illustrate how this research can work, let us think through what can happen to oppose the Nixon/Kennedy alliance at the service of doctors. Public research can show that once medicine becomes a commodity, it compounds the poverty of the poor with formal discrimination. For instance, the poor, who enter medical treatment, but do so only after they have suffered from lead-poisoning, malnutrition or congenital defects have no chance to obtain equal results in treatment. This would be true even though more money were spent on them than is spent on the rich, which is usually not the case. The cripples, the freaks, the odd and the crazy are another such category. They have no chance at a life of equality, as long as they are separated from the "normal" in asylums made by doctors for those whom doctors define as equally sick. Parkinson's Law applied cruelly to doctors: in a society which gives the doctor high prestige, medical science can always create more sick-roles than it is capable of providing with care. A pamphlet published by the State Department for the purpose of explaining to the Spanish speakers the social achievements of the USA boasts that 17% of the population are now recipients of mental health care. Americans can profit from research about the impression this statement about US privileges makes overseas.

The children are perhaps the largest group, partly because they are defenseless. At the last AMA meeting a pediatrician

claimed that the newborn must be considered patients until they are certified as healthy by a doctor. No colleague took him publicly to talk for his unconstitutional claim. It must be pointed out to the very young that medical attention cripples them. Public research can turn the ten-year-old against his parents, who have put them into a world they now destroy. The very young can come to understand that they have no chance to develop the spontaneous adaptability to the environment which was still normal for their elders, because doctors messed them up as infants. They can come to understand that the rate at which the atmosphere, the fish, and society are corrupted by their parents just barely permits their parents — but not them — to escape Armageddon.

But public research has not only the task to help the aggrieved to identify their co-defendants. It has also the task of making individuals aware of others who are willing to react in the same way they choose tools which abridge their liberty. There are poor and cripples and children — from another point of view three distinct groups — who have in common their overarching concern for a healthy environment; and there are others willing to enter an alliance to protect their rights to the use of health tools or to the practice of sick-care.

There are indeed people willing to pay for a healthy environment for their children at the rate at which others pay hospital bills for their dying mothers-in-law. They have a common interest with people who want bicycles rather than cars, but want them not because the environment is dear to them, but because they want to economize time.

There are other people who want to exercise forms of sick care which are now restricted to doctors. Ordinary people all over the US have begun to provide other consenting adults with tests, prescriptions, injections, casts, or abortions, even though the police are at the service of doctors and they have no medical license to kill or maim. Their interest lies in the abolition of license requirements, and this puts them into a class with moon-lighters who want to run gypsy-cabs and radical therapists who want to compete with psychiatrists.

It is the task of public research to help individuals to identify with groups of others who are aggrieved; to highlight the ways in which their freedom of action is legally abridged; to demonstrate that statutes which were enacted to protect monopoly by large-scale institutions over very modern tools now hurt the public.

Majorities in a Crisis

The major obstacle to the restructuring of society is not the lack of information about the limits which are needed, nor the lack of people who could accept them if they became inevitable, but rather the power of political myths. How these myths work and hamper politics can be illustrated easily.

Almost everyone in our society is a destructive consumer. Almost everyone is engaged in an aggression against the milieu. Destructive consumers constitute a numerical majority. Myth transforms them into a political one.

They come to form a mythical voting block on a nonexistent issue; "they" are invoked as the unbeatable guardians of vested interest in growth. This mythical majority paralyzes political action.

At closer inspection "they" are a number of reasonable individuals. One is an ecologist who just takes a jet plane to Stockholm; he wants to protect the environment from further pollution. Another one is an economist who knows that growing efficiency renders work increasingly scarce. He seeks to create new sources of employment. Neither of them has the same interests with a slumdweller in Detroit who purchases his color TV on time. The three belong no more to a voting-block which will defend growth, than clerks, repairman, and salesmen are somehow politically homogenized because each fears for his job, needs a car, and wants medicine for his children.

There can be no such thing as a majority which is opposed to an issue which has not arisen. A majority agitating for limits to growth is as ludicrous a concept as one defending growth at all cost. The stance which each man or woman might take when a social problem becomes an overwhelming threat depends on two

factors: the first is the way in which a smoldering conflict erupts into a political issue which demands attention and partisan action; the second is the existence of new elites which can provide an interpretative framework for new — and hitherto unexpected — alignments of interest.

I can only make conjectures on the mode in which the crisis of society will become an acute issue. But, no matter how correct my conjecture will be, I can make rather firm statements about the qualifications which are needed to provide guidance within this crisis.

I believe that growth will abruptly grind to a stop. The total collapse of the industrial mode of production will be the result of synergy in the practical failure of the systems which fed its expansion. Almost overnight people will simultaneously lose confidence in the value of education, health, welfare, transportation, or communication defined by the standards of present institutions, as they have lost confidence in value defined by the Treasury. This crisis will probably be triggered by an unforeseen event, as the Great Depression was touched off by the Wall Street Crash. Some fortuitous event will render publicly obvious the structural contradictions between stated purpose and effective results in our major institutions. Like other widely shared insights, this sudden event will have the potential of turning public imagination inside out. Large institutions can lose quite suddenly their respectability, their legitimacy and their reputation for serving the public good. It has happened with the Church in the Reformation, with Royalty in the Revolution. The unthinkable became obvious overnight: the people could and would behead their rulers. People who invoke the specter of a conservative majority seem incapable of envisaging political behavior in a crash. Business ceases to be as usual when the populace loses confidence in industrial productivity, and not just in paper currency.

At the moment it is still possible to face the breakdown of our various systems each in a separate perspective: no remedy seems to work, but it is still possible to raise and spend resources on remedies. Governments think that they can deal with the

breakdown of utilities, the disruption of the educational system, intolerable transportation, the chaos of the judicial process, the violent disaffection of the young. Each is dealt with as a separate phenomenon, each having its own cause, each calling for a new tax and program. Squabbles about alternative remedies still can re-enforce the credibility of either: free schools vs. public schools; satellite cities vs. gravitrains for commuters; higher professional standards in medicine vs. more para-medical professions. Since each of the proposed remedies appeals to some, the usual solution is an attempt to try both. The result is a further effort to make the pie grow, and to forget that this kind of pie is in the sky. So general systems analysts are called in to relate the breakdowns to each other. Coolidge's approach to the warning signals of the Depression is now taken to a world crisis of a much more radical type.

It would be a mere exercise in geomancy to predict which series of events will play the role of the Wall Street Crash to catalyze the crisis of industrial society. But it would be folly not to expect in the very near future an event on which the composite effects of several major unablances will render further growth virtually impossible. When this happens, the noise which will accompany the crisis will distract our attention from seeing it in proper perspective.

We now still have a chance to analyze the etiology of the coming crisis, and to prepare for it. If we are to anticipate its effects, we must investigate the way in which sudden change can bring about the emergence into power of previously submerged social groups. It is not calamity as such which creates these groups; and it is much less calamity which brings about their emergence, but calamity weakens the prevailing powers which have excluded the submerged from participation in the social process. It is the power of surprise which weakens control — the established control. And when controls are weakened, those used to control must seek new allies. In the weakened economic-industrial state of the Great Depression, the establishment could not do without organized labor. Organized labor got its share of power within the structure. In the weakened labor

market during the Second World War, industry could not do without black labor; and the blacks began to assert their power.

Forces that work at the limitation of production are already at work within society. There are people who would like to commute on a bicycle; and others who would like to keep the supermarket out of a neighborhood and parents who would like to shield their children from ads — each for his own reason. Public research can contribute much to make them more cohesive and conscious in their indictment of growth which they consider destructive. We may expect that their voices will acquire a new resonance when the crisis of overproductive society becomes concentrated and acute. The more unexpectedly the crisis comes, the more suddenly their velleities can turn into a program, and their desire can become a model for others. But the ability to direct events at that moment depends on the ability of these minorities to grasp the profound nature of the crisis, and to state it in effective language: to say what they want (to live near home), what they can do (build their own homes as did 33% of all people in Massachusetts in 1945 as against 11% today), and what they do not need (speed). The critical use of public language is the first pivot in a political inversion. A second pivot is needed.

The Process of Political Inversion

Further growth must lead to a multiple catastrophe. The acceptance of bounds to growth without a concomitant catastrophe sounds highly improbable. The inevitable catastrophic event can be either a crisis in civilization or its end: its end by annihilation or its end in a worldwide concentration camp run by Dr. Skinner. The foreseeable catastrophe will be a true crisis, that is, the occasion for a choice, only if at the moment it strikes the necessary social demands be effectively expressed. They must be represented by people who can demonstrate that the breakdown of the current illusion is for them a condition to choose an effective and convivial lifestyle. The preparation of such groups is the key task of new politics at the present moment.

I have already shown that these groups must be prepared to

provide a scientifically correct analysis of the catastrophic event, and communicate it in ordinary language. I have shown that they must be prepared to propose the necessity for a bounded society in practical terms that have general appeal. Sacrifice must be shown as the inevitable price for different groups of people to get each what they want — or at least be liberated from what has become intolerable: one opposes the supermarket because he likes fresh food, another because he wants to avoid poison for his children and a third because he wants to survive as a grocer. But beyond using words to describe the limits as both necessary and appealing, the leadership of these groups must be prepared to use a social tool which is fit to ordain what is good enough for all. It must be a tool, which, like language, is respected by all; a tool which like language, does not lose its power because of the purpose to which it has been put in recent history; a tool which, like language, possesses a fundamental structure which misuse cannot totally corrupt.

Such a tool can only be the basic structure of politics and law. At the moment of crash which is “industrial” rather than just “financial” the transformation of catastrophe into crisis depends on the confidence that an emerging elite can inspire in many people that the transition towards a convivial society can be — and can only be — the result of the use of due process. If the application of due process to the inversion of all major institutions of society is then called a cultural revolution, or the recuperation of the essential structure of Anglo-American law, or a return to the spirits of the *fueros de España* is a matter of labelling.

EMERGING INTEREST GROUPS

When I speak about emerging interest groups and their preparation, I am not speaking of parties, or of a church, or of new kinds of experts. I am above all not speaking about one party which could assume power at a moment of crisis. A “management” of the crisis would make catastrophe irreversible. A well-knit, well-trained party can establish its power at the moment of crisis, when the choice to be made is one within an overall

system. Such was the Great Depression: what was at issue was the control of the tools of production. Such were the major crises in which Marxists have come to power. But the crisis which I have described as imminent is not of this nature. It is not a crisis within industrial society, but one of the industrial mode of production itself. The only response to this crisis is full recognition of its depth and acceptance of inevitable self-limitations. The more varied the perspective from which this insight is shared by interest groups and the more disparate the interests which may be protected only by a reduction of power within society, the greater the probability that the inevitable will be recognized as such.

I am also not speaking about a majority opposed to growth on some abstract principle. Above all, such a majority is unfeasible. A well-organized elite, vocally promulgating an anti-growth orthodoxy would be feasible. But such anti-growth demagoguery would be highly undesirable. It would inevitably provide more power to the growth-optimizing bureaucrats and become their tool.

The proponents of a bounded society have therefore no need to put together some kind of majority. A voting majority in a democracy is not motivated by an explicit commitment of all its members to some specific ideology or to some particular value. A voting majority in favor of a specific institutional limitation would have to be composed of most disparate elements: those seriously aggrieved by some aspect of overproduction; those indifferent to the value of the output; and those who may have objections to the present organization of society, though these are irrelevant to the specific limit being set.

How this functions in times of normal politics can be well shown in the example of schools. Some people are childless and resent the school tax. Others feel that they are taxed more heavily and served less well than their peers in another district. Others object to tax-support of schools, since they want to send their children into catholic schools. Others again object to compulsory schooling as such: some because it does harm to the young and others because it fosters discrimination. All these

people form a voting majority, but neither a party nor a sect. Under present circumstances they succeed in cutting school down to size, but thereby they assure its more legitimate survival. A majority vote to limit a major institution tends to be conservative when business is as usual.

But such a majority vote can have the contrary effect in a crisis which affects society on a deeper level. The joint arrival of several institutions at their second watershed is such a crisis. The crash which will follow it must highlight the fact that industrial society as such — and not just its separate institutions — has outgrown the range of its effectiveness. The Nation State has become so powerful that its scale makes it impossible to fulfill its stated functions. Just as General Giap could use the US military machine to win his war, so the multinational corporations and professions can use the bi-partisan system to establish their empire. But while democracy in the US can survive a victory by Giap, it cannot survive one by ITT and its like. At the moment of a total crisis it becomes clear that the Nation State has grown into the holding-corporation for a multiplicity of self-serving tools, and the political party into an instrument to organize stockholders for the occasional election of boards and presidents. In this situation parties support each voters right to claim higher levels of *individual* consumption and to enforce thereby higher levels of *industrial* consumption. People can claim cars, but the appropriation of societies overall resources in a transportation system (which determines if cars are at all useful) is left to the decision of experts. Such parties do support a state which has as its only purpose the support of an increasing GNP, and they are obviously useless at the moment of a general crash. At that moment no agreed-upon limitation can keep any of the major institutions functioning.

Thus a general crisis opens the way to social reconstruction. The loss of legitimacy of the State as a holding corporation does not destroy, but reasserts, the need for constitutional procedure. The loss of confidence in parties which have become stockholders factions brings out the importance of adversary procedures in politics. A loss of credibility of opposing claims for more individ-

ual consumption only highlights the importance of the use of adversary procedures if the issue to decide upon is the reconciliation of opposing sets of society-wide limitations. The same general crisis which could easily lead to one-man rule, expert government and ideological orthodoxy, is also the great opportunity to reconstruct a political process in which all participate.

Political and legal structure are integral to one another. If this is recognized, law can be used as the outstanding convivial tool in the political arena. The structure of law, based on the adversary procedure and the standard of the prudent man can provide a continuous rather than a violent instrument for the inversion of our industrial society into a convivial one.