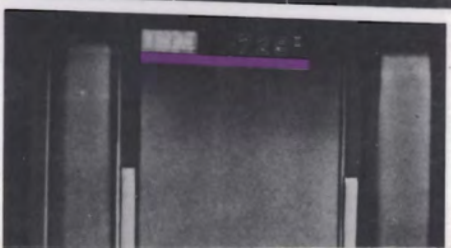
THE TECHNOLOGICAL SOCIETY

JACQUES ELLUL

With an Introduction by Robert K. Merton

A penetrating analysis of our technical civilization and of the effect of an increasingly standardized culture on the future of man

A Vintage Book



THE TECHNOLOGICAL SOCIETY

BY

JACQUES ELLUL

TRANSLATED FROM THE FRENCH BY JOHN WILKINSON

WITH AN INTRODUCTION BY ROBERT K. MERTON,
PROFESSOR OF SOCIOLOGY, COLUMBIA UNIVERSITY

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Statement from the Publisher

I would never have heard of this book and its author were it not for my friend W. H. Ferry, Vice-President of the Center for the Study of Democratic Institutions of the Fund for the Republic, Inc., at Santa Barbara, California.

Sometime in 1961, Robert M. Hutchins and Scott Buchanan told Aldous Huxley of the Center's interest in technology and asked his opinion about contemporary European works on the subject. Huxley recommended above all Ellul's *La Technique*, which had been published in Paris by Armand Colin in 1954 without having attracted much attention. At any rate the copies of the French original which the Center hastened to procure were from the first edition, as was also the copy I secured after my old friend Ferry had written me about it.

I couldn't possibly read Ellul's French, which apart from the matters with which he deals is very difficult, but since Scott Buchanan and Columbia's distinguished sociologist Robert K. Merton both said the book deserved publication in English, and since Mr. Buchanan had a translator at hand in John Wilkinson of the Center staff, who was willing to tackle this difficult and almost sure to be thankless job, I committed our firm to an undertaking that I soon began to call "Knopf's folly."

Members of the Center met Ellul in Greece in 1961, where he attended a conference as the Center's guest and read a paper he had written at their request. They later paid him for a new introduction he had written for the American edition of *La Technique*. And the Center also helped to defray some extraordinary expenses incurred by Professor Wilkinson in the course of his work.

I wish belatedly to thank the Center publicly for all they did to help us with one of the most difficult editorial tasks Alfred A. Knopf, Inc., has ever undertaken. This note should have appeared in our first printing and I am sorry it did not.

Foreword

In *The Technological Society,* Jacques Ellul formulates a comprehensive and forceful social philosophy of our technical civilization. Less penetrating than Thorstein Veblen's *The Engineers and the Price System,* it nevertheless widens the scope of inquiry into the consequences of having a society pervaded by technicians. Ellul's book is more colorful and incisive than Oswald Spengler's *Man and Technics*—which by contrast seems faded and unperceptive—and it is more analytical than Lewis Mumford's trilogy—although Ellul handles the historical evidence much more sparingly and with less assurance than Mumford. And it is more far-ranging and systematic than Siegfried Giedion's *Mechanization Takes Command,* which, of all the books overlapping Ellul's subject, comes close to giving the reader a sense of what the dominance of technique might mean for the present and the future of man. In short, whatever its occasional deficiencies, *The Technological Society* requires us to examine anew what the author describes as the essential tragedy of a civilization increasingly dominated by technique.

Despite Ellul's forceful emphasis upon the erosion of moral values brought about by technicism, he has written neither a latter-day Luddite tract nor a sociological apocalypse. He shows that he is thoroughly familiar with the cant perpetuated by technophobes

and for the most part manages to avoid their clichés. Indeed, he takes these apart with masterly skill to show them for the empty assertions they typically are. Neither does he merely substitute a high moral tone or noisy complaints for tough-minded analysis. His contribution is far more substantial. He examines the role of technique in modern society and offers a system of thought that, with some critical modification, can help us understand the forces behind the development of the technical civilization that is distinctively ours.

Enough of Ellul's idiosyncratic vocabulary has survived the hazards of transoceanic migration to require us to note the special meanings he assigns to basic terms. By *technique*, for example, he means far more than machine technology. Technique refers to any complex of standardized means for attaining a predetermined result. Thus, it converts spontaneous and unreflective behavior into behavior that is deliberate and rationalized. The Technical Man is fascinated by results, by the immediate consequences of setting standardized devices into motion. He cannot help admiring the spectacular effectiveness of nuclear weapons of war. Above all, he is committed to the never-ending search for "the one best way" to achieve any designated objective.

Ours is a progressively technical civilization: by this Ellul means that the ever-expanding and irreversible rule of technique is extended to all domains of life. It is a civilization committed to the quest for continually improved means to carelessly examined ends. Indeed, technique transforms ends into means. What was once prized in its own right now becomes worthwhile only if it helps achieve something else. And, conversely, technique turns means into ends. "Know how" takes on an ultimate value.

The vital influence of technique is of course most evident in the economy. It produces a growing concentration of capital (as was presciently observed by Marx). Vast concentrations of capital require increasing control by the state. Once largely confined within the business firm, planning now becomes the order of the day for the economy as a whole. The dominance of technique imposes centralism upon the economy (despite comparatively inconsequential efforts to decentralize individual industrial firms), for once technique develops beyond a given degree, there is no effective

alternative to planning. But this inevitable process is impersonal.

Only the naïve can really believe that the world-wide movement toward centralism results from the machinations of evil statesmen.

The intellectual discipline of economics itself becomes technicized. Technical economic analysis is substituted for the older political economy included in which was a major concern with the moral structure of economic activity. Thus doctrine is converted into procedure. In this sphere as in others, the technicians form a closed fraternity with their own esoteric vocabulary. Moreover, they are concerned only with what is, as distinct from what ought to be.

Politics in turn becomes an arena for contention among rival techniques. The technician sees the nation quite differently from the political man: to the technician, the nation is nothing more than another sphere in which to apply the instruments he has developed. To him, the state is not the expression of the will of the people nor a divine creation nor a creature of class conflict. It is an enterprise providing services that must be made to function *efficiently*. He judges states in terms of their capacity to utilize techniques effectively, not in terms of their relative justice. Political doctrine revolves around what is useful rather than what is good. Purposes drop out of sight and efficiency becomes the central concern. As the political form best suited to the massive and unprincipled use of technique, dictatorship gains in power. And this in turn narrows the range of choice for the democracies: either they too use some version of effective technique—centralized control and propaganda—or they will fall behind.

Restraints on the rule of technique become increasingly tenuous. Public opinion provides no control because it too is largely oriented toward "performance" and technique is regarded as the prime instrument of performance, whether in the economy or in politics, in art or in sports.

Not understanding what the rule of technique is doing to him and to his world, modern man is beset by anxiety and a feeling of insecurity. He tries to adapt to changes he cannot comprehend. The conflict of propaganda takes the place of the debate of ideas. Technique smothers the ideas that put its rule in question and filters out for public discussion only those ideas that are in substantial

accord with the values created by a technical civilization. Social criticism is negated because there is only slight access to the technical means required to reach large numbers of people.

In Ellul's conception, then, life is not happy in a civilization dominated by technique. Even the outward show of happiness is bought at the price of total acquiescence. The technological society requires men to be content with what they are required to like; for those who are not content, it provides distractions—escape into absorption with technically dominated media of popular culture and communication. And the process is a natural one: every part of a technical civilization responds to the social needs generated by technique itself. Progress then consists in progressive de-humanization—a busy, pointless, and, in the end, suicidal submission to technique.

The essential point, according to Ellul, is that technique produces all this without plan; no one wills it or arranges that it be so. Our technical civilization does not result from a Machiavellian scheme. It is a response to the "laws of development" of technique.

In proposing and expanding this thesis, Ellul reopens the great debate over the social, political, economic, and philosophical meaning of technique in the modern age. We need not agree with Ellul to learn from him. He has given us a provocative book, in the sense that he has provoked us to re-examine our assumptions and to search out the flaws in his own gloomy forecasts. By doing so, he helps us to see beyond the banal assertion that ours has become a mass society, and he leads us to a greater understanding of that society.

ROBERT K. MERTON

Columbia University
January 1964

Translator's Introduction

Jacques Ellul as the Philosopher of the Technological Society

Ernst Jünger once wrote that technology is the real metaphysics of the twentieth century. The irreversible collectivist tendencies of technology, whether it calls itself democratic or authoritarian, were already apparent to him, at the end of World War I. It is this society, in all its forms, which Jacques Ellul, of the Faculty of Law of Bordeaux, seeks to analyze.

Professor Ellul, unlike most of the other surviving leaders of the French Resistance, still functions as a voice of conscience for a France which seems to feel itself in danger of being overwhelmed from literally every point of the compass by the materialistic values of the cold war—consumer society. Greater influence is enjoyed by others such as Malraux and Sartre; but Malraux is in the service of the welfare state (albeit one with Gallic flourishes) and Sartre is growing rich by dispensing absinthe morality in the cellars of the Left Bank. "I sometimes wonder," says Ellul in a related connection, "about the revolutionary value of acts accompanied by such a merry jingle of the cash register."

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Ellul's principal work, this book, appeared under the title *La Technique* and the subtitle *L'enjeu du siècle.* The subtitle, which means literally "the stake of the century," is a characteristically dark and difficult Ellulian phrase which may or may not refer to a kind of "Pascal wager" put on technology by twentieth-century man. The *Technique* of the title, however, lends itself more easily to interpretation, although, characteristically, it too is used in a sense it does not usually enjoy. *Technique,* the reader discovers more or less quickly, must be distinguished from the several *techniques* which are its elements. It is more even than a generalized mechanical technique; it is, in fact, nothing less than the organized ensemble of *all* individual techniques which have been used to secure any end whatsoever. Harold Lasswell's definition comes closest to Ellul's conception: "The ensemble of practices by which one uses available resources to achieve values." This definition has the merit of emphasizing the *scope* of technique; but Ellul's further account makes it clear that it does not go far enough, since technique has become indifferent to all the traditional human ends and values by becoming an end-in-itself. Our erstwhile means have all become an end, an end, furthermore, which has nothing human in it and to which we must accommodate ourselves as best we may. We cannot even any longer pretend to act as though the ends justified the means, which would still be recognizably human, if not particularly virtuous. Technique, as the universal and autonomous technical fact, is revealed as the technological society itself in which man is but a single tightly integrated and articulated component. *The Technological Society* is a description of the way in which an autonomous technology is in process of taking over the traditional values of every society without exception, subverting and suppressing these values to produce at last a monolithic world culture in which all nontechnological difference and variety is mere appearance.

The technical malaise so deeply felt in non-Communist Europe at the imminent takeover has brought forth in recent years an astonishingly large number of literary, philosophic, and sociological analyses of the technical phenomenon. One of the great merits of Ellul's book arises from the fact that he alone has pushed such analysis to the limit in all spheres of human activity and in the totality of their interrelatedness. It may be added that what some

authors feel to be the book's demerits arise from the same source; they maintain that society more often than not refuses to be pushed to that *reductio ad absurdum* which is the inevitable end point of every thoroughgoing analysis. The books of such authors generally end on a note of optimism. A final chapter always asks: "What is to be done?" Unfortunately, their answers to the question are either inefficacious myths which confront reality with slogans, or only too efficacious technical solutions to technical problems which end only in subjecting man the more thoroughly to technology. The former are exemplified by most modern religions, philosophical systems, and political doctrines; the latter by schemes for mass education or mass cultivation of leisure, which, in Ellul's analysis, are themselves highly impersonal and technicized structures having much more in common with the assembly line than with what mankind has traditionally designated by these names.

The technological malaise seems to have been much less acutely felt in the United States. Individuals such as Aldous Huxley, Paul Tillich, and Erich Fromm, who have raised their voices in protest, are of European origin and received their education in Europe. Technolaters such as Professors B. F. Skinner of Harvard and most other American professors represent the familiar type of the American intellectual caught in an ecstatic technical vertigo and seldom proceeding beyond certain vague meditations on isolated problem areas such as the "population explosion," if indeed he considers the real problems posed by technology at all. Ellul holds the Americans to be the most conformist people in the world, but in fairness it must be objected that, in his own analysis, the Soviets seem better to deserve this dubious honor since they have made even politics into a technique. The Americans, apart from technicizing the electoral process, have left at least the sphere of politics to the operations of amateurish bunglers and have thereby preserved a modicum of humanity. It may be added that France, too, has been taken into the technological orbit with a speed which must have astonished Ellul. De Gaulle's plans for his new France contemplate the complete technicization of French society in nine years instead of the quarter century of grace which Ellul predicts in his book.

Since the religious object is that which is uncritically worshipped, technology tends more and more to become the new god.

This is true for all modern societies, but especially so for Communist societies, since Marxism, in Ellul's analysis of it, *consciously* identifies the material infrastructure, upon which the social superstructure is raised, with technology.[1] The expression of technological malaise in the Soviet Union or in Red China, where technolatry has become the new Establishment, would be blasphemy in the strictest sense of the word.

In composition and style, Ellul's book is certain to be an enigma, and even a scandal, to many. It is not sociology, political economy, history, or any other academic discipline, at least as these terms are usually understood. It will not even appear to be philosophy to a generation whose philosophic preoccupations are almost exclusively analytic. Ellul himself is in doubt about the value of the designation *philosopher*. But, if we think back to the *dialectical philosophies of the whole* of thinkers such as Plato and Hegel, Ellul's book *is* philosophy. If an American specialist, say, in economics, with his "terribly linear" logic and his apparently unshakable conviction that his arbitrarily delimited systems can and should be studied in isolation from all others, were to flip open Ellul's book to those sections which treat of matters economic, it is conceivable that he would be repelled by what he found. But if this same specialist could somehow or other implausibly be persuaded to persevere in the attempt to see with Ellul economics in the light of the whole of modern technical culture, it is likewise conceivable that he would gain important insights, not perhaps into the fine-structure of academic economic problems, but in the border region where his subject abuts on other disciplines, in that area where basic discoveries in economics (and everything else) are always made by gifted amateurs, who *faute de mieux* must be called philosophers.

Ellul's admittedly difficult style is not to be referred to that *style heurté* affected by so many postwar French existentialists. An element of this is doubtless present, but it would be much more accurate to say that, in an essentially dramatic work such as the present book must be deemed to be, the transitions and turns of thought must have a character entirely different from those to be

[1] Ellul once again showed much prescience. Marxist publications of the last few years have come to speak of the "technical-material infrastructure" instead of the "material infrastructure."

encountered in the ultra-respectable academic texts which have taken over from mathematics certain linear and deductive modes of presentation; modes, which, whatever their pedagogic value may be, serve, even in mathematics, only to obscure the way in which truth comes into being. To its dramatic presentation of what are, after all, well-known facts, Ellul's book owes its high persuasive quality.

This dramatic character would have been clearly evident if the book had been written as a dialogue. Indeed, a reader could easily cast it into this form by representing to himself the various thinkers who are introduced by name as the dramatis personae, and by treating the nameless "On the one hands" and "On the other hands" in the same way. In this way the "successive recantations" of some positions and the development of others in the light of a guiding concept of the whole become clear, and the book's essential affinity to a Platonic dialogue like the *Republic* is evident. (Nowhere is this successive recantation more evident than in the first chapter's search for definitions.) Even clearer is the similarity of the book to Hegel's *Phänomenologie des Geistes,* the last work of Western philosophy with which, in the translator's opinion, the present work bears comparison. *The Technological Society* is not a "phenomenology of mind" but rather a "phenomenology of the technical state of mind." Like Hegel's book, it is intensely histrionic; and like it, it shows, *without offering causal mechanisms,* how its subject in its lowest stage (technique as machine technique) develops dialectically through the various higher stages to become at last the fully evolved phenomenon (the technical phenomenon identical with the technical society). Again, as with Hegel, what the philosopher J. Loewenberg has called the "histrionic irony" of statement must drive the literal-minded reader mad.

The Danish historian of philosophy, Harald Hoeffding, says of Hegel's *Phenomenology:*

> The course of development described in this unique work is at once that of the individual and of the race; it gives at the same time a psychology and a history of culture—and in the exposition the two are so interwoven that it is often impossible to tell which of the two is intended.

With the stipulation that Ellul is treating of culture in the sense of the technological society, Hoeffding's penetrating remark holds as well for Ellul's book.

In such a work it is impossible to separate method from content. Yet, in another sense, and especially for a translator, it is imperative to do so. Although, after the time of Descartes, French savants in general were preoccupied with clarifying problems of method, it has been almost impossible *in the twentieth century* to extort from French writers on sociology and economics an adequate account of their procedures. Some of them have doubtless been oversensitive to Poincaré's famous jibe concerning the sciences "with the most methods and the fewest results." In Ellul's case, however, disinclination to discuss methodology specifically is almost certainly due in large part to his pervasive distrust of anything at all resembling a fixed doctrine. Nevertheless, throughout the book are scattered a large number of references to method, and it is possible and necessary to reconstruct from them a satisfactory account of the author's methodology.

Ellul first "situates" the "facts" of experience in a general context, and then proceeds to "focus" them. This figure of speech, drawn from, or at least appropriate to, descriptive astronomy, appears over and over again in connection with each supervening stage of complexity of the subject matter. The final result of the procedure is to bring to a common focal point rays proceeding from very different spheres. The reader should be warned that it is only possible to approximate in English the mixed metaphors and the studied imprecisions of each new beginning of the process, which are gradually refined to yield *at the focus* a precise terminology. The translator was always uncomfortably aware of too little precision, or too much, in his choice of English words. The reader seriously interested in these nuances has no recourse but to consult the original. The translator can do little more for him than to call his attention to the problem. Anyone familiar with similar "dialectic moments" in the works of Hegel or of Max Weber will understand at once what is meant.

Ellul repeats again and again that he is concerned not to make value judgments but to report things as they are. One might be tempted to smile at such statements in view of the intensely personal and even impassioned quality of a work in which one is never

for a moment unaware where the author's own sympathies lie. Nonetheless, on balance, it seems clear that he has not allowed his own value judgments to intrude in any illegitimate way on questions of fact. "Fact" is very important to Ellul, but only as experienced in the context of the whole. Facts as they figure in uninterpreted statistical analyses of a given domain, or as they may be revealed by opinion polls and in newspapers, are anathema to him; and he permits himself many diatribes against this kind of "abstract," disembodied fact which is so dear to the hearts of Americans, at least as Ellul imagines them to be. With this proviso, Ellul can echo the dictum of Hegel's *Phenomenology* that the only imaginable point of departure of philosophy is experience.

The insistence on rendering a purely phenomenological account of fact, without causal explanation of the interrelation of the subordinate facts, may seem distasteful to some readers. Since Aristotle it has been a common conception of science that we have knowledge only when we know the Why. Admittedly, whenever causal knowledge *is* available, it is indeed valuable. But it ought not to be forgotten that such knowledge is increasingly hard to come by, and, in fact, hardly makes its appearance at all in modern physics, say, where one must, for the most part, be content with purely functional (that is, phenomenological) equations, which dispense with any appeal to mechanism but which are nonetheless adequate for prediction and explanation, and which have the enormous additional advantage of containing no hidden concepts unconfrontable by experience. The important questions concerning the technological society rarely turn for Ellul on how or why things came to be so, but rather on whether his description of them is a true one.

Ellul's methodology is fundamentally dominated by the principle which has come to be called Engel's law, that is, the law asserting the passage of quantity into quality. To give a commonplace example, the city, after it reaches a certain threshold of population, is supposed to pass over into a qualitatively different type of urban organization. Unfortunately, both the popular and the usual philosophical accounts of Engel's law are incomplete, to use no worse word.

First, it is incorrect to speak at all of a "threshold" of quantity which, having been transcended, gives rise to a change of quality and to a new set of laws and explanatory principles. In dialectical

logic, *every* change of quantity *is* simultaneously a change of quality; and the discernment of a "threshold" quantity is partly a psychological fact of awareness, and partly an illicit attempt to try to import back into a dialectical logic some of the unequivocalness of the ordinary either/or logic. Now, Ellul's explanation of the technical takeover is based fundamentally on the fact that the material (that is, technical) substratum of human existence, which was traditionally not allowed to be a legitimate end of human action, has become so "enormous," so "immense," that men are no longer able to cope with it as means, so that it has become an end-in-itself, to which men must adapt themselves. But, with a better understanding of the illusory nature of the "threshold quantity," we are able to turn aside the objections which are always raised by those who rightly but extraneously urge that historical societies have *always* had to struggle with the possibility of a material takeover and that the present state of affairs is therefore not something new. The answer, of course, is that the objection is irrelevant. Ellul could not mean to assert that men in the past have not had to contend with material means which threatened to exceed their capacity to make good use of them, but that men in the past were not confronted with technical means of production and organization which in their sheer numerical proliferation and velocity unavoidably surpassed man's relatively unchanging biological and spiritual capacities to exploit them as means to human ends.

Second, Engel's law must *never* be taken to imply a one-way transition of quantity into quality. In dialectical logic the transformation of quality into quantity is a necessary concomitant of the reversible transformation of quantity into quality. It is, in fact, *the essence of technique to compel the qualitative to become quantitative,* and in this way to force every stage of human activity and man himself to submit to its mathematical calculations. Ellul gives examples of this at every level. Thus, technique forces all sociological phenomena to submit to the clock, for Ellul the most characteristic of all modern technical instruments. The substitution of the *tempus mortuum* of the mechanical clock for the biological and psychological time "natural" to man is in itself sufficient to suppress all the traditional rhythms of human life in favor of the mechanical. Again, genuine human communities are suppressed by

the technological society to form collectivities of "mass men" incapable of obeying any other law than the statistical "law of large numbers." All the technical devices of education, propaganda, amusement, sport, and religion are mobilized to persuade the human being to be satisfied with his condition of mechanical, mindless "mass man," and ruthlessly to exterminate the deviant and the idiosyncratic.

The reduction of everything to quantity is partly a cause, and partly an effect, of the modern omnipresence of computing machines and cybernated factories.

It should not be imagined, however, that the universal concentration camp which Ellul thinks is coming into being in all technical societies without exception will be felt as harsh or restrictive by its inmates. Hitler's concentration camps of hobnailed boots were symptoms of a deficient political technique. The denizen of the technological state of the future will have everything his heart ever desired, except, of course, his freedom. Admittedly, modern man, forced by technique to become in reality and without residue the imaginary producer-consumer of the classical economists, shows disconcertingly little regard for his lost freedom; but, according to Ellul, there are ominous signs that human spontaneity, which in the rational and ordered technical society has no expression except madness, is only too capable of outbreaks of irrational suicidal destructiveness.

The escape valves of modern literature and art, which technique has contrived, may or may not turn out to be adequate to the harmless release of the pent-up "ecstatic" energies of the human being. Technique, which can in principle only oppose technical and quantitative solutions to technical problems, must, in such a case, seek out other technical safety valves. It could, for example, convince men that they were happy and contented by means of drugs, even though they were visibly suffering from the worst kind of spiritual and material privation. It is obvious that *all such ultimate technical measures* must cause the last meager "idealistic" motifs of the whole technical enterprise to disappear. Ellul does not specifically say so, but it seems that he must hold that the technological society, like everything else, bears within itself the seeds of its own destruction.

It must not be imagined that the autonomous technique en-

visioned by Ellul is a kind of "technological determinism," to use a phrase of Veblen. It may sometimes seem so, but only because *all* human institutions, like the motions of all physical bodies, have a certain permanence, or vis inertiae, which makes it highly probable that the near future of statistical aggregations will see them continue more or less in the path of the immediate past. Things *could* have eventuated in the technological society otherwise than as they have.

Technique, to Ellul, is a "blind" force, but one which unfortunately seems to be more perspicacious than the best discernible human intelligences. There *are* other ways out, Ellul maintains, but nobody wants any part of them.

Ellul's insistence that the technical phenomenon is not a determinism is not weakened by the enumeration (in the second chapter) of five conditions which are said to be "necessary and sufficient" for its outburst in the recent past, since the sufficient conditions for the conditions (for example, the causes of the population explosion) are not ascertainable.

The inertia of the technical phenomenon guarantees not only the continued refinement and production of relatively beneficial articles such as flush toilets and wonder drugs, but also the emergence of those unpredictable secondary effects which are always the result of ecological meddling and which today are of such magnitude and acceleration that they can scarcely be reconciled with even semistable equilibrium conditions of society. Nuclear explosions and population explosions capture the public's imagination; but I have argued that Ellul's analysis demands that *all* indices of modern technological culture are exploding, too, and are potentially just as dangerous to the continued well-being of society, if by well-being we understand social equilibrium.

Reference to the vis inertiae of technique should not obscure the fact that technique has become the only fully spontaneous activity of the modern world. Art and science are mentioned as other human activities by Ellul. But art, though it is concrete, is subjective; and science, though objective in its description of reality, is abstract. Only technique is at once both concrete and objective in that it creates the reality it describes. Ellul *must* conclude that from among the data of science technique *legislates* those which it deems most efficient and rejects the rest Economic and social

"model builders," those assiduous technocratic apes, may seek to soften the violence of this description by pointing out that *all* sciences "specify a universe of discourse." It remains unfortunately true, however, that such "specification" proceeds by way of elimination of the human.

Ellul is no machinoclast like the partisans of the weak-minded Ludd seeking to wreck the stocking frames. He has no doctrinal delusions at all, a fortiori none like those of Rousseau and certain of his disciples, who imagined that man would be happy in a state of nature.

In view of the fact that Ellul continually apostrophizes technique as "unnatural" (except when he calls it the "new nature"), it might be thought surprising that he has no fixed conception of nature or of the natural. The best answer seems to be that he considers "natural" (in the good sense) *any* environment able to satisfy man's material needs, *if* it leaves him free to use it as means to achieve his individual, internally generated ends. The necessary and sufficient condition for this state of affairs is that man's means should be (qualitatively and quantitatively) "at the level" of man's capacities. Under these dubiously realizable circumstances, Ellul apparently thinks of techniques as so many blessings.

Since men are unwilling to acknowledge their demotion to the status of joyous robots, and since they demand justification for their individual and collective acts as never before in history, it is easy to understand why the modern intellectuals (and their forcing-house, the university) have become veritable machines for the invention of new myths and the propagation of old ones. It would be easy to compile a list of all the things which Ellul must deem "myth." Such a list would quite simply contain *all* philosophical, historical, religious, and political doctrines known to man, except insofar as such doctrines have technological components. The Western democracies, for example, are out after money and the Eastern Communists are out after power; otherwise they share an identical view of life, and the epiphenomenal variant ideologies which accompany identical acts can only be described as a cruel hoax.

It is disconcerting in the extreme to contemplate the possibility that cherished democratic institutions have become empty forms which have no visible connection with the acts of democratic na-

tions, except perhaps to render these acts technically less efficient than they otherwise need have been. But the fact that they have no connection is, paradoxically, a powerful reason for their survival. Ellul evidently contemplates a long future in which sclerotic rival ideologies will carry on their sham polemics.

Ellul, in agreement with much of Greek philosophy, seems to think that the distinction usually drawn between thought and action is a pernicious one. To him, to *bear witness to the fact* of the technological society is the most revolutionary of all possible acts. His personal reason for doing so is that he is a Christian, a fact which is spelled out in his book *La Présence*. His concept of the duty of a Christian, who stands uniquely (is "present") at the point of intersection of this material world and the eternal world to come, is not to concoct ambiguous ethical schemes or programs of social action, but to testify to the truth of both worlds and thereby to affirm his freedom through the revolutionary nature of his religion.

It is clear that many people who will accept Ellul's diagnosis of the technical disease will not accept his Christian therapy. The issue is nevertheless joined: if massive technological intervention is the only imaginable means to turn aside technology from its headlong career, how may we be sure that this intervention will be something other than just some new technical scheme, which, more likely than not, will be catastrophic?

JOHN WILKINSON

Center for the Study of Democratic Institutions
Santa Barbara, California
January 1964

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Note to the Reader

I think the task of the reader will be lightened if at the outset I attempt a definition of *technique*. The whole first chapter is devoted to making clear what constitutes technique in the present-day world, but as a preliminary there must be a simple idea, a definition.

The term *technique*, as I use it, does not mean machines, technology, or this or that procedure for attaining an end. In our technological society, *technique* is the *totality of methods rationally arrived at and having absolute efficiency* (for a given stage of development) in *every* field of human activity. Its characteristics are new; the technique of the present has no common measure with that of the past.

This definition is not a theoretical construct. It is arrived at by examining each activity and observing the facts of what modern man calls technique in general, as well as by investigating the different areas in which specialists declare they have a technique.

In the course of this work, the word *technique* will be used with varying emphasis on one or another aspect of this definition. At one point, the emphasis may be on rationality, at another on efficiency or procedure, but the over-all definition will remain the same.

Finally, we shall be looking at technique in its sociological aspect;

that is, we shall consider the effect of technique on social relationships, political structures, economic phenomena. Technique is not an isolated fact in society (as the term *technology* would lead us to believe) but is related to every factor in the life of modern man; it affects social facts as well as all others. Thus technique itself is a sociological phenomenon, and it is in this light that we shall study it.

JACQUES ELLUL

June 1963

Author's Foreword to the Revised American Edition

At the beginning I must try to make clear the direction and aim of this book. Although descriptive, it is not without purpose. I do not limit myself to describing my findings with cold objectivity in the manner of a research worker reporting what he sees under a microscope. I am keenly aware that I am myself involved in technological civilization, and that its history is also my own. I may be compared rather with a physician or physicist who is describing a group situation in which he is himself involved. The physician in an epidemic, the physicist exposed to radioactivity: in such situations the mind may remain cold and lucid, and the method objective, but there is inevitably a profound tension of the whole being.

Although I have deliberately not gone beyond description, the reader may perhaps receive an impression of pessimism. I am neither by nature, nor doctrinally, a pessimist, nor have I pessimistic prejudices. I am concerned only with knowing whether things are so or not. The reader tempted to brand me a pessimist should begin to examine his own conscience, and ask himself what causes him to make such a judgment. For behind this judgment, I believe, will always be found previous metaphysical value judgments, such

as: "Man is free"; "Man is lord of creation"; "Man has always overcome challenges" (so why not this one too?); "Man is good." Or again: "Progress is always positive"; "Man has an eternal soul, and so cannot be put in jeopardy." Those who hold such convictions will say that my description of technological civilization is incorrect and pessimistic. I ask only that the reader place himself on the factual level and address himself to these questions: "Are the facts analyzed here false?" "Is the analysis inaccurate?" "Are the conclusions unwarranted?" "Are there substantial gaps and omissions?" It will not do for him to challenge factual analysis on the basis of his own ethical or metaphysical presuppositions.

The reader deserves and has my assurance that I have not set out to prove anything. I do not seek to show, say, that man is determined, or that technique is bad, or anything else of the kind.

Two other factors may lead the reader to the feeling of pessimism. It may be that he feels a rigorous determinism is here described that leaves no room for effective individual action, or that he cannot find any solution for the problems raised in the book. These two factors must now engage our attention.

As to the rigorous determinism, I should explain that I have tried to perform a work of sociological reflection, involving analysis of large groups of people and of major trends, but not of individual actions. I do not deny the existence of individual action or of some inner sphere of freedom. I merely hold that these are not discernible at the most general level of analysis, and that the individual's acts or ideas do not *here and now* exert any influence on social, political, or economic mechanisms. By making this statement, I explicitly take a partisan position in a dispute between schools of sociology. To me the sociological does not consist of the addition and combination of individual actions. I believe that there is a collective sociological reality, which is independent of the individual. As I see it, individual decisions are always made within the framework of this sociological reality, itself pre-existent and more or less determinative. I have simply endeavored to describe technique as a sociological reality. We are dealing with collective mechanisms, with relationships among collective movements, and with modifications of political or economic structures. It should not be surprising, therefore, that no reference is made to the separate, inde-

pendent initiative of individuals. It is not possible for me to treat the individual sphere. But I do not deny that it exists. I do not maintain that the individual is more determined today than he has been in the past; rather, that he is differently determined. Primitive man, hemmed in by prohibitions, taboos, and rites, was, of course, socially determined. But it is an illusion—unfortunately very widespread—to think that because we have broken through the prohibitions, taboos, and rites that bound primitive man, we have become free. We are conditioned by something new: technological civilization. I make no reference to a past period of history in which men were allegedly free, happy, and independent. The determinisms of the past no longer concern us; they are finished and done with. If I do refer to the past, it is only to emphasize that present determinants did not exist in the past, and men did not have to grapple with them then. The men of classical antiquity could not have found a solution to our present determinisms, and it is useless to look into the works of Plato or Aristotle for an answer to the problem of freedom.

Keeping in mind that sociological mechanisms are always significant determinants—of more or less significance—for the individual, I would maintain that we have moved from one set of determinants to another. The pressure of these mechanisms is today very great; they operate in increasingly wide areas and penetrate more and more deeply into human existence. Therein lies the specifically modern problem.

This determinism has, however, another aspect. There will be a temptation to use the word *fatalism* in connection with the phenomena described in this book. The reader may be inclined to say that, if everything happens as stated in the book, man is entirely helpless—helpless either to preserve his personal freedom or to change the course of events. Once again, I think the question is badly put. I would reverse the terms and say: if man—if each one of us—abdicates his responsibilities with regard to values; if each of us limits himself to leading a trivial existence in a technological civilization, with greater adaptation and increasing success as his sole objectives; if we do not even consider the possibility of making a stand against these determinants, then everything *will* happen as I have described it, and the determinants *will* be transformed into inevitabilities. But, in describing sociological currents, I obviously

cannot take into account the contingent decisions of this or that individual, even if these decisions could modify the course of social development. For these decisions are not visible, and if they are truly personal, they cannot be foreseen. I have tried to describe the technical phenomenon as it exists at present and to indicate its *probable* evolution. Fatalism is not involved; it is rather a question of probability, and I have indicated what I think to be its most likely development.

What is the basis for this most likely eventuality? I would say that it lies in social, economic, and political phenomena, and in certain chains of events and sequences. If we may not speak of laws, we may, at any rate, speak of repetitions. If we may not speak of mechanisms in the strict sense of the word, we may speak of interdependencies. There is a certain logic (though not a formal logic) in economic phenomena which makes certain forecasts possible. This is true of sociology and, to a lesser degree, of politics. There is a certain logic in the evolution of institutions which is easily discernible. It is possible, without resorting to imagination or science fiction, to describe the path that a social body or institutional complex will follow. An extrapolation is perfectly proper and scientific when it is made with care. Such an extrapolation is what we have attempted. But it never represents more than a probability, and may be proved false by events.

External factors could change the course of history. The probable development I describe might be forestalled by the emergence of new phenomena. I give three examples—widely different, and deliberately so—of possible disturbing phenomena:

1) If a general war breaks out, and if there are any survivors, the destruction will be so enormous, and the conditions of survival so different, that a technological society will no longer exist.

2) If an increasing number of people become fully aware of the threat the technological world poses to man's personal and spiritual life, and if they determine to assert their freedom by upsetting the course of this evolution, my forecast will be invalidated.

3) If God decides to intervene, man's freedom may be saved by a change in the direction of history or in the nature of man.

But in sociological analysis these possibilities cannot be considered. The last two lie outside the field of sociology, and confront us with an upheaval so vast that its consequences cannot be as-

sessed. But *sociological* analysis does not permit consideration of these possibilities. In addition, the first two possibilities offer no analyzable fact on which to base any attempt at projection. They have no place in an inquiry into facts; I cannot deny that they may occur, but I cannot take them rationally into account. I am in the position of a physician who must diagnose a disease and guess its probable course, but who recognizes that God may work a miracle, that the patient may have an unexpected constitutional reaction, or that the patient—suffering from tuberculosis—may die unexpectedly of a heart attack. The reader must always keep in mind the implicit presupposition that *if* man does not pull himself together and assert himself (or if some other unpredictable but decisive phenomenon does not intervene), *then* things will go the way I describe.

The reader may be pessimistic on yet another score. In this study no solution is put forward to the problems raised. Questions are asked, but not answered. I have indeed deliberately refrained from providing solutions. One reason is that the solutions would necessarily be theoretical and abstract, since they are nowhere apparent in existing facts. I do not say that no solutions will be found; I merely aver that in the present social situation there is not even a beginning of a solution, no breach in the system of technical necessity. Any solutions I might propose would be idealistic and fanciful. In a sense, it would even be dishonest to suggest solutions: the reader might think them real rather than merely literary. I am acquainted with the "solutions" offered by Emmanuel Mounier, Pierre Teilhard de Chardin, Ragnor Frisch, Jean Fourastié, Georges Friedmann, and others. Unfortunately, all these belong to the realm of fancy and have no bearing on reality. I cannot rationally consider them in analyzing the present situation.

However, I will not make a final judgment on tomorrow before it arrives. I do not presume to put chains around man. But I do insist that a distinction be made between diagnosis and treatment. Before a remedy can be found, it is first necessary to make a detailed study of the disease and the patient, to do laboratory research, and to isolate the virus. It is necessary to establish criteria that will make it possible to recognize the disease when it occurs, and to describe the patient's symptoms at each stage of his illness.

This preliminary work is indispensable for eventual discovery and application of a remedy.

By this comparison I do not mean to suggest that technique is a disease of the body social, but rather to indicate a working procedure. Technique presents man with multiple problems. As long as the first stage of analysis is incomplete, as long as the problems are not correctly stated, it is useless to proffer solutions. And, before we can pose the problems correctly, we must have an exact description of the phenomena involved. As far as I know, there is no over-all and exact description of the facts which would make it possible to formulate the problems correctly.

The existing works on the subject either are limited to a single aspect of the problem—the effect of motion pictures on the nervous system, for example—or else propose solutions without the requisite preliminary study. I offer these pages as a first effort in laying the necessary ground; much more work will have to follow before we can see what man's true response is to the challenge before him.

But this must not lead the reader to say to himself: "All right, here is some information on the problem, and other sociologists, economists, philosophers, and theologians will carry on the work, so I have simply got to wait." This will not do, for the challenge is not to scholars and university professors, but to all of us. At stake is our very life, and we shall need all the energy, inventiveness, imagination, goodness, and strength we can muster to triumph in our predicament. While waiting for the specialists to get on with their work on behalf of society, each of us, in his own life, must seek ways of resisting and transcending technological determinants. Each man must make this effort in every area of life, in his profession and in his social, religious, and family relationships.

In my conception, freedom is not an immutable fact graven in nature and on the heart of man. It is not inherent in man or in society, and it is meaningless to write it into law. The mathematical, physical, biological, sociological, and psychological sciences reveal nothing but necessities and determinisms on all sides. As a matter of fact, reality is itself a combination of determinisms, and freedom consists in overcoming and transcending these determinisms. Freedom is completely without meaning unless it is related to necessity, unless it represents victory over necessity. To say that freedom

is graven in the nature of man, is to say that man is free because he obeys his nature, or, to put it another way, because he is conditioned by his nature. This is nonsense. We must not think of the problem in terms of a choice between being determined and being free. We must look at it dialectically, and say that man is indeed determined, but that it is open to him to overcome necessity, and that this *act* is freedom. Freedom is not static but dynamic; not a vested interest, but a prize continually to be won. The moment man stops and resigns himself, he becomes subject to determinism. He is most enslaved when he thinks he is comfortably settled in freedom.

In the modern world, the most dangerous form of determinism is the technological phenomenon. It is not a question of getting rid of it, but, by an act of freedom, of transcending it. How is this to be done? I do not yet know. That is why this book is an appeal to the individual's sense of responsibility. The first step in the quest, the first act of freedom, is to become aware of the necessity. The very fact that man can see, measure, and analyze the determinisms that press on him means that he can face them and, by so doing, act as a free man. If man were to say "These are not necessities; I am free because of technique, or despite technique," this would prove that he is totally determined. However, by grasping the real nature of the technological phenomenon, and the extent to which it is robbing him of freedom, he confronts the blind mechanisms as a conscious being.

At the beginning of this foreword I stated that this book has a purpose. That purpose is to arouse the reader to an awareness of technological necessity and what it means. It is a call to the sleeper to awake.

JACQUES ELLUL

La Marierre, Pessac, Gironde, France
January 1964

Author's Preface to the French Edition

Let us, first of all, clear up certain misunderstandings that inevitably arise in any discussion of technique.

It is not the business of this book to describe the various techniques which, taken together, make up the technological society. It would take a whole library to describe the countless technical means invented by man; and such an undertaking would be of little value. Moreover, quite enough elementary works describing the various techniques are already available. I shall frequently allude to some of these techniques on the assumption that their applications or their mechanics are familiar to the reader.

I do not intend to draw up a balance sheet, positive or negative, of what has been so far accomplished by means of these techniques, or to compare their advantages and disadvantages. I shall not repeat what has so often been stated, that through technology the work week has been materially shortened, that living standards have risen, and so forth; or, on the other side of the ledger, that the worker has encountered many difficulties in adapting to the machine. Indeed, no one is capable of making a true and itemized account of the total effect of existing techniques. Only fragmentary and superficial surveys are possible.

Finally, it is not my intention to make ethical or aesthetic judgments on technique. A human being is, of course, human and not a mere photographic plate, so that his own point of view inevitably appears. But this does not preclude a deeper objectivity. The sign of it will be that worshippers of technique will no doubt find this work pessimistic and haters of technique will find it optimistic.

I have attempted simply to present, by means of a comprehensive analysis, a concrete and fundamental interpretation of technique.

That is the sole object of this book.

J. E.

1954

THE TECHNOLOGICAL SOCIETY

CHAPTER

[1]

TECHNIQUES

No social, human, or spiritual fact is so important as the fact of technique in the modern world. And yet no subject is so little understood. Let us try to set up some guideposts to situate the technical phenomenon.

Situating the Technical Phenomenon

Machines and Technique. Whenever we see the word *technology* or *technique,* we automatically think of machines. Indeed, we commonly think of our world as a world of machines. This notion—which is in fact an error—is found, for example, in the works of Oldham and Pierre Ducassé. It arises from the fact that the machine is the most obvious, massive, and impressive example of technique, and historically the first. What is called the history of technique usually amounts to no more than a history of the machine; this very formulation is an example of the habit of intellectuals of regarding forms of the present as identical with those of the past.

Technique certainly began with the machine. It is quite true that all the rest developed out of mechanics; it is quite true also that without the machine the world of technique would not exist. But

to explain the situation in this way does not at all legitimatize it. It is a mistake to continue with this confusion of terms, the more so because it leads to the idea that, because the machine is at the origin and center of the technical problem, one is dealing with the whole problem when one deals with the machine. And that is a greater mistake still. Technique has now become almost completely independent of the machine, which has lagged far behind its offspring.

It must be emphasized that, at present, technique is applied outside industrial life. The growth of its power today has no relation to the growing use of the machine. The balance seems rather to have shifted to the other side. It is the machine which is now entirely dependent upon technique, and the machine represents only a small part of technique. If we were to characterize the relations between technique and the machine today, we could say not only that the machine is the result of a certain technique, but also that its social and economic applications are made possible by other technical advances. The machine is now not even the most important aspect of technique (though it is perhaps the most spectacular); technique has taken over all of man's activities, not just his productive activity.

From another point of view, however, the machine is deeply symptomatic: it represents the ideal toward which technique strives. The machine is solely, exclusively, technique; it is pure technique, one might say. For, wherever a technical factor exists, it results, almost inevitably, in mechanization: technique transforms everything it touches into a machine.

Another relationship exists between technique and the machine, and this relationship penetrates to the very core of the problem of our civilization. It is said (and everyone agrees) that the machine has created an inhuman atmosphere. The machine, so characteristic of the nineteenth century, made an abrupt entrance into a society which, from the political, institutional, and human points of view, was not made to receive it; and man has had to put up with it as best he can. Men now live in conditions that are less than human. Consider the concentration of our great cities, the slums, the lack of space, of air, of time, the gloomy streets and the sallow lights that confuse night and day. Think of our dehumanized factories, our unsatisfied senses, our working women, our estrangement from

nature. Life in such an environment has no meaning. Consider our public transportation, in which man is less important than a parcel; our hospitals, in which he is only a number. Yet we call this progress. . . . And the noise, that monster boring into us at every hour of the night without respite.

It is useless to rail against capitalism. Capitalism did not create our world; the machine did. Painstaking studies designed to prove the contrary have buried the obvious beneath tons of print. And, if we do not wish to play the demagogue, we must point out the guilty party. "The machine is antisocial," says Lewis Mumford. "It tends, by reason of its progressive character, to the most acute forms of human exploitation." The machine took its place in a social milieu that was not made for it, and for that reason created the inhuman society in which we live. Capitalism was therefore only one aspect of the deep disorder of the nineteenth century. To restore order, it was necessary to question all the bases of that society—its social and political structures, its art and its way of life, its commercial system.

But let the machine have its head, and it topples everything that cannot support its enormous weight. Thus everything had to be reconsidered in terms of the machine. And that is precisely the role technique plays. In all fields it made an inventory of what it could use, of everything that could be brought into line with the machine. The machine could not integrate itself into nineteenth-century society; technique integrated it. Old houses that were not suited to the workers were torn down; and the new world technique required was built in their place. Technique has enough of the mechanical in its nature to enable it to cope with the machine, but it surpasses and transcends the machine because it remains in close touch with the human order. The metal monster could not go on forever torturing mankind. It found in technique a rule as hard and inflexible as itself.

Technique integrates the machine into society. It constructs the kind of world the machine needs and introduces order where the incoherent banging of machinery heaped up ruins. It clarifies, arranges, and rationalizes; it does in the domain of the abstract what the machine did in the domain of labor. It is efficient and brings efficiency to everything. Moreover, technique is sparing in the use of the machine, which has traditionally been exploited to conceal

defects of organization. "Machines sanctioned social inefficiency," says Mumford. Technique, on the other hand, leads to a more rational and less indiscriminate use of machines. It places machines exactly where they ought to be and requires of them just what they ought to do

This brings us to two contrasting forms of social growth. Henri Guitton says: "Social growth was formerly reflexive or instinctive, that is to say, unconscious. But new circumstances (the machine) now compel us to recognize a kind of social development that is rational, intelligent, and conscious. We may ask ourselves whether this is the beginning not only of the era of a spatially finite world but also of the era of a conscious world." All-embracing technique is in fact the consciousness of the mechanized world.

Technique integrates everything. It avoids shock and sensational events. Man is not adapted to a world of steel; technique adapts him to it. It changes the arrangement of this blind world so that man can be a part of it without colliding with its rough edges, without the anguish of being delivered up to the inhuman. Technique thus provides a model; it specifies attitudes that are valid once and for all. The anxiety aroused in man by the turbulence of the machine is soothed by the consoling hum of a unified society.

As long as technique was represented exclusively by the machine, it was possible to speak of "man *and* the machine." The machine remained an external object, and man (though significantly influenced by it in his professional, private, and psychic life) remained none the less independent. He was in a position to assert himself apart from the machine; he was able to adopt a position with respect to it.

But when technique enters into every area of life, including the human, it ceases to be external to man and becomes his very substance. It is no longer face to face with man but is integrated with him, and it progressively absorbs him. In this respect, technique is radically different from the machine. This transformation, so obvious in modern society, is the result of the fact that technique has become autonomous.

When I state that technique leads to mechanization, I am not referring to the simple fact of human adaptation to the machine. Of course, such a process of adaptation exists, but it is caused by the ac-

tion of the machine. What we are concerned with here, however, is a kind of mechanization in itself. If we may ascribe to the machine a superior form of "know-how," the mechanization which results from technique is the application of this higher form to *all* domains hitherto foreign to the machine; we can even say that technique is characteristic of precisely that realm in which the machine itself can play no role. It is a radical error to think of technique and machine as interchangeable; from the very beginning we must be on guard against this misconception.

Science and Technique. Almost immediately we come up against a second problem. It is true that it is another pons asinorum; one hesitates even to mention it since the question has been so often discussed. The relation between science and technique is a standard subject for graduate theses—in all the trappings of nineteenth-century experimental science. Everyone has been taught that technique is an application of science; more particularly (science being pure speculation), technique figures as the point of contact between material reality and the scientific formula. But it also appears as the practical product, the application of the formulas to practical life.

This traditional view is radically false. It takes into account only a single category of science and only a short period of time: it is true only for the physical sciences and for the nineteenth century. It is not possible therefore to base a general study on it nor, as we are attempting to do here, an up-to-date review of the situation.

A few simple remarks suffice to destroy our confidence in these views. Historically, technique preceded science; even primitive man was acquainted with certain techniques. The first techniques of Hellenistic civilization were Oriental; they were not derived from Greek science. Thus, historically speaking, the relationship between science and technique ought to be reversed.

However, technique began to develop and extend itself only after science appeared; to progress, technique had to wait for science. Bertrand Gille has rightly said, in this historical perspective: "Technique, by means of repeated experiments, posed the problems, derived general notions and the four primary elements; but it had to wait for the solutions"—which science provided.

In the present era, the most casual inspection reveals an entirely

different relationship. In every instance, it is clear that the border between technical activity and scientific activity is not at all sharply defined.

When we speak of technique in historical science, we mean a certain kind of preparatory work: textual research, reading, collation, study of monuments, criticism, and exegesis. These represent an ensemble of technical operations which aim first at interpretation and then at historical synthesis, the true work of science. Here, again, technique comes first.

Even in physics, in certain instances, technique precedes science. The best-known example is the steam engine, a pure achievement of experimental genius. The sequence of inventions and improvements of Solomon De Caus, Christian Huygens, Denes Papin, Thomas Savery, and so on, rest on practical trial and error. The scientific explanation of the various phenomena involved was to come much later, after a lapse of two centuries, and even then it was not easy to formulate. There is still no automatic link between science and technique. The relation is not that simple; there is more and more interaction between them. Today all scientific research presupposes enormous technical preparation (as, for example, in atomic research). And very often it is some simple technical modification which allows further scientific progress.

When the technical means do not exist, science does not advance. Michael Faraday was aware of the most recent discoveries concerning the constitution of matter, but was unable to formulate precise theories because techniques for the production of vacua did not yet exist. Scientific results had to await high-vacuum techniques. The medical value of penicillin was discovered in 1912 by a French physician, but he had no technical means of producing and conserving penicillin; misgivings therefore arose about the discovery and led to its eventual abandonment.

The majority of investigators in a laboratory are technicians who perform tasks far removed from what is commonly imagined to be scientific work. The research worker is no longer a solitary genius. As Robert Jungk says: "He works as a member of a team and is willing to give up his freedom of research as well as personal recognition in exchange for the assistance and equipment a great laboratory offers him. These two things are the indispensable conditions without which he cannot even dream of realizing his projects. . . ."

Pure science seems to be yielding its place to an applied science which now and again reaches a brilliant peak from which new technical research becomes possible. Conversely, certain technical modifications—in airplanes, for instance—which may seem simple and mechanical, presuppose complex scientific work. The problem of reaching supersonic velocities is one. The considered opinion of Norbert Wiener is that the younger generation of research workers in the United States consists primarily of technicians who are unable to do research at all without the help of machines, large teams of men, and enormous amounts of money.

The relation between science and technique becomes even less clear when we consider the newer fields, which have no boundaries. Where does biological technique begin and where does it end? In modern psychology and sociology, what can we call technique, since in the application of these sciences everything is technique?

But it is not application which characterizes technique, for, without technique (previous or concomitant), science has no way of existing. If we disown technique, we abandon the domain of science and enter into that of hypothesis and theory. In political economy (despite the recent efforts of economists to distinguish the boundaries between science and economic technique), we shall demonstrate that it is economic technique which forms the very substance of economic thought.

The established foundations have indeed been shaken. But the problem of these relations, in view of the enormity of the technical world and the reduction of the scientific, would seem to be an academic problem of interest only to philosophers—speculation without content. Today it is no longer the frontiers of science which are at issue, but the frontiers of man; and the technical phenomenon is much more significant with regard to the human situation than with regard to the scientific. It is no longer in reference to science that technique must be defined. We need not pursue philosophy of science here, or establish, ideally or intellectually, what may be the relations between action and science. What we must do is look about us and note certain obvious things which seem to escape the all too intelligent philosophers.

It is not a question of minimizing the importance of scientific activity, but of recognizing that in fact scientific activity has been superseded by technical activity to such a degree that we can no

longer conceive of science without its technical outcome. As Charles Camichel has observed, the two are closer than ever before. The very fact that techniques advance with great rapidity demands a corresponding scientific advance, and sets off a general acceleration.

Moreover, techniques are always put to immediate use. The interval which traditionally separates a scientific discovery and its application in everyday life has been progressively shortened. As soon as a discovery is made, a concrete application is sought. Capital becomes interested, or the state, and the discovery enters the public domain before anyone has had a chance to reckon all the consequences or to recognize its full import. The scientist might act more prudently; he might even be afraid to launch his carefully calculated laboratory findings into the world. But how can he resist the pressure of the facts? How can he resist the pressure of money? How is he to resist success, publicity, public acclaim? Or the general state of mind which makes technical application the last word? How is he to resist the desire to pursue his research? Such is the dilemma of the researcher today. Either he allows his findings to be technologically applied or he is forced to break off his research. Such is the drama of the atomic physicists who saw that only the laboratories at Los Alamos could provide them with the technical instruments necessary to the continuation of their work. The state, then, exercises a very real monopoly, and the scientist is obliged to accept its conditions. As one of the atomic scientists put it: "What keeps me here is the possibility of using for my work a special microscope which exists nowhere else" (Jungk). The scientist is no longer able to hold out: "Even science, especially the magnificent science of our own day, has become an element of technique, a mere means" (Mauss). There we have, indeed, the final word: science has become an instrument of technique.

Later, we shall consider how it has come about that scientific utilitarianism has gained such momentum from technique that a disinterested piece of research is no longer possible. It has always been necessary to have a scientific substructure, but today it is scarcely possible to effect a separation between scientific and technical research. Indeed, our omnivorous technique (and this represents in part Einstein's thought) may in the end make science sterile.

I shall often use the term *technique* in place of the more commonly used term *science,* and designate as techniques work that is usually termed scientific. This is due to the close association of technique and science which I have pointed out and which I shall discuss more fully later on.

Organization and Technique. A third element will help us formulate our problem more clearly. I have already pointed out that we must understand the term *technique* in a broader sense. But some authors, not wishing to deviate from traditional linguistic usage, prefer to keep to its current meaning and seek another term to designate the phenomena we are describing here.

According to Arnold Toynbee, history is divided into three periods, and it is on the point of passing from the technical period into the period of organization. I agree with Toynbee that mechanical technique no longer characterizes our times. However important and impressive mechanical technique remains, it is only accessory to other factors which are much more decisive, if less spectacular. I have in mind the vast amount of organization in every field, the recognition of which led James Burnham to write *The Managerial Revolution.*

But I cannot agree with Toynbee in his choice of terms or in the line he draws between the technical period and the period of organization. In his sketchy conception of technique, for which he has been severely criticized, the confusion between machine and technique remains. He has limited the realm of technique to what it was in the past, without considering what it is now.

In reality, what Toynbee calls *organization,* and Burnham calls *managerial* action, is technique applied to social, economic, or administrative life. What but technique is the "organization" defined in the following? "Organization is the process which consists in assigning appropriate tasks to individuals or to groups so as to attain, in an efficient and economic way, and by the coordination and combination of *all* their activities, the objectives agreed upon" (Sheldon). This leads to the standardization and the rationalization of economic and administrative life, as Antoine Mas has well shown. "Standardization means resolving *in advance* all the problems that might possibly impede the functioning of an organization. It is not a matter of leaving it to inspiration, ingenuity, nor even intelligence to find a solution at the moment some difficulty arises;

it is rather in some way to anticipate both the difficulty and its resolution. From then on, standardization creates *impersonality*, in the sense that organization relies more on methods and instructions than on individuals." We thus have all the marks of a technique. Organization is a technique—and Andre L. A. Vincent had good reason to write: "To approach the optimum combination of factors, or the optimum dimension is . . . to accomplish technical progress in the form of a better organization."

It will no doubt be asked: What is the point of discussing these terms, since, at bottom, you are in agreement with Toynbee? But these discussions are important: Toynbee separates centuries and phenomena which ought to remain united. He would have us believe that organization is something other than technique, that man has in a way discovered a new field of action and new methods, and that we must study organization as a new phenomenon, when it is nothing of the sort. I, on the other hand, insist on the continuity of the technical process. It is this process which is taking on a new aspect (I would say, its true aspect) and is developing on a world-wide scale.

What are the consequences? The first is that the problems created by mechanical technique will be heightened to a degree as yet incalculable, as a result of the application of technique to administration and to all spheres of life. Toynbee believes that this organization which is succeeding technique is in some way a counterbalance to it, and a remedy (and that is a comforting view of history). But it seems to me that the exact opposite is true, that this development adds to the technical problems by offering a partial solution to old problems, itself based on the very methods that created the problems in the first place. This is the age-old procedure of digging a new hole to fill up an old one.

A second consequence: If what we are witnessing is only an extension of the domain of technique, what was said above about mechanization is understandable. Toynbee writes of organization as a phenomenon whose effects cannot yet be seen. However, we can be confident that the final result will be that technique will assimilate everything to the machine; the ideal for which technique strives is the mechanization of everything it encounters. It is clear, therefore, that my opposition to Toynbee, even if it appears to be merely verbal, is significant. The technical age continues to ad-

vance and we cannot even say that we are at the peak of its expansion. In fact, some decisive conquests remain to be made—man, among others—and it is hard to see what is to prevent technique from making them. Thus, even if this is not a question of a new factor, it is at least clear now what the phenomenon involves and what it signifies.

Definitions. Once we stop identifying technique and machine, the definitions of technique we find are inadequate to the established facts. Marcel Mauss, the sociologist, understands the problem admirably, and has given various definitions of technique, some of which are excellent. Let us take one that is open to criticism and, by criticizing it, state our ideas more precisely: "Technique is a group of movements, of actions generally and mostly manual, organized, and traditional, all of which unite to reach a known end, for example, physical, chemical or organic."

This definition is perfectly valid for the sociologist who deals with the primitive. It offers, as Mauss shows, numerous advantages. For example, it eliminates from the realm of techniques questions of religion or art (magic, however, ought to be classified among techniques, as we shall see later). But these advantages apply only in a historical perspective. In the modern perspective, this definition is insufficient.

Can it be said that the technique of elaboration of an economic plan (purely a technical operation) is the result of such movements as Mauss describes? No particular motion or physical act is involved. An economic plan is purely an intellectual operation, which nevertheless is a technique.

When we consider Mauss's statement that technique is restricted to manual activity, the inadequacy of his definition is even more apparent. Today most technical operations are not manual. Whether machines are substituted for men, or technique becomes intellectual, the most important sphere in the world today (because in it lie the seeds of future development) is scarcely that of manual labor. True, manual labor is still the basis of mechanical operation, and we would do well to recall Jünger's principal argument against the illusion of technical progress. He holds that the more technique is perfected, the more it requires secondary manual labor; and, furthermore, that the volume of manual operations increases faster than the volume of mechanical operations. This

may be so, but the most important feature of techniques today is that they do not depend on manual labor but on organization and on the arrangement of machines.

I am willing to accept the term *organized*, as Mauss uses it in his definition, but I must part company with him in respect to his use of the term *traditional*. And this differentiates the technique of today from that of previous civilizations. It is true that in all civilizations technique has existed as tradition, that is, by the transmission of inherited processes that slowly ripen and are even more slowly modified; that evolve under the pressure of circumstances along with the body social; that create automatisms which become hereditary and are integrated into each new form of technique.

But how can anyone fail to see that none of this holds true today? Technique has become autonomous; it has fashioned an omnivorous world which obeys its own laws and which has renounced all tradition. Technique no longer rests on tradition, but rather on previous technical procedures; and its evolution is too rapid, too upsetting, to integrate the older traditions. This fact, which we shall study at some length later on, also explains why it is not quite true that a technique assures a result known in advance. It is true if one considers only the user: the driver of an automobile knows that he can expect to go faster when he steps on the accelerator. But even in the field of the mechanical, with the advent of the technique of servo-mechanisms,[1] this axiom does not hold true. In these cases the machine itself adapts as it operates; this very fact makes it difficult to predict the final result of its activity. This becomes clear when one considers not use but technical progress—although, at the present time, the two are closely associated. It is less and less exact to maintain that the user remains for very long in possession of a technique the results of which he can predict; constant invention ceaselessly upsets his habits.

Finally, Mauss appears to think that the goal attained is of a chemical or a physical order. But today we recognize that techniques go further. Psychoanalysis and sociology have passed into the sphere of technical application; one example of this is propa-

[1] Mechanisms which involve so-called "feedback," in which information measuring the degree to which an effector (e.g., an oil furance) is in error with respect to producing a desired value (e.g., a fixed room temperature) is "fed back" to the effector by a monitor (e.g., a thermostat). (Trans.)

ganda. Here the operation is of a moral, psychic, and spiritual character. However, that does not prevent it from being a technique. But what we are talking about is a world once given over to the pragmatic approach and now being taken over by method. We can say, therefore, that Mauss's definition, which was valid for technique until the eighteenth century, is not applicable to our times. In this respect Mauss has been the victim of his own sociological studies of primitive people, as his classification of techniques (food gathering, the making of garments, transport, etc.) clearly shows.

Further examples of inadequate definition are those supplied by Jean Fourastié and others who pursue the same line of research as he. For Fourastié, technical progress is "the growth of the volume of production obtained through a fixed quantity of raw material or human labor"—that is, technique is uniquely that which promotes this increase in yield. He then goes on to say that it is possible to analyze this theorem under three aspects. In *yield in kind,* technique is that which enables raw materials to be managed in order to obtain some predetermined product; in *financial yield,* technique is that which enables the increase in production to take place through the increase of capital investment; in *yield of human labor,* technique is that which increases the quantity of work produced by a fixed unit of human labor. In this connection we must thank Fourastié for correcting Jünger's error—Jünger opposes technical progress to economic progress because they would be, in his opinion, contradictory; Fourastié shows that, on the contrary, the two coincide. However, we must nevertheless challenge his definition of technique on the ground that it is completely arbitrary.

It is arbitrary, first of all, because it is purely economic and contemplates only economic yield. There are innumerable traditional techniques which are not based on a quest for economic yield and which have no economic character. It is precisely these which Mauss alludes to in his definition; and they still exist. Among the myriad modern techniques, there are many which have nothing to do with economic life. Take, for example, a technique of mastication based on the science of nutrition, or techniques of sport, as in the Boy Scout movement—in these cases we can see a kind of yield, but this yield has little to do with economics.

In other cases, there are economic results, but these results are

secondary and cannot be said to be characteristic. Take, for example, the modern calculating machine. The solving of equations in seventy variables, required in certain econometric research, is impossible except with an electronic calculating machine. However, it is not the economic productivity which results from the utilization of this machine by which its importance is measured.

A second criticism of Fourastié's definition is that he assigns an exclusively productive character to technique. The growth of the volume of production is an even narrower concept than yield. The techniques which have shown the greatest development are not techniques of production at all. For example, techniques in the care of human beings (surgery, psychology, and so on) have nothing to do with productivity. The most modern techniques of destruction have even less to do with productivity; the atomic and hydrogen bombs and the Germans' V1 and V2 weapons are all examples of the most powerful technical creations of man's mind. Human ingenuity and mechanical skill are today being exploited along lines which have little reference to productivity.

Nothing equals the perfection of our war machines. Warships and warplanes are vastly more perfect than their counterparts in civilian life. The organization of the army—its transport, supplies, administration—is much more precise than any civilian organization. The smallest error in the realm of war would cost countless lives and would be measured in terms of victory or defeat.

What is the yield there? Very poor, on the whole. Where is the productivity? There is none.

Vincent, in his definition, likewise refers to productivity: "Technical progress is the relative variation in world production in a given sphere between two given periods." This definition, useful of course from the economic point of view, leads him at once into a dilemma. He is obliged to distinguish technical progress from progress of technique (which corresponds to the progression of techniques in all fields) and to distinguish these two from "technical progress, properly speaking," which concerns variations in productivity. This is an inference made from natural phenomena, for, in his definition, Vincent is obliged to recognize that technical progress includes *natural* phenomena (the greater or lesser richness of an ore, of the soil, etc.) by definition the very contrary of *technique!*

These linguistic acrobatics and hairsplittings suffice to prove the inanity of such a definition, which aims at a single aspect of technical progress and includes elements which do not belong to technique. From this definition, Vincent infers that technical progress is slow. But what is true of economic productivity is not true of technical progress in general. If one considers technique shorn of one whole part, and that its most progressive, one can indeed assert that it is slow in its progress. This abstraction is even more illusory when one claims to measure technical progress. The definition proposed by Fourastié is inexact because it excludes everything which does not refer to production, and all effects which are not economic.

This tendency to reduce the technical problem to the dimensions of the technique of production is also present in the works of so enlightened a scholar as Georges Friedmann. In his introduction to the UNESCO Colloquium on technique, he appears to start out with a very broad definition. But in the second paragraph, without warning, he begins to reduce everything to the level of economic production.

What gives rise to this limitation of the problem? One factor might be a tacit optimism, a need to hold that technical progress is unconditionally valid—which leads to the selection of the most positive aspect of technical progress, as though it were its only one.

This may have guided Fourastié, but it does not seem to hold true in Friedmann's case. I believe that the reasoning behind Friedmann's way of thinking is to be found in the turn of the scientific mind. All aspects—mechanical, economic, psychological, sociological—of the techniques of production have been subjected to innumerable specialized studies; as a result, we are beginning to learn in a more precise and scientific way about the relationships between man and the industrial machine. Since the scientist must use the materials he has at hand; and since almost nothing is known about the relationship of man to the automobile, the telephone, or the radio, and absolutely nothing about the relationship of man to the *Apparat* or about the sociological effects of other aspects of technique, the scientist moves unconsciously toward the sphere of what is known scientifically, and tries to limit the whole question to that.

There is another element in this scientific attitude: only that is

knowable which is expressed (or, at least, can be expressed) in numbers. To get away from the so-called "arbitrary and subjective," to escape ethical or literary judgments (which, as everyone knows, are trivial and unfounded), the scientist must get back to numbers. What, after all, can one hope to deduce from the purely qualitative statement that the worker is fatigued? But when biochemistry makes it possible to measure fatigability numerically, it is at last possible to take account of the worker's fatigue. Then there is hope of finding a solution. However, an entire realm of effects of technique—indeed, the largest—is not reducible to numbers; and it is precisely that realm which we are investigating in this work. Yet, since what can be said about it is apparently not to be taken seriously, it is better for the scientist to shut his eyes and regard it as a realm of pseudo-problems, or simply as nonexistent. The "scientific" position frequently consists of denying the existence of whatever does not belong to current scientific method. The problem of the industrial machine, however, is a numerical one in nearly all its aspects. Hence, all of technique is unintentionally reduced to a numerical question. In the case of Vincent, this is intentional, as his definition shows: "We embrace in technical progress all kinds of progress . . . *provided* that they are treatable numerically in a reliable way."

H. D. Lasswell's definition of technique as "the ensemble of practices by which one uses available resources in order to achieve certain valued ends" also seems to follow the conventions cited above, and to embrace only industrial technique. Here it might be contested whether technique does indeed permit the realization of values. However, to judge from Lasswell's examples, he conceives the terms of his definition in an extremely broad manner. He gives a list of values and the corresponding techniques. As values, for example, he lists riches, power, well-being, affection; and as techniques, the techniques of government, production, medicine, the family, and so on. Lasswell's conception of *value* may seem somewhat strange; the term is obviously not apt. But what he has to say indicates that he gives techniques their full scope. Moreover, he makes it quite clear that it is necessary to show the effects of technique not only on inanimate objects but also on people. I am, therefore, in substantial agreement with this conception.

Technical Operation and Technical Phenomenon. With the use of these few guideposts, we can now try to formulate, if not a full definition, at least an approximate definition of technique. But we must keep this in mind: we are not concerned with the different individual techniques. Everyone practices a particular technique, and it is difficult to come to know them all. Yet in this great diversity we can find certain points in common, certain tendencies and principles shared by them all. It is clumsy to call these common features Technique with a capital T; no one would recognize his particular technique behind this terminology. Nevertheless, it takes account of a reality—the technical phenomenon—which is worldwide today.

If we recognize that the method each person employs to attain a result is in fact, his particular technique, the problem of means is raised. In fact, technique is nothing more than *means* and the *ensemble of means.* This, of course, does not lessen the importance of the problem. Our civilization is first and foremost a civilization of means; in the reality of modern life, the means, it would seem, are more important than the ends. Any other assessment of the situation is mere idealism.

Techniques considered as methods of operation present certain common characteristics and certain general tendencies, but we cannot devote ourselves exclusively to them. To do this would lead to a more specialized study than I have in mind. The technical phenomenon is much more complex than any synthesis of characteristics common to individual techniques. If we desire to come closer to a definition of technique, we must in fact differentiate between the technical operation and the technical phenomenon.

The technical operation includes every operation carried out in accordance with a certain method in order to attain a particular end. It can be as rudimentary as splintering a flint or as complicated as programming an electronic brain. In every case, it is the method which characterizes the operation. It may be more or less effective or more or less complex, but its nature is always the same. It is this which leads us to think that there is a continuity in technical operations and that only the great refinement resulting from scientific progress differentiates the modern technical operation from the primitive one.

Every operation obviously entails a certain technique, even the

gathering of fruit among primitive peoples—climbing the tree, picking the fruit as quickly and with as little effort as possible, distinguishing between the ripe and the unripe fruit, and so on. However, what characterizes technical action within a particular activity is the search for greater efficiency. Completely natural and spontaneous effort is replaced by a complex of acts designed to improve, say, the yield. It is this which prompts the creation of technical forms, starting from simple forms of activity. These technical forms are not necessarily more complicated than the spontaneous ones, but they are more efficient and better adapted.

Thus, technique creates means, but the technical operation still occurs on the same level as that of the worker who does the work. The skilled worker, like the primitive huntsman, remains a technical operator; their attitudes differ only to a small degree.

But two factors enter into the extensive field of technical operation: consciousness and judgment. This double intervention produces what I call the technical phenomenon. What characterizes this double intervention? Essentially, it takes what was previously tentative, unconscious, and spontaneous and brings it into the realm of clear, voluntary, and reasoned concepts.

When André Leroi-Gourhan tabulates the efficiency of Zulu swords and arrows in terms of the most up-to-date knowledge of weaponry, he is doing work that is obviously different from that of the swordsmith of Bechuanaland who created the form of the sword. The swordsmith's choice of form was unconscious and spontaneous; although it can now be justified by numerical calculations, such calculations had no place whatever in the technical operation he performed. But reason did, inevitably, enter into the process because man spontaneously imitates nature in his activities. Accomplishments that merely copy nature, however, have no future (for instance, the imitation of birds' wings from Icarus to Ader). Reason makes it possible to produce objects in terms of certain features, certain abstract requirements; and this in turn leads, not to the imitation of nature, but to the ways of technique.

The intervention of rational judgment in the technical operation has important consequences. Man becomes aware that it is possible to find new and different means. Reason upsets pragmatic traditions and creates new operational methods and new tools; it examines rationally the possibilities of more extensive and less rigid

experimentation. Reason in these ways multiplies technical operations to a high degree of diversity. But it also operates in the opposite direction: it considers results and takes account of the fixed end of technique—efficiency. It notes what every means devised is capable of accomplishing and selects from the various means at its disposal with a view to securing the ones that are the most efficient, the best adapted to the desired end. Thus the multiplicity of means is reduced to one: the most efficient. And here reason appears clearly in the guise of technique.

In addition, there is the intervention of consciousness. Consciousness shows clearly, and to everybody, the advantages of technique and what it can accomplish. The technician takes stock of alternative possibilities. The immediate result is that he seeks to apply the new methods in fields which traditionally had been left to chance, pragmatism, and instinct. The intervention of consciousness causes a rapid and far-flung extension of technique.

The twofold intervention of reason and consciousness in the technical world, which produces the technical phenomenon, can be described as the quest of the one best means in every field. And this "one best means" is, in fact, the technical means. It is the aggregate of these means that produces technical civilization.

The technical phenomenon is the main preoccupation of our time; in every field men seek to find the most efficient method. But our investigations have reached a limit. It is no longer the best relative means which counts, as compared to other means also in use. The choice is less and less a subjective one among several means which are potentially applicable. It is really a question of finding the best means in the absolute sense, on the basis of numerical calculation.

It is, then, the specialist who chooses the means; he is able to carry out the calculations that demonstrate the superiority of the means chosen over all others. Thus a science of means comes into being—a science of techniques, progressively elaborated.

This science extends to greatly diverse areas; it ranges from the act of shaving to the act of organizing the landing in Normandy, or to cremating thousands of deportees. Today no human activity escapes this technical imperative. There is a technique of organization (the great fact of organization described by Toynbee fits very well into this conception of the technical phenomenon), just as

there is a technique of friendship and a technique of swimming. Under the circumstances, it is easy to see how far we are from confusing technique and machine. And, if we examine the broader areas where this search for means is taking place, we find three principal subdivisions of modern technique, in addition to the mechanical (which is the most conspicuous but which I shall not discuss because it is so well known) and to the forms of intellectual technique (card indices, libraries, and so on).

1) *Economic technique* is almost entirely subordinated to production, and ranges from the organization of labor to economic planning. This technique differs from the others in its object and goal. But its problems are the same as those of all other technical activities.

2) *The technique of organization* concerns the great masses and applies not only to commercial or industrial affairs of magnitude (coming, consequently, under the jurisdiction of the economic) but also to states and to administration and police power. This organizational technique is also applied to warfare and insures the power of an army at least as much as its weapons. Everything in the legal field also depends on organizational technique.

3) *Human technique* takes various forms, ranging all the way from medicine and genetics to propaganda (pedagogical techniques, vocational guidance, publicity, etc.). Here man himself becomes the object of technique.

We observe, in the case of each of these subdivisions, that the subordinate techniques may be very different in kind and not necessarily similar one to another as techniques. They have the same goal and preoccupation, however, and are thus related. The three subdivisions show the wide extent of the technical phenomenon. In fact, nothing at all escapes technique today. There is no field where technique is not dominant—this is easy to say and is scarcely surprising. We are so habituated to machines that there seems to be nothing left to discover.

Has the fact of technique no intrinsic importance? Does it spring merely from the march of time? Or does it represent a problem peculiar to our times? Our discussion of the biology of technique will bring us face to face with this question. But first we must survey in detail the vast field which the technical phenomenon covers, in order to become fully cognizant of what it signifies.

Historical Development

Primitive Technique. It is scarcely possible to give here a history of technique in its universal aspect, as we have just defined it. We are only now beginning to know a little of the history of mechanical technique. It is enough to recall the works of André Leroi-Gourhan, Richard Lefèbvre des Nöettes, Marc Bloch, and others. But the full history of technique has yet to be written. My book is not a history. I shall speak in a historical vein only when it is necessary to the understanding of the technical problem in society today.

Technical activity is the most primitive activity of man. There is the technique of hunting, of fishing, of food gathering; and later of weapons, clothing, and building. And here we face a mystery. What is the origin of this activity? It is a phenomenon which admits of no complete explanation. By patient research, one finds areas of imitation, transitions from one technical form to another, examples of penetration. But at the core there is a closed area—the phenomenon of *invention.*

It can be shown that technique is absorbed into man's psychology and depends upon that psychology and upon what has been called technical motivation. But we have no explanation of how an activity which once did not exist came to be.

How did man come to domesticate animals, to choose certain plants to cultivate? The motivating force, we are told, was religious,[2] and the first plants were cultivated with some magical end in mind. This is likely, but how was the selection made? And how did it happen that the majority of these plants were edible? How did man come to refine metals and make bronze? Was it chance, as the legend of the discovery of Phoenician glass has it? This is obviously not the answer.

One is left with an enigma; and there is some point in emphasizing that there is here the same mysterious quality as in the appearance of life itself. Each primitive operation of man implies the bridging of such an enormous gulf between instinct and the techni-

[2] See, for example, Pierre Deffontaines's *Géographie des religions.*

cal act that a mystic aura hovers about all subsequent development. Our modern worship of technique derives from man's ancestral worship of the mysterious and marvelous character of his own handiwork.

It has not been sufficiently emphasized that technique has evolved along two distinct paths. There is the concrete technique of *homo faber*—man the maker—to which we are accustomed, and which poses the problems we have normally studied. There is also the technique, of a more or less spiritual order, which we call magic.

It may seem questionable; nevertheless, magic *is* a technique in the strictest sense of the word, as has been clearly demonstrated by Marcel Mauss. Magic developed along with other techniques as an expression of man's will to obtain certain results of a spiritual order. To attain them, man made use of an aggregate of rites, formulas, and procedures which, once established, do not vary. Strict adherence to form is one of the characteristics of magic: forms and rituals, masks which never vary, the same kind of prayer wheels, the same ingredients for mystical drugs, for formulae for divination, and so on. All these became set and were passed on: the slightest variation in word or gesture would alter the magical equilibrium.

There is a relationship between the ready-made formula and a precise result. The gods being propitiated obey such an invocation out of necessity; all the more reason that they be given no opportunity to escape compliance because the invocation is not correctly formulated. This fixity is a manifestation of the technical character of magic: when the best possible means of obtaining the desired result has been found, why change it? Every magical means, in the eyes of the person who uses it, is the most efficient one.

In the spiritual realm, magic displays all the characteristics of a technique. It is a mediator between man and "the higher powers," just as other techniques mediate between man and matter. It leads to efficacy because it subordinates the power of the gods to men, and it secures a predetermined result. It affirms human power in that it seeks to subordinate the gods to men, just as technique serves to cause nature to obey.

Magic clearly displays the characteristics of primitive technique, as Leroi-Gourhan indicates when he says that technique is a

cloak for man, a kind of cosmic vestment. In his conflict with matter, in his struggle to survive, man interposes an intermediary agency between himself and his environment, and this agency has a twofold function. It is a means of protection and defense: alone man is too weak to defend himself. It is also a means of assimilation: through technique, man is able to utilize to his profit powers that are alien or hostile. He is able to manipulate his surroundings so that they are no longer merely his surroundings but become a factor of equilibrium and of profit to him. Thus, as a result of technique, man transforms his adversaries into allies.

These characteristics of material technique correspond perfectly to the characteristics of magical technique. There, also, man is in conflict with external forces, with the world of mystery, spiritual powers, and mystical currents. But there, too, man erects a barrier around himself, for he would not know how to defend himself by his own unaided intellect. He uses any means that will serve him both for defense and for adjustment. He turns to his own profit the hostile powers, which are obliged to obey him by virtue of his magical formulas. Masson-Oursel, in a recent study, confirms this. He shows that magic is basically a "scholasticism of efficiency" which man employs as an instrument against his environment; that magic is pragmatic, yet has a precision that must be called objective; and that its efficiency is demonstrated only in certain "consecrations or disqualifications." Masson-Oursel rightly believes that magic preceded technique—in fact, that magic is the first expression of technique.

Plainly, we have had two streams of technique from the very beginning. How does it happen that we never take cognizance of the second? There are a number of reasons. We can leave aside the causes that come from modern psychology. Because we are obsessed with materialism and do not take magic seriously, it has little interest for us, and we are unaware even today, as we study technique—the techniques that relate to men—that we are drawing on the great stream of magical techniques.

But this neglect is due as well to objective causes: in relation to purely material factors, it has been demonstrated that every milieu resists imitating the techniques of another social or ethnic group. Surely, this resistance was much stronger in the realm of magical techniques. Here were all the taboos and prohibitions, the im-

mense strength of magical conservatism. Then, too, whereas material techniques are relatively distinct and independent of one another, magical techniques are rapidly elaborated into a rigid system. Everything is of a piece, everything is dependent upon everything else; consequently, nothing can be meddled with, nothing modified without threat to the whole structure of beliefs and activities. Hence, their weak expansive power and their strong power of defense against alien magical techniques.

The realm of magical practice is limited, and there is little or no diffusion. Propagation begins with "spiritualist" religions which are not bound to special magical rites. There is, then, no possibility of choice between different rival magical techniques; yet expansion and choice are decisive factors in technical progress. There is no real progress in the realm of magic; here lies its fundamental difference. There is no progress in space, no progress in time; indeed, the tendency of magic is to regress. And because magical technique is tied to one ethnic group, to one given form of civilization, it disappears completely when that group or civilization disappears.

When a civilization dies, it transmits to its heirs its material but not its spiritual apparatus. Tools, houses, and methods of manufacture live on and, more or less reincarnated, are to be met with again. There may be a temporary material regression in periods of great destruction, but the lost ground is recovered, as if a collective historical memory made possible the recovery of what had been lost several generations before. But magical techniques, rites, formulas, and sacrificial practices disappear irremediably. The new civilization will fashion its own new stock of magic, which has little in common with the old. Only a set of generalizations so broad as to mean nothing, and overhasty analogies, create the belief that magical forms are perpetuated and renewed. Indeed, they live on only in the minds of the "initiates" and not in any human or social reality.

Consequently, a magical technique that is not passed on in time or space does not follow the same evolutionary curve as material technique. There is not a progression of discoveries built one upon the other; rather, discoveries remain side by side and do not affect one another.

There is another factor in the regression of magical techniques: the problem of evidence. In material techniques, choice is relatively

simple. Since every technique is subordinate to its immediate result, it is only a question of choosing the one that produces the most satisfactory result; and, in the material domain, that result can readily be seen. That one form of axe is superior to another is a judgment not beyond a normal man (in spite of the extreme difficulty primitive man experienced when faced with such a choice). But with magical techniques the same certainty or force of evidence does not exist. Who can judge their relative efficiency? Magical efficiency is not always to be measured by a clear material result such as making rain fall, but may have to do with some purely spiritual phenomena or even with material phenomena over a long period of time. Here matters are not clear nor the choice easy; the difficulty becomes even more acute when we think about the uncertainty of the reasons for failure. Was the magical technique really inefficient? Or was the one who used it incompetent? The common reaction is to blame the magician rather than the technique, and here again we see an element of immobility in magic.

The two great streams of technique which we have traced from their beginnings evolved in completely different ways. In manual technique we observe an increase and later a multiplication of discoveries, each based on the other. In magic we see only endless new beginnings, as the fortunes of history and its own inefficiency call its procedures into question.

Explanation becomes even more difficult when we note that in the magical domain too our own era has achieved an overwhelming superiority; our magical techniques have become really effective. These techniques obviously must not be confused with religious life or anything of that kind. This is purely a social phenomenon, both in aim and in form. However, the two aspects of technique, although both are social, are sharply separated, and would seem to have interacted very little anywhere.

Greece. Technique is essentially Oriental: it was principally in the Near East that technique first developed, and it had very little in the way of scientific foundation. It was entirely directed toward practical application and was not concerned with general theories, which alone can give rise to scientific movements. This predominance of technique in the East points up an error which is found throughout Western thought: that the Oriental mind is turned

toward the mystical and has no interest in concrete action, whereas the Western mind is oriented toward "know-how" and action, and hence toward technique. In fact, the East was the cradle of all action, of all past and primitive technique in the present sense of the word, and later of spiritual and magical technique as well.

The Greeks, however, were the first to have a coherent scientific activity and to liberate scientific thought. But then a phenomenon occurred which still astonishes historians: the almost total separation of science and technique. Doubtless, this separation was less absolute than the example of Archimedes has led historians to believe. But it is certain that material needs were treated with contempt, that technical research was considered unworthy of the intellect, and that the goal of science was not application but contemplation. Plato shunned any compromise with application, even in order to forward scientific research. For him, only the most abstract possible exercise of reason was important. Archimedes went even further. True, he rationalized practice and even made "applications" to a certain degree; but his machine was to be destroyed after it had demonstrated the exactness of his numerical reckonings.

Why did the Greeks adopt this Malthusian attitude toward activity? There are two possible answers: either they were not willing or they were not able. And it is likely that both are true. Abel Rey has devoted the fifth volume of his *Science Technique* to the Greeks. According to him, Greece in her decline became "incapable of sustaining the ideal of hard, disinterested labor (the ideal of an essentially contemplative intelligence disdainful of all utility). She then fell back on the techniques of the East. She was involved in them by her own techniques, for she had none the less sought to satisfy men's vital needs, in spite of the contempt in which she held them." Confronted with technical necessity, Greece lost her inventive genius and turned to Eastern technique. She did not know, says Abel Rey, how to find the bridge between "know-how" and "know-why."

This is true for the period of decadence, the second and first centuries B.C., but it does not seem to be the case in the preceding period; in the fifth century B.C., Greece experienced rapid technical development, although later it came to an abrupt halt.

In their golden age of science, the Greeks could have deduced

the technical consequences of their scientific activity. But they did not wish to. Walter asks: "Did the Greeks, obsessed with harmony, check themselves at the very point at which inquiry ran the risk of going to excess and threatened to introduce a monstrosity into their civilization?"

This was the result of a variety of factors, most of which were of a philosophic nature. For one thing, theirs was a conception of life which scorned material needs and the improvement of practical life, discredited manual labor (because of the practice of slavery), held contemplation to be the goal of intellectual activity, refused the use of power, respected natural things. The Greeks were suspicious of technical activity because it represented an aspect of brute force and implied a want of moderation. Man, however humble his technical equipment, has from the very beginning played the role of sorcerer's apprentice in relation to the machine. This feeling on the part of the Greeks was not a reflection of a primitive man's fear in the face of something he does not understand (the explanation given today when certain persons take fright at our techniques). Rather, it was the result, perfectly mastered and perfectly measured, of a certain conception of life. It represented an apex of civilization and intelligence.

Here we find the supreme Greek virtue, ἐγράτεια (self-control). The rejection of technique was a deliberate, positive activity involving self-mastery, recognition of destiny, and the application of a given conception of life. Only the most modest techniques were permitted—those which would respond directly to material needs in such a way that these needs did not get the upper hand.

In Greece a conscious effort was made to economize on means and to reduce the sphere of influence of technique. No one sought to apply scientific thought technically, because scientific thought corresponded to a conception of life, to wisdom. The great preoccupation of the Greeks was balance, harmony and moderation; hence, they fiercely resisted the unrestrained force inherent in technique, and rejected it because of its potentialities. For these same reasons, magic had relatively little importance in Greece.

Rome. Social technique was still in its infancy. Doubtless, there had been some attempts at social organization—those of certain Pharaohs, and those of the Persian empire, were not neglibible. But such organizations could be maintained only by police power,

whereas the exact opposite is true of genuine social organization. By the very fact of its existence, coercion demonstrates the absence of political, administrative, and juridical technique; for this reason the great empires of the past are of little importance to our study. Correlatively, an army (even the army of the Chaldeans, who advanced the art of war furthest) was a fairly inorganic crew whose aim was pillage and which applied no social technique. The army of Alexander made use of genuine strategy, but this was almost exclusively military and had no sociological foundations or attributes. It was the expression not of a people but of a state—and therefore lacked the substance necessary to technique.

In Rome, however, we pass on, at one step, to the perfection of social technique, both civil and military. Everything in Roman society was related to Roman law in its multiple forms, both public and private.

To characterize the technique of this law in the period during which it flourished (from the second century B.C. to the second century A.D.), we can say first of all that it was not the fruit of abstract thought, but rather of an exact view of the concrete situation, which the Romans attempted to turn to account with the fewest possible means. This realism respected justice and acknowledged history and necessity. From this concrete, experimental view, which the Romans held consciously, their administrative and judicial technique developed. And a kind of discipline appeared: the use of a minimum of means. This discipline, which probably had its foundations in religion, is one of the secrets of the whole development. To the degree that the Roman had to respond to necessity, and at the same time not permit himself excessive luxury, it was necessary to refine every means, to bring it to perfection, to exploit it in every possible way, and to give it free rein, without shackling it with exceptions and secondary rules. No social situation developed which did not immediately find its response in organization. Nor could this response be the creation of a new means, but rather the perfection of an old means. Indeed, the proliferation of means is thought even today to denote technological weakness.

A second element in the Roman development of organization was the search for an equilibrium between the purely technical factor and the human factor. Judicial technique did not begin as a substitute for man. In Roman judicial technique there was no

question of eliminating initiative and responsibility, but rather of allowing them to operate and to assert themselves. It was not until the third century A.D. that judicial technique attempted to deal with the details of life, to regulate everything, to foresee everything, thereby leaving the individual in a state of complete inertia. But the great judicial era of Rome was one of equilibrium: the law laid down the framework and supplied the means that men could use in following their own initiative. Of course, this presupposed a civic sense corresponding to the technical conception. The equilibrium between the two was evident in the system of procedure we call bureaucracy; in it is found, with an almost disconcerting simplicity, the perfect type of procedure. And there we find that one of the conditions of technique is respect for the individual, who is not yet considered apart from society.

A third characteristic of Roman technique was that it was directed toward a precise end: the internal coherence of society. This technique was not self-justifying, it did not have as its *raison d'être* its own self-development, and it was not imposed from the outside. It was not a kind of scaffolding which held independent elements together; it sought rather to promote cohesion. The foundation of society was not the police; it was an organization which enabled society to make the least possible use of the police. A wide variety of techniques—religious, administrative, and financial—were obviously needed to execute this design, but in no case was there recourse to force. When it appeared that the state would be compelled to use force, the organizational sense of the Romans led them to abandon a given project rather than attempt to maintain it by force. Force is never economical, and Rome was economical in all things.

This social coherence was the first judicial technique the world had known. It was also the basis for the Roman military system, which was a direct expression of civil society in that it had the same respect for efficiency and economy. From it came the development of organs of transport, food supply, and so on; and the Roman conception of mass strategy and their refusal to create heroes: combat was thus reduced to its most utilitarian level.

A fourth element was continuity. The judicial technique of the Romans was constantly being readapted in accordance with a historical plan. It involved a policy of watchful waiting while circum-

stances were not propitious, at the same time making preparations for the right moment, and when that moment came, carrying out the plan decisively.

As regards material techniques, the Romans did not develop them as brilliantly. From the fourth to the first century B.C., and after the second century A.D., there was almost total stagnation—tools and armaments no longer evolved. But from the first century B.C. to the first century A.D., a technical revival took place. Practical necessity (on the economic and military levels and with regard to transport) was met by the production of animal-powered machines (forges, water wheels, pumps, plows, the screw press, cord-operated ballistic engines, etc.).

The Romans possessed a remarkable understanding of applicability. Their judicial system could be applied always and everywhere (in the Empire); it was adapted to an unfailing continuity. And these were totally new phenomena which Rome introduced. Later, Rome was allowed to drift into a technical vertigo; the end was near.

Christianity and Technique. The East: passive, fatalist, contemptuous of life and action; the West: active, conquering, turning nature to profit. These contrasts, so dear to popular sociology, are said to result from a difference in religion: Buddhism and Islam on the one hand; on the other, Christianity, which is credited with having forged the practical soul of the West.

These ideas are hardly beyond the level of the rote repetitions found even in the works of serious historians. It is not for me to examine religious doctrines in themselves or as absolute if unrealized dogma, but rather to interpret them sociologically. After all, I am not writing theology; I am writing history. And there is a world of difference between dogma and its sociological application. (I shall not touch upon the personal interpretation of religion, which concerns the relationship between the individual and God.)

This being the case, it is obvious that certain statements call for modification. For example, the assertion that as a consequence of the teachings of Mohammed, the Islamic conquests of the seventh century are evidence of passivism. This might also be said of the determined Islamic resistance to Western encroachments during the last two centuries. We attribute to Buddhist indifferentism the remarkable artistic, political, and military development in India

from the second to the fifth century. In fact, however, these civilizations were little advanced technically, though they had developed in many other areas.

Christianity in Russia, on the other hand, gave rise to a mystical civilization which was indifferent to material life and had no technical drive and no interest in economic exploitation. "Ah, yes!" is the reply. "But Christianity in Russia had Eastern overtones . . ." Here, then, indifference to technique would appear to be a question of temperament and not of religion.

Another embarrassing fact: when in her decline Greece applied herself to technical inquiry and the development of industry, she looked to the East for methods. And in the first century, when Rome—the perfect example of the technical spirit in antiquity—took up industry, she too turned to the East for industrial techniques—the refining of silver and gold, glassmaking, the tempering of weapons, pottery, ship construction, and so on. All these techniques came to Rome from the East, either early, through the Etruscans, or much later, after the conquests. We are far indeed from being able to support this traditional cleavage between East and West. In fact, during classical antiquity it was the East which possessed the concrete, inventive mind that grasps the truth and exploits it.

The West is making a prodigious advance in technique at the present, and the West is traditionally Christian. Nor can it be maintained that Christianity is a negligible factor in that advance. However, there were several distinct historical periods in the West. The West was officially Christian until the fourteenth century; thereafter, Christianity became controversial and was breached by other influences. What do we find, from a technical standpoint, in the so-called Christian era, the period from the fourth to the fourteenth centuries, the "sociological moment"? First, we observe the breakdown of Roman technique in every area—on the level of organization as well as in the construction of cities, in industry, and in transport. From the fourth to the tenth centuries, in fact, there was a complete obliteration of technique, a condition so deplored that it became a focus of anti-Christian polemic, and rightly so. It was because the Christians held judicial and other technical activity in such contempt that they were considered the "enemies of the human race"—and not only because they opposed Caesar. The re-

proach of Celsus was not without truth. After the Christian triumph in Rome, there was not one great jurist left who could guarantee the life and the value of the Roman organization. Decadence? No —complete disinterest in such activity. Saint Augustine devoted much of his *De Civitate Dei* to justifying the Christians in this respect, and to denying that their influence was detrimental. "They are good citizens," he proclaimed. That may have been so, but their focus of interest was nevertheless on something other than the state and practical activity. I shall show later on that the technical state of mind is one of the principal causes of technical progress.

It is not a coincidence that Rome declined as Christianity triumphed. The Emperor Julian was certainly justified in accusing the Christians of ruining the industry of the Empire.

After this period of decadence (for which, of course, Christianity was not solely responsible), what does the historian find? The restoration, under Christian influence, of an active civilization—methodical, exploiting the riches of the world as a gift given by God to be put to good use? Not at all. The society which developed from the tenth to the fourteenth century was vital, coherent, and unanimous; but it was characterized by a total absence of the technical will. It was "a-capitalistic" as well as "a-technical."

From the point of view of organization, it was an anarchy in the etymological sense of the word—and it was completely nontechnical. Its law was principally based on custom. It had no social or political organization based on reasoned, elaborated rules. In all other areas—for example, in agriculture and industry—there was the same nearly total absence of technique. This was also true with regard to the military, the principal activity of the time. Combat was reduced to its most elementary—to charging in a straight line and to hand-to-hand engagement. Only architectural technique developed and asserted itself; but this was prompted not by a technical state of mind but by religious impulse.

Little effort was made to improve agricultural or industrial practices. There was no effort at useful creation—evidence of the remarkable practical genius of the Christian religion! And when at the beginning of the twelfth century, at first very feebly a technical movement began to take form, it developed under the influence of the East.

The technical impetus of our civilization came from the East, at first through the intermediacy of the Judaei[3] and the Venetians, and later through the Crusades. But even so, it limited itself to imitating what it had seen—except in art. Certain autonomous discoveries did take place, especially as a result of commercial necessity; but this development was no more intense than it had been under the Roman Empire.

In fact, the Middle Ages created only one new, complete technique, an intellectual technique, a mode of reasoning: scholasticism. The very name evokes its mediocrity. With its gigantic apparatus, it was in the end nothing but an extremely cumbersome formalism; it wandered for centuries in intellectual blind alleys, notwithstanding the prodigious intellects of the men who used it and were deformed by it. The balance sheet shows no triumphs, even on the historical plane.

The technical movement of the West developed in a world which had already withdrawn from the dominant influence of Christianity. A point can doubtless be made of the effects of the Reformation, but the economic consequences of this movement have been singularly exaggerated. In any case, this is not the place to take up this question.

Although, practically speaking, it seems clear that Christianity was scarcely an important cause of technical progress (not to mention regression), it is nevertheless customary to hold that Christianity, from the theological point of view, paved the way for technical development.

Let us consider the two arguments advanced for this point of view. First, and most important, it is held that Christianity suppressed slavery, the great obstacle to technical development. The moment men are free, they supposedly turn toward technique to be delivered from the misery of labor. Slavery was thus a hindrance to technique because no attempt was made either to relieve the miserable condition of the slave or to replace him by some other motive force. The second argument is more intelligent: that antiquity was possessed of a holy fear of nature, and dared not lay hand on the secrets which to the ancients were gods. They dared not make use of natural forces, which for them were supernatural.

[3] A particular kind of trader. (Trans.)

Christianity secularized nature: with Christianity nature once again became simply nature and no one scrupled to exploit it. Unfortunately, however, neither of these arguments is quite accurate.

There was in fact greater technical progress in civilizations where slavery was prevalent (for example, Egypt) than in others where that institution was practically unknown (for example, Israel). There was greater technical progress in the slaveholding period of Roman history than in the period when slaves were freed wholesale. And the liberation of the slaves during the era of the barbarian invasions produced no technical improvement, even at long term; almost seven centuries elapsed between the suppression of slavery and the beginning of even a feeble technical advance. The relation between technique and the absence of slavery is in no sense absolute; as Bertrand Gille has rightly pointed out, human transport by means of slaves was not known in Roman antiquity; yet the harnessing of animals had not been developed.

We have here one of those facile, impressive, and altogether antihistorical explanations which theorists are so fond of. The slave, in fact, represented capital which it was not in the owner's interest to lose or to use haphazardly. And, as the elder Cato indicates, had it been possible to make the slave's labor more efficient and less fatiguing, his master had every interest in doing so. Moreover, it did not cost anything to make use of the free men who lived on the vast domains of the public treasury or the *limes* or the Marches,[4] and later, on the ecclesiastical and seignorial lands. Certainly, it was not respect for human life which prompted the Romans to spare these people. And the people themselves scarcely possessed the freedom of mind or the material possibilities to improve their techniques. Gille has shown admirably that in Athens the Greek slaves may have had greater value than the free workmen.

The second argument is no more applicable. It is true that Christianity secularized nature. But did this benefit technique? We have noted, in passing, the religious origin of many forms of technique; indeed, nature, as the theater of spiritual forces, gives rise to one particular technique already mentioned: magic. One of the

[4] The *limes* designated the Empire's boundary regions to the north; the Marches, the Scottish and Welsh border areas. (Trans.)

goals of magic is to render the gods propitious to practical action and to put the "powers" at the service of material technique. The representation of nature as inhabited by the gods was itself a potent act, and favorable, if not to all applications, certainly to technique itself. Taboos applied only to certain concrete applications which were determined by ideas of right and wrong. Man thus felt that his actions were justified by the help given him by the gods of nature. Christianity, however, deprived him of this justification.

What was the doctrinal position of early Christianity regarding practical activity, from the very beginning? On the moral plane, Christianity condemned luxury and money—in short, everything that represented the earthly city, which was consecrated to Satan and opposed to the City of God. This was the era of the anchorite, of the renunciation of city life, of cenobitism presented as an ideal. The tendency was toward the restriction of economic life. On the theological plane, there was the conviction that the world was approaching its end, that it was useless to strive to develop or cultivate it, for the Lord was soon to return. It was wiser to be concerned with eschatology than with worldly affairs.

At the beginning of the medieval period, these doctrines lost some of their hold (although they persisted under other guises—the feeling about death, for instance). But another element of Christianity remained which was opposed to technical development: the moral judgment which Christians passed on all human activities.

Technical activity did not escape Christian moral judgment. The question "Is it righteous?" was asked of every attempt to change modes of production or of organization. That something might be useful or profitable to men did not make it right and just. It had to fit a precise conception of justice before God. When an element of technique appeared to be righteous from *every* point of view, it was adopted, but even then with excessive caution. Only inventions (representing a choice among techniques made by individuals versed in Greek or Latin) judged worthy were applied or even allowed to become known. It was within this narrow compass that certain monks propagated and improved technical instruments. The spread of the hydraulic mill by the Cistercians is well known; likewise the many specialized mills to be found at the

Abbey of Royaumont (the smith's mill, the fuller's mill, etc.). But these exceptions were few.

The search for justice before God, the measuring of technique by other criteria than those of technique itself—these were the great obstacles that Christianity opposed to technical progress. They operated in the Middle Ages in all areas of life, and made history coincide with theology.

The age of the Reformation, in its effort to return to the most primitive conception of Christianity, broke down many barriers. But, even then, it was not so much from the influence of the new theology as from the shock of the Renaissance, from humanism and the authoritarian state, that technique received a decisive impetus.

The Sixteenth Century. In the period from the sixteenth to the eighteenth century the absence of technique in all areas but the mechanical is striking. There was an absence of human reasoning concerning action, of efforts directed toward simplification and systematization, and of concern for efficiency. Certain important technical achievements were made—for example, guns and gun factories—and there was some agricultural research. But it is significant that histories of technique (Pierre Ducassé's, for example) leap from the Middle Ages to the end of the eighteenth century. Indeed, the period which followed the Renaissance and the Reformation was much less fertile in invention than the period which had preceded them.

Printing, the nautical compass, gunpowder (also copied from the East), all date from the fifteenth century. It would not do to minimize the importance of these inventions. For Norbert Wiener, they "constitute the locus of an industrial revolution which preceded the principal industrial revolution." Wiener, in a remarkable way, relates the principal inventions of this period to navigation, which, he proposes, was the propulsive force behind research. Alongside these major inventions, this period also saw a multitude of discoveries and new applications in banking, armaments, machinery, architecture (for example, the discovery of a new system for constructing the dome, as applied to Sainte-Marie-des-Fleurs), and in agriculture and the making of furniture.

The fifteenth century, in addition, is notable for a number of technical manuals from southern Germany and northern Italy

(written at the beginning of the century and printed and circulated at the end of it). These show a general interest in these problems, a technical preoccupation on the part of the men of the times. The great voyages were probably a consequence rather than a cause of this technical progress.

But this technical drive slackened during the sixteenth century, which became poorer and poorer in technique, and technical weakness persisted through the seventeenth century and into the beginning of the eighteenth. This poverty of technical achievement, which lasted two centuries, leads us once more to question the influence of the Reformation. What caused this slowdown of technical progress after the fifteenth century, which had been so rich in discoveries of all kinds?

An uninitiated reader who opens a scientific treatise on law, economy, medicine, or history published between the sixteenth and the eighteenth centuries is struck most forcibly by the complete absence of logical order. The materials are treated successively without any connection, progression of thought, development, or show of proof. The reader is apparently to be guided only by the author's fancy. Every chapter in a scientific work, say, of the sixteenth century, is a self-contained unit which justifies and proves itself. A mere affirmation by the author generally serves as proof. And he lets himself go in a free association of ideas which are in no way pertinent to the subject; his thoughts often wend off to matters completely unconnected with the subject of the book.

Purely personal reflection and private experience form the foundations of these books; in no sense do they represent an effort at common inquiry, reciprocal control, or search for the best method, all of which are indispensable for technique. The plan of a book was not laid out with the reader in mind; it was not based on subject matter, but rather on the personal fancy of the author, or on more obscure reasonings. Even men of powerful intellect such as Jean Bodin did not escape these failings.

A second characteristic of this scientific literature is that it attempts to set down in one book the whole realm of knowledge. It is not rare to find, in works on law in the sixteenth or seventeenth centuries, extended treatments of archaeology, theology, psychology, and linguistics, not to mention history and literature. Entire chapters concerned with magical practices or Peruvian soci-

ology may interrupt the course of a book devoted to revenues or to the jurisprudence of the Parliament of Bordeaux.

This amalgam of reflections and miscellaneous bits of knowledge is found in the works of the best authors; it demonstrates the absence of intellectual specialization. The intellectual ideal was universality, and it was a rare thing for a judge, say, to be ignorant of alchemy, or a historian, of medicine. This was, in effect, an extension by humanism of the universalism to which medieval theology aspired.

In the sixteenth and seventeenth centuries every intellectual had perforce to be a universalist. He had to have complete knowledge, and when he wrote on a given subject he felt constrained to put into the work everything he knew, pertinent or not. This was by no means a sign of muddleheadedness but rather of the prevailing search for a synthesized, universal system of knowledge. Every author sought to put his whole self into his work, even in the case of a technical book. Not the subject but the author dominated the work: this tendency itself is contrary to technical inquiry. The search was not for practical knowledge but for a comprehensive explication of phenomena. Thus Descartes, after having established an impeccable method of reasoning, gives himself over to the outpourings of his imagination in order to explain—to take a single example—the movements of the tides.

This explains another characteristic of the books written after the century of humanism: their lack of convenience. We find few tables of contents, no references, no division into sections, no indices, no chronology, sometimes not even pagination. The apparatus standard for scientific works today is not found even rudimentarily in the most perfect works of the period; and its absence is characteristic of the absence of intellectual technique. The books of the time were not written to be used, along with hundreds of others, to locate a piece of information accurately and quickly, or to validate or invalidate an experiment, or to furnish a formula. They were not written to be consulted. They were written to be read patiently in their entirety and to be meditated upon. Again, this goes back to the ideal of universality.

The presentation of a book as an author's entire self, as a personal expression of his very being, supposes that the reader sought in it not the solution of a given difficulty or the answer to a given

problem, but rather to make personal contact with the author. It was more a question of a personal exchange than of taking an objective position.

This applies to every other field of endeavor until the eighteenth century. Thus, in the simplest technical form, the mechanical, no decisive progress was made during this time (unless Pascal were to be considered the sole exception; but even Pascal merely extended already known techniques). The same holds true for financial, administrative, and military techniques, in spite of what Vauban says to the contrary.

Then an intermediate situation developed. But despite the efforts at co-ordination and systematization made by such great technicians as Richelieu and Colbert, the only result was a greater complication of the system, without much gain in efficiency. On the administrative and political level, all the new organs (each valuable in itself and without doubt efficient, but representing only an addition to what already existed) had to take into consideration every other organ already functioning in the same field. New complicated departments, jurisdictions, and hierarchies unceasingly weighed down the machinery. On the financial plane, the same monstrous growth occurred—for valid reasons—but it resulted in enfeeblement beneath a seeming efficiency. There was no change in financial technique, in spite of all the efforts of Colbert, who saw what should be done. There was no change in the technique of recruitment, supply, and administration of the army, in spite of the efforts of Louvois, who saw just as clearly what had to be done. Louis XIV was an impotent monarch, despite his authority, because of the absence of technical means.

Society was at a crossroads. More and more the need was felt to create new means; even the structure these must take was clearly perceived. But the framework of society, the ideas in currency, the intellectual positions of the day were not favorable to their realization. It was necessary to employ technical means in a framework foreign to them; these techniques were powerless to force a decision or to eliminate outmoded means. They ran up against the profound humanism, issue of Renaissance humanism, which still haunted the seventeenth century—it believed not only in knowledge and respect for the human being but in the genuine supremacy of man over means. This humanism, bound up with the

idea of universalism, did not allow techniques to grow. Men refused to conform to any uniform law, even when it operated for their own good. This refusal was found in all strata of society: in the most complex way when finance directors and parliamentary counselors refused to utilize new and precise techniques of accounting and legislative supremacy; in the most summary way when the peasants rejected new and rational methods of recruitment proposed for the army.

The world had to wait for the eighteenth century to see technical progress suddenly explode in every country and in every area of human endeavor.

The Industrial Revolution. The term industrial revolution is applied exclusively to the development of machinery, but that is to see only one side of it. In actual fact, the industrial revolution was merely one aspect of the technical revolution. It is preposterous that a specialist such as Lewis Mumford can write that he has found in the various modes of exploiting energy the key to the evolution of technique and the moving force behind its transformations. In his view, a first period, which lasted until about 1750, knew only hydraulic energy; a second period, from 1750 to 1880, is the age of coal; and a third, that of electricity. (The use of nuclear energy has only recently appeared; it is perhaps to be reckoned as part of the age of electricity.)

Mumford's thesis is incomprehensible unless *technique* is restricted to the *machine;* Mumford actually makes this identification. His distinction is then valid as a plan for the historical study of machines, but it is totally invalid for the study of technical civilization. When technical civilization is considered as a whole, this classification and explanation are shockingly summary and superficial. Norbert Wiener likewise rejects the classification founded on the different sources of energy. For him there has been only one industrial revolution, and that consisted in the replacement of human muscle as a source of energy. And, he adds, there is a second revolution in the making whose object is the replacement of the human brain. Of this last we have as yet only preparations and indications. We are not yet there. What we are witnessing at the moment is a rearrangement of the world in an intermediate stage; the change is not in the use of a natural force but in the application of technique to all spheres of life.

The technical revolution meant the emergence of a state that was truly conscious of itself and was autonomous in relation to anything that did not serve its interests—a product of the French Revolution. It entailed the creation of a precise military technique (Frederick the Great and Napoleon) in the field of strategy and in the fields of organization, logistics, and recruitment; the beginning of economic technique with the physiocrats, and later the liberals. In administration and police power, it was the period of rationalized systems, unified hierarchies, card indices, and regular reports. With Napoleon particularly, there was a tendency toward mechanization which resulted from the application of technique to more or less human spheres of action.

The revolution also entailed the exertion and the regrouping of all the national energies. There were to be no more loafers (under the French Revolution, they were imprisoned), no more privileged persons, no special interests. Everyone must serve in accordance with the strictures of technique.

From the judicial point of view, the technical revolution entailed the great systematization of law in the Napoleonic codes and the definitive suppression of spontaneous sources of law; for example, custom. It involved the unification of legal institutions under the iron rule of the state and the submission of law to policy. And throughout Europe, except in Great Britain, the nations, amazed by such an efficient operation, abandoned their traditional judicial systems in favor of the state.

This systematization, unification, and clarification was applied to everything—it resulted not only in the establishment of budgetary rules and in fiscal organization, but in the systematization of weights and measures and the planning of roads. All this represented technique at work. From this point of view, it might be said that technique is the translation into action of man's concern to master things by means of reason, to account for what is subconscious, make quantitative what is qualitative, make clear and precise the outlines of nature, take hold of chaos and put order into it.

In intellectual activity the same effort was evident, particularly in the creation of an intellectual technique for history and biology. The principles established by Descartes were applied and resulted not only in a philosophy but in an intellectual technique.

These phenomena are so far from being sources of energy that it

can scarcely be maintained that mechanical transformation brought about all the rest. In fact, the widespread mechanical development, spurred by the exploitation of energy, came *after* most of these other techniques. It would almost seem that the order was reversed, that the appearance of these other techniques was necessary to the evolution of the machine—which certainly had no greater influence on society than, say, the organization of the police.

The revolution resulted not from the exploitation of coal but rather from a change of attitude on the part of the whole civilization. Here we are faced with a most difficult question: Why, after such slow progress for centuries, did such an eruption of technical progress take place in a century and a half? Why, at a certain moment in history, did something become possible which had not seemed possible before? We must confess that the ultimate reason escapes us. Why did inventions suddenly burst forth in the second half of the eighteenth century? We cannot say. Here we are at the center of the mystery of invention, which strangely came to life for this brief moment.

The inventions of the nineteenth century are much more easily explained. A kind of chain reaction was set up: the discoveries made at the beginning of the century generated those that followed. There was a logical and foreseeable succession of events, once the first steps had been taken.

But why were the first steps taken? We will never know, and, in any case, that is not the purpose of this investigation. We ask rather why technical inventions have proliferated so radically and developed to the point where they threaten to engulf society. Why did the limitless applicability of the sciences become a reality when hitherto it had been restrained and equivocal? The Greeks knew that machines could be utilized; why did it devolve upon the nineteenth century to utilize them? The question, indeed, is why the nineteenth century not only made applications but did so on such a grand scale. Leonardo da Vinci invented a prodigious number of useful devices (the alarm clock, the silk-winder, a machine for carding textile fabrics, and so on), and proposed many technical improvements (double-hulled ships, the universal joint, conical gears, etc.). Why did none of his inventions and improvements find practical application?

There are a number of general answers. One can relate everything to scientific progress, for example. The eighteenth and nineteenth centuries saw advances in application, not in pure knowledge or in speculation. It is useless to recount the scientific evolution of this period or to enumerate the sensational series of principles and laws formulated and applied at this time. Parenthetically, it might be noted that the scientific revolution began as early as the first half of the seventeenth century. Experiments were then performed to prove the exactness of quantitative hypotheses. Moreover, a psychological transformation occurred which led to the consideration of phenomena as worthy of study in themselves. This prepared the way for technical progress, but it cannot explain it. These scientific discoveries represent necessary conditions—but not imperatives. It is evident that applications are impossible without principles, but, once principles have been established, applications do not necessarily follow. Applications may be made out of simple curiosity, as among the Greeks or among the makers of automatons in the eighteenth century. (These automatons were not without experimental value. Research in cybernetics today likewise ends in the making of automatons.)

The close link between scientific research and technical invention appears to be a new factor in the nineteenth century. According to Mumford, "the principal initiatives came, not from the inventor-engineer, but from the scientist who established the general law." The scientist took cognizance both of the new raw materials which were available and of the new human needs which had to be met. Then he deliberately oriented his research toward a scientific discovery that could be applied technically. And he did this either out of simple curiosity or because of definite commercial and industrial demands. Pasteur, for instance, was encouraged in his bacteriological research by wine producers and silkworm growers.

In the twentieth century, this relationship between scientific research and technical invention resulted in the enslavement of science to technique. In the nineteenth century, however, science was still the determining cause of technical progress. The society of the eighteenth century was not yet mature enough to allow the *systematic* development of inventions. As Siegfried Giedion says, the France of that period was a testing ground. Ideas proliferated but

could take no final form until society had undergone a transformation.

What distinguishes the eighteenth century is that applications were made for reasons of utility; soon the only justification of science was applicability. Most historians of technique content themselves with invoking philosophy to explain this.

The philosophy of the eighteenth century did indeed favor technical applications. It was naturalistic and sought not only to know but also to exploit nature. It was utilitarian and pragmatic. It concerned itself with easing human life, with bringing more pleasure into it and simplifying its labor. For the eighteenth century, man's life was narrowly confined to the material; it seemed evident that the problem of life would be resolved when men were able to work less while consuming more. The goal of science thus appeared to be fixed by philosophy.

This philosophy was concrete; it was bound up with material results. What cannot be seen cannot be judged, and this explains this century's judgment of history: that the foundation of civilizations is technique, not philosophy or religion.

For these admirable philosophers, technique had the enormous superiority of manifesting itself in a concrete way and of leaving its tracks for all to read. Voltaire and Diderot were its principal exponents. But I am unable to give this philosophy the highest place in the history of the development of techniques. It played a role, but it was not the prime force behind the technical movement. To say it was would be to exaggerate the force of these philosophic ideas and systems, which affected only a small minority of Frenchmen and a minute elite abroad. The technical movement was a *European* movement; the ideas of these philosophic minorities could scarcely have penetrated Europe in such a way as to make evident to everyone the excellence of technical progress. We have only to recall popular reactions to machinery—for example, to Vaucanson's loom, to the first steamboat, and to the first blast furnaces. These philosophic ideas scarcely suffice to explain the remarkable mobilization of all human forces in the nineteenth century.

It is even questionable whether this philosophy was universally accepted. At other times there have been utilitarian currents in philosophy, but they represented only one branch of philosophy

among several and did not lead to such a radical transformation of society.

The optimistic atmosphere of the eighteenth century, more than this philosophy, created a climate favorable to the rise of technical applications. The fear of evil diminished. There was an improvement in manners; a softening of the conditions of war; an increasing sense of man's responsibility for his fellows; a certain delight in life, which was greatly increased by the improvement of living conditions in nearly all classes except the artisan; the building of fine houses in great numbers. All these helped persuade Europeans that progress could only be achieved by the exploitation of natural resources and the application of scientific discoveries.

This state of mind created, in the second half of the eighteenth century, a kind of good conscience on the part of scientists who devoted their research to practical objectives. They believed that happiness and justice would result from their investigations; and it is here that the myth of progress had its beginning.

It is clear that this atmosphere was favorable to technical development. But, in itself, it was not enough. How, then, are we to explain the sudden blossoming of technique in the nineteenth century? (The eighteenth century was only the preliminary phase of technical application; the nineteenth century is the really interesting period.) I feel that this transformation of civilization can be explained by the conjunction in time of five phenomena: the fruition of a long technical experience; population expansion; the suitability of the economic environment; the plasticity of the social milieu; and the appearance of a clear technical intention.

The first of these factors must not be neglected: every modern technical application had ancestors. Arthur Vierendeel and Lewis Mumford have analyzed these preparations. Every invention has its roots in a preceding technical period, and every period bears in itself "not only the trivial residue but also the valuable survivals of past technologies, and the nuclei of new ones." What appears to be genuinely new is the formation of a "technical complex," which, according to Mumford, consists of a series of partial inventions that combine into an ensemble. This unit begins to function when the greatest number of its constituents have been assembled, and its trend is toward continuous self-perfection. From 1000 to about 1750, there had been a slow fermentation which had no immediate

consequences but which had amassed materials in every area of life. They had only to be drawn on for the technical miracle to take place. This continuity has been analyzed by Vierendeel in particular; and Wiener emphasizes it when he writes: "It is interesting to reflect on the fact that every tool possesses a genealogy and is the result of the tools which served to make it." This enormous sum of experiments, of apparatus, of inquiries was put to use abruptly at the end of an evolutionary period which had lasted for nearly ten centuries without social catastrophe. Continuity of this kind was important because it made unnecessary the transmission of the technical legacy from one civilization to another, an operation which inevitably involves the loss of a part of it, especially a part of the social forces that apply to nontechnical areas. This continuity is found in all fields of technique, from finance to transport. If technical progress does not appear at a given moment, it is only because the social milieu is not completely favorable. But it is ripening underground; it is self-perpetuating even while it is dormant, as in the seventeenth century. This long preparation was necessary as support and foundation for the structure the nineteenth century was to build; it represented what Charles Morazé in his *Essai sur la civilisation d'Occident* calls "collective incubation." This incubation, consisting of millions of accumulated experiments, was the preparation for the moment of formulation, of expression.

A second factor was equally necessary: the population expansion. Here again we find ourselves face to face with a familiar problem. For two decades population studies in relation to the development of civilization have demonstrated that there is a close link between technique and population: the growth of population entails a growth of needs which cannot be satisfied except by technical development. From another viewpoint, a population expansion offers favorable grounds for research and technical growth by furnishing not only the necessary market but also the requisite human material.

The third condition has been analyzed by Vincent. If technical progress is to take place, the economic milieu must combine two apparently contradictory traits: it must be at once stable and in flux. The foundations of economic life must be stable so that primary technical research can be devoted to well-defined objects

and situations. But at the same time this milieu must be capable of great change, so that technical inventions can be absorbed into the economy, and research stimulated. A rigid economy brings with it fixed customs which stifle the inventive faculty. Studies of the economic situation in the second half of the eighteenth century show that it had precisely these two opposed characteristics. But this is well known. I shall do no more than point it out and shall devote greater space to the last two conditions, which are usually neglected.

The fourth condition is possibly the most decisive. It is the plasticity of the social milieu, which involves two factors: the disappearance of social taboos and the disappearance of natural social groups.

The first of these appears in various forms, depending on the society involved. In the Western civilization of the eighteenth century there are two large categories: the taboos resulting from Christianity, and sociological taboos. The first category takes in all religious and moral ideas, judgments concerning action, the prevailing conception of man, and the ends proposed for human life. These were, theoretically and factually, opposed to technical development. When faith had been translated into prejudice and ideology, and personal religious experience incorporated into a social institution, a hardening of moral positions took place which corresponded to the creation of genuine taboos. The natural order must not be tampered with and anything new must be submitted to a moral judgment—which meant an unfavorable prejudgment. This was the popular mentality created by Christianity, particularly during the seventeenth century. Closely related to these were sociological taboos, in particular the conviction that a natural hierarchy exists which nothing can modify. The position of the nobility and the clergy, and above all of the king, could not be questioned. When in the middle of the eighteenth century these began to be questioned, the reaction of the people was that sacrilege was being committed; the stupor that accompanied the execution of Louis XVI was a religious stupor. In fact, regicide was seen as deicide. This constitution of society, which everyone relied on and recognized as the only one possible, was an obstacle to technique within it; technique was held to be fundamentally sacrilegious. The natural hierarchy operated against the practice of the mechani-

cal arts, which would only bring conveniences to the lower classes. And since the lower classes too believed in the natural hierarchy, they could only be submissive and passive; they did not try to better their lot. The important point here was not the reality of the facts or the existence of the hierarchy; it was belief in its natural and sacred character which stood in the way of technique.

The very structure of society—based on natural groups—was also an obstacle. Families were closely organized. The guilds and the groups formed by collective interests (for example, the University, the Parliament, the Confraternities and Hospitals) were distinct and independent. The individual found livelihood, patronage, security, and intellectual and moral satisfactions in collectives that were strong enough to answer all his needs but limited enough not to make him feel submerged or lost. They sufficed to satisfy the average man who does not try to gratify imaginary needs if his position is fairly stable, who opposes innovation if he lives in a balanced milieu, even though he is poor. This fact, which is so salient in the three millennia of history we know, is misunderstood by modern man, who does not know what a balanced social environment is and the good he could derive from it.

Man himself may feel less need to improve his condition. In addition, the very existence of natural groups is an obstacle to the propagation of technical invention. For primitive peoples, invention spreads in certain geographical areas within certain groups according to existing social bonds. Exterior diffusion, however, the crossing of a sociological frontier, is extremely difficult. This phenomenon exists in every society. Division into closely constituted groups is an obstacle to the propagation of inventions. The same holds for guilds. Guilds act not only spontaneously and as sociological units, but also voluntarily and according to the lawful constitution of each. This is also true of religious groups. Consider, for example, the manufacturing secrets jealously guarded by the French Protestants in the seventeenth century. The diffusion of every technique tends to be checked by these social divisions.

These obstacles disappeared at the time of the French Revolution, in 1789. With the disappearance of religious and social taboos came the creation of new religions, the affirmation of philosophic materialism, the suppression of the various hierarchies, regicide, and the struggle against the clergy. These factors acted powerfully

upon the popular consciousness and contributed to the collapse of the belief in these taboos.

At the same time (and this is the second factor which made for the plasticity of the social milieu) a systematic campaign was waged against all natural groups, under the guise of a defense of the rights of the individual; for example, the guilds, the communes, and federalism were attacked, this last by the Girondists. There were movements against the religious orders and against the privileges of Parliament, the Universities, and the Hospitalers. There was to be no liberty of groups, only that of the individual. There was likewise a struggle to undermine the family. Revolutionary legislation promoted its disintegration; it had already been shaken by the philosophy and the fervors of the eighteenth century. Revolutionary laws governing divorce, inheritance, and paternal authority were disastrous for the family unit, to the benefit of the individual. And these effects were permanent, in spite of temporary setbacks. Society was already atomized and would be atomized more and more. The individual remained the sole sociological unit, but, far from assuring him freedom, this fact provoked the worst kind of slavery.

The atomization we have been discussing conferred on society the greatest possible plasticity—a decisive condition for technique. The breakup of social groups engendered the enormous displacement of people at the beginning of the nineteenth century and resulted in the concentration of population demanded by modern technique. To uproot men from their surroundings, from the rural districts and from family and friends, in order to crowd them into cities still too small for them; to squeeze thousands into unfit lodgings and unhealthy places of work; to create a whole new environment within the framework of a new human condition (it is too often overlooked that the proletariat is the creation of the industrial machine)—all this was possible only when the individual was completely isolated. It was conceivable only when he literally had no environment, no family, and was not part of a group able to resist economic pressure; when he had almost no way of life left.

Such is the influence of social plasticity. Without it, no technical evolution is possible. For the individual in an atomized society, only the state was left: the state was the highest authority and it became omnipotent as well. The society produced was perfectly malleable

and remarkably flexible from both the intellectual and the material points of view. The technical phenomenon had its most favorable environment since the beginning of history.

At the same time, by a historical coincidence (whether fortuitous or not, I shall not undertake to say), what I have called a clear technical intention came into being. In all other civilizations there had been a technical movement—more or less extensive work of this kind—but not a mass intention, clearly understood and deliberately guiding the whole society in a technical direction.

Giedion says of the period from 1750 to 1850: "Invention was a part of the normal course of life. Everyone invented. Every entrepreneur dreamed of more rapid and economical means of fabrication. The work was done unconsciously and anonymously. Nowhere else and never before was the number of inventions per capita as great as in America in the 60's of that century."

It is possible that a similar phenomenon took place in prehistoric times when technique appeared out of sheer necessity. Pressed on all sides, man reacted by creating technique. In historical times the situation changed, however. Homo sapiens had by then established his supremacy over the other mammals with respect to natural forces. Some technical efforts had been pursued, now in one field, now in another; for example, in the military art of the Assyrians or in the art of construction of the Egyptians. There were always individuals who possessed a clear vision of technical supremacy; say, Archimedes in mechanics, or Loyola in spiritual technique. But we almost never find the distinctive characteristic of our time—a precise view of technical possibilities, the will to attain certain ends, application in all areas, and adherence of the whole of society to a conspicuous technical objective. All these, taken together, constitute what I have termed a clear technical intention.

Whence arose this intention? Many causes conspired to produce it, among them the influence of the philosophy of the eighteenth century, reinforced by the philosophy of Hegel and later that of Marx. But there were other factors which were as important. What really produced the general movement in favor of technique was special interest.

This technical movement has been studied by men as different as Descartes and Maré. But it was only when industrial self-inter-

est, for the sake of efficiency, demanded a search for the "one best way to do work" that research was begun by Gilbreth in the field of technique, with the amazing results we see today.

Special interest was and is the great motive force behind the development of technical consciousness—but not necessarily any particular interest; say, the capitalistic interest or the moneyed interest. The state interest was the first to become conscious in France, at the time of the Revolution. The state developed political and industrial technique, and later, with Napoleon, military and judicial technique, because it found them to be potent forces against its enemies within and without. The state protected "the arts and the sciences" (in reality, techniques) not out of greatness of spirit or concern for civilization, but out of the instinct for power. After the state, it was the *bourgeoisie* who discovered how much profit could be extracted from a consciously developed technique. In fact, the *bourgeoisie* has always been more or less involved with technique. They were the initiators of the first financial techniques and, later on, of the modern state. At the beginning of the nineteenth century, they saw the possibilities of drawing huge profits from this system, especially as they were favored by the crumbling "of morals and religion" and felt themselves free, in spite of the idealistic smoke screen they raised, to exploit individuals. This class put the interests of technique before the interests of individuals, who had to be sacrificed in order that technique might progress. It is solely because the *bourgeoisie* made money, thanks to technique, that technique became one of their objectives.

This alliance is well known and we need recall but a few facts. James Watt, his steam engine perfected, was ruined and at a dead end. It was a bourgeois, Matthew Boulton, who grasped the industrial and financial possibilities of Watt's invention and decided to apply it. Two further facts are pertinent: commercial capitalism preceded industrial capitalism; industry owed its rise to the accumulation of capital originating from commerce. And where did industrialization first occur and become most widespread? In England, because capitalism was more highly developed there and the *bourgeoisie* more at liberty to act than anywhere else. This is well known. The union between the *bourgeoisie* and technique was expressed not only in the development of factories, but much

more subtly in the fact that the majority of technicians came from this class. It was the *bourgeoisie* which promoted the advance of science.

Moreover, the *bourgeoisie* were so well aware of the relation between economic success and the scientific foundations of that success that they kept in their own hands, almost as a monopoly, the instruction which was the only means of access to the great schools and faculties that trained the technicians of science and the technicians of society.[5]

Technical progress is a function of bourgeois money. Yet today the Marxists claim that the *bourgoisie* either have attempted to restrain technical progress or make it serve the purposes of war. Their claim, however, does not prevent history from contradicting their theories. Marx himself would never have made such statements; what is true today was not true in his time.

However, this self-interest of the *bourgeoisie* was not enough to carry the whole of society along with it—witness the popular reactions against technical progress. As late as 1848, one of the demands of the workers was the suppression of machinery. This is easily understood. The standard of living had not risen, men still suffered from the loss of equilibrium in their lives brought about by a too rapid injection of technique, and they had not yet felt the intoxication of the results. The peasants and the workers bore all the hardships of technical advance without sharing in the triumphs. For this reason, there was a reaction against technique, and society was split. The power of the state, the money of the *bourgeoisie* were for it; the masses were against.

In the middle of the nineteenth century the situation changed. Karl Marx rehabilitated technique in the eyes of the workers. He preached that technique can be liberating. Those who exploited it enslaved the workers, but that was the fault of the masters and not of technique itself.

Marx was perhaps not the first to have said this, but he was the first to convince the masses of it. The working class would not be liberated by a struggle against technique but, on the contrary, by technical progress itself, which would automatically bring about the collapse of the *bourgeoisie* and of capitalism. This reconcilia-

[5] The author includes here not only faculties such as the École Polytechnique, but also administrative tribunals such as the Conseil d'État. (Trans.)

tion of the masses to techniques was decisive. But it would not have been sufficient to result in a clear consciousness of the technical objective, the new *consensus omnium*, had it not appeared simultaneously with a second historical fact, namely, the diffusion of the so-called benefits of techniques among the masses. These benefits included, for example, the conveniences of daily life, the progressive shortening of the work day, facilities for public transportation and medicine, new possibilities of making one's fortune (in the United States and in the colonies), housing improvements, and so forth. A prodigious upheaval took place between 1850 and 1914 which convinced everyone of the excellence of a technical movement that could produce such marvels and alter human life. All this, Marx explained, presaged even better things and pointed to the road to follow. Fact and theory were for once in agreement. How could public opinion resist?

Drawn by self-interest (the ideal of comfort, for instance), the masses went over to the side of technique; society was converted. A common will developed to exploit the possibilities of technique to the maximum, and groups of the most conflicting interests (state and individual, *bourgeoisie* and working class) united to hymn its praises. Literally everyone was agreed on its excellence. True, after 1914, certain criticisms came from the intellectuals, but these were ineffective because they were usually beside the point —manifestations of vague idealism or of sentimental humanitarianism.

In the middle of the nineteenth century, when technique had hardly begun to develop, another voice was raised in prophetic warning against it. The voice was Kierkegaard's. But his warnings, solidly thought out though they were, and in the strongest sense of the word prophetic, were not heeded—for very different reasons. They were too close to the truth.

This analysis applies chiefly to the countries where the technical movement first developed—England and France. In England events took a somewhat different course than in France, but they had the same scope and profound significance. The historical sequence varied, but the orientation in both countries was toward technical development. Social plasticity developed in England by different paths and at a different time than in France. Sociological taboos were broken at an early date. The regicide of Charles I by

Cromwell gave the initial and primary impulse to social plasticity; as all writers agree, after this date a rigid social hierarchy no longer existed in England. The supreme value was productive and efficient labor which permitted the industrious to rise high on the social ladder (William Pitt is a good example). The king no longer represented divine authority, nor was he able to resist the nation. No longer was there sociological rigidity based on the royal person or on the power of money. It would be an error to interpret sociologically the England of the eighteenth century in accordance with the stability which is discernible in the nineteenth, and which was achieved after the technical revolution, when society had entered new paths. In the eighteenth century, England was essentially mobile and unstable in all its structures. Christianity itself was not the conservative force it proved to be on the Continent. Two great currents divided English society before the advent of Methodism: the Church of England and the Puritans. The Puritans, even after their political failure, were the predominant influence. In keeping with the trend the Reformation set, they exploded all prevailing religious taboos and developed a practical and utilitarian mentality that emphasized the use and even the exploitation of the good things of this world given by God to men. The relationship of this trend to the development of capitalism is well known. The Church of England had favored tolerance since the end of the eighteenth century and had adopted as its leading principle Bishop Warburton's idea of social utility. Here, too, there was a kind of secularization of religion. Religion is no longer the framework of society; it can no longer impose its taboos or forms upon it. Rather, it integrates itself into society, adjusts to it, and adopts the notion of social utility as criterion and justification. At the same time the disintegration and atomization of English social groups occurred—brought about not so much by the influence of the state (as in France) as by the destruction of peasant society which began in the early eighteenth century and of which Defoe and Swift were such eloquent witnesses.

The peasant commune and the peasant family were slowly ruined in the eighteenth century. The historian notes the collapse, relentless and more rapid than in France, of a whole society which had been in equilibrium until then. The struggle between the landed and the moneyed interests ended with the victory of the

moneyed interests. It is not important here to detail the ways a new peasant society, based on the moneyed interest, came into being. Newly rich entrepreneurs bought up the great estates and took the place of the old gentry, but that is not our concern. Our concern is the merchants whose influence changed the organic structure of the traditional world. The small landowners and the yeomen were eliminated or reduced to an agricultural proletariat, or they were forced to migrate to the city. The rural corporations were ruined, the communes passed almost completely into the hands of the new landlords and ceased to constitute coherent sociological units. The movement was accelerated by the application of new agricultural methods, which were accepted much more rapidly than in France. The enclosure of the commons, which in France took place chiefly after 1780, began in England in 1730. The new agricultural techniques were plainly so superior that it was not possible to preserve the old "open field" system—the commons, the pastures, and the forests; thus the final blow was dealt to the old, organic, peasant society. The peasant could not survive as such, and with him, the whole of society entered into a state of flux. The plasticity we refer to came about in England as a result of this evolution in the use of land, which furnished the technical movement with the necessary manpower: apathetic, vacant, and uprooted. Not only was this manpower necessary for the development of industry; the masses thus created were indispensable to faith in techniques and the spread of techniques.

To summarize: social plasticity came about earlier in England than in France, and the technical movement developed along with it. Moreover, the state, which was dominant in French society, did not have the same influence in Great Britain.

This applies too to the development of a clear technical consciousness. In Great Britain this consciousness appeared as a bourgeois interest. The spirit behind the introduction of new techniques in the rural districts was very different from that which characterized France a short time later. The technical movement in France was launched by the monarchy and took a scientific form: the academies and the research institutes propagated the new techniques throughout the country; and the nobles applied them, very often disinterestedly. In England, profit was from the very beginning the prime motive. And empiricism was the dominant factor

because technique was more efficient. Techniques were developed because it paid to develop them; commercial activity found them advantageous. This was true in agriculture as well as in industry.

The English technical movement was marked by the fact that all the different financial systems (banks, stock exchanges, insurance companies) were perfected. The clear consciousness of the value of technique expressed itself primarily in terms of money, and was located at the center of the systems of distribution. And the acceleration of invention in this area influenced all other techniques. The British state attained this clear technical consciousness at a comparatively last date, and then only when it saw that techniques were to its immediate interest.

This phenomenon of technical clarity sometimes came about through an association of the interests of the state and the interests of private individuals. In steelmaking, for example, the fact that Henry Cort was supplier to the Admiralty was decisive, in 1780, for the application and development of steel puddling. The state found in this procedure an excellent means of improving its naval vessels. However, it was competition with the Napoleonic empire that started His Majesty's government down the road of technique.

Thereafter, both governments understood that only technical efficiency in all governmental relations and enterprises could command the paths of peace as well as the affairs of war. The English state henceforth had the same influence on the development of techniques as the French revolutionary state had exerted through the establishment of a clear technical consciousness. The way had already been paved in England by the emergence of the British *bourgeoisie.* Whatever the differences in its development in England and France, however, the technical consciousness that appeared was identical in both countries.

In the United States this took place at the beginning of the nineteenth century. Until then, the society of this country was inorganic. But at that time the American social milieu was favorable; moreover, the Americans profited from the technical consciousness evolved in Europe, and so they arrived immediately at a model for technique. Giedion has noted that the Americans began by mechanizing complex operations, which produced the assembly line, whereas the Europeans tended to mechanize simple opera-

tions, such as spinning. This American accomplishment was the result of the exceptional flexibility of the American milieu.

These conditions were not found in the other European countries: Spain, Italy, Germany, Austria, Russia. In these nations the social structures remained as they were and the social hierarchy was not attacked. The taboos of religion were fanatically respected, and those of society were not questioned. The Inquisition and the Tribunal of the Empire jealously guarded the spiritual and sociological divisions of society. This world was already undermined, ruined, and emptied of content, but its rigid forms were universally accepted as good. There were few changes in the cities and none at all in the rural areas. The traditional organism remained intact. And when enlightened despotism began to create some excitement, this world was so little prepared that it exhausted itself in the struggle against the old social structures. Consider, for example, the fate of Peter the Great, Joseph II, and the melancholy and celebrated Marquis de Pombal.

Great inventions may have been made in Germany and Russia during this period. Everyone is familiar with the claims of Hitler, and later of Stalin, that all important discoveries were made in their respective countries. Allowing for exaggeration, there is perhaps some truth in these claims. But the discoveries were not applied, and only application counts in the rise of technique. Application did not take place because the felicitous combination of factors we have discussed was lacking. The social milieu of these countries, their spiritual tendencies, group psychology, sociological structures, and past history were all unfavorable to the rise of technique. The state in some countries, principally Prussia, was favorable to it; but a clear technical consciousness on the part of the state alone was obviously insufficient to open the door to the great mobilization of men and things necessary for this multiform progress.

The joint occurrence of the five factors we have briefly analyzed explains the exceptional growth of technique. Never before had these factors coincided. They are, to summarize: (1) a very long technical maturation or incubation without decisive checks before the final flowering; (2) population growth; (3) a suitable economic milieu; (4) the almost complete plasticity of a society mal-

leable and open to the propagation of technique; (5) a clear technical intention, which combines the other factors and directs them toward the pursuit of the technical objective. Some of these conditions had existed in other societies; for example, the necessary technical preparation and the destruction of taboos in the Roman Empire in the third century. But the unique phenomenon was the simultaneous existence of all five—all of them necessary to bring about individual technical invention, the mainspring of everything else.

What else can history teach us? Only the vanity of believing we can impose our theories on history. Any philosophy which asserts that human experience repeats itself is ineffectual.

CHAPTER

[2]

THE CHARACTEROLOGY OF TECHNIQUE

In discussing technique today it is impossible not to take a position. And the position we take is determined by a historical choice, conscious or unconscious.

Acknowledging that the technical phenomenon is a constant of human history, is there anything new about its present aspect? There are two distinct positions on this question. The first maintains that there is no more real technical innovation in the modern world than there was in the Stone Age. Jean Fourastié asks humorously whether prehistoric man, the first time he saw a bronze sword used, did not feel as menaced by it as we feel by the atom bomb. It would seem, then, that technical innovations have always had the same surprising and unwelcome character for men. (This is an inexhaustible source of jokes for motion pictures and cartoons.) If we become frightened, we are merely obeying ancestral instincts. There is no more real reason to be frightened by the

atomic bomb than by any invention thousands of years old—which, as we see, has not destroyed the human race. The technique of today has the same characteristics as all preceding techniques. This normal development, however rapid and surprising, cannot be of danger to us.

In opposition to this resolutely optimistic position, there is another which maintains that we are confronted with a genuinely new phenomenon. There is nothing in common between the modern technical complex and the fragments of it which are laboriously sought out in the course of history to demonstrate that there has always been technique. For those who hold this viewpoint, the technical phenomenon represents a complete change, not only of degree, but of kind. Modern society is confronted with a transition (heralded by Marx and particularly by Engels) which involves change of quality as a consequence of change of quantity. This postulate, which Engels applied to physical phenomena, holds true for sociological phenomena as well. Beyond a certain quantity, the phenomenon, even though in a sense it remains the same, does not have the same quality, is not of the same nature.

One cannot choose between these two theses in a subjective and a priori manner. It is necessary to examine the objective characteristics of technique to determine whether there has really been a change. But what characteristics shall we examine? Not the intrinsic ones; these do not change. If we consider intrinsic characteristics, the first position is right. The mental operation by means of which Archimedes constructed certain engines of war is identical with that of any modern engineer who improves a motor. And the same instinct impels a man to catapult stones and to construct a machine gun. Likewise, the same laws of propagation of technical invention operate, no matter what the stage of technical evolution. However, these identities are not at all convincing.

Many men who have studied the problems posed by different techniques admit that there is a radical difference between the traditional situation and the situation we face today. On the basis of intrinsic characteristics, these men have established a distinction between (*a*) the fundamental techniques which, as Ducassé says, "sum up all man's relations with his environment," and (*b*) the techniques which are the results of applied science. The first group is composed of techniques which, although seldom identical in

method and form, are identical in intrinsic characteristics. They constitute the complex of fundamental techniques which sociologists such as LeRoi-Gourhan usually study and on the basis of which they elucidate the laws of technique. Primitive techniques have no reality in themselves; they are merely the intermediary between man and his environment.

The techniques which result from applied science date from the eighteenth century and characterize our own civilization. The new factor is that the multiplicity of these techniques has caused them literally to change their character. Certainly, they derive from old principles and appear to be the fruit of normal and logical evolution. However, they no longer represent the same phenomenon. In fact, technique has taken substance, has become a reality in itself. It is no longer merely a means and an intermediary. It is an object in itself, an independent reality with which we must reckon.

However, this often admitted difference does not seem to me to characterize conclusively the singularity of the technical situation today. The characterization can be challenged because it does not rest upon deep historical experience. It is not enough simply to declare, by drawing on everyone's experience of the disparity between our technique and the limited needs of our bodies, that technique is a reality in itself. We may keep this in mind, but we must also recognize that it is incomplete and not altogether convincing.

It is not, then, the intrinsic characteristics of techniques which reveal whether there have been real changes, but the characteristics of the relation between the technical phenomenon and society. Let us take a very simple comparison. A shell explodes and the explosion is normally always the same. Any fifty shells of the same caliber when exploded display approximately the same objective characteristics from a physical or chemical point of view. The sound, light, and projection of fragments remain nearly identical. The intrinsic characteristics of the fifty explosions are the same. But if forty-nine shells go off in some remote place and the fiftieth goes off in the midst of a platoon of soldiers, it cannot be maintained that the results are identical. A relation has been established which entails a change. To assess this change, it is not the intrinsic character of the explosion which must be examined, but rather its relation to the environment. In the same way, to learn if there has been, for

man, a change in modern technqiue in relation to the old, we must assess, not the internal characteristics of the technique, but the actual situation of technique in human society.

To go beyond this and to imagine, for example, what might have been the psychological reaction of primitive men when faced with technical invention is pure fantasy. The question put by Jean Fourastié, strictly speaking, has no meaning. The working of the mind varies according to place and time, and we cannot project ourselves with any assurance into the mind of primitive man. In order to remain within the limits of what can be known, we must be content to study the relation between technique and society, a relation which has the advantage of being meaningful.

Technique in Civilization

Traditional Techniques and Society. What was the position of technique in the different societies which have preceded ours? Most of these societies resembled one another in their technical aspects. But it is not enough to say that technique was restricted. We must determine the precise characteristics of the limitations, which are four in number.

First, technique was applied only in certain narrow, limited areas. When we attempt to classify techniques throughout history, we find principally techniques of production, of war and hunting, of consumption (clothing, houses, etc.), and, as we have said, magic. This complex of techniques would seem to modern man to represent a rather considerable domain and, indeed, to correspond to the whole of life. What more could there be than producing, consuming, fighting, and practicing magic? But we must look at these things in perspective.

In so-called primitive societies, the whole of life was indeed enclosed in a network of magical techniques. It is their multiplicity that lends them the qualities of rigidity and mechanization. Magic, as we have seen, may even be the origin of techniques; but the primary characteristic of these societies was not a technical but a religious preoccupation. In spite of this totalitarianism of magic, it is not possible to speak of a technical universe. Moreover, the importance of techniques gradually diminishes as we reach historical

societies. In these societies, the life of the group was essentially nontechnical. And although certain productive techniques still existed, the magical forms which had given a technique to social relations, to political acts, and to military and judicial life tended to disappear. These areas ceased to respond to techniques and became subject instead to social spontaneities. The law, which had traditionally expressed itself in certain customs, no longer had any character of technical rigor; even the state was nothing but a force which simply manifested itself. These activities depended more on private initiative, short-lived manifestations or ephemeral traditions, than on a persevering technical will and rational improvements.

Even in activities we consider technical, it was not always that aspect which was uppermost. In the achievement of a small economic goal, for example, the technical effort became secondary to the pleasure of gathering together. "Formerly, when a New England family convoked a 'bee' (that is, a meeting for working in common), it was for all concerned one of the most pleasurable times of the year. The work was scarcely more than a pretext for coming together."[1] The activity of sustaining social relations and human contacts predominated over the technical scheme of things and the obligation to work, which were secondary causes.

Society was free of technique. And even on the level of the individual, technique occupied a place much more circumscribed than we generally believe. Because we judge in modern terms, we believe that production and consumption coincided with the whole of life.

For primitive man, and for historical man until a comparatively late date, work was a punishment, not a virtue. It was better not to consume than to have to work hard; the rule was to work only as much as absolutely necessary in order to survive. Man worked as little as possible and was content with a restricted consumption of goods (as, for example, among the Negroes and the Hindus)—a prevalent attitude, which limits both techniques of production and techniques of consumption. Sometimes slavery was the answer: an entire segment of the population did not work at all and depended on the labor of a minority of slaves. In general, the slaves

[1] George C. Homans, quoted by Jerome Scott and R. P. Lynton.

did constitute a minority. We must not be misled by Imperial Rome, Greece under Pericles, or the Antilles in the eighteenth century. In most slaveholding nations, slaves were in a minority.

The time given to the use of techniques was short, compared with the leisure time devoted to sleep, conversation, games, or, best of all, to meditation. As a corollary, technical activities had little place in these societies. Technique functioned only at certain precise and well-defined times; this was the case in all societies before our own. Technique was not part of man's occupation nor a subject for preoccupation.

This limitation of technique is attested to by the fact that in the past technique was not considered nearly as important as it is today. Heretofore, mankind did not bind up its fate with technical progress. Man regarded technical progress more as a relative instrument than as a god. He did not hope for very much from it. Let us take an example from Giedion's admirable book, in which he elucidates the small importance technique had traditionally.

In our day, we are unable to envisage comfort except as part of the technical order of things. Comfort for us means bathrooms, easy chairs, foam-rubber mattresses, air conditioning, washing machines, and so forth. The chief concern is to avoid effort and promote rest and physical euphoria. For us, comfort is closely associated with the material life; it manifests itself in the perfection of personal goods and machines. According to Giedion, the men of the Middle Ages also were concerned with comfort, but for them comfort had an entirely different form and content. It represented a feeling of moral and aesthetic order. Space was the primary element in comfort. Man sought open spaces, large rooms, the possibility of moving about, of seeing beyond his nose, of not constantly colliding with other people. These preoccupations are altogether foreign to us.

Moreover, comfort consisted of a certain arrangement of space. In the Middle Ages, a room could be completely "finished," even though it might contain no furniture. Everything depended on proportions, material, form. The goal was not convenience, but rather a certain atmosphere. Comfort was the mark of the man's personality on the place where he lived. This, at least in part, explains the extreme diversity of architectural interiors in the houses of the period. Nor was this the result of mere whim; it represented an

adaptation to character; and when it had been realized, the man of the Middle Ages did not care if his rooms were not well heated or his chairs hard.

This concept of comfort, closely bound up with the person, clearly takes death for granted, as did man himself; man's awareness of death likewise profoundly influences his search for an adequate milieu. Giedion's study is convincing. Medieval man did not dream for an instant that technique had any influence at all, even on objects which today we consider completely material and consequently of a technical order.

This limitation of the sphere of action of technique was increased even more by the limitation of the technical means employed in these fields. There was no great variety of means for attaining a desired result, and there was almost no attempt to perfect the means which did exist. It seems, on the contrary, that a conscious Malthusian tendency prevailed. It was expressed, for example, in the regulations of the guilds concerning tools, and in Roman law, by the principle of the economy of forms. Man tended to exploit to the limit such means as he possessed, and took care not to replace them or create other means as long as the old ones were effective. From the judicial point of view, the principle of the economy of forms led to the creation of the fewest possible legal instruments. Laws were few, and so were institutions. Man used the utmost ingenuity to obtain a maximum of results from a minimum of means at the price of fictions, transpositions, applications *a pari* and *a contrario*, and so on. This was also true industrially. Society was not oriented toward the creation of a new instrument in response to a new need. The emphasis was rather on the application of old means, which were constantly extended, refined, and perfected.

The deficiency of the tool was to be compensated for by the skill of the worker. Professional know-how, the expert eye were what counted: man's talents could make his crude tools yield the maximum efficiency. This was a kind of technique, but it had none of the characteristics of instrumental technique. Everything varied from man to man according to his gifts, whereas technique in the modern sense seeks to eliminate such variability. It is understandable that technique in itself played a very feeble role. Everything was done by men who employed the most rudimentary means. The

search for the "finished," for perfection in use, for ingenuity of application, took the place of a search for new tools which would have permitted men to simplify their work, but also would have involved giving up the pursuit of real skill.

Here we have two antithetical orders of inquiry. When there is an abundance of instruments that answer all needs, it is impossible for one man to have a perfect knowledge of each or the skill to use each. This knowledge would be useless in any case; the perfection of the instrument is what is required, and not the perfection of the human being. But, until the eighteenth century, all societies were primarily oriented toward improvement in the use of tools and were little concerned with the tools themselves. No clean-cut division can be made between the two orientations. Human skill, having attained a certain degree of perfection in practice, necessarily entails improvement of the tool itself. The question is one of transcending the stage of total utilization of the tool by improving it. There is, therefore, no doubt that the two phenomena do interpenetrate. But traditionally the accent was on the human being who used the tool and not on the tool he used.

The improvement of tools, essentially the result of the practice of a personal art, came about in a completely pragmatic way. For this reason, we can put in the first category all the techniques we have classified with regard to intrinsic characteristics. A small number of techniques, not very efficient: this was the situation in Eastern and Western society from the tenth century B.C. to the tenth century A.D.

The world of technique had still a third characteristic prior to the eighteenth century: it was local. Social groups were very strong and closed to outsiders. There was little communication, materially speaking, and even less from the spiritual point of view. Technique spread slowly. Certain examples of technical propagation are always cited; the introduction of the wheel into Egypt by the Hyksos; the Crusades; and so on. But such events took millennia and were accidental. In the majority of cases, there was little transmission. Imitation took place very slowly and mankind passed from one technical stage to the next with great difficulty. This is true of material techniques, and even more so of non-material techniques.

Greek art remained Greek in industrial projects such as pottery-making, even when imitated by the Romans. Roman law did not

extend beyond the Roman borders, whereas the Napoleonic code was adopted by Turkey and Japan. As for magic, that technique remained completely secret.

Every technical phenomenon was isolated from similar movements elsewhere. There was no transmission, only fruitless gropings. Geographically, we can trace the compass of a given technique, follow the zones of its influence, imitation, and extension; in almost every case we find how small was the extent of its radiation.

Why was this so? The explanation is simple: technique was an intrinsic part of civilization. And civilization consisted of numerous and diversified elements—natural elements such as temperament and flora, climate and population; and artificial elements such as art, technique, the political regime, etc. Among all these factors, which mingled with one another, technique was only one. It was inexorably linked with them and depended on them, as they depended on it. It was part of a whole, part of the determinate society, and it developed as a function of the whole and shared its fate.

Just as one society is not interchangeable with another, so technique remained enclosed in its proper framework; no more would it become universal than the society in which it was embedded. Geographically there could be no technical transmission because technique was not some anonymous piece of merchandise but rather bore the stamp of the whole culture. This entails much more than the existence of a simple barrier between social groups. Technique was unable to spread from one social group to another except when the two were in the same stage of evolution and except when civilizations were of the same type. In the past, in other words, technique was not objective, but subjective in relation to its own culture.

It is understandable, therefore, that technique, incorporated in its proper framework, did not evolve autonomously. On the contrary, it depended on a whole ensemble of factors which had to vary with it. It is not accurate to conceive the movement in the oversimplified manner of Marxism, as first the evolution of technique, and subsequently the alignment of the other factors. This veiw is accurate for the nineteenth century but it is false for history as a whole. Certain important covariations traditionally existed, and these factors, covariant with technique, changed according

to the type of civilization. There was, for example, the association of technique and the state among the Egyptians and the Incas; of technique and philosophy in Greece and China. Francastel has shown how technique could be "absorbed and directed by the arts," as happened, say, in the fifteenth century, when it was subordinated to a plastic vision of the world, which imposed on it limits and demands. At that time, there existed a whole "civilization well provided with technical inventions, but which deliberately undertook to use them only to the degree in which these inventions would allow it to realize an imaginative construction." Thereafter, we find a complicated "art technique" and, as elsewhere, we almost never find technique in a pure state.

The consequence was an extreme local diversity of techniques for attaining the same result. No comparison or competition existed yet between these different systems; the formulation: "The one best way in the world" had not yet been made. It was a question of the "best way" in a given locality. Because of this, arms and tools took very different forms, and social organizations were extremely diverse.

It is impossible to speak of slavery as all of a piece. Roman slavery, for example, had nothing to do with Teutonic slavery, or Teutonic slavery with Chaldean. We habitually use one term to cover very different realities. This extreme diversity divested technique of its most crucial characteristic. There was no single means which was judged best and able to eliminate all others by virtue of its efficiency. This diversity has made us believe that there was an epoch of experimentation, when man was groping to find his way. This is a false notion; it springs from our modern prejudice that the stage we find ourselves in today represents the highest level of humanity. In reality, diversity resulted not from various experimental attempts on the part of various peoples, but from the fact that technique was always embedded in a particular culture.

Alongside this spatial limitation of technique, we find a time limitation. Until the eighteenth century, techniques evolved very slowly. Technical work was purely pragmatic, inquiry was empirical, and transmission slow and feeble. Centuries were required for: (*a*) utilization of an invention (for example, the water mill); (*b*) transition from a plaything to a useful object (gunpowder, automatons); (*c*) transition from a magical to an economic opera-

tion (breeding of animals); (*d*) simple perfecting of an instrument (the horse yoke and the transition from the simple stick plow to the train plow). This was even more true for abstract techniques. Abstract techniques, I maintain, are almost nontransmissible in time from a given civilization to its successor. We must be somewhat skeptical, and in any case prudent, when the evolution of techniques is presented as an evolution of inventions; actually this development was never more than potential. There is nothing to prove that true technique existed heretofore, that is, in the sense of generalized application. It is possible to compile a fine catalogue of seventeenth-century inventions, and to deduce from it that a great technical movement was in force at that time. Many writers have fallen into this error—among them, Jean Laloup and Jean Nelis. It is not because Pascal invented a calculating machine and Papin a steam engine that there was a technical evolution; nor was it because a "prototype" of a power loom was built; nor because the process of the dry distillation of coal was discovered. As Gille has very judiciously noted: "The best-described machines in the eighteenth century *Encyclopédie* are possibly better conceived than those of the fifteenth century, but scarcely constitute a revolution." The initial problem was to construct the machine, to make the invented technique actually work. The second consisted in the diffusion of the machine throughout the society; and this second step proceeded very slowly.

This divergence between invention and technique, which is the cause of the time lag we have spoken of, is correctly interpreted by Gille in these words: "There was a discontinuity of technical progress but there was probably a continuity of research." Gille shows clearly that technical progress develops according to a discontinuous rhythm: "It is tied up with demographic or economic rhythms and with certain internal contradictions." This discontinuity still contributes to evolutionary lag today.

Slowness in the evolution of techniques is evident throughout history. Very few variations seem to have occurred in this constant. But it cannot be maintained that this slowness was completely uniform. Yet, even in periods that appear rather fertile, it is clear that evolution was slow. For example, Roman law, which was particularly rich in the classical period, took two centuries to find a perfect form. Moreover, the number of applied inventions was sharply re-

stricted. The fifteenth century, in spite of its importance, produced no more than four or five important technical applications. The natural consequence of this evolutionary slowness was that technique could be adapted to men. Almost unconsciously, men kept abreast of techniques and controlled their use and influence. This resulted not from an adaptation of men to techniques (as in modern times), but rather from the subordination of techniques to men. Technique did not pose the problem of adaptation because it was firmly enmeshed in the framework of life and culture. It developed so slowly that it did not outstrip the slow evolution of man himself. The progress of the two was so evenly matched that man was able to keep pace with his techniques. From the physical point of view, techniques did not intrude into his life; neither his moral evolution nor his psychic life were influenced by them. Techniques enabled man to make individual progress and facilitated certain developments, but they did not influence him directly. Social equilibrium corresponded to the slowness of general evolution.

This evolutionary slowness was accompanied by a great irrational diversification of designs. The evolution of techniques was produced by individual efforts accompanied by a multitude of scattered experiments. Men made incoherent modifications on instruments and institutions which already existed; but these modifications did not constitute adaptations. We are amazed when we inspect, say, a museum of arms or tools, and note the extreme diversity of form of a single instrument in the same place and time. The great sword used by Swiss soldiers in the sixteenth century had at least nine different forms (hooked, racked, double-handed, hexagonal blades, blades shaped like a fleur-de-lis, grooved, etc.). This diversity was evidently due to various modes of fabrication peculiar to the smiths; it cannot be explained as a manifestation of a technical inquiry. The modifications of a given type were not the outcome of calculation or of an exclusively technical will. They resulted from aesthetic considerations. It is important to emphasize that technical operations, like the instruments themselves, almost always depended on aesthetic preoccupations. It was impossible to conceive of a tool that was not beautiful. As for the idea, frequently accepted since the triumph of efficiency, that the beautiful is that which is well adapted to use—assuredly no such notion guided the aesthetic searchings of the past. No such conception of

beauty (however true) moved the artisan who carved a Toledo blade or fabricated a harness. On the contrary, aesthetic considerations are gratuitous and permit the introduction of uselessness into an eminently useful and efficient apparatus.

This diversity of forms was manifestly conditioned by vainglory and pleasure—the vainglory of the user, the pleasure of the artisan. Both caused changes in the classic type. And why not include as well that pure fantasy which runs through all the creations of Greece and the Middle Ages?

All this led to a modification of the given type. The search for greater efficiency likewise played a role, but it was one factor among several. The different forms were subject to trial and error, and certain forms were progressively stabilized and imitated, either because of their plastic perfection or because of their usefulness. The final result was the establishment of a new type derived from its predecessor.

This diversity of influences, which operated on all technical mechanisms, explains in part the slow tempo of progress in these areas. To obey a multiplicity of motives and not reason alone seems to be an important keynote of man. When, in the nineteenth century, society began to elaborate an exclusively rational technique which acknowledged only considerations of efficiency, it was felt that not only the traditions but the deepest instincts of humankind had been violated. Men sought to reintroduce indispensable factors of aesthetics and morals. Out of this effort came the unprecedented creation of certain aspects of style in the 1880's: the tool with machine-made embellishments. Sewing machines were decorated with cast-iron flowers, and the first tractors bore engraved bulls' heads. That it was wasteful to supply such embellishments soon became evident; their ugliness doubtless contributed to the realization. Moreover, these flourishes represented a wrong road, technically speaking. The machine can become precise only to the degree that its design is elaborated with mathematical rigor in accordance with use. And an embellishment could increase air resistance, throw a wheel out of balance, alter velocity or precision. There was no room in practical activity for gratuitous aesthetic preoccupations. The two had to be separated. A style then developed based on the idea that the line best adapted to use is the most beautiful.

Abstract techniques and their relation to morals underwent the

same evolution. Earlier, economic or political inquiries were inextricably bound with ethical inquiry, and men attempted to maintain this union artificially even after they had recognized the independence of economic technique. Modern society is, in fact, conducted on the basis of purely technical considerations. But when men found themselves going counter to the human factor, they reintroduced—and in an absurd way—all manner of moral theories related to the rights of man, the League of Nations, liberty, justice. None of that has any more importance than the ruffled sunshade of McCormick's first reaper. When these moral flourishes overly encumber technical progress, they are discarded—more or less speedily, with more or less ceremony, but with determination nonetheless. This is the state we are in today.

The elimination of these evolutionary factors and of technical diversification has brought about a transformation of the basic process of this evolution. Technical progress today is no longer conditioned by anything other than its own calculus of efficiency. The search is no longer personal, experimental, workmanlike; it is abstract, mathematical, and industrial. This does not mean that the individual no longer participates. On the contrary, progress is made only after innumerable individual experiments. But the individual participates only to the degree that he is subordinate to the search for efficiency, to the degree that he resists all the currents today considered secondary, such as aesthetics, ethics, fantasy. Insofar as the individual represents this abstract tendency, he is permitted to participate in technical creation, which is increasingly independent of him and increasingly linked to its own mathematical law.

It was long believed that rational systematization would act to reduce the number of technical types: in the measure that the factors of diversification were eliminated, the result would be fewer and more simple and precise types. Thus, during the latter part of the nineteenth century—in the mechanical, medical, and administrative spheres—exact instruments were available from which fantasy and irrationality had been totally eliminated. The result was fewer instruments. As further progress was made, however, a new element of diversification came into play: in order that an instrument be perfectly efficient, it had to be perfectly adapted. But the most rational instrument possible takes no account of the extreme diversity of the operational environment. This represents an essen-

tial characteristic of technique. Every procedure implies a single, specific result. As Porter Gale Perrin puts it: "Just as a word evokes an idea which exactly corresponds to no other word," so a fixed technical procedure generates a fixed result. Technical methods are not multipurposive, or adaptable, or interchangeable. Perrin has demonstrated this in detail with reference to judicial technique, but it also holds for everything else. Take the well-known example, cited by Pierre de Latil, of a machine, brought to the highest possible pitch of perfection, the purpose of which was to produce from cast iron, at a single stroke, cylinder heads for aircraft engines. The machine was 28 meters long and cost $100,000. But the moment the required type of cylinder head was changed, the machine became good for nothing; it was unadaptable to any new operation. A judicial system may function perfectly adequately in France but not in Turkey. For true efficiency, not only must the rational aspect of the machine be taken into account, but also its adaptation to the environment. A military tank will have a different form depending on whether it is to be used in mountainous terrain or in rice paddies. The more an instrument is designed to execute a single operation efficiently and with utmost precision, the less can it be multipurposive. A new diversification of technical apparatus thus appears: today instruments are differentiated as a result of the continually more specialized usage demanded of them.

The field of aviation gives us one of the best examples of this. Aircraft are described by the use to which they are put. We have, correspondingly, extremely precise and more and more diversified types. The list of French military aircraft, consisting at the present of five great categories, is as follows: (1) strategic bombers, (2) tactical bombers, (3) pursuit planes, (4) reconnaissance planes, and (5) transport planes. These five categories are subdivided further; there are altogether thirteen different subtypes, none of which are interchangeable with one another. Each has very different characteristics resulting from more and more refined technical adaptations.

The same extensive differentiation is found in much less important areas. A recent brochure of the world's largest refiner of lubricating oils lists fifteen different kinds of lubricants designed exclusively for automobiles. Each type corresponds to a definite use, each possessing specific qualities, and all equally necessary.

A fourth characteristic of technique, which results from the characteristics just enumerated, is the possibility, reserved to the human being, of choice. Inasmuch as all techniques were geographically and historically limited, societies of many different types were able to exist. For the most part, there was an equilibrium between two major types of civilization—the active and the passive. This distinction is well known. Some societies are oriented toward the exploitation of the earth, toward war, conquest, and expansion in all its forms. Other societies are inwardly oriented; they labor just enough to support themselves, concentrate on themselves, are not concerned with material expansion, and erect solid barriers against anything from without. From the spiritual point of view, these societies are characterized by a mystical attitude, by a desire for self-dissolution and absorption into the divine.

Human societies are variable, however. A group which has hitherto been active might become passive. The Tibetans, for instance, were conquerors and believers in magic until their conversion to Buddhism. Thereafter they became the world's most passive and mystical people. The reverse can also take place.

The two types of society coexisted throughout history; indeed, this seemed necessary to the equilibrium of world and man. Until the nineteenth century, technique had not yet excluded one of them. Moreover, man could isolate himself from the influence of technique by attaching himself to a given group and exerting influence on this group. Of course, other constraints acted on him; the individual was never completely free with respect to his group, but these constraints were not completely decisive or imperative in character.

Whether we are considering unconscious sociological cohesion or the power of the state, we find these forces always necessarily counterbalanced by the existence of other neighboring groups and other loyalties. There was no irrefutable constraint on man, because nothing absolutely good in respect to everything else had been discovered. We have noted the diversity of technical form and the slowness of imitation. But it was always human action which was decisive. When several technical forms came into contact, the individual made his choice on the basis of numerous reasons. Efficiency was only one of them, as Pierre Deffontaines has demonstrated in his work on religious geography.

Although the individual existing in the framework of a civilization of a certain type was always confronted with certain techniques, he was nevertheless free to break with that civilization and to control his own individual destiny. The constraints to which he was subject did not function decisively because they were of a nontechnical nature and could be broken through. In an active civilization, even one with a fairly good technical development, the individual could always break away and lead, say, a mystical and contemplative life. The fact that techniques and man were more or less on the same level permitted the individual to repudiate techniques and get along without them. Choice was a real possibility for him, not only with regard to his inner life, but with regard to the outer form of his life as well. The essential elements of life were safeguarded and provided for, more or less liberally, by the very civilization whose forms he rejected. In the Roman Empire (a technical civilization in a good many respects), it was possible for a man to withdraw and live as a hermit or in the country, apart from the evolution and the principal technical power of the Empire. Roman law was powerless in the face of an individual's decision to evade military service or, to a very great degree, imperial taxes and jurisdiction. Even greater was the possibility of the individual's freedom with respect to material techniques.

There was reserved for the individual an area of free choice at the cost of minimal effort. The choice involved a conscious decision and was possible only because the material burden of technique had not yet become more than a man could shoulder. The existence of choice, a result of characteristics we have already discussed, appears to have been one of the most important historical factors governing technical evolution and revolution. Evolution was not, then, a logic of discovery or an inevitable progression of techniques. It was an interaction of technical effectiveness and effective human decision. Whenever either one of these elements disappeared, social and human stagnation necessarily followed. Such was the case, for example, when effective technique was (or became) rudimentary and inefficacious among the Negroes of Africa. As to the consequences of a lapse in the second element, we are experiencing them today.

The New Characteristics. The characteristics of the relationship of technique, society, and the individual which we have analyzed

were, I believe, common to all civilizations up to the eighteenth century. Historically, their existence admits of little discussion. Today, however, the most cursory review enables us to conclude that all these characteristics have disappeared. The relation is not the same; it does not present any of the constants recognizable until now. But that is not sufficient to characterize the technical phenomenon of our own day. This description would situate it in a purely negative perspective, whereas the technical phenomemon is a positive thing; it presents positive characteristics which are peculiar to it. The old characteristics of technique have indeed disappeared; but new ones have taken their place. Today's technical phenomenon, consequently, has almost nothing in common with the technical phenomenon of the past. I shall not insist on demonstrating the negative aspect of the case, the disappearance of the traditional characteristics. To do so would be artificial, didactic, and difficult to defend. I shall point out, then, in a summary fashion, that in our civilization technique is in no way limited. It has been extended to all spheres and encompasses every activity, including human activities. It has led to a multiplication of means without limit. It has perfected indefinitely the instruments available to man, and put at his disposal an almost limitless variety of intermediaries and auxiliaries. Technique has been extended geographically so that it covers the whole earth. It is evolving with a rapidity disconcerting not only to the man in the street but to the technician himself. It poses problems which recur endlessly and every more acutely in human social groups. Moreover, technique has become objective and is transmitted like a physical thing; it leads thereby to a certain unity of civilization, regardless of the environment or the country in which it operates. We are faced with the exact opposite of the traits previously in force. We must, therefore, examine carefully the positive characteristics of the technique of the present.

There are two essential characteristics of today's technical phenomenon which I shall not belabor because of their obviousness. These two, incidentally, are the only ones which, in general, are emphasized by the "best authors."

The first of these obvious characteristics is rationality. In technique, whatever its aspect or the domain in which it is applied, a rational process is present which tends to bring mechanics to bear

on all that is spontaneous or irrational. This rationality, best exemplified in systematization, division of labor, creation of standards, production norms, and the like, involves two distinct phases: first, the use of "discourse" in every operation; this excludes spontaneity and personal creativity. Second, there is the reduction of method to its logical dimension alone. Every intervention of technique is, in effect, a reduction of facts, forces, phenomena, means, and instruments to the schema of logic.

The second obvious characteristic of the technical phenomenon is artificiality. Technique is opposed to nature. Art, artifice, artificial: technique as art is the creation of an artificial system. This is not a matter of opinion. The means man has at his disposal as a function of technique are artificial means. For this reason, the comparison proposed by Emmanuel Mounier between the machine and the human body is valueless. The world that is being created by the accumulation of technical means is an artificial world and hence radically different from the natural world.

It destroys, eliminates, or subordinates the natural world, and does not allow this world to restore itself or even to enter into a symbiotic relation with it. The two worlds obey different imperatives, different directives, and different laws which have nothing in common. Just as hydroelectric installations take waterfalls and lead them into conduits, so the technical milieu absorbs the natural. We are rapidly approaching the time when there will be no longer any natural environment at all. When we succeed in producing artificial *aurorae boreales,* night will disappear and perpetual day will reign over the planet.

I have given only brief descriptions of these two well-known characteristics. But I shall analyze the others at greater length; they are technical automatism, self-augmentation, monism, universalism, and autonomy.

Characteristics of Modern Technique

Automatism of Technical Choice. "The one best way": so runs the formula to which our technique corresponds. When everything has been measured and calculated mathematically so that the method which has been decided upon is satisfactory from the rational point

of view, and when, from the practical point of view, the method is manifestly the most efficient of all those hitherto employed or those in competition with it, then the technical movement becomes self-directing. I call the process *automatism.*

There is no personal choice, in respect to magnitude, between, say, 3 and 4; 4 is greater than 3; this is a fact which has no personal reference. No one can change it or assert the contrary or personally escape it. Similarly, there is no choice between two technical methods. One of them asserts itself inescapably: its results are calculated, measured, obvious, and indisputable.

A surgical operation which was formerly not feasible but can now be performed is not an object of choice. It simply is. Here we see the prime aspect of technical automatism. Technique itself, *ipso facto* and without indulgence or possible discussion, selects among the means to be employed. The human being is no longer in any sense the agent of choice. Let no one say that man is the agent of technical progress (a question I shall discuss later) and that it is he who chooses among possible techniques. In reality, he neither is nor does anything of the sort. He is a device for recording effects and results obtained by various techniques. He does not make a choice of complex and, in some way, human motives. He can decide only in favor of the technique that gives the maximum efficiency. But this is not choice. A machine could effect the same operation. Man still appears to be choosing when he abandons a given method that has proved excellent from some point of view. But his action comes solely from the fact that he has thoroughly analyzed the results and determined that from another point of view the method in question is less efficient. A good example is furnished by the attempts to deconcentrate our great industrial plants after we had concentrated them to the maximum possible degree. Another example would be the decision to abandon certain systems of high production in order to obtain a more constant productivity, although it might be less per capita. It is always a question of the improvement of the method in itself.

The worst reproach modern society can level is the charge that some person or system is impeding this technical automatism. When a labor union leader says: "In a period of recession, productivity is a social scourge," his declaration stirs up a storm of protest and condemnation, because he is putting a personal judgment before the

technical axiom that what can be produced must be produced. If a machine can yield a given result, it must be used to capacity, and it is considered criminal and antisocial not to do so. Technical automatism may not be judged or questioned; immediate use must be found for the most recent, efficient, and technical process.

Communism's fundamental criticism of capitalism is that financial capitalism checks technical progress that produces no profits; or that it promotes technical progress only in order to reserve for itself a monopoly. In any case, as Rubinstein points out, technical progress occurs under capitalism for reasons which have nothing to do with technique, and it is this fact which is to be criticized. Since the Communist regime is oriented toward technical progress, the mark of the superiority of Communism is that it adopts all technical progress. Rubinstein concludes his study by remarking that this progress is the goal of all efforts in the Soviet Union, where it is said to be possible to allow free play to technical automatism without checking it in any way.

Another traditional analysis supplements Rubinstein's. This serious study, carried out by Thorstein Veblen, maintains that there is a conflict between the machine and business. Financial investment, which originally accelerated invention, now prolongs technical inactivity. Capitalism does not give free play to technical activity, the goal of which is that a more efficient method or a more rapidly acting machine should *ipso facto* and automatically replace the preceding method or machine. Capitalism does not give free play to these factors because it inadmissibly subordinates technique to ends other than technique itself, and because it is incapable of absorbing technical progress. The replacement of machines at the tempo of technical invention is completely impossible for capitalist enterprise because there is no time to amortize one machine before new ones appear. Moreover, the more these machines are improved, and hence become more efficient, the more they cost.

The pursuit of technical automatism would condemn capitalist enterprises to failure. The reaction of capitalism is well known: the patents of new machines are acquired and the machines are never put into operation. Sometimes machines that are already in operation are acquired, as in the case of England's largest glass factory in 1932, and destroyed. Capitalism is no longer in a position to pursue technical automatism on the economic or social plane. It

is incapable of developing a system of distribution that would permit the absorption of all the goods which technique allows to be produced. It is led inevitably to crises of overproduction. And in the same way it is unable to utilize the manpower freed by every new technical improvement. Crises of unemployment ensue.

Thus we return to the old schema of Marx: it is the automatism of technique, with its demand that everything be brought into line with it, that endangers capitalism and heralds its final disappearance. This is an accurate criticism, and reveals two things. First, that we are correct in speaking of automatism. If the situation of capitalism is indeed as described, it is so because technical progress acts automatically. The choice between methods is no longer made according to human measure, but occurs as a mechanical process which nothing can prevent. Capitalism, in spite of all its power, will be crushed by this automatism. Second, that for the men of our time, this automatism is just and good. If Communism can make this critique of capitalism a successful springboard for propaganda, it is only because the criticism is valid. And it is valid because everything can be called into question (God first of all), except technical progress. There is nothing left to do but wonder at a mechanism that functions so well and, apparently, so tirelessly. But, above all else, no finger must be laid upon it, nor its automatism interfered with. It is in this that the headway of technical progress becomes automatic; when modern man renounces control over it and cannot bring himself to raise his hand against it so as to make the choice himself.

This, then, is the first aspect of technical automatism. Inside the technical circle, the choice among methods, mechanism, organizations, and formulas is carried out automatically. Man is stripped of his faculty of choice and he is satisfied. He accepts the situation when he sides with technique.

Let us examine the second aspect of automatism. When we leave the technical domain proper, we find a whole ensemble of nontechnical means; among them a kind of preliminary process of elimination is taking place. The various technical systems have invaded all spheres to the point that they are everywhere in collision with modes of life which were heretofore nontechnical. Human life as a whole is not inundated by technique. It has room for activities that are not rationally or systematically ordered. But the collision

between spontaneous activities and technique is catastrophic for the spontaneous activities.

Technical activity automatically eliminates every nontechnical activity or transforms it into technical activity. This does not mean, however, that there is any conscious effort or directive will.

From the point of view which most interests modern man, that of yield, every technical activity is superior to every nontechnical activity. Take, for example, politics. It used to be said that politics was an art, consisting of finesse, aptness, a particular kind of ability, even genius; in short, of personal qualities which seemed to operate by chance. If politics was to become a technical activity, chance must be eliminated. The results to be obtained must be certain. Unpredictability, which all men share to a greater or lesser degree, must also be eliminated. Rules had to be established for this particularly unstable game if certainty of result was to be achieved. The difficulty was great, but not greater, perhaps, than the difficulty involved in harnessing atomic energy.

It was Lenin who established political technique. He did not succeed in formulating a complete set of principles for it, but from the beginning he attained a twofold result. Even a mediocre politician, by the application of the "method," was able to achieve a good average policy, to ward off catastrophes, and to assure a coherent political line. Moreover, the method was far superior to nontechnical policy; the same result could be obtained with fewer resources and with much less expense.

On the military plane, the technique applied by Hitler (and it was a technique, not military genius as with Napoleon—although it is a mark of genius to develop a technique for war or for politics) not only enabled him to achieve what was not necessarily a direct result of his technique but, more important, it enabled him to resist for three years an adversary who possessed approximately a fivefold superiority in all areas—in numbers of men and military machines, in economic power, and so on. This capacity to resist resulted from the remarkable military technique of the Germans and from the perfectly developed relationship they worked out between nation and army.

In the same way, the political technique of Lenin's school made, and is making, possible the achievement of successes over all other political forms, even when these political forms are able to bring

infinitely superior resources to bear. The tide of Leninian policy retreats for certain periods before the superior weight of the enormous politico-economic machines of the opponents. But to such a political technique only another political technique can be opposed; and since the American political technique, for example, is so inferior, it must deploy instead an enormous expenditure of resources. The superiority of a technique to enormous but inefficiently used resources and machinery means that the point at which technique inserts itself becomes a real turning point. The milieu into which a technique penetrates becomes completely, and often at a stroke, a technical milieu. If a desired result is stipulated, there is no choice possible between technical means and nontechnical means based on imagination, individual qualities, or tradition. Nothing can compete with the technical means. The choice is made a priori. It is not in the power of the individual or of the group to decide to follow some method other than the technical. The individual is in a dilemma: either he decides to safeguard his freedom of choice, chooses to use traditional, personal, moral, or empirical means, thereby entering into competition with a power against which there is no efficacious defense and before which he must suffer defeat; or he decides to accept technical necessity, in which case he will himself be the victor, but only by submitting irreparably to technical slavery. In effect he has no freedom of choice.

We are today at the stage of historical evolution in which everything that is not technique is being eliminated. The challenge to a country, an individual, or a system is solely a technical challenge. Only a technical force can be opposed to a technical force. All else is swept away. Serge Tchakotin reminds us of this constantly. In the face of the psychological outrages of propaganda, what reply can there be? It is useless to appeal to culture or religion. It is useless to educate the populace. Only propaganda can retort to propaganda, or psychological rape to psychological rape. Hitler formulated this long before Tchakotin. He writes, in *Mein Kampf:* "Unless the enemy learns to combat poison gas with poison gas, this tactic, which is based on an accurate evaluation of human weaknesses, must lead almost mathematically to success."

The exclusive character of technique gives us one of the reasons for its lightning progress. There is no place for an individual today unless he is a technician. No social group is able to resist the pres-

sures of the environment unless it utilizes technique. To be in possession of the lightning thrust of technique is a matter of life or death for individuals and groups alike; no power on earth can withstand its pressures.

Will the technical phenomena of today be able to maintain itself, or must it suffer in its turn impairment or even liquidation? It is difficult to see ahead, and, in any case, this is not the place to try to do so. Doubtless, technique has its limits. But when it has reached these limits, will anything exist outside them? Its limits are presupposed by its object and its method. But is it not succeeding in undermining everything which is outside it? Beyond its precise and limited compass, whatever its size, will there remain anything in existence? We shall be answering this question all through this book. Within the technical circle nothing else can subsist because technique's proper motion, as Jünger has shown, tends irresistibly toward completeness. To the degree that this completeness is not yet attained, technique is advancing, eliminating every lesser force. And when it has received full satisfaction and accomplished its vocation, it will remain alone in the field. Technique thus reveals itself at once destroyer and creator, and no one wishes or is able to master it.

Self-augmentation. The self-augmentation of technique also has two aspects. At the present time, technique has arrived at such a point in its evolution that it is being transformed and is progressing almost without decisive intervention by man. Modern men are so enthusiastic about technique, so assured of its superiority, so immersed in the technical milieu, that without exception they are oriented toward technical progress. They all work at it, and in every profession or trade everyone seeks to introduce technical improvement. Essentially, technique progresses as a result of this common effort. Technical progress and common human effort come to the same thing. Vincent analyzes with great subtlety the multitude of factors which intervene, each in its small way, in technical progress: the consumer, accumulation of capital, research bureaus and laboratories, and the organization of production, which acts "in some sense mechanically." Technical progress appears to Vincent to be "the resultant" of all these factors. In one sense, technique indeed progresses by means of minute improvements which are the result of common human efforts and are indefinitely additive until

they form a mass of new conditions that permit a decisive forward step. But it is equally true that technique sharply reduces the role of human invention. It is no longer the man of genius who discovers something. It is no longer the vision of a Newton which is decisive. What is decisive is this anonymous accretion of conditions for the leap ahead. When all the conditions concur, only minimal human intervention is needed to produce important advances. It might almost be maintained that, at this stage of evolution of a technical problem, whoever attacked the problem would find the solution.

The example of the steam engine and its manifold successive small alterations is well known. This example is being repeated today in all fields.

The accretion of manifold minute details, all tending to perfect the ensemble, is much more decisive than the intervention of the individual who assembles the new data, adds some element which transforms the situation, and thus gives birth to a machine or to some spectacular system that will bear his name.

This is the way progress takes place in the field of education, too. After the general direction given by initiators (like Decroly or Montessori), it is the findings of thousands of educators which ceaselessly nourish the improvement of technique. In fact, educational systems are completely transformed as a result of practice—without any one's being quite aware of it. In industrial plants, the discovery of details is utilized in another way: to create interest on the part of the worker in his work. The worker is asked not only to use the machine he operates, but also to study it to find flaws in its operation, then to find remedies against these faults, and in addition to determine how its productivity might be improved. The result is the "suggestion box" by means of which workers may indicate their ideas and plans for improvement.

This collective, anonymous research advances techniques almost everywhere in the world by a like impulse, a striking result of self-augmentation. It is noticeable that identical technical inventions are produced simultaneously in many countries. To the degree that science is taking on a more and more technical aspect, these discoveries are made everywhere at the same time—a further indication that scientific discoveries are, in reality, governed by technique.

The smashing of the atom and the atomic bomb are characteris-

tic of this simultaneity. In Germany, Norway, the U.S.S.R., the United States, and France, research had reached almost the same point in 1939. But circumstances upset European technical evolution and gave superiority to the United States. Among these circumstances were the invasion of Norway and France, the collapse of Germany several months after the discovery, and the lack of means and raw material in the U.S.S.R. What is true of scientific inventions is much more true of technical inventions. Only lack of means halts progress in certain countries. The more advanced a country is in the employment of technique, the more material is required, whether in numbers of men, raw materials, or complexity of machines. A country must be wealthy to exploit techniques to a maximum. And when the country is able to do this, technique returns a hundredfold increase in its wealth. This is another element in self-augmentation.

It is still necessary to justify the term *self-augmentation*, since it appears to be contradicted by what I have just been saying. If technical advance is assured by the joint effort of thousands of technicians, each of whom makes his contribution, it would seem impossible to speak of self-augmentation. But there is another aspect which must be brought to light.

There is an automatic growth (that is, a growth which is not calculated, desired, or chosen) of everything which concerns technique. This applies even to men. Statistically, the number of scientists and technicians has doubled every decade for a century and a half. Apparently this is a self-generating process: technique engenders itself. When a new technical form appears, it makes possible and conditions a number of others. To take a plain and elementary example: the internal-combustion engine made possible and conditioned the techniques of the automobile, the submarine, and so on. In the same way, once a technical procedure has been discovered, it is applicable in many fields other than the one for which it was primarily invented. The techniques of "operational research," for example, were devised to help make certain military decisions. But it was immediately noted that they could be applied wherever any decision had to be made. As Baraché, a specialist in these techniques, says: "The nature of the problems themselves was secondary . . the methods of approach and the tech-

niques employed proved to have a general scope." The same could be said for the techniques of organization. There is, therefore, a self-augmentation of the areas of application.

This does not necessarily mean an infinite or indefinite augmentation of technique. I do not wish at this point to enter the realm of prognosis, but predictions of the more or less rapid extinction of technical progress seem to me to be contradicted by the facts. Whether it be Lewis Mumford, say, declaring that the era of mechanical progress is almost at an end, or Colin Clark announcing the transition of secondary mechanical activities to tertiary activities, they are exhibiting what can only be termed a dangerous confidence.

Lewis Mumford shows that certain of our inventions cannot be improved, that the possible domain of mechanical activity cannot be extended, and that mechanical progress is limited by the nature of the physical world. This last is true. But we are far from knowing the total possibilities of the physical world. And after Mumford had written that statement fifteen years ago, servomechanisms, radar, and atom smashing were discovered. It is obvious that the augmentation of machines cannot be unlimited. But, so as not to rest our hopes on an alleged stagnation, it will be enough for this progress to continue for another century.

What is true of mechnical techniques is also true of economic techniques. I agree fully with the remarks of Léon Hugo Dupriez when he points out the error of the "stagnationists"—of Wolf, for example, who writes: "The law of the limit of technico-economic development is that past progress closes the door to future progress. For future progress there remains in every case only a margin, only a fraction, indeed only a small fraction, of past progress." Dupriez's exposure of the error of statements like this seems to me so convincing that I shall content myself with referring the reader to his work.

On the other hand, Lewis Mumford shows (and, from another perspective, this is also Colin Clark's thought) that the best organization will tend to reduce the use of certain machines. This is rigorously exact. But this "best organization" is precisely technique itself and, moreover, it comprises a mechanical element as well. When Fourastié announces an augmentation of the tertiary, non-mechanized sector, the extraordinary progress of administrative

mechanization of the last ten years must be considered. This mechanization completely modifies the conditions of human work by what has been termed "the replacement of the organic and the psychological by the mechanical." It is certain that this fact will entail the same social crisis of unemployment as in the "secondary" sector. To take an example, the tabulator adds and prints 45,000 numbers an hour (as compared with 1,500 for a trained employee). It reads, calculates, analyzes, and prints 150 lines a minute. A punching machine, attached to it, produces the punched cards which recapitulate the results. The Gamma (a magnetic-drum machine) has a "memory" with a capacity for 200,000 individual items of data. A 1960-model calculating machine can handle 40,000 operations a second. The machine, along with organizational development, is now the means of reducing both the number of employees and expenses, and also of reducing, on the collective plane, the tertiary sector of manpower.

We can hardly agree that mechanical augmentation is decelerating. We are simply in another phase of technical progress: the phase of assimilation, organization, and conquest of the other areas. Here the progress to be made seems limitless, and consists primarily in the efficient systematization of society and the conquest of the human being. All that can be said is that, at best, technical activity has changed its field of operation; it cannot be said that it has slowed down.

Moreover, nothing argues that subsequently technical activity will not again turn toward the world of machines with renewed vigor. On the whole, it is the principle of the combination of techniques which causes self-augmentation.

Self-augmentation can be formulated in two laws:

1. *In a given civilization, technical progress is irreversible.*

2. *Technical progress tends to act, not according to an arithmetic, but according to a geometric progression.*

The first of these laws—and we base our conviction on the whole of history—makes us certain that every invention calls forth other technical inventions in other domains. There is never any question of an arrest of the process, and even less of a backward movement. Arrest and retreat only occur when an entire society collapses. In the transition to a successor, a certain number of technical procedures are lost. But, in the framework of the same civilization,

technical progress is never in question. Later I shall examine the reasons for this. Technical progression is of the same nature as the process of numbering; there is no good ground for halting the progression, because after each number we can always add 1. In technical evolution also, it seems that limits no longer exist. Improvements that result from the application of technique to the matter at hand (whether it be physical or social) can be added uninterruptedly; there is no reason for arresting the process. In arguing thus, the qualification must be made that this can be said only of the *ensemble* of techniques, of the technical phenomenon, and not of any particular technique. For every technique taken by itself there apparently exist barriers that act to impede further progress, barriers to the addition of new inventions—but these can sometimes be cleared, as the sound barrier has been for aircraft. For the technical phenomenon in its ensemble, however, a limitless progress is open. This progress, as Wiener has shown, is a necessity. Since techniques, proportionally to their development, exhaust the resources of nature, it is indispensable to fill the vacuum so created by a more rapid technical progress. Only inventions perpetually more numerous and automatically increasing can make good the unheard-of expenditures and the irremediable consumption of raw materials such as wood, coal, petroleum, and even water.

What is it that determines this progression today? We can no longer argue that it is an economic or a social condition, or education, or any other human factor. Essentially, the preceding technical situation alone is determinative. When a given technical discovery occurs, it has followed almost of necessity certain other discoveries. Human intervention in this succession appears only as an incidental cause, and no one man can do this by himself. But anyone who is sufficiently up-to-date technically can make a valid discovery which rationally follows its predecessors and rationally heralds what is to follow.

Two points must be made more precise here. First, the technical consequences of a technical improvement are not necessarily of a kind. Thus, a purely mechanical discovery may have repercussions in the domain of social techniques or in that of organizational techniques. For example, machines that use perforated cards affect statistics and the organization of certain business enterprises. Con-

versely, some kind of social technique (for instance, full employment) may entail an improvement in the techniques of economic production.

Here we note the interdependence of techniques which is stated in the second law of self-augmentation: technical progress tends to be brought about according to a geometric progression. A technical discovery has repercussions and entails progress in several branches of technique and not merely in one. Moreover, techniques combine with one another, and the more given techniques there are to be combined, the more combinations are possible. Thus, almost without deliberate will, by a simple combination of new data, incessant discoveries take place everywhere; and whole fields are opened up to technique because of the meeting of several currents. Material techniques of communication, psychological techniques, commercial techniques, techniques of authoritarian government, all combine to produce the important phenomenon of propaganda, which represents a new technique independent of all the rest and necessarily produced as a consequence of the preceding phenomena.

This second law of self-augmentation explains a characteristic of the technical movement which has engaged the attention of contemporary sociologists. This is the unevenness of technical development. Enormous disparities exist not only in the various global areas of technical expansion but also in each field within the various sectors. Technique progresses more rapidly in one branch than in another—and certain retrogressions are always possible. To Frankel this unevenness of development is the key to the disturbances of equilibrium and the social difficulties that the technical phenomenon provokes. According to Frankel, if all branches evolved in the same rhythm, there would be no problem. Frankel's view, certainly too simple, is probably not inexact. However, it explains little. In fact, these clashing rhythms cannot be altered because of technical automatism.

Fourastié is right in arguing that technical progress is unpredictable. It cannot be known with certainty even a short time in advance in what quarter the new technical invention will be produced, precisely because such inventions are, for the most part, the result of self-augmentation. (Of course, a distinction must be made between invention and discovery.) Short of halting progress by force

in an advanced sector, there are no means of bringing these rhythms back into harmony; and the role of the individual is progressively weakened.

The final point to make in discussing self-augmentation is that technique, in its development, poses primarily technical problems which consequently can be resolved only by technique. The present level of technique brings on new advances, and these in turn add to existing technical difficulties and technical problems, which demand further advances still. This is a concrete problem in town planning. A large city supposes a concentration of the means of transport, air control, traffic organization, and so on. Each of these permits the city to grow even larger and promotes new technical advances. For example, to make housework easier, garbage-disposal units have been put into use which allow the garbage to run off through the kitchen sinks. The result is enormous pollution of the rivers. It is then necessary to find some new means of purifying the rivers so that water can be used for drinking. A great quantity of oxygen is required for bacteria to destroy these organic materials. And how shall we oxygenate rivers? This is an example of the way in which technique engenders itself.

The mechanization of administrative work in business offices raises the problem of a necessarily different kind of organization. It is not merely a question of replacing human beings with machines or of speeding up the work (of bookkeeping, for example), but rather of effecting operations of a new type which must be integrated into a new kind of organization. For example, the organization of the whole system of inventory analysis (with its four functions of entering, grouping, totaling, and comparing) becomes necessary. An ensemble of new techniques must be elaborated without which the machine in question would be good for nothing, resulting only in what Mas terms "pseudo-systematization."

The implications of self-augmentation become clearer: the individual's role is less and less important in technical evolution. The more factors there are, the more readily they combine and the more evident is the urgent need for each technical advance. Advance for its own sake becomes proportionately greater and the expression of human autonomy proportionately feebler.

Human beings are, indeed, always necessary. But literally anyone

can do the job, provided he is trained to it. Henceforth, men will be able to act only in virtue of their commonest and lowest nature, and not in virtue of what they possess of superiority and individuality. The qualities which technique requires for its advance are precisely those characteristics of a technical order which do not represent individual intelligence. And here we enter into another area, the nature of the technician.

In this decisive evolution, the human being does not play a part. Technical elements combine among themselves, and they do so more and more spontaneously. In the future, man will apparently be confined to the role of a recording device; he will note the effects of techniques upon one another, and register the results.

A whole new kind of spontaneous action is taking place here, and we know neither its laws nor its ends. In this sense it is possible to speak of the "reality" of technique—with its own substance, its own particular mode of being, and a life independent of our power of decision. The evolution of techniques then becomes exclusively causal; it loses all finality. This is what economists such as Alfred Sauvy mean when they say that "by a slow reversal . . . production is more and more determined by the wishes of individuals in their capacity as producers, than by their decisions as consumers." In reality, it is not the "wishes" of the "producers" which control, but the technical necessity of production which forces itself on the consumers. Anything and everything which technique is able to produce *is* produced and accepted by the consumer. The belief that the human producer is still master of production is a dangerous illusion.

Technique is organized as a closed world. It utilizes what the mass of men do not understand. It is even based on human ignorance. As Charles Camichel says: "The worker cannot understand the workings of modern industry." The individual, in order to make use of technical instruments, no longer needs to know about his civilization. And no single technician dominates the whole complex any longer. The bond that unites the fragmentary actions and disjointedness of individuals, co-ordinating and systematizing their work, is no longer a human one, but the internal laws of technique. The human hand no longer spans the complex of means, nor does the human brain synthesize man's acts. Only the intrinsic monism

of technique assures cohesion between human means and acts. Technique reigns alone, a blind force and more clear-sighted than the best human intelligence.

This phenomenon of self-augmentation gives technique a strangely harsh aspect. It resembles nothing other than itself. Whatever the domain to which it is applied, man or God, technique simply *is;* it undergoes no modifications in the movement which is its being and essence. It is the only locus where form and being are identical. It is only a form, but everything conforms to it. Here technique assumes the peculiar characteristics which make it a thing apart. A precise and well-defined boundary surrounds it: there is that which is technique, and there is everything else, which is not. Whoever passes this boundary and enters into technique is constrained to adopt its characteristics. Technique modifies whatever it touches, but it is itself untouchable. Nothing in nature, or in social or human life, is comparable with it. The intelligence of art or war comes nowhere near that of technique, no more than does the industry of ants or bees. A hybrid but not sterile being, and capable of self-generation, technique traces its own limits and fashions its own image.

Whatever the adaptations nature or circumstances demand of it, technique remains self-identical in its characteristics and its course. Hindrances seem to compel it to become, not something else, but even more itself. Everything it assimilates strengthens it in its traits. There is no hope of seeing it change into a fine and gracious being: it is neither Caliban nor Ariel, but it has been able to take Ariel and Caliban into the unconditioned circles of its universal method.

Monism.[2] The technical phenomenon, embracing all the separate techniques, forms a whole. This monism of technique was already obvious to us when we determined, on the basis of the evidence, that the technical phenomenon presents, everywhere and essentially, the same characteristics. It is useless to look for differentiations. They do exist, but only secondarily. The common features of the technical phenomenon are so sharply

[2] The French word is *unicité* or *insécabilité*. I have adopted "monism" as the English equivalent. "Holism" might have been better. In any case, the accumulated philosophical baggage of both these terms must be rejected and the meaning of the term understood contextually. (Trans.)

drawn that it is easy to discern that which is the technical phenomenon and that which is not. The difficulties experienced in the study of technique arise partly from the method to be used and partly from terminology. They do not arise from the phenomenon itself, which is eminently simple to fix.

To analyze these common features is tricky, but it is simple to grasp them. Just as there are principles common to things as different as a wireless set and an internal-combustion engine, so the organization of an office and the construction of an aircraft have certain identical features. This identity is the primary mark of that thoroughgoing unity which makes the technical phenomenon a single essence despite the extreme diversity of its appearances.

As a corollary, it is impossible to analyze this or that element out of it—a truth which is today particularly misunderstood. The great tendency of all persons who study techniques is to make distinctions. They distinguish between the different elements of technique, maintaining some and discarding others. They distinguish between technique and the use to which it is put. These distinctions are completely invalid and show only that he who makes them has understood nothing of the technical phenomenon. Its parts are ontologically tied together; in it, use is inseparable from being.

It is common practice, for example, to deny the unity of the technical complex so as to be able to fasten one's hopes on one or another of its branches. Mumford gives a remarkable example of this when he contrasts the grandeur of the printing press with the horridness of the newspaper. "On the one side there is the gigantic printing press, a miracle of fine articulation . . . On the other the content of the papers themselves recording the most vulgar and elementary emotional states . . . There the impersonal, the cooperative, the objective; here the limited, the subjective, the recalcitrant, the ego, violent and full of hate and fear, etc. . . ." Unfortunately, it did not occur to Mumford to ask whether the content of our newspapers is not really necessitated by the social form imposed on man by the machine.

This content is not the product of chance or of some economic form. It is the result of precise psychological and psychoanalytical techniques. These techniques have as their goal the bringing to the individual of that which is indispensable for his satisfaction in the conditions in which the machine has placed him, of inhibiting in

him the sense of revolution, of subjugating him by flattering him. In other words, journalistic content is a technical complex expressly intended to adapt the man to the machine.

It is certain that a press of high intellectual tone and great moral elevation either would not be read (and then one would scarcely see the wherefore of these beautiful machines) or would provoke in the long run a violent reaction against every form of technical society, including the machine. This reaction would come about not because of the ideas such a press would disseminate, but because the reader would no longer find in it the indispensable instrument for releasing his repressed passions.

In a sound evaluation of the problem, it ought never to be said: on the one side, technique; on the other, the abuse of it. There are different techniques which correspond to different necessities. But all techniques are inseparably united. Everything hangs together in the technical world, as it does in the mechanical; in both, the advisability of the isolated means must be distinguished from the advisability of the mechanical "complex." The claims of the mechanical "complex" must prevail when, for example, a machine too costly or overrefined threatens to wreck the ensemble.

There is an attractive notion which would apparently resolve all technical problems: that it is not the technique that is wrong, but the use men make of it. Consequently, if the use is changed, there will no longer be any objection to the technique.

I shall return more than once to this conception. Let us examine a single aspect of it now. First, it manifestly rests on the confusion between machine and technique. A man can use his automobile to take a trip or to kill his neighbors. But the second use is not a use; it is a crime. The automobile was not created to kill people, so the fact is not important. I know, of course, that killing people is not what those who explain things in this way have in mind. They prefer to say that man orients his pursuits in the direction of good and not of evil. They mean that technique seeks to invent rational therapies and not poison gases, useful sources of energy and not atomic bombs, commercial and not military aircraft, etc. This leads them straight back to man—man who decides in what direction to orient his researches. (Must it not be, then, that man is becoming better?) But all this is an error. It resolutely refuses to recognize technical reality. It supposes, to begin with, that men orient technique in a

given direction for moral, and consequently nontechnical, reasons. But a principal characteristic of technique (which we shall study at length) is its refusal to tolerate moral judgments. It is absolutely independent of them and eliminates them from its domain. Technique never observes the distinction between moral and immoral use. It tends, on the contrary, to create a completely independent technical morality.

Here, then, is one of the elements of weakness of this point of view. It does not perceive technique's rigorous autonomy with respect to morals; it does not see that the infusion of some more or less vague sentiment of human welfare cannot alter it. Not even the moral conversion of the technicians could make a difference. At best, they would cease to be good technicians.

This attitude supposes further that technique evolves with some end in view, and that this end is human good. Technique, as I believe I have shown, is totally irrelevant to this notion and pursues no end, professed or unprofessed. It evolves in a purely causal way: the combination of preceding elements furnishes the new technical elements. There is no purpose or plan that is being progressively realized. There is not even a tendency toward human ends. We are dealing with a phenomenon blind to the future, in a domain of integral causality. Hence, to pose arbitrarily some goal or other, to propose a direction for technique, is to deny technique and divest it of its character and its strength.

There is a final argument against this position. It was said that the use made of technique is bad. But this assertion has no meaning at all. As I have pointed out, a number of uses can always be made of the machine, but only one of them is the technical use. The use of the automobile as a murder weapon does not represent the technical use, that is, the one best way of doing something. Technique is a means with a set of rules for the game. It is a "method of being used" which is unique and not open to arbitrary choice; we gain no advantage from the machine or from organization if it is not used as it ought to be. There is but one method for its use, one possibility. Lacking this, it is not a technique. Technique is in itself a method of action, which is exactly what a use means. To say of such a technical means that a bad use has been made of it is to say that no technical use has been made of it, that it has not been made to yield what it could have yielded and ought to have yielded. The

driver who uses his automobile carelessly makes a bad use of it. Such use, incidentally, has nothing to do with the use which moralists wish to ascribe to technique. Technique *is* a use. Moralists wish to apply another use, with other criteria. What they wish, to be precise, is that technique no longer be technique. Under the circumstances, there are no further significant problems.

There is no difference at all between technique and its use. The individual is faced with an exclusive choice, either to use the technique as it should be used according to the technical rules, or not to use it at all. It is impossible to use it otherwise than according to the technical rules.

Unfortunately, men today accept this reality only with difficulty. Thus, when Mumford makes the statement: "The army is the ideal form towards which a purely mechanical industrial system must tend," he is unable to restrain himself from adding: "But the result is not ideal." What is the "ideal" doing here? The ideal is not the problem. The problem is solely to know whether this mode of organization responds to technical criteria. Mumford is able to show that it is nothing of the kind, because he limits techniques to machines. But if he were to accept the role of human techniques in the organization of the army he could account for the fact that the army indeed remains the irreproachable model of a technical organization, and its value has nothing to do with an ideal. It is infantile to wish to submit the machine to the criterion of the ideal.

It is also held that technique could be directed toward that which is positive, constructive, and enriching, omitting that which is negative, destructive, and impoverishing. In demagogic formulation, techniques of peace must be developed and techniques of war rejected. In a less simple-minded version, it is held that means ought to be sought which palliate, without increasing, the drawbacks of technique. Could not atomic engines and atomic power have been discovered without creating the bomb? To reason thus is to separate technical elements with no justification. Techniques of peace and alongside them other and different techniques of war simply do not exist, despite what good folk think to the contrary.

The organization of an army comes to resemble more and more that of a great industrial plant. It is the technical phenomenon presenting a formidable unity in all its parts, which are inseparable. The fact that the atomic bomb was created before the atomic

engine was not essentially the result of the perversity of technical men. Nor was it solely the attitude of the state which determined this order. The action of the state was certainly the deciding factor in atomic research (I shall take up this point later). Research was greatly accelerated by the necessities of war and consequently directed toward a bomb. If the state had not been oriented toward the ends of war, it would not have devoted so much money to atomic research. All this caused an undeniable factor of orientation to intervene. But if the state had not promoted such efforts, it would have been the whole complex of atomic research which would have been halted without distinction between the uses of war and peace.

If atomic research is encouraged, it is obligatory to pass through the stage of the atomic bomb; the bomb represents by far the simplest utilization of atomic energy. The problems involved in the military use of atomic energy are infinitely more simple to resolve than are those involved in its industrial use. For industrial use, all the problems involved in the bomb must be solved, and in addition certain others, a fact corroborated by J. Robert Oppenheimer in his Paris lecture of 1958. The experience of Great Britain between 1955 and 1960 in producing electricity of nuclear origin is very significant in this respect.

It was, then, necessary to pass through the period of research which culminated in the bomb before proceeding to its normal sequel, atomic motive power. The atomic-bomb period is a transitory, but unfortunately necessary, stage in the general evolution of this technique. In the interim period represented by the bomb, the possessor, finding himself with so powerful an instrument, is led to use it. Why? Because everything which is technique is necessarily used as soon as it is available, without distinction of good or evil. This is the principal law of our age. We may quote here Jacques Soustelle's well-known remark of May, 1960, in reference to the atomic bomb. It expresses the deep feeling of us all: "Since it was possible, it was necessary." Really a master phrase for all technical evolution.

Even an author as well disposed toward the machine as Mumford recognizes that there is a tendency to utilize all inventions whether there is need for them or not. "Our grandparents used sheet iron for walls although they knew that iron is a good conductor of

heat . . . The introduction of anesthetics led to the performance of superfluous operations. . . ." To say that it could be otherwise is simply to make an abstraction of man.

Another example is the police. The police have perfected to an unheard of degree technical methods both of research and of action. Everyone is delighted with this development because it would seem to guarantee an increasingly efficient protection against criminals. Let us put aside for the moment the problem of police corruption and concentrate on the technical apparatus, which, as I have noted, is becoming extremely precise. Will this apparatus be applied only to criminals? We know that this is not the case; and we are tempted to react by saying that it is the *state* which applies this technical apparatus without discrimination. But there is an error of perspective here. The instrument tends to be applied *everywhere* it *can* be applied. It functions without discrimination—because it exists without discrimination. The techniques of the police, which are developing at an extremely rapid tempo, have as their necessary end the transformation of the entire nation into a concentration camp. This is no perverse decision on the part of some party or government. To be sure of apprehending criminals, it is necessary that *everyone* be supervised. It is necessary to know exactly what every citizen is up to, to know his relations, his amusements, etc. And the state is increasingly in a position to know these things.

This does not imply a reign of terror or of arbitrary arrests. The best technique is one which makes itself felt the least and which represents the least burden. But every citizen must be thoroughly known to the police and must live under conditions of discreet surveillance. All this results from the perfection of technical methods.

The police cannot attain technical perfection unless they have total control. And, as Ernst Kohn-Bramstedt has remarked, this total control has both an objective and a subjective side. Subjectively, control satisfies the desire for power and certain sadistic tendencies. But the subjective aspect is not the dominant one. It is not the major aspect, the expression of what is to come. In reality, the objective aspect of control—more and more, that is to say, the pure technique which creates a milieu, an atmosphere, an environment, and even a model of behavior in social relations—dominates more and more. The police must move in the direction of anticipat-

ing and forestalling crime. Eventually intervention will be useless. This state of affairs can come about in two ways: first, by constant surveillance, to the end that noxious intentions be known in advance and the police be able to act before the premeditated crime takes place; second, by the climate of social conformity which we have mentioned. This goal presupposes the paternal surveillance of every citizen and, in addition, the closest possible tie-in with all other techniques—administrative, organizational, and psychological. The technique of police control has value only if the police are in close contact with the trade unions and the schools. In particular, it is allied with propaganda. Wherever the phenomenon is observed, this connection exists. Propaganda itself cannot be efficient unless it brings into play the whole state organization, and particularly the police power. Conversely, police power is a genuine technique only when it is supplemented by propaganda, which plays a leading role in the psychological environment necessary to the completeness of the police power. But propaganda must also teach acceptance of what the police power is and what it can do. It must make the police power palatable, justify its actions, and give it its psychosociological structure among the masses of the people.

All this is equally true for dictatorial regimes in which police and propaganda concentrate on terror, and for democratic regimes in which the motion pictures, for example, show the good offices of the police and procure it the friendly feeling of the public. The vicious circle mentioned by Ernst Kohn-Bramstedt (past terror accentuates present propaganda, and present propaganda paves the way for future terror) is as true of democratic as of dictatorial regimes, if the term *terror* is replaced by *efficiency.*

This type of police organization is not an arbitrary prospect. It is maintained by every authoritarian government, where every citizen is regarded as a suspect ignorant of his own capabilities. It is the tendency in the United States, and we are beginning to see the first elements of it in France. The administration of the French police was oriented, in 1951, toward an organization of the system "in depth." This took place, for example, at the level of the Record Office. Certain elements of this are simple and well known: fingerprint files, records of firearms, application of statistical methods which allow the police to obtain in a minimum of time the most varied kinds of information and to know from day to day the current

state of criminality in all its forms. Other elements are somewhat more complicated and new. For example, a punched-card mechanical index system (*Recherches*) has been installed in the Criminal Division. This system offers four hundred possible combinations and permits investigations to begin with any element of the crime: hour of commission, nature, objects stolen, weapons used, etc. The combination obviously does not give the solution but a series of approximations.

The most important item in this catalogue of police techniques is the creation of the so-called "suspect files," which show whether the police ever suspected any individual for any reason or at any time whatsoever, even though no legal document or procedure ever existed against him (from the press conference of M. Baylot, Prefect of Police, 1951). This means that any citizen who, once in his life, had anything to do with the police, even for noncriminal reasons, is put under observation—a fact which ought to affect, speaking conservatively, half the adult male population. It is obvious that these lists are only a point of departure, because it will be tempting, as well as necessary, to complete the files with all observations which may have been collected.

Finally, this technical conception of the police supposes the institution of concentration camps, not in their dramatic aspects, but in their administrative aspects. The Nazi's use of concentration camps has warped our perspectives. The concentration camp is based on two ideas which derive directly from the technical conception of the police: preventive detention (which completes prevention), and re-education. It is not because the use of these terms has not corresponded to reality that we feel it necessary to refuse to see in the concentration camp a very advanced form of the system. Nor is it because the so-called methods of re-education have, on the whole, been methods of destruction that we feel we must consider such a concept of "re-education" an odious joke. The further we advance, the more will the police be considered responsible for the re-education of social misfits, a goal that is a part of the very order which they are charged with protecting.

We are experiencing at present the justification of this development. It is not true that the perfection of police power is the result of the state's Machiavellianism or of some transitory influence. The whole structure of society implies it, of necessity. The more we mo-

bilize the forces of nature, the more must we mobilize men and the more do we require order, which today represents the highest value. To deny this is to deny the whole course of modern times. This order has nothing spontaneous in it. It is rather a patient accretion of a thousand technical details. And each of us derives a feeling of security from every one of the improvements which make this order more efficient and the future safer. Order receives our complete approval; even when we are hostile to the police, we are, by a strange contradiction, partisans of order. In the blossoming of modern discoveries and of our own power, a vertigo has taken hold of us which makes us feel this need to an extreme degree. After all, it is the police who are charged, from the external point of view, with insuring this order which covers organization and morals. How then can we possibly deny to the police indispensable improvements in their methods?

We in France are still in the preparatory phase of this development, but the organization of police power has been pushed very far in Canada and New Zealand, to take two examples. Technical necessity imposes the national concentration camp (which, I must point out, does not involve the suffering usually associated with it).

Let us take another example. A new machine of great productive power put into circulation "releases" a great quantity of work; it replaces many workers. This is an inevitable consequence of technique. In the crude order of things, these workers are simply thrown out of work. Capitalism is blamed for this state of affairs and we are told that technique itself is not responsible for technological unemployment and that the establishment of socialism would set things right. The capitalist replies: "Technological unemployment always dies out of itself. For example, it creates certain new activities which will in the long run create employment for qualified workers." This appears to be a dreadful prospect because it implies a readaptation in *time* and a more or less lengthy period of unemployment. But what does socialism propose? That the "liberated" worker will be used somewhere else and in some other capacity. In the Soviet Union the worker is either adapted to a new skill by means of vocational training or he is sent to another part of the country. In the Beveridge Plan the worker is employed wherever the state opens a plant of any sort. This socialist solution involves readaptation in space. But this solution, too, appears to be com-

pletely alien to human nature. Man is not a mere package to be moved about, an object to be molded and applied wherever there is need. These two forms of readaptation, the only ones possible, are both inhumane. The New Work Code promulgated in the (East) German Democratic Republic in November, 1960, shows this inhumanity in operation in the socialist camp. And none of these adaptations can be separated from the machine which replaces human labor. They are its necessary and inevitable consequence. Of course, idealists will speak of the reduction of the work week. But this reduction can only be effected when equivalent technical improvements are produced in all fields of work. According to Colin Clark, it seems that this reduction, too, must "ceiling out" before long. But this consideration passes over into the area of economics.

I could cite innumerable examples, but the ones I have given suffice to show that technique in itself (and not the use made of it, or its non-necessary consequences) leads to a certain amount of suffering and to social scourges which cannot be completely separated from it. This is its very mechanism.

Of course, a technique can be abandoned when it proves to have evil effects which were not provided for. From then on, there will be an improvement in the technique. A characteristic example is furnished by J. de Castro in *The Geography of Hunger*. De Castro shows in detail, with regard to Brazil, what was already known superficially about other countries, that certain techniques of exploitation have proved disastrous. According to de Castro, certain regions were deforested in order to grow sugar cane. But only the immediate technical productivity was considered. In a further work, de Castro seeks to show that the hunger problem was created by application of the capitalist and colonialist system to agriculture. His reasoning, however, is correct only to a very limited extent. It is true that when an agriculture of diversified crops is replaced by a single-crop economy for commercial ends (tobacco and sugar cane), capitalism is to blame. But most often crop diversification is not disturbed. What happens is that new areas are brought under cultivation, producing a population increase and also a unilateral utilization of the labor forces. And this is less a capitalist than a technical fact. If the possibility of industrializing agriculture exists, why not use it? Any engineer, agronomist, or economist of a hun-

dred years ago would have agreed that bringing uncultivated lands under cultivation constituted a great advance. The application of European agricultural techniques represented an incomparable forward step, when compared, for example, to Indian methods. But it involved certain unforeseen consequences: the resulting deforestation modified hydrographic features, the rivers became torrents, and the drainage waters provoked catastrophic erosion. The topsoil was completely carried away and agriculture became impossible. The fauna, dependent on the existence of the forest, disappeared. In this way, the food-producing possibilities of vast regions vanished. The same situation is developing as a result of the cultivation of peanuts in Senegal, of cotton in the South of the United States, and so on. None of this represents, as is commonly said, a poor application of technique—one guided by selfish interest. It is simply technique. And if the situation is rectified "too late" by the abandonment of the old technique, it will only be as a consequence of some new technical advance. In any case, the first step was inevitable; man can never foresee the totality of consequences of a given technical action. History shows that every technical application from its beginnings presents certain unforeseeable secondary effects which are much more disastrous than the lack of the technique would have been. These effects exist alongside those effects which were foreseen and expected and which represent something valuable and positive.

Technique demands the most rapid possible application; the problems of our day are evolving rapidly and require immediate solutions. Modern man is held by the throat by certain demands which will not be resolved simply by the passage of time. The quickest possible counter-thrust, often a matter of life or death, is necessary. When the parry specific to the attack is found, it is used. It would be foolish not to use the available means. But there is never time to estimate all the repercussions. And, in any case, they are most often unforeseeable. The more we understand the interrelation of all disciplines and the interaction of the instruments, the less time there is to measure these effects accurately.

Moreover, technique demands the most immediate application because it is so expensive. It must "pay off," in money, prestige, or force (depending on whether the regime is capitalist, Communist, or Fascist, respectively). There is no time for precautions

when the distribution of dividends or the salvation of the proletariat is at stake. Nor can we permit ourselves to say that these motives are no affair of technique. If none of them existed, there would be no money for technical research and there would be no technique. Technique cannot be considered in itself, apart from its actual modes of existence.

We are brought back, then, to serious facts of this order: in certain agricultural research in England, antiparasitic agents called *systemics* were applied. An injection was made into a fruit tree, which as a consequence was infected with the agent from its roots to its leaves. Every parasite died. But nothing is known of the effects on the fruit, or of the effects on man, and *in the long run* of the effects on the tree. All that is known is that the agent is not an immediate deadly poison for the consumer. Such products are already commercially available, and it is probable that they will shortly be used on a large scale. What we have said about systemics holds for the specific insecticide, D.D.T. It was announced originally that this insecticide was completely harmless for warm-blooded animals. Subsequently, D.D.T. was widely used. But it was noted in 1951 that D.D.T. in fatty solution (oily or otherwise) is actually a poison for warm-blooded animals and causes a whole complex of disturbances and diseases, in particular, rickets. This fatty solution may be produced entirely by accident, as when cows treated with this chemical produce milk containing D.D.T. Rickets has been detected in calves nourished with such milk. And several international medical congresses since 1956 have drawn attention to the grave danger to children.

But the real question is not the question of error. Errors are always possible. Two facts alone concern us: it is impossible to foresee all the consequences of a technical action; and technique demands that everything it produces be brought into a domain that affects the entire public.

The weight of technique is such that no obstacle can stop it. And every technical advance is matched by a negative reverse side. An excellent study of the effect of petroleum explorations in the Sahara (1958) concludes with the observation that the most serious problem is the increase in the wretchedness of the local population. The causes of this growing misery, among others, are: the supplanting of caravan traffic by motor vehicles; the disappearance of the date

palms (diseased through widespread chemical wastes); and the disappearance of cereal grains because of nonmaintenance of the irrigation works. This complex seems to represent a typical example.

The human being is delivered helpless, in respect to life's most important and most trivial affairs, to a power which is in no sense under his control. For there can be no question today of man's controlling the milk he drinks or the bread he eats, any more than of his controlling his government. The same holds for the development of great industrial plants, transport systems, motion pictures, and so on. It is only after a period of dubious experimentation that a technique is refined and its secondary consequences are modified through a series of technical improvements. Henceforth, someone will say, it will be possible to tame the monster and separate the good results of a technical operation from the bad. That may be. But, in the same framework, the new technical advance will in its turn produce further secondary and unpredictable effects which are no less disastrous than the preceding ones (although they will be of another kind). De Castro declares that the new techniques of soil cultivation presuppose more and more powerful state control, with its police power, its ideology, and its propaganda machinery. This is the price we must pay.

William Vogt, surveying the same problem, is still more precise: in order to avoid famine, resulting from the systematic destruction of the topsoil, we must apply the latest technical methods. But conservation will not be put into practice spontaneously by individuals; yet, these methods must be applied globally or they will not amount to anything. Who can do this? Vogt, like all good Americans, asserts that he detests the authoritarian police state. However, he agrees that only state controls can possibly produce the desired results. He extols the efforts made by the liberal administration of the United States in this respect, but he agrees that the United States continues "to lose ground literally and figuratively," simply because the methods of American agricultural administration are not authoritarian enough.

What measures are to be recommended? The various soils must be classified as to possible ways to cultivate them without destroying them. Authoritarian methods must be applied in order (*a*) to evacuate the population and to prevent it from working the imperiled soil; and (*b*) to grow only certain products on certain types

of soil. The peasant can no longer be allowed freedom in these respects. This evolution is to be facilitated by centralization of the great land holdings. In Latin America there are today from 20 to 40 million ecologically displaced persons, persons occupying lands which ought not to be under cultivation. They are living on hillsides from which it is absolutely necessary to drive them if the means of existence of their countries are to be saved from destruction. It will be difficult and costly to relocate these people, but Latin America has no choice. If she does not solve this problem, she will be reduced to the most miserable standard of living.

All experts on agricultural questions are in fact in fundamental agreement. De Castro (although hostile to the ideas of Vogt) and Dumont (critical of de Castro on certain points) come to the conclusion that only strict planning on a world scale can solve the problems of agriculture, and that only human relocation and collective distribution of wealth can solve the problem of famine. This can only mean that man, if he is to improve the traditional agricultural techniques and be rid of their drawbacks, will be obliged to apply extremely rigorous administrative and police techniques. Here again we have a good example of the interconnection of different elements and of the unpredictability of the secondary effects.

It was believed for a long time that the TVA was a praiseworthy response to certain problems raised by technique. Today, however, certain major flaws have become apparent. For example, the correct application of methods of reforestation and animal reproduction were not understood. Flood control was not carried out by retention of the water in the soil but by submerging permanently a good part of the lands which have been saved to protect others. Man, we repeat, is never able to foresee the totality of effects of his technique. No one could have foreseen that regulating the Colorado River for irrigation purposes would lead the Pacific Ocean to encroach upon the coast of California, or that it would endanger the valleys (which had been "regulated") by the removal of up to 500 tons a day of sand and rock. It is likewise impossible to foresee the effect of techniques intended to control the weather, dispel clouds, precipitate rain or snow, and so on. In another area, Professor Lemaire, in a study of narcotic drugs, shows that technique permits the manufacture of synthetic narcotics with greater and greater ease and in increasing quantities. But, according to

Lemaire, the control of these drugs is thereby rendered more and more difficult because "we cannot predict whether they will or will not be dangerous. The only proof is their habitual use by addicts. But to obtain this proof requires years of experience."

There is scarcely need to recall that universal famine, the most serious danger known to humanity,[1] is caused by the advance of certain medical techniques which have brought with them good and evil inextricably mixed. This is not a question of good or bad use. No more so is the problem, posed by atomic techniques, of the disposal of atomic waste. Atomic explosions are not the real problem. The real problem continues to be that of the disposal of the ceaselessly accumulating waste materials, despite the reassuring but unfortunately partisan explanations of some atomic scientists. The International Agency for Atomic Energy recognized, in 1959, that these wastes represent a deadly peril and that there is no sure way of avoiding it, except perhaps by means of the difficult process of "vitrification" being undertaken in Canada. And all this involves the *peaceful* use of the atom!

In every case, what can really be foreseen more or less clearly is the need of state intervention to control the effects of technical applications. But by the time a technique is modified in the light of these effects, the evil has already been done. When it is proposed to "choose" between effects, it is always too late. It is doubtless still possible to modify any given element, but only at the price of secondary repercussions. Again, it is doubtless possible to produce, by means of rational exploitation of natural resources, enough food to nourish five billion human beings. But this can be accomplished only at the price of forced labor and a new kind of slavery. Whatever point we choose to examine, we always perceive this interrelation of techniques. In 1960, the World Congress for the Study of Nutrition considered the problem of how modern nutrition is vitiated by the use of chemical products which are themselves significant contributory causes of the so-called diseases of civilization (cancer, cardiovascular illnesses, etc.). But the Congress's studies indicate that the solution can no longer be a return to a "natural" nutrition. On the contrary, a further step must be taken which involves *completely* artificial alimentation, so-called rational ali-

[1] That this problem can be solved seems doubtful to most recent congresses, the Vevey Congress of 1960 among them.

mentation. It will not be sufficient merely to control grains, meat, butter, and so forth. The stage at which this would have been feasible has been passed. New technical methods must be found. But can we be assured that this new alimentation will in its turn present no danger?

Every rejection of a technique judged to be bad entails the application of a new technique, the value of which is estimated from the point of view of efficiency alone. But we are always unaware of the more remote repercussions. History shows us that these are seldom positive, at least when we consider history as a whole instead of contenting ourselves with examining disconnected phenomena such as the population increase, the prolongation of the average life span, or the shortening of the work week. These are symptoms which perhaps would have meaning if man were merely an animal, but which have no conclusive significance if man is something more than a production machine.

However, it is not my intention to show that technique will end in disaster. On the contrary, technique has only one principle: efficient ordering. Everything, for technique, is centered on the concept of order. This explains the development of moral and political doctrines at the beginning of the nineteenth century. Everything which represented an ordering principle was taken in deadly earnest. At the same time the means destined to elaborate this order were exploited as never before. Order and peace were required for the development of the individual techniques (after society had reached the necessary stage of disintegration). Peace is indispensable to the triumph of industrialization. It will be hastily concluded from this that industrialization will promote peace. But, as always, logical deductions falsify reality. J. U. Nef has shown admirably that industrialization cannot act otherwise than to promote wars. This is no accident, but rather an organic relation. It holds not only because of the direct influence of industrialization on the means of destruction but also because of its influence on the means of existence. Technical progress favors war, according to Nef, because (*a*) the new weapons have rendered more difficult the distinction between offense and defense; and (*b*) they have enormously reduced the pain and anguish implied in the act of killing.

On another plane, the distinction between peaceful industry and military industry is no longer possible. Every industry, every tech-

nique, however humane its intentions, has military value. "The humanitarian scientist finds himself confronted by a new dilemma: Must he look for ways to make people live longer so that they are better able to destroy one another?" Nef has described all this remarkably well. It is no longer a question of simple human behavior, but of technical necessity.

The technical phenomenon cannot be broken down in such a way as to retain the good and reject the bad. It has a "mass" which renders it monistic. To show this we have taken only the simplest, and hence the most easily debatable, examples. To enable the reader to grasp fully the reality of this monism, it would be necessary to present every problem with all its implications and ramifications into other fields. The case of the police, for example, cannot be considred merely within its specific confines; police technique is closely connected with the techniques of propaganda, administration, and even economics. Economics demands, in effect, an increasing productivity; it is impossible to accept the nonproducers into the body social—the loafers, the coupon-clippers, the social misfits, and the saboteurs—none of these have any place. The police must develop methods to put these useless consumers to work. The problem is the same in a capitalist state (where the Communist is the saboteur) and in a Communist state (where the saboteur is the internationalist in the pay of capitalism).

The necessities and the modes of action of all these techniques combine to form a whole, each part supporting and reinforcing the others. They constitute a co-ordinated phenomenon, no element of which can be detached from the others. It is an illusion, a perfectly understandable one, to hope to be able to suppress the "bad" side of technique and preserve the "good." This belief means that the essence of the technical phenomenon has not been grasped.

The Necessary Linking Together of Techniques. We have seen how the two technical characteristics, self-augmentation and monism, combine. Now we must consider the historical, necessary linking up of all the different techniques. This analysis will complete my discussion of these two characteristics.

Machine technique appeared after 1750. The technical state of mind was first manifested in the application of the principles of science. We already know how this necessity arose (it is emphasized in all textbooks). The flying shuttle of 1733 made a greater pro-

duction of yarn necessary. But production was impossible without a suitable machine. The response to this dilemma was the invention of the spinning jenny by James Hargreaves. But then yarn was produced in much greater quantities than could possibly be used by the weavers. To solve this new problem, Cartwright manufactured his celebrated loom. In this series of events we see in its simplest form the interaction that accelerates the development of machines. Each new machine disturbs the equilibrium of production; the restoration of equilibrium entails the creation of one or more additional machines in other areas of operation.

Production becomes more and more complex. The combination of machines within the same enterprise is a notable characteristic of the nineteenth century. It is impossible, in effect, to have an isolated machine. There must be adjunct machines, if not preparatory ones. This need, which is not clearly evident in the textile industry (a loom is relatively self-sufficient), is singularly well defined in the metallurgical industry. Fabrication in this area consists of multiple inseparable operations. For each of these operations, one or more machines are needed. This gives rise to a complex enterprise which demands the application of the organization of production. The need for organization of machines is found even in the textile industry. A large number of looms must be grouped together in order to utilize the prime mover most effectively, since no individual loom consumes very much energy. To obtain maximum yield, machines cannot be disposed in a haphazard way. Nor can production take place irregularly. A plan must be followed in all technical domains. And this plan, which becomes more and more inflexible in proportion to increasing production, is the product of a technique of organization and of operation.

Organizational technique was still very sketchy at the beginning of the nineteenth century. But with the increase in the number of manufactured products, new commercial methods had to be created. Capital, labor, producers, and consumers had to be found. Three new kinds of technique emerged: commercial, industrial, and transportational. Commercial techniques developed at the beginning of the nineteenth century with the same velocity as industrial techniques. These commercial techniques exploited all the old systems which had previously existed sporadically and

without much vigor. Bills of exchange, banks, clearing houses, double-entry bookkeeping, and the like, were further developed.

The need to distribute manufactured goods thus acted to produce a powerful commercial technique, which, however, proved to be incapable of assuring proper distribution. The accumulation of capital (produced by the machine and also necessitated by it) became the source of an international financial organization, with its systems of great firms, insurance, credit, and the corporation with limited liabilities. The corporation was indispensable in view of the magnitude of the commercial traffic generated by sheer concentration.

But the two systems, commercial and financial, were only able to function at full capacity if they were in a position to dispose of their merchandise at the most favorable point, as determined by commercial techniques. This implied the rapid, regular, and certain transport of merchandise. Hence, systems of transport had to be assured if financial and commercial techniques were to be able to operate. A new technique came into being, transport, which was not a direct result of the machine. It was a separate branch; and organization played a greater role in it than the machine itself (in railway routes and timetables, problems of eminent domain, etc.).

At the period this technical torrent was emerging from industrial enterprise, a crowd of human beings began to gather about the machine. A great number of individuals were necessary to service it; an equally great number were required to collect about it to consume its products. The first great change consisted in forcing the consumer to come to the machine, inasmuch as adequate means of transportation were to come fifty years too late. With this development came the hitherto unknown phenomenon of the big city. At the beginning, the big city engendered no particular technique; people were merely unhappy in it. But it soon appeared that megalopolis represented a new and special kind of environment, calling for special treatment. The technique of city planning made its appearance. At first, urban planning was only a clumsy kind of adaptation which was little concerned, for example, with slums (despite the efforts of the utopian planners of the middle of the century). Somewhat later, as big city life became for the most part intolerable, techniques of amusement were developed. It became indis-

pensable to make urban suffering acceptable by furnishing amusements, a necessity which was to assure the rise, for example, of a monstrous motion-picture industry.

This phase of development was still dominated by the machine, and corresponded to what Mumford has called the paleotechnical period. During this period the instruments of the power mentality developed. It became apparent that mechanical improvements alone do not suffice to yield socially valuable results. This was clearly a period of transition in which inventions had not yet completely overthrown the older institutions. And they had not yet touched human life, except indirectly. It was a period of disorder. And the most glaring manifestation of this disorder was man's exploitation of man. This disorder, however, led to a strenuous search for order, which developed first in the economic field. For some time it had been possible to believe that the increasing flow of merchandise would be absorbed automatically. But the illusions of liberalism collapsed very quickly. Little by little, the liberal system broke down before the profusion of goods which the machine blindly poured forth. It was inescapable that only technical methods of distribution would be able to cope with the problems created by technical methods of production. There was no way around it. A mechanism of distribution and consumption was necessary, as precise as the mechanism of production, which itself was not yet sufficiently precise, merely because it was mechanical. It was imperative that the different parts of the productive mechanism be adjusted and that the goods produced correspond exactly to the need, in quantity as well as in quality. It was no longer sufficient to organize enterprise. The entire production had to be organized in all its details. And if production were completely organized, there could be no question of allowing consumption (which had, in the meantime, become mechanized) to operate without its own world-wide organization. These logical interactions, which emerged first on the national level, were soon found on the international level as well.

The development of this mechanism inevitably implied the most perfect possible economic technique. This economic technique in turn would permit the utilization of new machines. Reciprocally, certain other instruments would facilitate the improvement of the economic technique. Moreover, nothing could be left to chance,

in this kind of organization; the labor supply in particular could not be entrusted to the whim of the individual. Economic organization presupposes a technique of labor. (The precise form of this technique is of little consequence to us here. We are interested only in the principle.) Labor had to be systematized; it had to become scientific. Thus, of necessity a new technique was added to the preceding ones. But at the same time it became mandatory to compensate the workers for the fatigue generated by technical labor. Here we meet again the necessity for additional mass amusement —a necessity which the existence of the big city had already provoked. The cycle was inevitable.

The whole edifice was constructed little by little, and all its individual techniques were improved by mutual interaction. Before long, however, the need for still another instrument appeared. Who was to co-ordinate this multiplicity of techniques? Who was to build the mechanism necessary to the new economic technique? Who was to make binding the decisions necessary to service the machines? The individual is not by himself rational enough to accept what is necessary to the machines. He rebels too easily. He requires an agency to constrain him, and the state had to play this role—but the state now could not be the incoherent, powerless, and arbitrary state of tradition. It had to be an effective state, equal to the functioning of the economic regime and in control of everything, to the end that machines which had developed at random should become "coherent." To this end, the state itself must be coherent. Thus, the techniques of the state—military, police, administrative, and political—made their appearance. Without them, all the rest would have been no more than faint hopes unable to attain maximum development. They intermingled, necessitating one another, and all of them necessitated by the economy.

It soon became evident that such external action was insufficient. A great effort was required of the individual, and this effort he could not make unless he was genuinely convinced, not merely constrained. He must be made to yield his heart and will, as he had yielded his body and brain. And so the techniques of propaganda, education, and psychic manipulation came to reinforce the others. Without them, man could scarcely have been equal to his organizations and his machines. Without them, technique could not have been completely certain of its operation. To the degree that material

techniques became more precise, intellectual and psychic techniques became more necessary. By these means man acquired the conviction and strength needed to make possible the maximum utilization of the others. So the edifice was completed.

It is impossible to amputate a part of the system or to modify it in any way without modifying the whole. The system was not built through whim or personal ambition. Its factors were all reciprocally engendered.

In this description we have constantly encountered the term *necessity;* it is necessity which characterizes the technical universe. Everything must accommodate itself to it with mathematical certainty. Every successive technique has appeared because the ones which preceded it rendered necessary the ones which followed. Otherwise they would have been inefficacious and would not have been able to deliver their maximum yield.

It is useless to hope for modification of a system like this—so complex and precisely adjusted that no single part can be modified by itself. Moreover, the system perfects and completes itself unremittingly. And, except in print, I see no sign of any modification of the technical edifice, no principle of a different social organization that would not be founded on technical necessity.

Technical Universalism. This characteristic of the technical phenomenon manifests itself under two aspects, the first geographic and the second qualitative.

From the geographic point of view, it is easy to see that technique is constantly gaining ground, country by country, and that its area of action is the whole world. In all countries, whatever their degree of "civilization," there is a tendency to apply the same technical procedures. Even when the population of a given country is not completely assimilated technically, it is nevertheless able to use the instruments which technique puts into its hands. The people of these countries have no need to be Westernized. Technique, to be used, does not require a "civilized" man. Technique, whatever hand uses it, produces its effect more or less totally in proportion to the individual's more or less total absorption in it.

Vogt emphasizes this fact, for example, when he shows that in the domain of agriculture the most up-to-date techniques have become universal. Never before, says Vogt, has man destroyed his natural environment "with the inexorableness of an armored divi-

sion. These 'civilized' forces of destruction, which have been developed under our influence, have conquered the entire globe to such a degree that Malays, Hottentots and Ainos are spreading the plague."

In the course of history there have always been different principles of civilization according to regions, nations, and continents. But today everything tends to align itself on technical principles. In the past, different civilizations took different "paths"; today all peoples follow the same road and the same impulse. This does not mean that they have all reached the same point, but they are situated at different points along the same trajectory. The United States represents the type that France will represent in thirty years, and China in possibly eighty. All the business of life, from work and amusement to love and death, is seen from the technical point of view. The number of "technical slaves" is growing rapidly, and the ideal of all governments is to push as fast as possible toward industrialization and technical enslavement.

I am well acquainted with the perfectly valid arguments which turn on economic necessity and the misery of the so-called "backward" peoples. But the problem is not the process involved; it is simply to note that different societies are adopting Western technique. The Vevey Congress of 1960 forcefully emphasized this point. Although, understandably, the primary problem of the underdeveloped peoples is undernourishment, obsession with technique has befuddled them to such a point that what they are demanding, and what we are offering, is the very industrialization that will aggravate the evil. Technique is the same in all latitudes and hence acts to make different civilizations uniform. This tendency arises directly from technique itself. The Oriental, Russian, and South American societies were by no means historically prepared, as was ours, to favor technical development.

The best sociologists have noted that technique involves the same effects everywhere. R. P. Lynton writes: "The industrialization of a community of Europe or America, on the one hand; or of Siam, Nigeria, Turkey, or Uruguay, on the other, poses the same problems." If the technical movement had had its inception in one of these "backward" countries, it would have aborted. But these societies are presented with a technical movement in full vigor and in all its expansive power. No longer is there any question as to

whether circumstances favorable to its flowering exist. The technical movement is strong enough to impose itself and to break down all barriers to its progress.

But why does this expansion exist at all? Until now it was generally accepted that very similar social environments were necessary if propagation of techniques were to occur. This is no longer true. Today technique imposes itself, whatever the environment. This expansive force can be explained by a whole ensemble of historical reasons (more or less superficial, though true), and by one profound reason (to be examined later on).

The historical reasons are bound up with two great currents which have occasioned the technical invasion: commerce and war. Colonial war opened the door to those European nations that possessed the whole complex of technical means. The conquering nations exported their machines and their organization through their armies. The vanquished peoples, in a state of mind compounded of admiration and fear, adopted the machines, which came to replace their gods. Not only were the machines the means their conquerors had used to subdue them, but the machines represented the possible means for liberation from these conquerors. In these colonies traffic in arms and in all the instruments of power began to flourish as a means of provoking insurrection. At first, rebellion was incoherent, but to the degree that these peoples became better organized and technicized, rebellion became a national affair.

War also involved the backward peoples globally. I have in mind not so much the direct effects of colonial war as the effects of wars among so-called civilized nations. The colonies of Germany and France became involved in the war between these nations. Later on, China and Siberia came in. Yakuts rode in tanks in the front line of the Red Army. War provokes the sudden and stupefying adaptation of the "savage" to machinery and discipline.

The second factor governing technical invasion is commerce. It was mandatory for the Western powers to conquer the markets necessary for Western industry and technical life. No barrier could oppose this necessity; and primitive peoples were literally swamped by the products of modern technique. In 1945 the Americans sent tons of individual military rations to the Bulgarians, who had no desire at all to adapt themselves to a new kind of butter and

to other substitutes. But their resistance necessarily yielded to technical adaptation and, very rapidly, to plain abundance. The excessiveness of the means broke down all traditional and individual desires.

After consumer goods came an invasion of productive techniques. Technical invasion is a question not only of colonialism but also, for the less powerful countries, of simple technical subordination. This, and this only, explains the formation of the two blocs today. All political or economic explanations are superficial and ridiculous. There are two great technical powers, the United States and the Soviet Union. Every other country must subordinate itself to one or the other of the two simply because of their technical superiority. Technical invasion is not exclusively colonial invasion but assumes other forms as well.

The phenomenon of present-day decolonialization is closely related to the possibilities of the technical development of peoples who, up to now, have lived in symbiosis with colonial powers. From the very moment of "independence," these peoples are constrained to appeal for assistance to the two major powers; after all, they cannot possibly be self-sufficient on the technical plane. The major powers then equip them in a "disinterested" way. In fact, of course, the major powers have no choice if they cherish any hope at all that the poverty of these new "free" nations will not make them theatres of endemic war (not to mention the fact that the major powers are themselves in competition). Thus, the best and most moral intentions (as, for example, Harry S. Truman's Point Four aid to colonial lands) lead to a rapid technicization of the world; and every political phenomenon accelerates this technicization, which necessarily assumes a Western look.

The expensive factors are clearly favored by the elementary technical facts. Consider, for example, the speed and thoroughness of the means of communication, which permit technical products to be transported anywhere in the world soon after their appearance in the country of origin. The result of this must be speedy unification.

The very means of communication presuppose such unification. Great ocean-going vessels necessitate continually improved port installations everywhere. Railroads demand identical roadbeds in all countries. Aviation requires a whole technical substructure,

which is becoming more important day by day and which must become ever more uniform as tonnage and speed increase.

The creation of the port of Lavera, near Port-de-Bouc, is a case in point. To construct a harbor for oil tankers to meet the demands of the French market, it was necessary to conform exactly to the international requirements of petroleum shipping. These demands are wholly technical: depth of channel for modern tankers of more than 30,000 tons, special docks, relay reservoirs fitted with technical improvements exactly adapted to the tankers, and so on. It was clearly impossible to continue to do without these facilities. In French home ports today, the petroleum brought in by the large tankers must first be discharged by small lighters to plants which are either floating installations or of insufficient pumping capacity. This results in loss of time and excessive handling. Every ton of crude oil bears an extra burden of approximately three dollars. These factors are clear and are leading to the acceptance of the most modern procedures—which reciprocally contributes to world-wide technical unification.

There is still another element in the mechanism of technical expansion: the export of technicians. This is not only a question of German technicians going, for example, to the United States or to Russia. (This exodus, incidentally, was accompanied by a certain technical flowering which rendered German technique truly international.) There is the same diffusion of American technique to underdeveloped countries by the application of President Truman's Point Four Program. Academicians are supplied who are charged with blueprinting the future of underdeveloped peoples. (This form of technical assistance assimilates intellectually the inhabitants of the countries in question.) In addition, the United States directly supplies the necessary technicians for exploiting the natural resources of these countries. The immediate purpose is to raise the standard of living of the population, beginning with a realistic appraisal of the possibilities of the given country, and the final objective is a perfectly humanitarian one; we can refrain from passing judgment on whether American imperialism is involved. Nevertheless, this leads to a diffusion of techniques throughout the world in an accelerated tempo, and at the same time it leads to technical identity in all countries.

A certain educational unity is also involved here. Every citizen

of an underdeveloped country must become adept in the use of the new techniques. This leads to the extension of European-style education, allows the colored peoples to participate actively in scientific progress, and provokes as a consequence a kind of a priori adhesion to technical diffusion. Since 1956 we have been witnessing the same diffusion of technicians from the Soviet Union, and more recently from China, to Syria, Guinea, Ghana, and Cuba. Without entertaining political suspicions of these acts, let us bear in mind only that these factors, among others, are an active aid to technical invasion.

Technical invasion does not involve the simple addition of new values to old ones. It does not put new wine into old bottles; it does not introduce new content into old forms. The old bottles are all being broken. The old civilizations collapse on contact with the new. And the same phenomenon appears under every possible cultural form. Take, for example, religion. We have seen one religion disappear under our very eyes as a result of a technical fact: Mikado worship vanished after the bomb was dropped at Hiroshima. We are witnessing the collapse of Buddhism under Communist pressure in Tibet and China. And, according to recent studies, Buddhism is vanishing for technical reasons, not because of the ideological effect of Communism. The phenomenon is due, on the one hand, to a brutal and massive infusion of industrial techniques and, on the other, to the use of propaganda techniques which entail the abandonment of religion by the ever growing population. In a certain sense these religious people are not left without religion. To their transcendental religion a "social" religion is opposed, a religion which is but an expression of technical progress.

Even the most classically oriented sociologists today recognize that the impact of techniques is producing a collapse of the non-Western civilizations. This involves the collapse of cultural as well as of economic forms, and of the traditional psychological and sociological structures.

UNESCO has been greatly preoccupied with these questions, and both the *Bulletin of the Social Sciences* and the reports of Dr. Margaret Mead strike an alarming note. Investigators find, in effect, that it is easy to transfer technical procedures, but that the elaboration of sociological and psychological methods of controlling them is slow, difficult, and laborious.

One is always running up against the simple-minded tendency to say, as Charles F. Frankel puts it, that "it is sufficient to give technical procedures and their accumulated blessings to the backward peoples in order to put them on their feet, as one might give an injection to a sick man." This kind of injection may conceivably help. But in giving it, we destroy the traditional ways of life. Technique does not, of itself, carry its own equilibrium. The opposite is nearer the truth. We have seen in the West how technique destroyed communities and brought the relevance of the human being into question, even though technique was born in the Western milieu and grew only slowly. How much more formidable are its effects when it is suddenly implanted in a foreign environment, appearing in all its power at a single stroke. In Africa the worker is separated from his family and, as S. Herbert Frankel says, "his social ego remains attached to the rural group while he himself has been transplanted into an industrial milieu. When his family comes to the city they are completely unprepared for urban life and are destroyed in that environment morally and sociologically." In Australia we find the same collapse of the traditional way of life. A. P. Elkin says: "In the tribe, authority belonged to the elders . . . but it is now in process of passing to the corral boss, or to the ranch owner. . . . The mysterious rites, which are associated with the succession of the seasons and with the search for food, and which in the past occupied a great deal of time, are tending to lose their meaning." It would be easy enough to give many more examples.

Every culture must be considered as a whole. The transformation of a given element through the effect of technique produces shocks in all areas. All the peoples of the world today live in a cultural breakdown provoked by the conflicts and the internal strife resulting from technique. Over and above this—as Margaret Mead points out—since every human being incorporates in his own person the cultural environment in which he lives, its disagreements and incoherences are to be met with again in each individual personality.

Moreover, we are poorly equipped to respond to this cultural collapse. We have few studies of the mentality and the needs of these peoples, and even fewer studies of their psychological reactions to technique. We have no studies of the social and adminis-

trative measures that might meet their needs, or of their changes in aptitudes. We never send along with our technique any civilized environment or adaptable value capable of replacing what is being destroyed. This, at any rate, is the diagnosis of UNESCO, an agency generally characterized by optimism.

The situation is being studied now, but for the most part we are too late. All the instruments ought long since to have been prepared, for no natural adaptation or spontaneous reorganization can be counted upon. No hope of this exists. We have no instruments ready. And while the problem is being studied, the ravages of technique are making steady inroads. We are in a veritable race, but it is evident that we are beaten before we begin. The effects of technique are already too far advanced for us to begin again at the beginning. There is no doubt that all the traditional cultures and sociological structures will be destroyed by technique before we can discover or invent social, economic, and psychological forms of adaptation which might possibly have preserved the equilibrium of these peoples and societies.

In the political sphere the phenomenon takes the form of the brutal transition from elementary forms of society to the fully developed modern dictatorship. A major part of the world's population has passed in a few years from serfdom or feudalism to the most punctilious dictatorial state, by virtue and necessity of productive and administrative techniques. The Soviet Union, Turkey, and Japan are well-known examples.

The problem of dictatorship is likewise posed by decolonialization. Either one succeeds in organizing the country and in establishing a centralized authoritarian state (as has occurred in Ghana, Guinea, Ivory Coast, Sudan) or anarchy reigns (as in the Belgian Congo, Cameroon). Halfway liberal successes (as, for example, Tunisia) are infinitely rare and fragile.

As to economics, it seems scarcely necessary to discuss these problems. All the traditional economic structures of production and distribution in Africa and Asia are exploding in the presence of the new technical means. Up to the time of Western intervention, life on the Asiatic continent was highly stable; populations and environments were in equilibrium. Of course, things were far from being perfect; undernourishment, for example, was always a danger. But certain civilizations were harmonious enough; some of them

endured much longer than our own. Everyone, I believe, agrees that the tribulations of modern Asia stem in part from the complexity that the West has imposed on it, the complexity and density of structure provoked by the indispensable application of techniques.

In all areas, then, technique is producing the rapid collapse of all other civilizations. When we speak of the collapse of these civilizations, we are speaking only of sociological forms. Even the weakest civilizations preserve certain values which, in Roger Bastide's words, permit them to "maintain a mental equilibrium which cultural shock might shatter. . . . The social situation allows the old complexes to remain alive which, not being fulfilled any longer through ancestral customs, create for themselves new defense mechanisms." But it is very probable that this situation is only temporary; even these psychological reserves will be attacked and absorbed by technique when the so-called human techniques (those which have man for their object) are applied to them.

Obviously, the effect of technique on these groups will not be the same everywhere. Detailed sociological studies have been made of the various phenomena of assimilation, regrouping, functioning, and marasmus or progressive dissolution. According to these studies, there has not been comparable and identical progression in every case. However, behind this diversity is to be noted an absolute incompatibility between the technical type of civilization and all the others. Technicians have not willed this outcome; no one seeks consciously to destroy a civilization. This is simply the proverbial collision between the earthenware pot and the iron pot. What happens, happens, despite the best possible intentions of the iron pot.

It might be said: "This is not necessary. Why should the simple fact of bringing more well-being to India ruin the Hindu civilization?" I do not know if it is necessary, but nevertheless it is so. A civilization which is collapsing cannot be re-created abstractly. It is too late to turn back and enable these worlds to live. What has been given them is not simply well-being. This well-being presupposes a transformation of all of life: work where there had been only laziness; machines and their accessories, organs of co-ordination and rational administration, and internal adherence to the regime.

Technique cannot be otherwise than totalitarian. It can be truly efficient and scientific only if it absorbs an enormous number of phenomena and brings into play the maximum of data. In order to co-ordinate and exploit synthetically, technique must be brought to bear on the great masses in every area. But the existence of technique in every area leads to monopoly. This is noted by Jacques Driencourt when he declares that the technique of propaganda is totalitarian by its very nature. It is totalitarian in message, methods, field of action, and means. What more could be required?

One could require more. Totalitarianism extends to whatever touches it, even things which seem, at first sight, very remote from it. When technique has fastened upon a method, everything must be subordinated to it. There are no longer any neutral objects or situations. Claude Munson forcefully demonstrates that psychological technique, as it operates in the army or in a great industrial plant, entails a direct action on the family. It involves psychological adaptation of family life to military or industrial methods, supervision of family life, and training family life for military or industrial service. Technique can leave nothing untouched in a civilization. Everything is its concern.

It will be objected: "If these transformations do take place, technique alone is not responsible. Many other factors have contributed; for example, the intellectual superiority of the white race, the corruption of these other civilizations, and the population growth." In fact, all these factors refer back to the problems of techniques. Indeed, Western intellectual superiority is only manifested in the technical domain. And the alleged corruption of the Chinese and Islamic civilizations depends solely on the criteria by which they are judged. In making the objection, we are in effect judging solely on the basis of technical criteria.

Again, it will be objected: "Granting all this, is it not the case that coexistence, and even synthesis, has been possible between these two kinds of life? After all, when the Barbarians invaded the Roman Empire, a successful synthesis eventually took place." But the historical situation was clearly not the same then as it is today. In fact, it was the Roman civilization which, being technical, endured. The civilizations threatened today by our own can offer no effective resistance because they are nontechnical.

The decisive factor which leads me to reject the three objections

just stated is that our technique, which is destroying all other civilizations, is more than a simple mechanism: it is a whole civilization in itself.

We have analyzed the combination of circumstances that favored technical development in the West and guaranteed its easy diffusion. Since technique has engulfed civilization, a very remarkable effect has been observed—in fact, a complete reversal. When technique penetrates a new milieu, it tends to reproduce in this milieu the circumstances which, in a fortuitous way, it found favorable to itself in the nineteenth century in France and England. At least, it reproduces those features which it is possible and necessary to reproduce. It is of small importance for technique to hit upon a long cultural experience or a favorable demographic situation. On the contrary, social plasticity and a clear technical consciousness are the general terms which it forcibly imposes in every area of the world. It dissociates the sociological forms, destroys the moral framework, desacralizes men and things, explodes social and religious taboos, and reduces the body social to a collection of individuals. The most recent sociological studies (even those made by optimists) hold that technique is the destroyer of social groups, of communities (whatever their kind), and of human relations. Technical progress causes the disappearance, as Jerome Scott and R. P. Lynton put it, of that "amalgam of attitudes, customs and social institutions which constitute a community." Communities break up into their component parts. But no new communities form. The individual in contact with technique loses his social and community sense as the frameworks in which he operated disintegrate under the influence of techniques. This fact is established beyond question by the disappearance of responsibilities, functional autonomies, and social spontaneities, the absence of contact between the technical and the human environment, and so forth. In the area of industrial labor, for example, sociologists point out the physical separation between the industrial plant and the social group in which the plant is situated (the city, say). In traditional societies, the social and the economic aspects of life were inextricably meshed into a social whole. But in a technical society the two aspects are strictly separated; this in itself brings about the dissolution of the entire group. Related activities such as production and social relations cannot be separated without ruining

the whole society. However, to the degree that production is technique and social relations is not, the two are of necessity dissociated. This is the conclusion reached by innumerable detailed studies of social groups at the point at which technique begins to function. The conclusion is equally true of the industrialized milieus of Europe, America, Asia, and Africa. The situation cannot be otherwise. The technicians themselves are very clear on this point. For example, an official report of 1958 on the perspectives of economic development in Algeria indicated that this development can only be brought about by changing the Algerians' whole way of life, in particular, by putting the still seminomad masses to work. Development involves economic planning, displacement of populations, mobilization of the local economy, acceptance of authoritarian political power, modification of local moral habits and traditional mentalities; in short, a New Deal of the Emotions! These are the conditions proposed and (and considered normal) for technical progress in the "Third World."[4] Technique makes its sociological compost pile where it does not find one already made. And it possesses sufficient power and efficiency today to succeed. Before long, it will produce everywhere that clear technical consciousness which is the easiest of its creations to bring about, and which man falls in with so willingly. The world that technique creates cannot be any other than that which was favorable to it from the very beginning. In spite of all the men of good will, all the optimists, all the doers of history, the civilizations of the world are being ringed about with a band of steel. We in the West became familiar with this iron constraint in the nineteenth century. Now technique is mechanically reproducing it everywhere as necessary to its existence. What force could prevent technique from so acting, or make it be otherwise than it is?

Technique has progressively mastered *all* the elements of civilization. We have already pointed this out with regard to man's economic and intellectual activities. But man himself is overpowered by technique and becomes its object. The technique which takes man for its object thus becomes the center of society; this extraordinary event (which seems to surprise no one) is often designated as *technical civilization*. The terminology is exact and we must fully

[4] Sauvy, Balandier, et al.: *Le Tiers Monde.*

grasp its importance. *Technical civilization* means that our civilization is constructed *by* technique (makes a part of civilization only what belongs to technique), *for* technique (in that everything in this civilization must serve a technical end), and *is* exclusively technique (in that it excludes whatever is not technique or reduces it to technical form).

We can see that this is actually the case in certain phenomena considered essential to a civilization, for example, art and literature. These activities in modern society are tightly subordinated in different ways to technical necessities by the direct interference of technique. Take, for example, the motion pictures, radio, and television. These media require great capital investments. As a result, artistic expression is subordinated to a censorship of money or of the state. This censorship most often takes the form of indirect influences, which, again, may assume different guises. Personal music is supplanted by the radio; and painting, threatened by photography, is obliged to modify itself by becoming abstract so as not to be a mere substitute for reproduction. Modern art and literature manifest in all points their subordination to the technique which has extended its power over all activity, and hence over all culture.

Herein lies the inversion we are witnessing. Without exception in the course of history, *technique belonged to a civilization* and was merely a single element among a host of nontechnical activities. Today *technique has taken over the whole of civilization.* Certainly, technique is no longer the simple machine substitute for human labor. It has come to be the "intervention into the very substance not only of the inorganic but also of the organic."

This intervention into the inorganic world is represented, for example, by the exploration of the atom and its use for purposes as yet unknown. But the world which is most clearly taking on a technical form is the organic. In this realm the necessity of production penetrates to the very sources of life. It controls procreation, influences growth, and alters the individual and the species. Death, procreation, birth, habitat; all must submit to technical efficiency and systematization, the end point of the industrial assembly line. What seems to be most personal in the life of man is now technicized. The manner in which he rests and relaxes becomes the object of techniques of relaxation. The way in which he makes a decision is no longer the domain of the personal and voluntary; it has

become the object of the techniques of "operations research." As Giedion says, all this represents experimentation at the very roots of being.

How is it possible, then, not to believe that all of civilization is affected and engulfed when the very substance of man is questioned? The essence of civilization is thus absorbed.

Concerning art, Giedion goes on to say: "What happened to art in this period gives us the most intimate vision possible of the penetration in depth of the human being by mechanization. Barr's revealing selections in his *Cubism and Abstract Art* show us how the artist, who reacts like a seismograph, expresses the influence of full mechanization . . . Mechanization has penetrated into the subconscious of the artist. Chirico expresses it in a remarkable way in the mixture he makes of man and machine . . . The anxiety, the solitude of man forms a melancholy architecture of the preceding epoch and its mechanical dolls, painted in the smallest details with a tragic expression."

We have the large-scale frescoes of Léger which construct the image of cities out of signs, traffic signals, and machine parts. Even the Russians and Hungarians, who in 1920 were far from mechanization, were inspired by his creative power. In the hands of Duchanu and others, the machine, marvel of efficiency, was transformed into an irrational object, charged with irony. At the same time, a new aesthetic language was introduced.

To free themselves from a corrupt art and the prevailing taste, artists have recourse to objects such as machines and mechanisms because these objects contain an objective truth. What is true of the plastic arts is likewise true of music. Preoccupation with "objectivity" is prevalent there, too. Igor Stravinsky writes: "My work is architectonic and not anecdotal; objective construction and not descriptive." These are the words of a man unconsciously steeped in the technical milieu. Since Stravinsky wrote this, music has been still further transformed by means of techniques which were not originally musical techniques, that is, neither musical methodology nor instrument construction. I have in mind Schaeffer's "concrete music," Ussachewsky's "music for tape," and Eimert's electronic music, all of which make use of technical means that are not a priori musical. In none of these types of music is there any longer the need for a performer. The ancestral musical structures disin-

tegrate and are atomized and we have a phenomenon that is fundamentally new. We shall doubtless see ever more refined and exacting research into musical technique, and the dominant musical structure and rhythm will undoubtedly correspond entirely to the technical environment.

The external structures imposed by technique can no longer, by themselves, modify the components of a society; here the internal influence of technique on the human being becomes decisive. Henceforth, every component of civilization is subject to the law that technique is itself civilization. Civilization no longer exists of itself. Every activity—intellectual, artistic, moral—is only a part of technique. This fact is so enormous and unpredictable that we are simply unable to foresee its consequences. Most of us, blinded by traditional and well-established situations, are unable to grasp its meaning. Henceforth, there will be no conflict between contending forces among which technique is only one. The victory of technique has already been secured. It is too late to set limits to it or to put it in doubt. The fatal flaw in all systems designed to counterbalance the power of technique is that they come too late.

Under these circumstances, it is understandable that technique, in all the lands it has penetrated, has exploded the local, national cultures. Two cultures, of which technique is one, cannot coexist. This does not mean, of course, that uniformity prevails. There are still great differences from region to region. But for the most part these differences are due to the fact that the vestiges of a civilization take a long time to disappear completely. Technique has already gained its victory over Buddhism. It is clear, however, that it will take two or three generations to modify the mode of life and thought engendered by Buddhism. A certain diversity will persist while this mode of life is weakening. Technique does not lead to general uniformity. In fact, it creates a certain diversity. Its objectives are always the same, and so is its influence on man. But though it is axiomatic that the one best way will prevail, this one best way will vary with climate, country, and population. The more technique is refined, the more it varies its means of action. Therefore, we shall continue to have the appearance of different civilizations in India and in Greenland. They will indeed be different in certain aspects. But their essence will be identical; they will be techniques. And what differences there are will result from the cold

calculation of some technician, instead of being the result of the profound spiritual and material effort of generations of human beings. Instead of being the expression of man's essence, they will be the accidents of what is essential: technique.

The differences which exist today are therefore without importance in relation to the fact of technical identity. The differences to come will bear upon the most diverse activities and give the illusion of liberty. But they will nevertheless be no more than the expression of the monism of technique. Geographically and qualitatively, technique is universal in its manifestations. It is devoted, by nature and necessity, to the universal. It could not be otherwise. It depends upon a science itself devoted to the universal, and it is becoming the universal language understood by all men. We need not belabor the fact, which everyone recognizes, that science is universal. And this fact in turn leads of necessity to the technical universalism which stems from it.

The second of the two elements we referred to (production and social relations) requires more explication. In his relation to the world, man has always made use of multiple means, none of which were universal because none were objective. Technique is a means of apprehending reality, of acting on the world, which allows us to neglect all individual differences, all subjectivity. Technique alone is rigorously objective. It blots out all personal opinions. It effaces all individual, and even all collective, modes of expression. Today man lives by virtue of his participation in a truth become objective. Technique is no more than a neutral bridge between reality and the abstract man.

Technique, moreover, creates a bond between men. All those who follow the same technique are bound together in a tacit fraternity and all of them take the same attitude toward reality. There is no need for them to converse together or to understand one another. A team of surgeons and assistants who know the technique of a given operation have no need to address one another in order that the necessary motions be correctly performed at the right moment.

Industrial labor likewise tends more and more to dispense with orders and personal contact. This was pushed to an extreme in the concentration camps, where men of different nations were mixed together so that they should have no contacts and yet be able to

perform collective work. It was hasty and superficial work, to be sure, but a little more rigor could easily make this labor really productive (as seems to be the case in the Soviet Union). One cannot speak merely of isolation. These men work in teams, but there is no need for them to know or understand one another. They need only understand the technique involved and know in advance what their teammate will do. It is not necessary for the crew to understand one another in order to run an aircraft. The indicator panel controls the actions to be performed; and every crew member, submitting by necessity and conscience to the automatic indications, obeys for the safety of all. Each man's actions are dictated by the conditions of life and its preservation. This is clear in the case of flying an aircraft. But it is equally clear in every other situation involving technique—and this encompasses the most important areas of life. Men do not need to understand each other in order to carry out the most important endeavors of our times.

Technique is of necessity, and as compensation, our universal language. It is the fruit of specialization. But this very specialization prevents mutual understanding. Everyone today has his own professional jargon, modes of thought, and peculiar perception of the world. There was a time when the distortion of overspecialization was the butt of jokes and a subject for vaudeville. Today the sharp knife of specialization has passed like a razor into the living flesh. It has cut the umbilical cord which linked men with each other and with nature. The man of today is no longer able to understand his neighbor because his profession is his whole life, and the technical specialization of this life has forced him to live in a closed universe. He no longer understands the vocabulary of the others. Nor does he comprehend the underlying motivations of the others. Yet technique, having ruptured the relations between man and man, proceeds to rebuild the bridge which links them. It bridges the specializations because it produces a new type of man always and everywhere like his duplicate, who develops along technical lines. He listens to himself and speaks to himself, but he obeys the slightest indications of the apparatus, confident that his neighbor will do the same. Technique has become the bond between men. By its agency they communicate, whatever their languages, beliefs, or race. It has become, for life or death, the universal language which compensates for all the deficiencies and separations it

has itself produced. This is the major reason for the great impetus of technique toward the universal.

The Autonomy of Technique. The primary aspect of autonomy is perfectly expressed by Frederick Winslow Taylor, a leading technician. He takes, as his point of departure, the view that the industrial plant is a whole in itself, a "closed organism," an end in itself. Giedion adds: "What is fabricated in this plant and what is the goal of its labor—these are questions outside its design." The complete separation of the goal from the mechanism, the limitation of the problem to the means, and the refusal to interfere in any way with efficiency; all this is clearly expressed by Taylor and lies at the basis of technical autonomy.

Autonomy is the essential condition for the development of technique, as Ernst Kohn-Bramstedt's study of the police clearly indicates. The police must be independent if they are to become efficient. They must form a closed, autonomous organization in order to operate by the most direct and efficient means and not be shackled by subsidiary considerations. And in this autonomy, they must be self-confident in respect to the law. It matters little whether police action is legal, if it is efficient. The rules obeyed by a technical organization are no longer rules of justice or injustice. They are "laws" in a purely technical sense. As far as the police are concerned, the highest stage is reached when the legislature legalizes their independence of the legislature itself and recognizes the primacy of technical laws. This is the opinion of Best, a leading German specialist in police matters.

The autonomy of technique must be examined in different perspectives on the basis of the different spheres in relation to which it has this characteristic. First, technique is autonomous with respect to economics and politics. We have already seen that, at the present, neither economic nor political evolution conditions technical progress. Its progress is likewise independent of the social situation. The converse is actually the case, a point I shall develop at length. Technique elicits and conditions social, political, and economic change. It is the prime mover of all the rest, in spite of any appearance to the contrary and in spite of human pride, which pretends that man's philosophical theories are still determining influences and man's political regimes decisive factors in technical evolution. External necessities no longer determine technique.

Technique's own internal necessities are determinative. Technique has become a reality in itself, self-sufficient, with its special laws and its own determinations.

Let us not deceive ourselves on this point. Suppose that the state, for example, intervenes in a technical domain. Either it intervenes for sentimental, theoretical, or intellectual reasons, and the effect of its intervention will be negative or nil; or it intervenes for reasons of political technique, and we have the combined effect of two techniques. There is no other possiblity. The historical experience of the last years shows this fully.

To go one step further, technical autonomy is apparent in respect to morality and spiritual values. Technique tolerates no judgment from without and accepts no limitation. It is by virtue of technique rather than science that the great principle has become established: *chacun chez soi.* Morality judges moral problems; as far as technical problems are concerned, it has nothing to say. Only technical criteria are relevant. Technique, in sitting in judgment on itself, is clearly freed from this principal obstacle to human action. (Whether the obstacle is valid is not the question here. For the moment we merely record that it is an obstacle.) Thus, technique theoretically and systematically assures to itself that liberty which it has been able to win practically. Since it has put itself beyond good and evil, it need fear no limitation whatever. It was long claimed that technique was neutral. Today this is no longer a useful distinction. The power and autonomy of technique are so well secured that it, in its turn, has become the judge of what is moral, the creator of a new morality. Thus, it plays the role of creator of a new civilization as well. This morality—internal to technique—is assured of not having to suffer from technique. In any case, in respect to traditional morality, technique affirms itself as an independent power. Man alone is subject, it would seem, to moral judgment. We no longer live in that primitive epoch in which things were good or bad in themselves. Technique in itself is neither, and can therefore do what it will. It is truly autonomous.

However, technique cannot assert its autonomy in respect to physical or biological laws. Instead, it puts them to work; it seeks to dominate them.

Giedion, in his probing study of mechanization and the manufacture of bread, shows that "wherever mechanization encounters

a living substance, bacterial or animal, the organic substance determines the laws." For this reason, the mechanization of bakeries was a failure. More subdivisions, intervals, and precautions of various kinds were required in the mechanized bakery than in the non-mechanized bakery. The size of the machines did not save time; it merely gave work to larger numbers of people. Giedion shows how the attempt was made to change the nature of the bread in order to adapt it to mechanical manipulations. In the last resort, the ultimate success of mechanization turned on the transformation of human taste. Whenever technique collides with a natural obstacle, it tends to get around it either by replacing the living organism by a machine, or by modifying the organism so that it no longer presents any specifically organic reaction.

The same phenomenon is evident in yet another area in which technical autonomy asserts itself: the relations between techniques and man. We have already seen, in connection with technical self-augmentation, that technique pursues its own course more and more independently of man. This means that man participates less and less actively in technical creation, which, by the automatic combination of prior elements, becomes a kind of fate. Man is reduced to the level of a catalyst. Better still, he resembles a slug inserted into a slot machine: he starts the operation without participating in it.

But this autonomy with respect to man goes much further. To the degree that technique must attain its result with mathematical precision, it has for its object the elimination of all human variability and elasticity. It is a commonplace to say that the machine replaces the human being. But it replaces him to a greater degree than has been believed.

Industrial technique will soon succeed in completely replacing the effort of the worker, and it would do so even sooner if capitalism were not an obstacle. The worker, no longer needed to guide or move the machine to action, will be required merely to watch it and to repair it when it breaks down. He will not participate in the work any more than a boxer's manager participates in a prize fight. This is no dream. The automated factory has already been realized for a great number of operations, and it is realizable for a far greater number. Examples multiply from day to day in all areas. Man indicates how this automation and its attendant exclusion of men op-

erates in business offices; for example, in the case of the so-called tabulating machine. The machine itself interprets the data, the elementary bits of information fed into it. It arranges them in texts and distinct numbers. It adds them together and classifies the results in groups and subgroups, and so on. We have here an administrative circuit accomplished by a single, self-controlled machine. It is scarcely necessary to dwell on the astounding growth of automation in the last ten years. The multiple applications of the automatic assembly line, of automatic control of production operations (so-called cybernetics) are well known. Another case in point is the automatic pilot. Until recently the automatic pilot was used only in rectilinear flight; the finer operations were carried out by the living pilot. As early as 1952 the automatic pilot effected the operations of take-off and landing for certain supersonic aircraft. The same kind of feat is performed by automatic direction finders in anti-aircraft defense. Man's role is limited to inspection. This automation results from the development servomechanisms which act as substitutes for human beings in more and more subtle operations by virtue of their "feedback" capacity.

This progressive elimination of man from the circuit must inexorably continue. Is the elimination of man so unavoidably necessary? Certainly! Freeing man from toil is in itself an ideal. Beyond this, every intervention of man, however educated or used to machinery he may be, is a source of error and unpredictability. The combination of man and technique is a happy one only if man has no responsibility. Otherwise, he is ceaselessly tempted to make unpredictable choices and is susceptible to emotional motivations which invalidate the mathematical precision of the machinery. He is also susceptible to fatigue and discouragement. All this disturbs the forward thrust of technique.

Man must have nothing decisive to perform in the course of technical operations; after all, he is the source of error. Political technique is still troubled by certain unpredictable phenomena, in spite of all the precision of the apparatus and the skill of those involved. (But this technique is still in its childhood.) In human reactions, howsoever well calculated they may be, a "coefficient of elasticity" causes imprecision, and imprecision is intolerable to technique. As far as possible, this source of error must be eliminated. Eliminate the individual, and excellent results ensue. Any

technical man who is aware of this fact is forced to support the opinions voiced by Robert Jungk, which can be summed up thus: "The individual is a brake on progress." Or: "Considered from the modern technical point of view, man is a useless appendage." For instance, ten per cent of all telephone calls are wrong numbers, due to human error. An excellent use by man of so perfect an apparatus!

Now that statistical operations are carried out by perforated-card machines instead of human beings, they have become exact. Machines no longer perform merely gross operations. They perform a whole complex of subtle ones as well. And before long—what with the electronic brain—they will attain an intellectual power of which man is incapable.

Thus, the "great changing of the guard" is occurring much more extensively than Jacques Duboin envisaged some decades ago. Gaston Bouthoul, a leading sociologist of the phenomena of war, concludes that war breaks out in a social group when there is a "plethora of young men surpassing the indispensable tasks of the economy." When for one reason or another these men are not employed, they become ready for war. It is the multiplication of men who are excluded from working which provokes war. We ought at least to bear this in mind when we boast of the continual decrease in human participation in technical operations.

However, there are spheres in which it is impossible to eliminate human influence. The autonomy of technique then develops in another direction. Technique is not, for example, autonomous in respect to clock time. Machines, like abstract technical laws, are subject to the law of speed, and co-ordination presupposes time adjustment. In his description of the assembly line, Giedion writes: "Extremely precise time tables guide the automatic cooperation of the instruments, which, like the atoms in a planetary system, consist of separate units but gravitate with respect to each other in obedience to their inherent laws." This image shows in a remarkable way how technique became simultaneously independent of man and obedient to the chronometer. Technique obeys its own specific laws, as every machine obeys laws. Each element of the technical complex follows certain laws determined by its relations with the other elements, and these laws are internal to the system and in no way influenced by external factors. It is not a question of causing the human being to disappear, but of making him capitulate, of in-

ducing him to accommodate himself to techniques and not to experience personal feelings and reactions.

No technique is possible when men are free. When technique enters into the realm of social life, it collides ceaselessly with the human being to the degree that the combination of man and technique is unavoidable, and that technical action necessarily results in a determined result. Technique requires predictability and, no less, exactness of prediction. It is necessary, then, that technique prevail over the human being. For technique, this is a matter of life or death. Technique must reduce man to a technical animal, the king of the slaves of technique. Human caprice crumbles before this necessity; there can be no human autonomy in the face of technical autonomy. The individual must be fashioned by techniques, either negatively (by the techniques of understanding man) or positively (by the adaptation of man to the technical framework), in order to wipe out the blots his personal determination introduces into the perfect design of the organization.

But it is requisite that man have certain precise inner characteristics. An extreme example is the atomic worker or the jet pilot. He must be of calm temperament, and even temper, he must be phlegmatic, he must not have too much initiative, and he must be devoid of egotism. The ideal jet pilot is already along in years (perhaps thirty-five) and has a settled direction in life. He flies his jet in the way a good civil servant goes to his office. Human joys and sorrows are fetters on technical aptitude. Jungk cites the case of a test pilot who had to abandon his profession because "his wife behaved in such a way as to lessen his capacity to fly. Every day, when he returned home, he found her shedding tears of joy. Having become in this way accident conscious, he dreaded catastrophe when he had to face a delicate situation." The individual who is a servant of technique must be completely unconscious of himself. Without this quality, his reflexes and his inclinations are not properly adapted to technique.

Moreover, the physiological condition of the individual must answer to technical demands. Jungk gives an impressive picture of the experiments in training and control that jet pilots have to undergo. The pilot is whirled on centrifuges until he "blacks out" (in order to measure his toleration of acceleration). There are catapults, ultrasonic chambers, etc., in which the candidate is forced

to undergo unheard-of tortures in order to determine whether he has adequate resistance and whether he is capable of piloting the new machines. That the human organism is, technically speaking, an imperfect one is demonstrated by the experiments. The sufferings the individual endures in these "laboratories" are considered to be due to "biological weaknesses," which must be eliminated. New experiments have pushed even further to determine the reactions of "space pilots" and to prepare these heroes for their roles of tomorrow. This has given birth to new sciences, biometry for example; their one aim is to create the new man, the man adapted to technical functions.

It will be objected that these examples are extreme. This is certainly the case, but to a greater or lesser degree the same problem exists everywhere. And the more technique evolves, the more extreme its character becomes. The object of all the modern "human sciences" (which I will examine later on) is to find answers to these problems.

The enormous effort required to put this technical civilization into motion supposes that all individual effort is directed toward this goal alone and that all social forces are mobilized to attain the mathematically perfect structure of the edifice. ("Mathematically" does not mean "rigidly." The perfect technique is the most adaptable and, consequently, the most plastic one. True technique will know how to maintain the illusion of liberty, choice, and individuality; but these will have been carefully calculated so that they will be integrated into the mathematical reality merely as appearances!) Henceforth it will be wrong for a man to escape this universal effort. It will be inadmissible for any part of the individual not to be integrated in the drive toward technicization; it will be inadmissible that any man even aspire to escape this necessity of the whole society. The individual will no longer be able, materially or spiritually, to disengage himself from society. Materially, he will not be able to release himself because the technical means are so numerous that they invade his whole life and make it impossible for him to escape the collective phenomena. There is no longer an uninhabited place, or any other geographical locale, for the would-be solitary. It is no longer possible to refuse entrance into a community to a highway, a high-tension line, or a dam. It is vain to aspire to live alone when one is obliged to participate in all col-

lective phenomena and to use all the collective's tools, without which it is impossible to earn a bare subsistence. Nothing is gratis any longer in our society; and to live on charity is less and less possible. "Social advantages" are for the workers alone, not for "useless mouths." The solitary is a useless mouth and will have no ration card—up to the day he is transported to a penal colony. (An attempt was made to institute this procedure during the French Revolution, with deportations to Cayenne.)

Spiritually, it will be impossible for the individual to disassociate himself from society. This is due not to the existence of spiritual techniques which have increasing force in our society, but rather to our situation. We are constrained to be "engaged," as the existentialists say, with technique. Positively or negatively, our spiritual attitude is constantly urged, if not determined, by this situation. Only bestiality, because it is unconscious, would seem to escape this situation, and it is itself only a product of the machine.

Every conscious being today is walking the narrow ridge of a decision with regard to technique. He who maintains that he can escape it is either a hypocrite or unconscious. The autonomy of technique forbids the man of today to choose his destiny. Doubtless, someone will ask if it has not always been the case that social conditions, environment, manorial oppression, and the family conditioned man's fate. The answer is, of course, yes. But there is no common denominator between the suppression of ration cards in an authoritarian state and the family pressure of two centuries ago. In the past, when an individual entered into conflict with society, he led a harsh and miserable life that required a vigor which either hardened or broke him. Today the concentration camp and death await him; technique cannot tolerate aberrant activities.

Because of the autonomy of technique, modern man cannot choose his means any more than his ends. In spite of variability and flexibility according to place and circumstance (which are characteristic of technique) there is still only a single employable technique in the given place and time in which an individual is situated. We have already examined the reasons for this.

At this point, we must consider the major consequences of the autonomy of technique. This will bring us to the climax of this analysis.

Technical autonomy explains the "specific weight" with which

technique is endowed. It is not a kind of neutral matter, with no direction, quality, or structure. It is a power endowed with its own peculiar force. It refracts in its own specific sense the wills which make use of it and the ends porposed for it. Indeed, independently of the objectives that man pretends to assign to any given technical means, that means always conceals in itself a finality which cannot be evaded. And if there is a competition between this intrinsic finality and an extrinsic end proposed by man, it is always the intrinsic finality which carries the day. If the technique in question is not exactly adapted to a proposed human end, and if an individual pretends that he is adapting the technique to this end, it is generally quickly evident that it is the end which is being modified, not the technique. Of course, this statement must be qualified by what has already been said concerning the endless refinement of techniques and their adaptation. But this adaptation is effected with reference to the techniques concerned and to the conditions of their applicability. It does not depend on external ends. Perrot has demonstrated this in the case of judicial techniques, and Giedion in the case of mechanical techniques. Concerning the over-all problem of the relation between the ends and the means, I take the liberty of referring to my own work, *Présence au monde moderne.*

Once again we are faced with a choice of "all or nothing." If we make use of technique, we must accept the specificity and autonomy of its ends, and the totality of its rules. Our own desires and aspirations can change nothing.

The second consequence of technical autonomy is that it renders technique at once sacrilegious and sacred. (*Sacrilegious* is not used here in the theological but in the sociological sense.) Sociologists have recognized that the world in which man lives is for him not only a material but also a spiritual world; that forces act in it which are unknown and perhaps unknowable; that there are phenomena in it which man interprets as magical; that there are relations and correspondences between things and beings in which material connections are of little consequence. This whole area is mysterious. Mystery (but not in the Catholic sense) is an element of man's life. Jung has shown that it is catastrophic to make superficially clear what is hidden in man's innermost depths. Man must make allowance for a background, a great deep above which lie his reason and his clear consciousness. The mystery of man perhaps creates the

mystery of the world he inhabits. Or perhaps this mystery is a reality in itself. There is no way to decide between these two alternatives. But, one way or the other, mystery is a necessity of human life.

Man cannot live without a sense of the secret. The psychoanalysts agree on this point. But the invasion of technique desacralizes the world in which man is called upon to live. For technique nothing is sacred, there is no mystery, no taboo. Autonomy makes this so. Technique does not accept the existence of rules outside itself, or of any norm. Still less will it accept any judgment upon it. As a consequence, no matter where it penetrates, what it does is permitted, lawful, justified.

To a great extent, mystery is desired by man. It is not that he cannot understand, or enter into, or grasp mystery, but that he does not desire to do so. The sacred is what man decides unconsciously to respect. The taboo becomes compelling from a social standpoint, but there is always a factor of adoration and respect which does not derive from compulsion and fear.

Technique worships nothing, respects nothing. It has a single role: to strip off externals, to bring everything to light, and by rational use to transform everything into means. More than science, which limits itself to explaining the "how," technique desacralizes because it demonstrates (by evidence and not by reason, through use and not through books) that mystery does not exist. Science brings to the light of day everything man had believed sacred. Technique takes possession of it and enslaves it. The sacred cannot resist. Science penetrates to the great depths of the sea to photograph the unknown fish of the deep. Technique captures them, hauls them up to see if they are edible—but before they arrive on deck they burst. And why should technique not act thus? It is autonomous and recognizes as barriers only the temporary limits of its action. In its eyes, this terrain, which is for the moment unknown but not mysterious, must be attacked. Far from being restrained by any scruples before the sacred, technique constantly assails it. Everything which is not yet technique becomes so. It is driven onward by itself, by its character of self-augmentation. Technique denies mystery a priori. The mysterious is merely that which has not yet been technicized.

Technique advocates the entire remaking of life and its frame-

work because they have been badly made. Since heredity is full of chance, technique proposes to suppress it so as to engender the kind of men necessary for its ideal of service. The creation of the ideal man will soon be a simple technical operation. It is no longer necessary to rely on the chances of the family or on the personal vigor which is called virtue. Applied biogenetics is an obvious point at which technique desacralizes;[5] but we must not forget psychoanalysis, which holds that dreams, visions, and the psychic life in general are nothing more than objects. Nor must we forget the penetration and exploitation of the earth's secrets. Crash programs, particularly in the United States, are attempting to reconstruct the soil which massive exploitation and the use of chemical fertilizers have impaired. We shall soon discover the functions of chlorophyll and thus entirely transform the conditions of life. Recent investigations in electronic techniques applied to biology have emphasized the importance of DNA and will possibly result in the discovery of the link between the living and the nonliving.

Nothing belongs any longer to the realm of the gods or the supernatural. The individual who lives in the technical milieu knows very well that there is nothing spiritual anywhere. But man cannot live without the sacred. He therefore transfers his sense of the sacred to the very thing which has destroyed its former object: to technique itself. In the world in which we live, technique has become the essential mystery, taking widely diverse forms according to place and race. Those who have preserved some of the notions of magic both admire and fear technique. Radio presents an inexplicable mystery, an obvious and recurrent miracle. It is no less astonishing than the highest manifestations of magic once were, and it is worshipped as an idol would have been worshipped, with the same simplicity and fear.

But custom and the recurrence of the miracle eventually wear out this primitive adoration. It is scarcely found today in European countries; the proletariat, workers and peasants alike, with their motorcycles, radios, and electrical appliances, have an attitude of condescending pride toward the jinn who is their slave. Their ideal is incarnated in certain things which serve them. Yet they retain some feeling of the sacred, in the sense that life is not worth the

[5] See, in this connection, the previous note.

trouble of living unless a man has these jinns in his home. This attitude goes much further in the case of the conscious segment of the proletariat, among whom technique is seen as a whole and not merely in its occasional aspects. For them, technique is the instrument of liberation for the proletariat. All that is needed is for technique to make a little more headway, and they will be freed proportionately from their chains. Stalin pointed to industrialization as the sole condition for the realization of Communism. Every gain made by technique is a gain for the proletariat. This represents indeed a belief in the sacred. Technique is the god which brings salvation. It is good in its essence. Capitalism is an abomination because on occasion it opposes technique. Technique is the hope of the proletarians; they can have faith in it because its miracles are visible and progressive. A great part of their sense of the mysterious remains attached to it. Karl Marx may have been able to explain rationally how technique would free the proletariat, but the proletariat itself is scarcely equal to a full understanding of this "how." It remains mysterious for them. They retain merely the formula of faith. But their faith addresses itself with enthusiasm to the mysterious agent of their liberation.

The nonintellectual classes of the *bourgeoisie* are perhaps less caught up in this worship of technique. But the technicians of the *bourgeoisie* are without doubt the ones most powerfully taken with it. For them, technique *is* sacred, since they have no reason to feel a passion for it. Technical men are always disconcerted when one asks them the motives for their faith. No, they do not expect to be liberated; they expect nothing, yet they sacrifice themselves and devote their lives with frenzy to the development of industrial plants and the organization of banks. The happiness of the human race and suchlike nonsense are the commonplaces they allege. But these are no longer of any service even as justifications, and they certainly have nothing at all to do with man's passion for technique.

The technician uses technique perhaps because it is his profession, but he does so with adoration because for him technique is the locus of the sacred. There is neither reason nor explanation in his attitude. The power of technique, mysterious though scientific, which covers the whole earth with its networks of waves, wires, and paper, is to the technician an abstract idol which gives him a

reason for living and even for joy. One sign, among many, of the feeling of the sacred that man experiences in the face of technique is the care he takes to treat it with familiarity. Laughter and humor are common human reactions in the presence of the sacred. This is true for primitive peoples; and for the same reason the first atomic bomb was called "Gilda," the giant cyclotron of Los Alamos "Clementine," the atomic piles "water pots," and radioactive contamination "scalding." The technicians of Los Alamos have banned the word *atom* from their vocabulary. These things are significant.

In view of the very different forms of technique, there is no question of a technical religion. But there is associated with it the feeling of the sacred, which expresses itself in different ways. The way differs from man to man, but for all men the feeling of the sacred is expressed in this marvelous instrument of the power instinct which is always joined to mystery and magic. The worker brags about his job because it offers him joyous confirmation of his superiority. The young snob speeds along at 100 m.p.h. in his Porsche. The technician contemplates with satisfaction the gradients of his charts, no matter what their reference is. For these men, technique is in every way sacred: it is the common expression of human power without which they would find themselves poor, alone, naked, and stripped of all pretentions. They would no longer be the heroes, geniuses, or archangels which a motor permits them to be at little expense.

What shall we say of the outburst of frenzy when the Sputnik went into orbit? What of the poems of the Soviets, the metaphysical affirmations of the French, the speculations on the conquest of the universe? What of the identification of this artificial satellite with the sun, or of its invention with the creation of the earth? And, on the other side of the Atlantic, what was the real meaning of the excessive consternation of the Americans? All these bore witness to a marked social attitude with regard to a simple technical fact.

Even people put out of work or ruined by technique, even those who criticize or attack it (without daring to go so far as to turn worshippers against them) have the bad conscience of all iconoclasts. They find neither within nor without themselves a compensating force for the one they call into question. They do not even live in despair, which would be a sign of their freedom. This bad

conscience appears to me to be perhaps the most revealing fact about the new sacralization of modern technique.

The characteristics we have examined permit me to assert with confidence that there is no common denominator between the technique of today and that of yesterday. Today we are dealing with an utterly different phenomenon. Those who claim to deduce from man's technical situation in past centuries his situation in this one show that they have grasped nothing of the technical phenomenon. These deductions prove that all their reasonings are without foundation and all their analogies are astigmatic.

The celebrated formula of Alain has been invalidated: "Tools, instruments of necessity, instruments that neither lie nor cheat, tools with which necessity can be subjugated by obeying her, without the help of false laws; tools that make it possible to conquer by obeying." This formula is true of the tool which puts man squarely in contact with a reality that will bear no excuses, in contact with matter to be mastered, and the only way to use it is to obey it. Obedience to the plow and the plane was indeed the only means of dominating earth and wood. But the formula is not true for our techniques. He who serves these techniques enters another realm of necessity. This new necessity is not natural necessity; natural necessity, in fact, no longer exists. It is technique's necessity, which becomes the more constraining the more nature's necessity fades and disappears. It cannot be escaped or mastered. The tool was not false. But technique causes us to penetrate into the innermost realm of falsehood, showing us all the while the noble face of objectivity of result. In this innermost recess, man is no longer able to recognize himself because of the instruments he employs.

The tool enables man to conquer. But, man, dost thou not know there is no more victory which is thy victory? The victory of our days belongs to the tool. The tool alone has the power and carries off the victory. Man bestows on himself the laurel crown, after the example of Napoleon III, who stayed in Paris to plan the strategy of the Crimean War and claimed the bay leaves of the victor.

But this delusion cannot last much longer. The individual obeys and no longer has victory which is his own. He cannot have access even to his apparent triumphs except by becoming himself the object of technique and the offspring of the mating of man and

machine. All his accounts are falsified. Alain's definition no longer corresponds to anything in the modern world. In writing this, I have, of course, omitted innumerable facets of our world. There are still artisans, petty tradesmen, butchers, domestics, and small agricultural landowners. But theirs are the faces of yesterday, the more or less hardy survivals of our past. Our world is not made of these static residues of history, and I have attempted to consider only moving forces. In the complexity of the present world, residues do exist, but they have no future and are consequently disappearing.

Only the things which have a future interest us. But how are we to discern them? By making a comparison of three planes of civilization which coexist today: India, Western Europe, and the United States. And by considering the line of historical progression from one to the other—all of this powerfully reinforced by the evolution of the Soviet Union, which is causing history to boil.

In this chapter we have sketched the psychology of the tyrant. Now we must study his biology: the circulatory apparatus, the state; the digestive apparatus, the economy; the cellular tissue, man.

CHAPTER

[3]

TECHNIQUE AND ECONOMY

There is a certain naïveté in wishing to treat the problem of economic technique in a few pages, and it seems completely useless to take up once again a question so frequently studied. But, as in the book as a whole, I do not mean to address myself exclusively to those aspects of the problem which are traditionally considered, that is, to the facts. The facts, figures, statistics (well or little known) form the background and foundation of my inquiry. It seems unnecessary to reiterate them. They can be found in many books, so I shall continue with the "cursive" method I have hitherto employed. By encircling the facts, I shall emphasize their importance; and on the basis of the data given, I shall seek to derive new aspects and "lines of force" for new studies. It might be asked whether this has not already been done and is hence unnecesary. But this inquiry presupposes that we have escaped not only from sole preoccupation with brute facts but from formal logic as well. Neither gives an account of reality. The point is to let oneself be guided by a kind of logic internal to facts and things. It is useless to speak of "laws." I am opposed to the attitude, represented for ex-

ample by the works of Fourastié, which combines elements on the basis of pure logic, yielding a terribly linear and inhuman result. I am likewise opposed to the attitude, characteristic of the majority of Western intellectuals, which, having taken account of the facts, denies them forthwith by avowals of hope and assertions of the certainty of human freedom—which is anything but scientific. This attitude can be reduced to the conviction that the reality of things is simply too frightful to behold. Instead of guiding themselves by reality, most investigators of the problem adopt an attitude flatly contradicted by all the events of modern times. This attitude might be summarized as follows: "The facts are the elements of a game of patience which is amorphous and has no form of its own. The individual is perfectly at liberty among these facts to arrange the pieces of the game as he will and to elaborate a voluntary and humane economy."

I take an extreme view but one that I believe is closer to reality. I see that the facts have their form and their specific weight. They respect neither freedom of the individual nor formal logic. I am striving in this essay to find their special consistency and their common tendencies, and to discover whether man still has a place in this tangle; whether he still has any authority among these colossal masses in movement; whether he still can exert any force whatever on the statistics which are slipping from his hands into the abstract and the unreal. Can he have a place, authority, and the possibility of action on a better basis than ill-founded declarations of hope or blind acts of unreasonable faith?

The Best and the Worst

The Influence of Technique on the Economy. Let us consider first the aspect of the relation between technique and economy which is traditionally studied, particularly by Marx. Technique, or rather techniques, appears as the motive force and the foundation of the economy. Without them, there is no economy. For this reason, a distinction can be made in economics between dynamic force, which is technical invention, and static force, the organization of the economy. Marx distinguishes between the system of production and the system of distribution: the former revolutionary, the latter

necessarily conservative. It is self-deception to put economics at the base of the Marxist system. It is technique upon which all the rest depends. But the distinction made by Marx must be revised, for it is no longer true that technique plays its role in the realm of production alone. Distribution, too, is to a great degree modified by techniques. Indeed, no area of economic life is today independent of technical development. It is to Fourastié's credit that he pointed out that technical development controls all contemporary economic evolution, from production operations to demography. (There is no doubt that world population growth is related to the increase in consumption.) Even more abstract spheres are shown by Fourastié to be dominated by technical progress; for example, the price mechanism, capital evolution, foreign trade, population displacement, unemployment, and so on.

This invasion of all economic activity by technique seems today indisputable. Of course the problem had been raised by economists before Fourastié, if not in full, at least to a certain degree. In an effort to explain crises, Gottfried Haberler, in *Prosperity and Depression,* ascribed their existence to inequality of technical development in different branches of economic activity. The success of a technique leads to its full development; technique will tend to reach the limits of its possible development in a given area. The result is, first, an inequality of power in the various areas of the economy, which provokes an unblancing of the whole system; and second, a diminution of plasticity of the economic milieu. Technical progress entails stasis in one part or other of the system; the economy is strained to the full and loses all possibility of adaptation, barring, of course, a complete breakdown. The crisis then results from the fact that the system cannot progress, economically, at the same tempo in all its parts.

Henri Guitton returns to this idea when he notes that the adaptive mechanisms which were active during the nineteenth century have become more and more hampered. This disturbance seems to be attributable to the loss of structural elasticity. A structure suitable to simplified mechanisms, lighter, so to speak (the old world had not accumulated as many innovations as the new), is no longer adapted to the exigencies of growth of a world no longer young.

In an altogether different field, John Maynard Keynes has also shown in his work, *General Theory,* that technical progress is an

indispensable factor in the economy. The economic world cannot remain stationary. It is unceasingly called on to evolve. In particular, the importance of technical progress is central to the theory of investment. All the possibilities of labor must be utilized at any price. It is necessary constantly to uncover new possibilities of investment. For, says Keynes, the more numerous the consumers' goods—the production of which has been provided for in advance —the more difficult it is to find corresponding new needs—which must likewise be anticipated and which call for new investments. What Keynes in fact fears is that there will not be sufficient new possibilities of investment. There is only one way to ensure limitless possibilities. These possibilities have nothing to do with spontaneous human needs, but involve technical discovery and application, which create new products to replace the old, and also stimulate the need for these products. Technical progress is therefore a decisive factor in the progression of investment. The epicentric position of the theory of investment in Keynes's system is well known. If a Byzantine phase of technical arrest were to occur in the economic realm, it would represent not only an arrest of economic evolution but a regression as well, with a resultant series of deep crises.

In a closely related sense, a great importance is attached to technique both by those who hold and by those who reject the theory of economic maturity. According to this theory, only ceaseless technical progress can compensate for the causes of depression which become manifest in an economy that has arrived at maturity. These causes of depression are decline in the rate of population growth and limitation of geographic expansion—two factors which entail a decrease in the rate of investment. Technical progress could remedy this but, according to the initiator of the theory, technique shares in the decrease, not absolutely, but relatively. Technical progress no longer occurs rapidly enough to compensate for the other factors. Not even the opponents of this theory repudiate the importance of the technical factor, and that is what interests us here.

Yet another element of economic life ought not to be neglected: agricultural production. In this case, too, the upheaval brought about by techniques is a radical one. We have already noted the danger to the earth itself. As to the benefits and the penetration of

technique into farm labor, it suffices to refer the interested reader to Giedion's work. But I must insist on one point: as a result of the influence of techniques, the modern world is faced with a kind of "unblocking of peasant life and mentality." For a long time peasant tradition resisted innovation, and the old agricultural systems preserved their stability. Today technical transformation is an established fact; the peasant revolution is in process or already completed, and everywhere in the same direction. The actual extent of the progress of this revolution is of small importance; what counts is the first step, which permits the barriers of tradition to be hurdled. The peasant becomes conscious of the inferiority of his traditions; the usual justifications are held in contempt and the peasant world passes from the irrational to the rational. Once again we encounter the notion that technique destroys traditional forms of civilization and introduces instead a global unity. What does this unblocking mean for the future? In the years to come we shall witness an acceleration of technical progress in rural life, and an acceleration of already perceptible phenomena: peasant emigration, agricultural specialization, deforestation, and the growth of agricultural production in general. These events are of major importance in view of the fact that agricultural production still remains the basis of economic life; and that the countries of the world most dependent on industry, Great Britain and Japan, have not reached as high a standard of living as the United States because of the lack of sufficient cultivable lands. The economic repercussions of this type of technical progress are easily grasped.

These examples, chosen arbitrarily from different social areas, show that the influence of technique on economic life is much more widespread and profound than classical manuals of economics would have us believe.

Moreover, all this is implied in the elementary observation that the progress of production closely depends on technical progress. It is at the present a truism to say that a new, general economic organization corresponds to certain new forms of production.

This dependence of the economy on techniques and primarily on machines has come about in an irrational way. It is not the action of clear and certain causes which have produced this interdependence. Veblen asks whether machines do not squander more

effort and material than they save; whether they do not cause grave economic losses by the developments they bring about in means of transport, etc. The same questions are put by Bertrand Russell and still more emphatically by Gaston Bardet, who points to the enormous waste of human forces, of time, work, and capital, occasioned by the social structures conditioned by the machine. These are indeed simple questions, but important ones.

We see, then, that the influence of technique on the economy does not arise from an indisputable economic superiority of the machine. Ideas and theories no longer dominate, but rather the power of production. The industrial revolution of the nineteenth century resulted immediately from the technical advances of that time; this relation has not changed. Marx was unquestionably right with respect to the period from about 1830 to the present; the motive force of all economic evolution has indeed been technical development. However, Marx was not necessarily right with respect to other periods of history. Technical progress has not always been the basic principle. We have already shown the contrary. Moreover, this does not mean that the consequences Marx draws from his contention are true. All we need do is note that Marx's observation is correct: the more we advance into the new world, the more is economic life dependent on technical development.

Economic Consequences. As Jean Marchal says, "the accumulation of machines transforms the economy." We know that technique is not equivalent to the machine, and Marchal's statement is even truer when technique is considered in my more general sense. Furthermore, his formula, which historically is more or less exact, tends to appear all the more exact in view of the economic disturbances caused, for example, by automation. A simplistic view of the automated economy proclaims ease and abundance for all men, thanks to technique. But, unfortunately, this is not so simple. We are, in fact, confronted with a phenomenon which will produce a veritable economic mutation. None of the economic modalities (salaries, distribution, reduction of the work week, transfer of the labor force from one area to another, disturbance of the balance of production in the various areas) seems capable of resolution in the present state of affairs. Even the socialist economic structure is not adapted to receive the massive effects of automa-

tion. This has been avowed by the Soviet economists themselves in their research into the effects of automation in the light of Marxism.

Returning to Marchal's formula, we might ask in what direction this transformation acts. If we consider certain traits of technical progress of concern to the economy, we note that they all move in the same direction. Let us recall that technical means are becoming more and more enormous and costly. Consider, for example, (*a*) the ever more numerous machines that are necessary to production, which act more rapidly, are always being improved upon, and are subject to frequent replacement because of constant inventive progress; (*b*) the organization of labor, which implies more and more numerous and costly personnel, which, although indispensable, is not always immediately forthcoming; (*c*) publicity techniques. In all these economic means the same fact is to be noted, the investment of enormous amounts of nonproductive capital. Capital in such amounts can no longer be owned by a single person and economic activity is beyond the range of individual possibilities. But technical progress cannot do without the concentration of capital. An economy based on individual enterprise is not conceivable, barring an extraordinary technical regression. The necessary concentration of capital thus gives rise either to an economy of corporations or to a state economy.

A concentration of enterprise corresponds to this concentration of capital. This fact can hardly be denied today, especially in view of the power of these enterprises. Two examples from the United States: In 1939, 52 per cent of all industrial capital was held by 0.1 per cent of the total number of enterprises; and in 1944, 62 per cent of all workers were employed in 2 per cent of American enterprises. A similar concentration of banking facilities exists. Of 30,000 banks in the United States in 1920, only 15,000 were left in 1956. There were 350 mergers in 1955 alone. The situation became so evident that in 1956 the Federal Reserve Board undertook a campaign against this concentration.

This tendency toward concentration is confirmed daily, as Joseph Lajugie shows. The important thing is to recognize the real motive force behind it. The human and social effects of this concentration are, on the whole, evil. In a great corporation, the workers are more than ever enslaved and scarcely in a position to act in a distinctively human way. Even the consumer is frequently imposed

upon. The integration of the individual into the technical complex is more complete than ever before.

From the purely economic point of view, the value of the results is highly debatable. It would seem, from the point of view of the market economy, that concentration should be a markedly favorable factor. It involves, for example, suppression of competition and a tendency to raise prices. But, more striking still, concentration does not result in growth of profits. In many branches of production, profit growth is arrested or even declines when the transition is made from the medium-size enterprise to the large corporation.

What, then, is the motive force behind this concentration? Technique alone. A number of elements in technique demand concentration. Mechanical technique requires it because only a very large corporation is in a position at the present to take advantage of the most recent inventions. Only the large corporation is able to apply normalization, to recover waste products profitably, and to manufacture byproducts. Technique applied to problems of labor efficiency requires concentration because only through concentration is it possible to apply up-to-date methods which have gone far beyond the techniques of the former efficiency and time-study experts (for instance, the application of techniques of industrial relations). Finally, economic technique demands both vertical and horizontal concentration, which permits stockpiling at more favorable prices, accelerated capital turnover, reduction of fixed charges, assurance of markets, and so on.

Technical progress thus entails concentration. But this concentration represents real advantages only in the technical domain. The impulse to concentrate is so strong that it takes place even contrary to the decisions of the state. In the United States and in France, the state has often opposed concentration, but ultimately it has always been forced to capitulate and to stand by impotently while the undesired development occurs. This confirms my judgment concerning the decisive action of technique on the modern economy.

What is more, the technique of organization renders the intervention of the state indispensable.

The necessity of normalizing products is no longer debated today. It is one of the conditions of economic progress. This normalization is based on technical research. But here, as everywhere else in a capitalist or semiliberal economy, the technical result is in conflict

with certain interests. In order to apply it, the good will of the public cannot be counted on. It then becomes indispensable to sanction normalization in some other way. And only the state can apply this sanction. The result is the creation of arbitration commissions armed with public powers to deal with normalization.

Technical necessity calls for state intervention in order to organize the electric power network. Later on I shall discuss the interrelation of the network and the purely technical motives which prompt it. It is not the regulation of opposed interests, but the necessity of a higher organization embracing the local organizations, which, in this case, brings about the appeal to state power. The technical organism called a *combine* is of the same order. Whether it be the TVA or a Soviet *Kombinat*, it is perfectly illusory to claim that such combines represent autonomous organisms. In fact, the technical necessity which brought them into being gains force and value only through state intervention. Doubtless, when the organism is constituted, it may receive a certain independence from the state. But we must not forget who the real parent is. Nor must we overlook the fact that this parentage represents a profound intervention in the economy on the part of the state, an intervention, moreover, not dictated by a theory or a will to power, but by the technical manifest.

The necessity of utilizing certain goods also tends in the same direction. It has long been recognized that technical progress is effected more rapidly in the creation of the means of production. From this fact comes a kind of hypertrophy of machine-producing industries. The well-known Hoover Committee for the elimination of waste found, for example, that the production of the American clothing industry was 45 per cent greater than necessary. The capacity of the shoe industry was double its real production; and the printing industry was overequipped by 100 per cent. The excess production of home appliances and automobiles is well known. None of this overproduction would represent a waste, if one were judging on the basis of world needs. But, in the present situation, overproduction produces disequilibrium with respect to revenues, investment, and consumption possibilities, and so on. There is no absolute need to halt technical growth in any given area (say, in heavy industry). But there is a need to find markets for this overproduction. At present, only the state is in a position to sustain the

tempo of technical progress in this direction, a heavy burden indeed.

Economics even intervenes in politics—consider the expansion of systematic "planning," which proceeds by waves, so to speak. Here there is a transition from the microeconomy to the macroeconomy which it would be interesting to study in a detailed way. I shall simply point out that the application of planning on the scale of the enterprise leads to a nationwide application of planning in which all enterprises obey a like rule.

The establishment of production norms or of a plan becomes rational and technically necessary when the method is already extended to the national field. I could easily give additional examples; for instance, in the development of financial and banking techniques. Let us bear in mind that atomic energy, say, when put to work will suppose state control of all sources of energy. It is inconceivable that an individual could have at his disposal the sources of atomic power. Not doctrinal but technical reasons today render economic life inseparable from the state. This does not mean that the economy necessarily becomes collectivist or totalitarian. For the moment let us simply note the indissoluble relation.

This relation is admitted by many economists. Is it the result of chance or of choice? Of neither exclusively. Nor is it the result of a managed economy. As Robert Mossé writes: "With the development of the managed economy, it has become very difficult to trace a boundary between politics and economics . . ." In reality, it is a necessity resulting from the advance of technique. Technique plays an important role in economic life; but it has the same effect with reference to economic science. A relation is being established between technical progress in economic life and technical progress in science or method. The two converge and end in identical results.

Before examining this transformation of method, we must briefly recall that political economy has changed its object, and almost its nature, as a consequence of the enormous accumulation of ecomic facts. Economic facts have been rendered more numerous and more enormous—and this is not the least effect of technique in economic life. The definition of economic science has hence become more and more complex and comprehensive. Without seeking to note all the points of the curve, let two definitions suffice for

comparing the distance between the extremes. The first was given in 1850, the second in 1950. In the first, economic science was defined as the "science of wealth." Its object was primarily acquiring wealth and disposing of it. It was therefore an individual and private matter. The objective of political economy is conceived in such a way today that it is virtually impossible to encompass it in a formula. As Marchal shows, we have the problem of satisfying the needs of humanity, co-ordinating the available means of production, modifying existent institutions, and even transforming human needs. These problems must all be studied not on the plane of the individual but on the plane of the social group, and an effort made to disengage the laws of these social groups.

There is no need to go to the extreme and substitute for the organization of production the organization of distribution alone, as Robert Mossé appears to be doing when he writes: "From the moment production becomes sufficient, the essential thing is to distribute goods and leisure." Without going that far, it is easy, as Lange has done, to see the difference between a science of the production of wealth and a science of administration of scarce goods. More and more, the economic fact covers all human activity. Everything has become function and object of the economy, and this has been effected by the intermediacy of technique. To the extent that technique has demanded complete devotion of man or brought to light a growing number of measurable facts, or rendered economic life richer and more complex, or enveloped the human being in a network of material possibilities that are being gradually realized, it has transformed the object of the economy. The economy now becomes obliged to take into account all human problems. The development of techniques is responsible for the staggering phenomenon of the absorption by economics of all social activities.

The Secret Way

But another relation between technique and economy exists: the formation of an economic technique. Not only has economic science changed its object and its nature, but it has produced a technique which is simultaneously a method of knowledge and a method of

action. Political economy has not renounced its claim to being normative. It seeks not only to grasp reality but also to modify it. But the real relation of these two aspects of economic technique is obvious. The method of scientific knowledge as such reacts on the economic milieu and tends to shape it; but this technique is not "neutral." It does not merely stand ready to do the bidding of any random doctrine or ideology. It behaves rather with its own specific weight and direction. It is not a mere instrument, but possesses its own force, which urges it into determined paths, sometimes contrary to human wishes.

Economists, not understanding this, want to disengage their technique from its "neutrality" and to bring it into the service of their ends. They reject the definition: "Economics is the science [technique!] of efficient choices." But when they seek to humanize the economy, they learn quickly enough that such attempts lead directly to the subjugation of the ends to techniques. Those who pose the problem of ends and propose a humane economy as their goal are the very persons who develop techniques further and enhance their specific weights, as Jacques Aventur has shown. But whereas the overpowering phenomenon of the machine strikes home to everyone and makes plain its influence on economic life, the ways of economic technique are secret and everyone remains convinced of its innocuousness and docility.

In order to grasp the nature of economic technique, it is first of all necessary to grasp the reasons for its rise. One of its causes is so simple that I shall mention it only in passing. This is the evolution of the sciences in general.

The sciences in general, in the twentieth century, have passed through a crisis of growth characterized by the appearance of certain problems of methodology and technique. Economic science is likewise abandoning dogmatic positions and deductive methods in order to establish exact procedures. This may have taken place before the first gropings of the infant science had borne definitive results. Many economists believe that the ideal science, which must serve all others as model, is physics, and that economic method must approximate the method of physics taken as general type but not as specific means.

At the same time economists feel, as a kind of challenge, the in-

effectiveness of their system. Nothing has exposed the vanity of political economy better than their contradictory diagnoses and therapies for economic crises. For some the cause of crisis is an unsaleable surplus of goods; for others, insufficiency of production. For some it is an excess of savings; for others, a lack of them. And as far as the proposed remedies are concerned, some economists would raise the discount rate and others would lower it. Some hold that wages must be stabilized and others demonstrate that they must be lowered. Such contradictions can only arise from a defect of method. And the economists bitterly resent the ironical attitude the public has toward them. One of them recently wrote: "The public believes in the physicist, but it has no confidence in the economist." Policymakers absolutely cannot rely on what the economists say, nor follow their contradictory counsels with respect to action. All this, then, made it mandatory to replace the regime of theories, which gave birth to nothing but opinion, with a rigorous method which "sticks" to facts.

The need to stick to the facts became more imperative as the facts themselves became more complex. Here again the effect of techniques made itself felt. The facts of economic life could be grasped directly when economic life was still relatively simple, when economic phenomena (for example, at the end of the eighteenth century) presented a picture which, in magnitudes and elements, was compatible with direct experience. But the enormous growth of the economic milieu has made direct apprehension impossible and brought about the decline of corresponding modes of reasoning. Everyday logic cannot embrace more than a very limited number of data. It was therefore necessary to invent a method corresponding to the increasing complexity and amplitude of economic phenomena. At the beginning of the twentieth century, a "technical state of mind" appeared which developed mightily toward midcentury. This state of mind was characterized, first of all, by an effort to make a hard and fast separation between what is and what should be. The doctrinal character of economics was completely repudiated. The sole interest was in matters of fact. The goal was simply to know scientifically, to accumulate facts, to put them in mutual relation, and, if possible, to explain them by means of one another.

Political economy is no longer a moral science in the traditional sense. It has become technique and has entered into a new ethical framework, which I shall define later on. This represents a decisive step for the creation of a technique. The technical state of mind is likewise evident in the creation of a precise method (which more and more consists in the application of mathematics to economics) and in the precise delimitation of a sphere of action. In effect, in order for technique to exist, method must be applied to a fixed order of phenomena. In the transition of doctrine to technique, the central idea was the distinction between microeconomics and macroeconomics, as in the work of François Perroux, a leader in this inquiry in France.

We have here a decisive situation. Microeconomics studies economic phenomena at the human level where the relatively humane traditional methods can be applied, where individual decision is respected, but where the complete application of the technical apparatus is not permitted, either with respect to method or with respect to action. The observation of facts on the microeconomic level does not *ipso facto* entail action, and to promote action is one of the principal characteristics of techniques. Even if microeconomic inquiry is useful and congenial, it nevertheless appears to have no future because it pertains to the limited world of the individual.

Macroeconomics, on the other hand, opens all roads to technical research and application. Technical application presupposes, as we have already noted, measurable magnitudes, elimination of errors of judgment, and amplitudes of movement wide enough for technique to have an understandable object. These are precisely the characteristics of macroeconomic inquiry. There is no doubt that the methods of macroeconomics are still somewhat uncertain, and many phenomena are recalcitrant to it (for example, scientific techniques applicable to revenues). Nevertheless, this is the domain a priori of technique and we can be assured, as a consequence, that this is where the really effective forces will be concentrated. We are likewise assured that microeconomics, far from being an element in the foundation of macroeconomics, or a complementary element to it, will be absorbed. It will lose its reason for existence to the extent that macroeconomics develops surer techniques. We are heading

toward a society in which knowledge of microeconomic phenomena will be the result of simple deduction from knowledge of macroeconomic phenomena.

The technicians in these new disciplines all have one trait in common: the joy of constituting a closed group in which the layman has no part at all. This represents an unconscious tendency; but we observe it among many modern economists in the form of a secret technique, an esotericism, a certain contempt for whatever does not belong to its new world of means.

This "pride of youth" always appears among technicians when they are convinced that their new method is unassailable and that their discoveries are becoming the center of things. The authority in which they clothe themselves takes the form of a secret vocabulary which is incomprehensible to the outsider even when it is employed, as often happens, to enunciate the most obvious facts. Technique always creates a kind of secret society, a closed fraternity of its practitioners. It is a new thing in the milieu of economics to note a kind of studied incommunicability. Up to now, every man with a little education was able to follow the works and theories of the economists. To be able to follow them today, one would have to be both a specialist and a technician. The technique itself is difficult and the necessary instruments cannot be managed without previous education. And there is that caprice of many economists to constitute themselves a closed society. These two factors coincide, indicating the grave consequence of excluding the public from the technical life. Yet it can scarcely be otherwise.

Technique as a general phenomenon (as we shall see when we study the political milieu) always gives rise to an aristocracy of technicians who guard secrets to which no outsider has access. Decisions which have a serious basis take on the appearance of arbitrary and incomprehensible decrees. A cleavage like this, which is inevitable in the advance of technique, is decisive for the future of the democracies. Economic life, not in its content but in its direction, will henceforth entirely elude popular control. No democracy is possible in the face of a perfected economic technique. The decisions of the voters, and even of the elected, are oversimplified, incoherent, and technically inadmissible. It is a grave illusion to believe that democratic control or decision-making can be reconciled with economic technique. Little by little the elements necessary to

the creation of this technique are taking shape; and soon they will be perfected.

The Economic Techniques of Observation. I do not intend to describe these instrumentalities; I am concerned here solely with exhibiting them as an ensemble.

The principal instruments which have been developed are: statistics, accounting procedures, the application of mathematics to economics, the method of models, and techniques of research into public opinion. It is evident that these elements reciprocally condition one another.

At the base of the structure lies statistics, the instrumentality for determining the raw facts of economics. At one time statistical data were ridiculed on the ground that they were misleading. But this stage lies behind us, and nowadays a large measure of confidence rests in the precision of such data. This change has resulted, in part, from a change in the state of mind of the statisticians themselves. They are immersed in a "statistical atmosphere" and comply with the quantitative and numerical practices of the modern world. To statisticians, statistics is no longer a mere game; it is an essential operation of society. This represents a change not only in perspective and in seriousness, but also in basic position. For a long time statistics was the work of amateurs; today it is a complex organization of specialists. It has become a profession and, as a consequence, is practiced much more earnestly. Moreover, the statisticians have at their disposal increasingly precise instruments. Among these instruments (which have transformed administrative as well as statistical technique) are the calculating machine, the punched-card machine, and microfilm. Not only has the speed of operation been prodigiously accelerated, but also its precision and its dimensions. By means of microfilm, hitherto uncombinable elements can be combined; and by means of the electronic brain, operations can be effected which the human brain could never perform.

The statistician is, materially speaking, in a position to perform convincingly. This is even more evident in the utilization of statistical data. As we shall see, the combination of the elements is essential, and this combination becomes feasible largely through the intermediacy of the machine.

A final element increases the professional seriousness of the statisticians: their responsibility. In democratic countries, it lies in the

realm of private enterprise; the various organs concerned with statistical data in effect sell their studies to the great corporations which must know precisely, for example, the course of a market. If the information proves inexact, the statistician can be sued in civil court, at least in the United States. In countries under authoritarian rule, responsibility is a public matter; in the Soviet Union the statistician who gives false information is regarded as a saboteur.

These elements together make modern statistical data more and more precise. The great scope of statistical operations and of the organs involved generally escapes the nonspecialist. To give a single example, there are in the United States fifty-six federal agencies, each of which specializes in one or several statistical categories. Altogether, twelve categories of weekly statistics are published. One of these, the category of price, takes in four elements. One of these (gross price) comprehends 1,690 weekly quotations combined in 890 series. This indicates the extreme complexity of the operation. It must become even more complex when interpretation is undertaken.

All this work is not motivated by pure scientific interest. It is oriented toward action. Permanent inquiry of this sort is no longer instituted to construct or support doctrines but rather to relate information to action. In order to succeed in effecting this connection, interpretation is necessary, and this is the principal task of the technical discipline called econometrics.

Econometrics is distinct from mathematical economics. It is much more theoretical. Its principal operations on statistical data are twofold: (1) analysis, comprising operations such as simplification or dissociation of statistical data; and (2) comparison, which can be applied to different kinds of elements. Magnitudes can be compared by establishing what are called equations of regression, which express a constant relation between two magnitudes of the economic domain. Variations can also be compared; here a correlation index is established, according to which two economic phenomena vary in direct or in inverse proportion but with the same velocity. Within the same realm, the econometrician tries to establish certain relations: no fact in the economic domain can be regarded as due to chance; and not satisfied with simply noting and giving the correlation formula, the econometrician goes further and

establishes the causal relation between two phenomena, a procedure which leads into the future.

Until recently, economists operated on concrete data alone. But, for the purposes of action, they must make predictions. A distinction must be drawn between predictions which are made according to the system of covariations, and causal explanations of phenomena. Here the economist leaves the purely technical realm. An equation no longer provides the solution; there is a certain subjectivity, a certain personal judgment. To be sure, it is present in the various other operations, but to a lesser degree.

Economic technique has taken over a variety of other means; for example, stochastics, the application of the calculus of probabilities to economic phenomena. This technique is extraordinarily difficult to handle. It does not operate on raw figures but on statistical data, on data furnished by econometrics (as, for example, the coefficients of elasticity), and on the data furnished by public-opinion research institutes. In connection with the third element, it is evident that economic phenomena are not mechanical; opinion plays a role. In a very simplified way, it might be said that stochastics seeks to establish a law of probability, or of the frequency, of a given event, starting with a very large number of observations. Stochastics, therefore, represents an instrument of prediction which gives the direction of the most probable evolution of the situation.

This stochastic calculus is limited only by the nature of the economic and social milieu. For example, if a given law is exact, the public which is informed of it tends to react in the inverse sense. But sometimes it reacts by conforming to the law. The act of prediction is thus in a sense self-falsifying. But the public, by so reacting, falls under the influence of a new prediction which is completely determinable. The economist is able to establish laws of probability for all deviations of opinion. It must be assumed, however, that one remains in the framework of rational behavior. The system works all the better when it deals with men who are better integrated into the mass, men whose consciousness is partially paralyzed, who lend themselves willingly to statistical observations and systematization. The results obtained by this technique are impressive, even though the technique is still immature.

Much more classical, and of a different order, is the whole com-

plex of accounting techniques. These techniques have been much modified and no longer belong merely to the realm of enterprise but rather to that of economics. The accountant is no longer a mere agent for registering the movement of funds in an enterprise. According to the Lutfalla report published by the Conseil Économique, 1948, he has become a veritable "profits engineer." His operations encompass not only money but all the elements of production. He is oriented toward the past and also toward the future. The more complex manufacturing operations become, the more necessary it is to take adequate precautions and to use foresight. It is not possible to launch modern industrial processes lightly. They involve too much capital, labor, and social and political modifications. Detailed forecasting is necessary. We shall meet this question again when we discuss planning, but it is appropriate here to call attention to the so-called "input-output" techniques Leontieff has pointed out. These represent a method designed to establish in a precise, numerical way the interconnections among all sectors of production techniques. They determine for each sector what is bought from and sold to the others. This method makes it possible to establish in detail what raw materials, instruments, tools, and machines are required to produce a given product. Under present conditions, one can no longer fix magnitudes approximately or be content with mastering certain key subjects. For even a very ordinary commodity, two or three hundred basic elements must be taken into account. Exact quantities, weights, and times must be fixed. The necessary calculations can only be performed with the help of computing machines. With this method the well-known and hackneyed formula—that everything is reciprocally dependent—becomes a rigorous reality. But it is the technical elements which are reciprocally dependent, welded together by a common necessity and expressed in certain new techniques.

What holds for the private accountant is even more true for the public accountant who works on a nationwide scale. There are certain differences between the two insofar as enterprise has private profit as its end. As a consequence of the profit motive, the private accountant must comply with the rules of capitalist management. The public accountant (who becomes an accountant of initiative) draws up balance sheets and future revenue potentials for a complex organism whose reactions are slow and of great am-

plitude when referred to the impulses at their origin. If public enterprise behaves in any way like capitalist enterprise, its internal dynamism complies with certain laws. The role of the accountant is to discover these laws. The effects of this new revenue-calculating economic technique, which relates economic effects to their causes, are easily seen in fields such as the liquor industry, housing, transportation, and so on. It is clear that this calculated revenue potential bears not merely on money but also on human capital. France does not yet have a central accounting service which could completely exploit this technique and establish a measurement of social needs, means of production, movement of capital, national income, and demographic change, etc.

Returning to the methods of pure economic technique, we find the method of models. It is extremely difficult to experiment in economic matters. But experimentation is indispensable in all sciences and even more so in techniques. As Vincent puts it, a model is a "simplified but complete representation in its numerical aspect of the economic evolution of a society; for example, a nation during a given period." A model is a reproduction in miniature of a certain economic ensemble in the form of mathematical equations. It is impossible, obviously, to put all economic phenomena into a model; a certain arbitrariness is called for. The primary act is therefore a choice, founded on some theoretical decision, of the constants and variables to be put into the model. This theoretical decision, however, is not arbitrary. It is guided by certain principles, in particular the necessity of linking observation to action. Once the constants and the variables of the system have been selected (and they may be numerous), the relations between them are established. Some of these relations are evident in the sense that they are purely quantitative; others are more unstable and subjective and must be established by the economic technician himself. They are empirical relations, verified or proven false by experiment. Finally, the ensemble of these relations must be put in the form of equations by insertion of the time factor. Then, by solving the equations, it is possible to study the evolution of the system and its incidences. This facilitates the study of the evolution of certain mechanisms determined by a social group, or of the incidence of some exterior intervention into an economic system, or of the influence and importance to the whole of every element in an ensemble.

Models can be purely theoretical or historical, as when the data arise from statistics (in which case they must be tested against the actual evolution of society). Or they can be predictive, as when the attempt is made to forecast the future. These predictive models are the object of great interest in the study of economic complexes.

The last of these new economic techniques which I wish to describe in this brief review is public-opinion analysis. Everyone is acquainted with the Gallup Institute, which has branches in almost every country of the world. Various systems (soundings, samplings, inquiries) are used to establish periodically the feelings of a given class or category of the population, about any important question. Certainly, there is strong skepticism about these methods. No one believes that he thinks and acts like his neighbor. No one is sympathetic to the notion that he is a mere number in some list or series; and this unconscious rejection makes for skepticism. Nonetheless, the results of such samplings must be deemed valid, in spite of the seeming (but easily explainable) setbacks they suffer, as, for example, in the well-known case of the American presidential elections of 1948. The results reflect various phenomena: sociological currents, ethical preferences, and political opinions with which we here are not concerned. But other results reflect economic currents: opinions concerning prices and wages, commercial choices, urgent economic needs (to the extent that they are measurable), and so on. In sum, anything in the nature of an opinion which can be grasped by a good observer or reporter will henceforth be numerically measured and followed scientifically during all stages of its development. This method represents a great revolution; it permits the integration of opinion in the technical world in general and in economic technique in particular. This system brings into the statistical realm measures of things hitherto unmeasurable. It effects a separation of what is measurable from what is not. Whatever cannot be expressed numerically is to be eliminated from the ensemble, either because it eludes numeration or because it is quantitatively negligible. We have, therefore, a procedure for the elimination of aberrant opinions which is essential to the understanding of the development of this technique. The elimination does not originate in the technique itself. But the investigators who utilize its results are led to it of necessity. No activity can embrace the whole complexity of reality except as a given

method permits. For this reason, this elimination procedure is found whenever the results of opinion probings are employed in political economy.

The economist is thus provided with an arsenal of technical means which enable him to observe and sometimes to predict economic reality in detail. Then the following question is unavoidable: Will these techniques remain simple techniques of observation, of pure knowledge? We grant that their creators had no ulterior motives. The means are there simply to be of assistance to economic science. But will this motive be adhered to? Let us consider the position of the economist as J. U. Nef has described it. The economist, more or less stricken with an inferiority complex in regard to the public, "abandoning the hope of affecting policy by objective thinking, seeks refuge by becoming an expert and counselor on questions of technology or practical politics." Economists cherish the hope of influencing reality. The technique of knowledge the economist is now acquiring allows him, through the state, to exercise this influence. We note this in all countries, no matter what their type of economy or form of government. It has been called the reign of the experts, but it is in actual fact the reign of the technicians. Economists today have the means of being technicians near the seat of state power. But even without wishing to take account of this tendency, we know that these means of observation of reality will not remain inert. Like all techniques, they possess specific weights and direction. The reasons are very simple.

An organization for establishing statistical data is extremely costly and cannot continue without profits. One way of making a profit is to sell statistical products to a capitalist clientele, which will utilize them to guide its business into certain channels. A statistical bureau then becomes a counseling bureau. But the use of statistical data in a semiliberal capitalist economy is restricted and cannot be developed to its full effectiveness. This incapacity of capitalism correctly to employ techniques appears time and again. Mumford says: "One of the most flagrant faults of capitalism is not to have known how to make use of existing laboratories, for example, the Bureau of Standards, to determine norms from which the whole body of consumers would have benefited." The tendency of technological society is to determine the movements of the macroeconomy; yet it is striking to note that sta-

tistics, once established, tend to revert to the level of the micro-economy and individual decision, and to find employment only on this level. This is obviously insufficient; the economists are in a position to lay claim to something better than a clientele which, in any case, seldom enables them to cover their costs. They must address themselves to the state. Certain semipublic corporations finance the operations, but it is clear that the state demands its *quid pro quo*. If the state is to pay for statistical research, it must get something in return: assistance in directing national affairs. The state requires the economist, on the basis of statistics, to seek out methods of intervention either directly or by subtle means such as those advocated by John Maynard Keynes. When the great private corporations or the state ask the economist for a method to influence reality, they are addressing the economist's own invincible longing, which in the beginning engendered the improvement of these scientific means. Suppose that we have accumulated enormous quantities of facts, have encompassed the whole of reality, and possess the means to follow the mechanism of economic phenomena and even to a certain degree to predict them. Shall this accumulated force, then, serve no purpose? The 1952 report of the American Bureau of Labor Statistics shows clearly that this ensemble of means leads inevitably to planning.

We confess that we are unable to follow Closon's reasoning when he declares that the operations of the Compabilité Nationale are not a threat to freedom because, in fact, they are not applied. Once the trends of the economy have been recognized and reduced to numerical form, will it be tolerated that no intervention be undertaken when the catastrophic consequences of some decision or other have been clearly perceived?

On a more modest but still significant plane, what meaning has a detailed accounting of all the needs of a thoughtless worker (including the number of springs in his mattress and the number of razor blades he uses annually), undertaken in order to establish a minimum wage, if he can spend his money haphazardly? Mere prediction would plainly be absurd. The irrationality of the individual keeps him from living on the amount he could live on according to calculations. He would die of hunger on a subsistence minimum, unless an authoritarian education made him conform.

Let us grant that this represents no more than a temptation to

the economist. But it would require superhuman strength not to yield to this temptation once action becomes possible; the more so because the informational techniques described are closely connected to techniques of action, as are the establishment of norms or of accounting plans. We have distinguished somewhat arbitrarily between knowledge and action in order to present in the most objective way possible the normal development of economics produced by the creation of these techniques. Even when they serve solely for the purposes of knowledge, it is clear by how many routes they end in intervention. Econometrics is only to be understood if it issues in its normal end, the establishment of economic planning. Without this, econometrics is inefficient, and efficiency is the very law of technique. Like a horse chafing at the bit, the techniques of economic science await the signal to intervene more completely than ever before in the reality they have come to understand.

The Economic Techniques of Action. At the same time that the economist has created a technique for knowing, he has created a technique for acting. A new world is awakening, an economic mutation is being effected. Among these techniques of intervention we shall consider only two: plan and norms.

The establishment of norms by the economist has become necessary, Dieterlen tells us, simply in order to follow and understand economic development. (A good example of the transition from techniques of understanding to techniques of action.) It is not sufficient merely to follow the course of statistical data. It is necessary to erect in advance a system of norms of progression of the elements of a given economic system which will permit us at any moment to estimate the divergence of a given element of the system from the norm. Even in a nondirected economy, it is possible to determine (*a*) a certain relation among the different economic components; (*b*) a "normal" tendency for the evolution of each of these elements; and, consequently, (*c*) a "normal" evolution of their relation. When such a scheme has been established, it is then possible to say whether one of the elements is progressing too rapidly or too slowly, a fact which, in Dieterlen's opinion, should serve to reveal the causes of an economic crisis.

But if we thus establish certain norms of progression, we are confronted with two facts. First, the necessity of intervention: once

the norm has been set and a condition which diverges from it has been observed, it would be folly to permit a dangerously abnormal phenomenon to develop. Second, the possibility of extending such an establishment of norms. Why should inquiry be limited to a given system? Once a calculus of norms is possible, it ought to be extended throughout the economy. This legislative tendency will operate not merely in the area of the organization of labor. A bureau for setting standards, or a service of industrial analysis, is no longer limited to the co-ordination, say, of wages and of the scientific organization of labor. These operations transcend the level of private enterprise and attain the level of the general. They harmonize the complementary activities of wide economic sectors. We are then completely within the technique of intervention; the transition from the one to the other has been imperceptible.

If the term *norm* is taken in its exact meaning, it is evident that the application of the system of norms orients us in a unique direction. Under capitalism, norms are fundamental to the planning of enterprise, but the tempo of production remains a function of market conditions. In a planned economy, norms are fundamental to all economic calculations. They determine the quantities to be produced and measure the degree to which the plan is realized in the market (Fedotov). The technique of normalization can only have full scope in a planned economy. It tends, in proportion to its development, to imply a planned economy, simply because it tends to pass from private planning and an atomized economy to a global economy and general planning (the fundamental condition of its application). A global economy is more exact to the degree that both these aspects of planning are subject to the law and control of the machine, as Mas indicates.

All this represents a tendency rather than an accomplished fact. As soon as industrial normalization intervenes, it brings with it this tendency which inevitably devalues the older economic types and the older industrial organizations.

Norms mutually entail each other and presuppose certain synchronizations. It is almost impossible to conceive of localized norms. If it is asked what the motive force behind this tendency is, once again we must answer: efficiency. The logic of norms was clearly evident in the application in Britain in 1940 of the National Research Project. Research on the measure of production and its

practical consequences spread like a slick of oil and brought the whole of industry into line. It has been praised as "political economy entering into action."

This "chain reaction" is also only a tendency at the moment. It is claimed that counteracting factors, economic and human, will prevent it from becoming a reality. But these other factors are not technical. The competition is between divergent forces, the one technical, the others not. And in our society the technical factor must prevail over the others. I therefore believe that in this area, too, the logic of norms will impose itself everywhere. And if in my analysis of this development I seem to have isolated the technical factor, this is not because I choose to neglect or fail to recognize the others. But, as I have already demonstrated, the technical factor is at present the decisive one. In addition, most of the other developmental factors are well known and almost universally studied, whereas the technical factor remains, in general, obscure.

As soon as norms become essential because of their obvious utility, they appear to complement the plan. There is no better means of co-ordinating them or permitting them their full efficiency than to integrate them into a plan. This is what I mean by the *logic of norms.*

Another technique of intervention which has recently become essential (and which I shall only mention) is so-called operational research. Its basic characteristics, its objectives, and its meaning are identical with those of norms. But the problem here is a problem of decision. Norms and operational research are today the two means by which the plan is executed.

Planning represents a second aspect of the economic technique of intervention. Everyone has an approximate idea of what planning means: the state decides everything and regulates everything in advance. We must analyze at least the characteristics of the planning operation, if not its details. Economic planning is a variety of technique, not a form or a system or an economic theory. Not a single economy of any type whatsoever has been constructed by means of planning. We think otherwise because the Russian adventure has always appeared to us in such a guise. "It was desired to build an economy of the collective type and to succeed in this a plan was elaborated." But the Russian plan assumed its own mean-

ing independently of all theoretical ideas. In reality, the plan is a technique and *ipso facto* indifferent to doctrines and opinions; it is least of all concerned with principles of action. In Germany no one had any very clear concept of the economic form that should be adopted, but planning was accepted as an efficient means. In our own day, it is even more true that plans develop in all countries without any foundation of economic doctrine. This, in one sense, is very reassuring. People constantly say: "If we remain true to our old doctrine and the plan is only an instrument, we remain what we were. If planning has sometimes functioned as a socialist instrument, it was only because it was in the service of socialist doctrines." This is, as consolation, illusory. But it is at least founded on the truth that planning is not connected with any particular doctrine. System or not, however, it perhaps implies a certain definite form of economy.

A second observation leads us to insist on the importance of "ways and means" in the establishment of the plan. The plan is not merely a set of commands or some general orientation. There are two focuses in the plan. There is the choice of objectives, the direction to give to an economic system in its ensemble. There is also the most concrete possible anticipation of the means needed to reach these objectives. Economic choice of objectives and the establishment of corresponding means—such is the plan. But this choice and these means are elaborated in the most rational possible way, and a whole complex of techniques of application enables the user to avoid arbitrariness. With regard to the techniques of the formation of a plan, we refer the reader to the works of Charles Bettelheim.

Now let us consider a great difficulty which is an important point of discussion in modern planning: prices and wages. Until now, the plan has been more or less tied to "real" prices and wages. Planning, if not actually established by the market, was at least fixed in temporal or spatial relation to market prices and wages. But this situation could not last long. The intention of the third Soviet plan was precisely to fix prices and wages in a purely abstract, but not arbitrary, way by certain econometric methods, independently of the laws of the market. It would seem from the various wage manipulations which took place in 1949, and the repudiation of Vosnessenski, that this attempt was not a success. However, we

must consider it as the only logical way in which planning could then have been undertaken. And this approach may very well be eliminated by new improvements in economic technique. This would set to rest the objections of François Perroux, for whom the plan was thereby deprived of all "economic rationality."

A plan is executed in accordance with two constant principles: efficiency and social need. The plan first answers the constant search for the most efficient use of mechanical means, natural riches, and disposable forces. The problem is to organize, co-ordinate, and normalize these elements in such a way that each instrument produces its maximum yield. Planning has been criticized on all fronts, from the philosophic to the economic. But no one has yet questioned the fundamental efficiency of planning, except at the beginning. This criticism had its origin in two things, the gropings of the planners and the ignorance of the critics. Everyone has since become convinced that the mechanism is efficient—with allowances for a certain bluff that up to now has accompanied planning experiments. As far as technique is concerned, judgment is based solely on efficiency, and planning appears fully justified in this respect.

The second of the two principal criteria of planning is the satisfaction of social needs. The initial difficulty is to determine just what these needs are at a given moment. How shall we effect the balance between social needs and production? Theoretically these are insoluble questions (I say *theoretically* advisedly). The proposed means (opinion polls, ration cards, obligatory absorption by the buyer of whatever is produced) indicate that the question as it is usually posed is abstract. If one says: "In planning, the consumer is in command," one is making abstraction from the fact that the plan, a sociological phenomenon, answers to *social* need and not to individual need. At the same time one is thinking of an abstract man (a kind of fixed image of man), and this, too, renders the proposed question inoperative. The social man envisaged by the plan is a man integrated more and more into modern technical society. His needs are more and more collectivized, not indeed by direct pressure, but by publicity, standardization of goods, intellectual uniformity, and so on. It is well-known that "to the standardization of production corresponds a standardization of taste which gives to social life its collective character." Moreover, mass consumption corresponds spontaneously to mass production. There is no need

for repressive measures. The adaptation of the public occurs of itself. The *average* man becomes the norm in the most liberal system in the world because only the products necessary to the average man are offered on the market. In fact, the problem of understanding social needs is complicated only if planning technique is separated from all the other techniques. These other techniques spontaneously lead men to feel certain social needs conformable to certain data. When the plan is reinserted into its true framework, it is evident that there is no need of forcing social needs. They are prepared in advance, so that the plan is in a position to correspond exactly to them, after a more or less difficult period of adaption.

The whole evolution of human needs, in their "sociologism," tends toward the plan. There is almost no necessity any longer to exert pressure on these needs. They are already what they should be, provided that we abandon human misfits to their miserable lot, a procedure which is, in any case, the course of all techniques. When it is a question of dominating the world, one cannot stop to consider Kirgiz shepherds or Bantu huntsmen who will not accept the laws of the determining forces.

Planning does not pretend to produce an immediate response to all social needs. As I have said, there is choice. It is choice which can render certain persons unhappy but not hopeless, because the plan is inserted into a dynamic conception of the economy. The equilibrium between production and consumption is neither static nor does it exist at present. It is to come, and will constantly renew itself. The choice effected at a given moment is placed in a general perspective which makes this choice relative, and at the same time subordinate, to subsequent foreseeable development. It is necessary therefore to consider both the future of realization and the mechanism of uniformization of needs (which I have already mentioned). This leads the two lines to come together constantly. This is an element of the dialectical view of the economy, which is the only one admissible today. During the realization of a plan, a constant readaptation of means and ends is simultaneously effected, assuring a greater cohesion of the ensemble, if not a greater certainty of realization.

Finally, it seems to me important, in connection with the plan itself, to emphasize the need for utilizing the labor force efficiently. It would appear that full employment is an internal necessity, not

merely a momentary circumstance, of the plan. Charles Bettelheim has demonstrated that without full employment there is no possible satisfaction of the totality of social needs. In this connection, wages change their character and become a part of the social product. The plan ought, therefore, to provide for both full employment and the assignment of the labor force in accordance with the requirements of the production plan. It becomes indispensable to extend the plan to the whole labor force. Without this, the mechanism cannot function. And this then poses the question of the place, of the limitation, of the characteristics of planning.

One need not yield to the puerile enthusiasm that considers planning a panacea, a polyvalent remedy like penicillin. But it is necessary to put the plan into a different perspective. Whatever the remedies or proposed reforms for resolving injustice and incoherence in the modern economy, everything occurs through the agency of the plan. The plan in itself is no solution. But it is the indispensable instrument of all solutions. Even if one starts with Knut Wicksell or John Maynard Keynes, one meets again and again the urgency of planning.

In Mumford's proposals to release man from the clutches of technique, there is an interesting project for an economic regionalism on a world-wide plane. But this regionalism can, in fact, only be based on the exceedingly complete and rigid planning of production and distribution.

Planning and Liberty. Everybody, or almost everybody, is convinced today of the effectiveness of the two techniques of intervention, norm and plan. And, in fact, in view of the challenges which not only nations but political and social systems hurl at one another, and even more, in view of the challenge that man is making to misery, distress, and hunger, it is difficult to see how the use of the means provided by planning could be avoided. In the complexity of economic phenomena arising from techniques, how could one justify refusal to employ a trenchant weapon that simplifies and resolves all contradictions, orders incoherences, and rationalizes the excesses of production and consumption? And since the techniques of economic observation, if they are to have their full scope, issue directly in the technique of planning, and since there can be no question of renouncing the youthful vigor of these mathematical methods, how is it possible not to see them through to the end?

Yet a certain disquiet has appeared among those who cherish human freedom and democracy. They ask if planning is not an all-consuming force. They seek to set three kinds of limits to its power, represented by: (*a*) flexible planning, (*b*) the system of limited planning, and (*c*) the separation of the planning agency from the state (in short, what is usually called the reconciliation of liberty and socialism). No one accepts Friedrich August von Hayek's proposition (in his *Road to Serfdom*) that planning is essentially evil. Conscientious economists are unable to renounce technical discovery. They seek a middle term.[1] Is it to be a limited plan? But

[1] See a compendium of ideological illusions concerning planning and liberty contained in a recent special number devoted to this question in the *Indian Journal of Political Science*. Ten or so articles attempt to demonstrate that planning is indeed indispensable but that it presents no danger at all to freedom. A complete unreality characterizes these articles. The position of the authors can be summarized as follows.

First, they express the hope of saving freedom through liberal and partial planning. (However, other authors in the same volume show that this hope is absurd and ineffective.) Second, the articles contain other formulas, equally absurd and without content. "Planning should have as its object the realization of freedom"; "The more rational planning becomes, the greater the freedom of the people." These are mere affirmations, and one would seek in vain for corresponding realities or for a possible content.

Some of these authors rely for proof of their propositions on a series of simple syllogisms. For example: "(1) Planning increases production. (2) Production allows the satisfaction of more needs. (3) The satisfaction of needs is the condition of freedom. Hence, planning is the condition of freedom." This reasoning is faulty for two reasons. It is linear and takes no account of the complexity of the facts (for example, put a man in prison, give him everything he needs: he is nonetheless free). It derives its conclusion partly from an economic premise (the first) and partly from an ethical premise (the third), without attempting to distinguish the logical planes on which these premises lie. The third premise is, in any case, wholly questionable from a spiritual or ethical point of view. (I shall return later to a discussion of this.)

But for these authors the principal hope of saving freedom, in this amazing theory, lies in the claim that an enlightened public opinion has the power to direct the decision of the planners toward the satisfaction of its real needs. In this case, one would indeed have democratic planning, collectivism on a voluntary base. But to reason like this is surely to move in a world of dreams. The good faith of these intellectuals compels one to think seriously of pathology.

Can anyone really believe that, if public opinion wanted pastry shops, planning could be oriented toward these institutions, if, in addition, the other uses of flour had to be sacrificed? Can anyone really believe that public opinion would receive any satisfaction if it demanded footgear when tractors were needed? Such beliefs are simple nonsense. It will be maintained that public opinion does not *really* know what it needs . . . But then the technician makes the decision. We are familiar enough with the mechanism: first producer goods, then consumer goods. Of course, public opinion will be "consulted" after the technician has made his decision: "You would have preferred woolen goods? Technically impossible; we had to make them of cotton. Green? Unfortunately, there is no aniline. But you can choose between

then the problem is posed: where lies the limit? For some economists, planning is a purely economic question bearing on key industries. But the debate has lasted a century and no decision has been reached as to which industries are key industries. The decision becomes even more difficult as categories change with time (the extraction of uranium, for example, was not a key industry twenty years ago) and as the interpenetration of economic activities becomes greater and greater. It is becoming extremely difficult to analyze the factors involved in production. Every part of the system is, directly or indirectly, dependent on all the others through financial repercussions or through the structure of labor. How, then, is it possible to set up a planned sector of the economy alongside an unplanned sector? When one rereads what was published on this problem only ten years ago, it is clear that these studies are completely out of date and have been rendered null and void by subsequent technical improvements. Let us assume that a plan has been made for a five-year period. If now the attempt is made to limit it to economics by allowing the greatest possible freedom outside this area (for example, by having no planning in the social domain), how can this economic plan possibly be viable?

The problem of financing is necessarily raised even by a flexible and limited plan. It was clear, at the time of the discussion of the new phase of the Monnet plan (September, 1950), that bank credit, the appeal to private financing, was insufficient. It was necessary to turn to public financing. But this represented an enormous undertaking, even for the state. The state was obliged to concern itself with the planning of its finances according to the more or less

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light red and dark red. See what freedom you have!" In effect, these authors seek to baptize obedience to technical necessity with the name *freedom*. They attempt to hide the real compulsions and write either out of blindness or hypocrisy.

Only one of these articles is valid. Suda declares: "So much the worse for freedom. We can sacrifice it. In any case, on the plane of values, dedication to the common good is a higher ideal than freedom." I cannot agree with this, but at least it allows us honestly to assess our situation. We encounter the same attempt at justification (in general, better supported but as unconvincing) in *Entre la planification et la liberté*, in which Dutch, French, Norwegian, and American authors study the problem from very varied viewpoints (*Revue Economique*, March, 1953).

These illusions are contradicted by Tibor Mende himself (*India After 12 Years*, 1959). He shows that Indian agricultural planning (the communal projects of the villages) collapsed because it was not comprehensive and authoritarian. His comparison of India with China is a clear demonstration that, in accordance with the criteria of yield and efficiency (the sole justified criteria of any planning), the most authoritarian methods are the most profitable.

new totalitarian financial conception, which assumes control of the whole national revenue and affects every citizen.

In order for the plan to be realized, the use of the labor force must also be integrated into it. This is recognized by Great Britain, for example, in its conception of full employment. The application of the plan likewise presupposes planning of housing and of vocational guidance, apprenticeships, and schools. Moreover, it quickly becomes clear that there is a need too for social security (a necessary psychological and sociological element if full employment is to function without too violent a shock to human nature). This interrelation is not imaginary and gratuitous. Internal necessity connects the elements of the plan, and it is folly to think of breaking its links.

Thus the plan, once adopted as method, tends perpetually to extend to new domains. To limit it would be to put the method in a position in which it cannot function—exactly as though one were to construct efficient automobiles but refuse to build adequate roads. The car could indeed run on narrow, rutted, and sandy roads, but it would not give the results for which it had been designed. Certain complementary given elements become proportionately more numerous as planning improves and modern society becomes more complicated. These mutual relationships render limited planning impossible. The plan engenders itself, unless technique itself is renounced.

The same situation holds if the planner aspires to adopt a flexible plan or one independent of the state. In such a case the fundamentals of the plan are not obligatory. The plan appears as mere advice concerning what would be desirable; the producers remain independent, the consumers have free choice, and the attitude of the individual prevails over the social. The flexible plan is subject to constant revisions and readjustments demanded by universal personal freedom. The same holds true if the attempt is made to refer the organization of the plan to agencies other than the state: to narrower organisms, such as administrative divisions of specialized economic organizations; or to organizations of wider scope, as, for example, international organizations. The appeal to international bodies is designed to vitiate the criticism of such writers as Hayek concerning the dangers of totalitarianism which arise when the state is in charge of the plan.

These different proposals are extremely deceptive. The flexible plan has only one defect; but that defect is crucial: the plan cannot be realized. The reason is simple. If the plan corresponds to the real nature of planning, it ought to fix objectives, which normally would not be attained by the play of self-interest and a modicum of effort. It must stretch productive forces to the maximum, arouse energies, and exploit existing means with the maximum of efficiency. (That planners do not always succeed, that administrative errors occur, and that not all planning invariably acts with the maximum efficiency is no more a criticism of the system than errors of calculation are a criticism of mathematics.) But if the individual is allowed freedom of decision and there is no plan, he will not make the maximum effort required of him. If the industrialist is allowed to retain full independence, he will seek out other arrangements and not arrive at the objectives proposed. Hence, the plan, in order to be realized, must be paired with an apparatus of sanctions. This appears to be a veritable law of economics; planning is inseparably bound up with coercion.

The individual does not realize spontaneously what is most efficient. Nor do the workers conform spontaneously to Gilbreth's "movements." The following alternative presents itself. Either the plan is flexible but is not realized, as experience shows: in spite of the propaganda about the Monnet plan, its objectives were only 70 per cent realized. The flexible plan of the Bulgarians (1947) was 37 per cent realized. The Monnet plan, which ought to have been completed in 1950, was actually completed in 1953, having taken twice the proposed time. In *L'action psychologique* (1959), Maigret restudies the effect on the breakdown of the plan of the absence of propaganda (which would have rendered the plan psychologically compulsory). It is useless to expend the great amount of labor which goes into a plan only to reach a stalemate. Or the plan *must* be realized, but at the cost of loading it with sanctions so that it becomes more rigid. Those who count on the good will of mankind display a delirious, idealistic optimism. Centuries of history, despite the facts, have not been able to convince them of the contrary; reason certainly will not change them. But they are so far removed from reality that their opinion is negligible.

The problem of sanctions brings planning into relation with the state. Anyone who claims that planning and the state are separable,

or that local plans can be carried out (the TVA is always cited), has forgotten that local plans must be guaranteed by the state or they come to nothing. And this suffices to give back to the state all its prerogatives. It is evident (and Russia and Germany were no exceptions) that it is not the state itself which creates the plan, but rather some specialized organism more or less dependent on it. As to the TVA, the source of this enterprise was the Roosevelt government, which performed operations of expropriation, made means available, and assured sanctions.

How, then, is it possible to retain a belief in the independence of the plan? The bond between planning and the state is organic and not due to chance. At the minimum, the power of the state is required for a general examination of available resources and to put all the national forces to work. I do not use the word *planning* in the technical sense, as when one points to school-construction programs or traffic-signal installations. Local entities are of course able to execute such programs. But they do not represent planning any more than does dike construction in the Netherlands. If they did, the "planning" of a house by an architect would have to fall under this category. As to international decisions (which might be cited as a proof of the separation of the plan from the state), these do not represent plans in the proper sense of the term (for instance, the Bretton Woods agreements). The sole hope of realization of international plans—for example, in Europe—rests, as we clearly see today, on the existence of a European state. This kind of planning acquires substance only to the degree that such a state is constituted. This fact corroborates our thesis. Only a supranational state would be able to convince both the national states and the trusts to co-operate in a common economic operation. The Dawes and Young plans ended in failure because they had no means for genuine sanctions and no political power to support them. Conversely, we note that the Marshall Plan (which became the ECA) is imperceptibly producing a political system. The Atlantic Pact is a correlative to the Marshall Plan, and Europe will begin to organize itself only in the event that the ECA is seen to be completely useless unless it is applied to a politically ordered world.

The Americans understood perfectly that the only alternative to a useless expenditure of money in the ECA was a European political organization. Unification, or even economic co-ordination, can-

not be conceived of independently. Mere understanding or good intentions can scarcely result in real planning. Again we are back at the necessary conditions for the realization of a planned economy.

That in an ideal society the connection between plan and state is unnecessary, just as the need for penalties disappears in the case of the individual as he exists in himself, I am willing to admit. But that does not make me believe in such an ideal and take it as a reality. In fact, I note that techniques of knowledge engender and necessitate techniques of action, and techniques of action presuppose certain conditions and developments in accordance with a true law which might be called the law of the extension of planning.

This extension of planning does not necessarily bring about a socialist society. Private ownership of the means of production need not be modified in order to have a planned economy. Likewise, planning does not necessarily bring about a dictatorial state. The use of sanctions and propaganda can be accommodated to forms other than dictatorships. But when a technique invades a certain domain, in connection with planning, the technique effects its whole operation with completeness. It is useless to try to set limits to it or to seek some other mode of procedure.

The Great Hopes

Economic Systems Confronted by Technique. Jean Marchal is right in reducing to three systems the economic solutions presently recommended. Marchal's three systems are: corporatism, planning, and liberal interventionism. But after having correctly observed that the system of planned economy is at bottom no more rational than the system of the market economy, he is wrong in adding that "the choice between the two systems follows more from philosophic preferences than from truly scientific considerations"; and that "neither of these systems can pretend to a total rationality."

It is not philosophical preferences which weigh one system against the other, or which lead to the choice between them. If I ask myself which of the two ought logically to prevail, I am not referring to the "philosophical" choice of the masses. It is efficiency and success that lead history to adopt a certain direction—not man who in some sense makes a decision. The problem does not concern

personal decision or preference; it is a question of discerning what seems most probable. At the present moment, what system is most efficient? I insist on the phrase *at the present moment*. It means nothing to explain that liberal capitalism was extraordinarily efficient a century ago. The statement is true and we do not wish to deny it. But what of the present moment? If we accept the idea that different human systems of action ought to correspond to different social, political, and economic circumstances, can we uphold the thesis that the past efficiency of liberal capitalism is a pledge of present efficiency? Let us remember that from the point of view of efficiency the Russian and German planned economies were successes. And the United States adopted a planned regime when it was challenged by war—it may be added, with all the care and precaution presupposed by the critical democratic sensibility of the Anglo-Saxons.

Shortly after reconversion, in 1950, however, the Americans were obliged to embark on a new program. It was not merely an armaments program (which had certain advantages in connection with full employment), but a sound program encompassing a group of countries, as indicated by Truman's Point Four. These programs presupposed a planned economy.

It would seem that we are today unable to escape the facts. And the facts direct us toward the planned economy, regardless of our theoretical judgments in the matter. It is also often asked whether, after long periods of planned economy, the trend could be reversed. But this is another problem.

We must ask why these fixed and rigid programs (which emerge in a planned economy) are adopted on a wider and wider scale, irrespective of doctrines and intentions. The only reply is that planning permits us to do more quickly and more completely whatever appears desirable. Planning in modern society is *the* technical method. It does not necessarily represent the best economic solution, but it does represent the best technical solution. We must demand of planning what it is able to do, and nothing else. Marchal, therefore, is right in saying that the planned economy is not more rational than the market economy. It is not at all certain that it will result in any greater savings. I understand that one of the preoccupations of economic science is whether a result has been attained in the most economical manner possible. But this is possibly

only an abstract point of view and, in any case, is secondary. The same problem arises in war between one general who hesitates to sacrifice human life and another general who desires victory at any cost and is willing to sacrifice everything to gain it. Unfortunately, our experience since the eighteenth century has been that the general who hesitates to make the sacrifice is always defeated. The same problem is posed by "dumping." In speed, intensity, and coherence, the technique of the plan proves superior. There may be waste. This is not completely certain. But it ought not to be forgotten that the charge of waste was one of the keenest criticisms leveled against liberalism. It is possible that waste will be mitigated through an improvement of the technique. We are not presently in a position to say one way or the other.

These observations might be summed up in the statement that in one case technique exists and in the other it does not. But things are not so simple. It is standard practice to set up in opposition the possible solutions; for example, corporatism and planning. But we should guard against the possibility that the contrast is completely artificial. We should guard against abandoning ourselves to the judgment of the specialists. The important question is one of perspective. Every system is composed of different elements. We can put these elements in different perspectives and thereby arrive at different judgments. The specialist will fasten on certain specific elements. Either he will envisage a given system *sub specie aeternitatis*, in which case his judgment will be that the planned economy and the corporate economy are clearly not identical. Or he will envisage the system from the viewpoint of practical realization in all the facets of its achievements. In this case the structure of a corporation (or the systems of corporative production) will again be judged not to be the same as the structure of the planned economy in genuinely concrete details.

These elements of a given system, which are important in their specificity, lose importance, however, if, instead of isolating the system, we try to reintegrate it into the complex of society and into the general course of history. What then takes on importance are the elements in their relation. Relations are of the highest importance, not mere internal consistency. It is the connections between the economic system and the state (with its technical means, different classes, and structures in national form) which be-

come characteristic. And we do not mean here theoretical connections, but real ones resulting from the internal necessity of the regime. From this point of view, the corporate economy and the planned economy come singularly close together, to the degree that both systems (*a*) take a firm hold on the economy, (*b*) manage it on the basis of exact mathematical methods, (*c*) integrate it into a Promethean society which excludes all chance, (*d*) centralize it in the frameworks of nation and state (the corporate economy today has no chance of success except as a state system), (*e*) cause it to assume an aspect of formal democracy to the total exclusion of real democracy, and (*f*) exploit all possible techniques for controlling men. The kinship of the two systems is obvious in spite of differences in material structure.

The end pursued by both the corporate economy and the planned economy, and the means adopted to reach this end, are identical. Only the outward forms change. It is useless to compare these forms. History will decide which form is best—best adapted to the common end.

It does not seem to me to be exact, therefore, to hold that there are three possible economic pathways. There are only two. And only one of them entails the exploitation of these techniques; the other one ascribes the chief place to nature. (Here again is the old opposition between the natural and the artificial, the artificial representing the expression of art: *techné.*) The complete identity, rather than the resemblance, between corporatism and planning ought to be noted. Corporatism is adapted to a traditional, cultivated, bourgeois mentality; planning, to an innovating, proletarian, pseudo-scientific mentality. But the attitude of the two is fundamentally the same. And, speaking objectively, the result, insofar as the real structure of human society is concerned, will be identical. As to the choice between the two, the system that can best utilize the techniques proposed by the economists will prevail. Up to now, there is no doubt that the planned society seems better able than the corporate society to utilize these techniques. The corporate society brings to bear a whole complex of nontechnical considerations (sentimental or doctrinaire) which the planned society rejects.

It may be objected that in the planned society politics intervene on a major scale and that this is not technique. I would then ask

what kind of politics is meant. As we shall see, politics have tended to become technical in the countries that have adopted planning.

The serious study of the opposition between politics and economics, and of the relations between them, dates back perhaps twenty years. This opposition has tended to become less and less real as the two have found a common denominator in technique. When the economy and the political milieu are simultaneously subjected to technical method, the problem of the interference of politics in the economy ceases to have major importance. It no longer has the same significance as personal influence, private interest, or moral judgments. The alignment of the two has not yet been fully completed—and this constituted the particular weakness of Hitler's Germany—but it takes more than a decade to overcome technically great political and economic machines.

All these considerations attest to the fundamental likeness of the corporate economy and the planned economy. Only these two economic attitudes are left. They should not be considered, however, in their extreme aspects. A planned society does not imply that every detail is integrated into the plan. Nor does the plan provide for the humblest means. Liberalism, likewise, cannot be understood in its entirety. One scarcely speaks any longer of a "liberal interventionism" in which the distinction is made between the policy of structure (improvement of distribution, etc.) and the policy of prosperity (influence on the economy itself of certain means which have been decided upon; for example, money). The state no longer leaves the economy to itself; but state intervention is flexible enough to allow the entrepreneurs some initiative and grant (controlled) freedom to the market. This is the attitude of the best minds in France. They are guided not only by a desire for equilibrium and a traditional confidence in the "middle of the road," but also by a preoccupation with human and nonconformist elements. I do not deny that these elements are desirable, or that attributing a strategic role to the state (while reserving tactical freedom to the citizens) is a tempting concept. But I am searching for the possible here. Would such an economic orientation really satisfy technical conditions? Is it realizable in depth? The answer is certainly yes, if we abstract it from reality. But when we come back to reality, it is immediately evident that the liberal orientation represents the most difficult of the possible alternatives. The equilibrium we seek be-

tween technique and freedom and between state and private enterprise is not stable. It is continually being put to the test and must be ceaselessly re-established. The tension required of the individual in this struggle seems to me to raise a grave question. Is it feasible to obtain from the individual ceaseless effort to establish the very framework of his activity? And will his activity *within* this framework be sustained? In other words, is this equilibrium the best possible condition for economic development? Will not the energy employed to secure the structural framework be dissipated in some other quarter? One must take account, after all, of human nature. This is even more true of a liberally supervised economy than of a totally planned economy, precisely because the former entails a certain degree of freedom for the individual. The human being, left to his own devices, will not choose the most difficult paths or the tightest situation. He will choose the line of least resistance. I am speaking of the man of the twentieth century, the product of the society based on ease, security, and comfort.

The average man like myself, or the entrepreneur of my acquaintance, has no great desire to maintain his equilibrium at the expense of a ceaseless re-creating of a failing virtue. Under these conditions, he finds that things go badly. He far prefers a simple solution, summary, no doubt, and brutal, but assuring him an easy road. Since means of direct intervention are available, the average person prefers that they be used (unless private interests lead him to prefer the freedom of the great beasts of the jungle). The partisans of direct intervention present two conditions as necessary to its realization: first, a reform of the state, which is henceforth to transcend all private interests and be endowed with competent organisms for flexible and concealed intervention; second, a precise and complete economic theory dealing with the sequence of economic events and the means of intervention. These two conditions amount, however, to a single condition: the primacy of technique. But then the same problems recur. There is the difficulty of preventing technique from going to the limit of its potentialities. There is the difficulty presented by the conjunction of economic and political techniques which mutually reinforce one another. And so on. Is it credible that a state which has become really technical (we shall study its characteristics in the following chapter) will be satisfied with half measures? Nothing of the kind. The seeds of destruction are in the very

conditions proposed for the establishment of the economic form represented by liberal interventionism. Thence the fundamental instability which renders the attempt to establish such an economic form not a final solution but merely an intermediate stage.

This development (that is, from liberal interventionism to the fully planned society) is the more certain because liberal interventionism has usually corresponded neither to the general tendencies of society nor to the historical situation. I certainly do not wish to imply that such an economic form, from the standpoint of economic science, is not valid or justified. But when considered in the framework of today's reality, it loses its validity.

The general tendencies of modern society are too well known for me to dwell on the contradictions they offer to liberal interventionism. It is said that this solution, which allows for concessions and would abandon certain values it believes cannot be saved, in order to preserve certain others, represents an underhanded way of establishing collectivism. My answer is that the problem is essentially spiritual. The economic orientation called *liberal interventionism* presupposes a spiritual revolution that has not yet even begun.[2] Again, the historical situation is eminently unfavorable to the philsophy of the "middle of the road." Herein lies the challenge that is made both in war and in peace to peoples seeking to orient themselves in this direction.

The simple presence of the Soviet Union acts as a catalyst and transforms the internal situation of the semiliberal countries, whether they have direct economic relations with the Soviets or not. Here we have a planned economic system in competition with certain other systems. As Marchal has shown, when contact is established, the capitalistic countries, out of commercial necessity, are obliged to align themselves with the Soviet system. In other words, planning technique forces the competitors to imitation.

This effect has been brilliantly analyzed by Gottfried Haberler. He demonstrates that the development of state socialism and collectivism is reflected in the whole economic complex and results in a generalized nationalization of economic activity and in state monopolies of foreign commerce. A country engaged in planning its economic activity will establish quantitative controls over foreign

[2] I refer the interested reader to my book *Présence au monde moderne.*

trade in order to adapt it to the general national planning. Quotas and exchange controls are established which are then necessarily reflected in the commerce of nations that aspire to free activity. Haberler astutely notes that measures of international commerce taken by free nations in response to other countries with planned economies in turn result (if they are co-ordinated and planned) in a marked degree of internal economic planning. State monopolies of international commerce cannot result in multilateral and nondiscriminatory commerce. Haberler shows also that commercial agreement on a liberal basis is not possible between nations with a planned economy and nations with a nonplanned economy.

In view of the disturbance from abroad, then, how is it possible to maintain the delicate mechanisms of the policy of prosperity based on individual enterprise?

The planned economy seems to represent the most probable solution imposed by economic technique and desired by the greater part of modern society, not only of men but of powers.

The real problem is not to judge but to understand.

Progress. Technique, in its action on the economy, awakened vast hopes in human hearts. And certainly there is no question of denying these hopes. The machine and all that came with it, all it brought in the way of progress, would put into human hands riches perhaps different but as impressive as those of legend. These riches would not be piles of gold or precious stones reserved for the darlings of the gods, but comfort and pleasure for everyone. And if the carved palaces, the chests encrusted with coral and enamel, the scultpures and objects of gold, the precious table services, the arms with handles of emerald and pearl were all fated to disappear, in compensation every man was promised decent glassware and porcelain, a house in which he could be warm, abundant nourishment, and, little by little, comfort and hygienic surroundings that would assure him physical and mental harmony. Everyone was to have in full measure the wherewithal to live. And, more than that, new needs would arise which would no longer be the rare pleasures of initiates but simply the human condition. To drink chilled beverages in the summer or to be warm in the winter would no longer be the costly fancy of a prince.

Poverty was retreating and, with it, man's suffering. The machine was taking over. The time devoted to work remained time wasted;

but it was constantly decreasing and no one imagined that this process would ever stop.

This extreme view of things developed so rapidly that by the end of the nineteenth century people saw in their grasp the moment in which everything would be at the disposal of everyone, in which man, replaced entirely by the machine, would have only pleasures and play. We have had to lower our sights. In practice, things have not turned out to be so simple. Man is not yet relieved of the brutal fate which pursues him. What appeared so near has again been postponed. Yet two wars, two "accidents," have in no way affected our glorious conception of progress. Spiteful actions of fate, human errors—call them what they will—men refuse to see in them anything that essentially affects the marvelous progress that opens before them. In spite of accidents, they believe that the road is still free. The man of the mid-twentieth century preserves in his heart exactly the same expectations as his grandfather had.

No doubt he has repudiated what he thought was naïve. And perhaps a certain distrust keeps him from enjoying the full life to the extent that he might have expected. Even if he is unaware of it, the average man preserves in his collective consciousness the obscure feeling that he has been duped. He had believed so completely in the takeover by the machine, and in plenty, and he does not wish to fall into a trap again. Nevertheless, hope persists wherever tomorrows beckon; say Hitler's Thousand Years, or the bourgeois's stupid notion of progress. The hope is still the same, but the human being (model 1950) tells himself that he can only attain Paradise through the destruction of his enemies. His feeling of frustration—occasioned by the abrupt loss of what was possible and even within reach—is one of the elements behind the atrocities of modern wars. When man finds the foe who stands in his way and who alone has barred Paradise to him (be it Jew, Fascist, capitalist, or Communist), he must strike him down, that from the cadaver may grow the exquisite flower the machine had promised.

All myths directly or indirectly go back to the myth of Paradise; and the technical productivity man is witnessing seems to have spurred a proliferation of myths. Psychologists and sociologists have observed the appearance of new myths; and many theories have been advanced to account for this return of man to the sacred world. But such explanations are unsatisfactory because they lack

a material basis. That material basis is, in fact, the enormous technical progress of the modern world. This progress restores to man the supernatural world from which he had been severed, an incomprehensible world but one which he himself has made, a world full of promises that he knows can be realized and of which he is potentially the master. He is seized by sacred delirium when he sees the shining track of a supersonic jet or visualizes the vast granaries stocked for him. He projects this delirium into the myth through which he can control, explain, direct, and justify his actions . . . and his new slavery. The myth of destruction and the myth of action have their roots in this encounter of man with the promise of technique, and in his wonder and admiration.

If we consider the theses of the economists, we find that they, too, affirm the same hope. They locate it elsewhere and prescribe conditions and modalities to it, but the foundation is the same. Technique is for them, too, the only means of abundance and leisure. Fourastié is right in putting the case numerically to dramatize the shortening of the work week and the enormous transformation in living standards and in the qualitative nature of life. The case is indeed simple if 1950 is compared with 1815. But it is no longer quite so simple if 1950 is compared with 1250. It is important to consider, for labor, not only time but intensity. It is possible to make a meaningful comparison between the fifteen-hour workday of a miner in 1830 and the seven-hour workday of 1950. But there is no common denominator between the seven-hour day of 1950 and the fifteen-hour day of the medieval artisan. We know that the peasant interrupts his workday with innumerable pauses. He chooses his own tempo and rhythm. He converses and cracks jokes with every passer-by.

Exactly the same holds true for the qualitative nature of life. If a whole people is oriented toward the search for justice or purity, if it obeys in depth the primacy of the spiritual, it does not suffer from the lack of material things, just as we today do not feel the inverse need of the spiritual. Such preferences depend on personal judgment and on the society concerned.

We cannot say with assurance that there has been progress from 1250 to 1950. In so doing, we would be comparing things which are not comparable. Certainly, an airplane which, after all, exists concretely seems like progress, compared with dim historical mem-

ories. Therefore, it is advisable to limit ourselves to saying that there has been progress since the beginning of the industrial era, which was founded on the breakup and destruction of the noncomparable and vanished old order. For modern man with his peculiar orientation—which has material possessions and "stomach" as the central values—the period of great hopes indeed arrived. And these hopes are the same (even if the forms differ) for a man met at random and for a great economist.

However, as it is said in England, "you get nothing for nothing, and not much for sixpence." In spite of leisure and abundance, supposing that leisure and abundance come in the way men expect them, there is a great difference between this state and Paradise. The difference has to do with the cost. The old dream that has tempted man from the beginning, the medieval legend of the man who sells his soul for an inexhaustible purse, which recurs with an enticing insistence through all the changes of civilization, is perhaps in process of being realized, and not for a single man but for all. I say *perhaps*. Modern man never aks himself what he will have to pay for his power. *This* is the question we ought to be asking. (And we shall do so later, after we have completed our description of the technical phenomenon.)

Centralized Economy. We are now in a position to trace certain characteristics that technique imposes on the economy of the modern world. We must recall that there is no accommodation with technique. It is rigid in its nature and proceeds directly to its end. It can be accepted or rejected. If it is accepted, subjection to its laws necessarily follows.

What are the effects of these laws on the economic world? The first trait that can be clearly perceived is the connection between the economic mechanism and the state. This connection exists not by virtue of socialist doctrines, nor because the state wills to intervene, but because there is no other way of proceeding when technical development is present.

Technique always supposes centralization. When I use gas, or electricity, or the telephone, it is no plain and simple mechanism which is at my disposal, but a centralized organization. A central telephonic or electrical station gives substance to the whole electric network and to every individual piece of apparatus. The technical "central" is the normal expression of every application. A coexist-

ence of these centrals is implied: a completely centralized organization which ultimately encompasses all human activities. Technical centralization is one of the major realities of our time. The question is whether these centralized organs can exist independently of one another. Can each develop in its own specific and autonomous way? Jünger, who poses this question, is correct in stressing that the system is not hierarchical, that every technical body is independent of its neighbor, and that there is no subordination among them. Economically and politically, however, the risk is very great. Each of the centralized bodies must be put into its proper position and relation with respect to the others. This is a function of the plan, and only the state is in a position to supervise the whole complex and to co-ordinate these organisms in order to obtain a higher degree of centralization.

The idea of effecting decentralization while maintaining technical progress is purely utopian. For its own centralization, technique requires interrelated economic and political centralization. And we are speaking here of mechanical technique alone, without going into the motives of political technique.

The state, which by its very nature is the organ of centralization, is at the same time the organ of choice of the technical centralization. Anyone who believes statesmen are malevolent in willing centralization demonstrates thereby only his own naïveté. The state is forced to realize the plan for exclusively technical reasons.

We have already seen how the necessity of sanctions brings about a relation between the plan and the state. This relation can also be envisaged as the administrative framework of the state, which supports the techniques of planning and assures them freedom of operation and a certain stability. I must insist on this last characteristic.

The techniques set up by the plan must envisage economic reality and its probable development as faithfully as possible. In order to elaborate a plan, however, it is necessary to consider certain elements as stable and fixed, and not take all elements as simultaneously variable. But there is no guarantee that these elements will really be fixed. The same difficulty arises when it becomes substantially impossible to forecast the development of some factor or other in economic life. In such a case, either a hypothetical evolution of the factor will be posed, or the factor will be fixed arbi-

trarily. This is a problem in a five-year plan and, much more acutely, in a plan of longer duration in which production must be projected far into the future. An excellent example is the groundwork for the electrification of France. Should it be based on steam plants or hydroelectric plants? To decide this, inquiry must be made, among other factors, into the relative cost price of each system for a given amount of electrical power produced. These plants would be designed to last for a long time; but how long? Let us suppose the period to be the mean duration of a waterfall, a hundred years. The calculation would then proceed on this basis, subject to three fundamental factors: the cost of the initial establishment, the capitalization of the maintenance charges for a hundred years, and the cost of coal for a hundred years. The third of these factors can be calculated roughly; but what of the second? It depends on the interest rate, which cannot be predicted that far in advance. There is yet another factor: monetary developments. How then can the plan be established? There is only one way: to require state guarantees; to obtain from the political power the assurance that for the realization of the plan the interest rate of the loans will not vary.

It may be noted in passing (and this confirms our thesis of the unity of the technical phenomenon) that the improvement of statistics makes it necessary for the state to intervene in economic technique: the publication of statistics may be of great utility to the intelligence services of some eventual enemy. Stuart Arthur Rice gives examples of statistics in foreign commerce which contributed to sabotage operations. Hence, the state must centralize all statistics and either make available only statistics of interest to a given category of businessmen or manufacturers or keep completely secret whatever might be of interest to the enemy. This surveillance was entrusted, in 1950, in the United States to the Bureau of the Budget. It must be noted that American public opinion is not content with this compromise. It tolerates badly the "indecision" imposed by the cold war. However, a strong minority desires a total blackout of statistics, as in the Soviet Union. The state would then have indirect, but nevertheless complete, control of economic activity, inasmuch as it alone would know the full economic situation.

A bond is thus established between the state and the economy whereby technical progress is not possible without the interven-

tion of the state. This does not mean that the whole economy is in the hands of the state. We ought, on the whole, to abandon the idea of a ravaging and dictatorial state. Let us think only of the cold and impersonal mechanism that holds all sources of energy in its hands. What is production without energy? What is the economy? Does not the agent that controls the supply of energy also direct the economy? Technically speaking, the control of energy can no longer be in the hands of any agent but the state. This is true even in the United States, as has recently been shown.

If statistics are to be given their full scope, it is necessary to coordinate the actions of different organisms to avoid useless repetition, and also to pay the bill, since centers for statistical research do not pay for themselves. When statistical data have been collected, what agency but the state is in a position to exploit them fully and make them yield their total practical value? It is scarcely necessary to recall that the very different factors that result from technique (trusts, atomic energy, capital concentration, the hypertrophic enlargement of the means of production, and many more) all entail state action. The relation established by technical facts, which become the common denominator between state and economy, is neither chance nor fleeting. There is no possibility of reversing the movement, as certain idealistic anti-interventionists would have us believe. Neither is there any hope, short of certain extraordinary transformations, that the conjunction of state and economy is transitory, as the Communists would have us believe.

Certainly, if production were to become sufficiently great, if the system of distribution were perfect (and, once fixed, were not subject to variation), and if, above all else, men were to become angels (an indispensable condition), the conjunction between state and economy might disappear. The same would be true if modern technique were to vanish. But it is advisable to think in more realistic terms.

The fact that the economy and the state are reciprocally joined is technically founded in such a way that the two tend to become aspects of the same phenomenon, a phenomenon which, moreover, is not the the result of a simple accretion of previous phenomena. It seems to me particularly important to emphasize this new character. Because of the existence of techniques, we are beyond the problems of ordinary *Étatism* or of socialism. It is not the simple

phenomenon of the growth of power or the struggle against capitalism which is decisive here. We are witnessing the birth of a new organism, the technical state, which makes economic life more secure in proportion as it becomes more technical. It is no longer even possible to say: "It could be done otherwise." In the abstract as well as in the concrete, all technical evidence attests to the contrary. What is involved is in fact the logical development of the nation-state.

This double relation (the state assuring the national life, and whatever pertains to the nation converging toward the state) becomes more specific, stronger, and more rigid when technical elements come into play. What was mere tendency becomes framework, what was talk becomes means, and the relation of administration to population becomes organization. And because the economy is an aspect of the nation, it, too, comes into the system. The state, too, changes its aspect on contact with technical elements. The principal goals of the economy are at first modified, but its elements of pride and power, potentially always there, emerge subsequently in a more brutal way. Humble humanitarian motives are no longer important. Technique is too neutral and the state too powerful for either to encumber itself with such things. It is no longer even a question of wealth or distribution; in the technical synthesis, the economy becomes again the servant, when (after Marx) it had been thought the master.

The duel of politics and economics culminates in a synthesis in which politics disappears and economics is forced into submission. This synthesis, to be sure, has not yet been fully realized. France, one of the older nations, is not even completely conscious of what is happening. But the Soviet Union is already very close to this synthesis, and the United States is being oriented in this direction very rapidly as a result of the large-scale economic maneuvers into which it is being forced. And, above all, new nations such as Australia and New Zealand are spontaneously constructing this synthetic complex. How could Africa even hope to refashion its society rapidly (as its new independence requires) if it did not resolutely embrace technical synthesis? Nasser, Mohammed V, and Castro are all attempting precisely this.

I remarked above that this is not socialism. With the disappearance of humanitarian goals, socialism is rendered unfeasible by

the sheer weight of techniques. The ownership of the means of production ceases to be the central problem. Social equality becomes a myth as a result of the emergence of an aristocracy of technicians; and the proletariat is necessarily extended (to no one's dissatisfaction), instead of disappearing. Certain elements of socialism continue to exist; for example, social security, the redistribution of the national income, and the suppression of individual profit. But they exist as isolated fragments, and not as a system. It is not even certain that these elements will be found in all the syntheses now being created. Their continued existence depends on whether they are judged to be efficient. They cannot escape this judgment. An excellent example of fragmentary socialism, based on anything but socialistic motives, is given by Fourastié. He demonstrates (correctly, I believe) that capital decreases in importance in proportion as technique increases in importance. "In a period of technical progress, the wage value of capital tends toward zero, whereas the physical product of capital constantly increases." Clearly, it is not a question of the absolute value of capital. Yet the capitalist sees his assets lose value in direct proportion to the development of technical progress. I shall not repeat Fourastié's reasoning—it seems to me convincing. His conclusion, moreover, is of the first importance: that the center of the economic problem is shifting. The legal question of ownership is no longer important. The debate no longer concerns who owns the means of production, or who will take the profits. The crux of the economic problem has moved to the extreme point of technical development. The real debate concerns who will be in a position to support, absorb, and integrate technical progress and to furnish optimal conditions for its development.

It is contrary to the nature of technique to be compatible with anarchy in any sense of the word. When milieu and action become technical, order and organization are imposed. The state itself, projected into the technical movement, becomes its agent. Technique is, therefore, the most important factor in the destruction of capitalism, much more so than the revolt of the masses. Human revolt can only accompany the destruction of capitalism and philosophize about it. As to socialism, the final result is still indiscernible and no prediction, except of a negative nature, is possible.

Economic centralization has been criticized on humane grounds. Jean François Gravier has attacked the movement on purely technical grounds and has attempted to show that decentralization (at least of the population) is necessary if society is to remain in equilibrium. His thesis is as follows: Technique permits the diffusion of the population over a wide area with as well developed economic potentialities as the great cities. Diffusion would not be subject to present health hazards, oppressive costs to communities (a resident of Paris costs the state five times as much as a resident of Vendée), and so on. This thesis, then, is based on new technical development. But there are three objections: First, decentralization is not possible unless there is a powerful *planned organization for decentralization*. Such an organization usually operates on the level of the individual, not of the economic organism. Second, population diffusion could lead to an urbanization of the countryside rather than to a true diffusion of the population into a rural milieu. Third, the thesis represents a mere theoretical possibility and not a necessary movement.

It must be admitted that actual experience seems to contradict the thesis. Since 1955 a serious and concerted movement has been under way to decentralize Paris and its industrial complex. The result so far is that six hundred industrial plants have left the area. But only four thousand wage earners have been resettled in the provinces, whereas, when the plants in question achieve full operation, they will employ seventy-five thousand wage earners *recruited locally*. Moreover, half of these six hundred plants have been settled in the vicinity of Paris. During the five-year period in question, fifty thousand new jobs have been created each year in Paris alone and the population of the city has risen by nearly a million.

Decentralization, then, has experienced a radical setback. Economists who have analyzed this setback conclude that in order to decentralize industrially it is necessary to effect *total* decentralization, including administrative, financial, and cultural decentralization. Total action, however, would be difficult to achieve; precise and adequate technical motives for it do not exist. Furthermore, it would have to be implemented by authoritarian measures. The state would have to act to constrain the citizens with authoritarian

penalties corresponding to authoritarian decisions. It is easily seen that the proposed decentralization would have to rest upon a major aggrandizement of centralized authority.

The Authoritarian Economy. An economy completely founded on technique cannot be a liberal economy. (This is not entirely the same as the preceding idea.) Technique is, in reality, opposed to liberalism, a social form which is unable to absorb and utilize modern techniques. It seems clear that economic liberalism is not in itself a technique. In fact, the attitude represented by laissez-faire, however much mitigated it may have become, is a renunciation of the use of techniques; techniques suppose conscious human action, not abstention from action.

When liberalism requires men to put their trust in the obscure alchemy of certain natural "laws," it in effect restrains them from making use of the technical means at their disposal. These means permit men to intervene in the order of nature, to adjust its "laws" to their purposes, and to exploit them, as in the physical order. They also permit intervention that would appear to contradict natural laws and modify the order of nature. It is clear, then, that they are not really "laws" at all. In view of this, technique does not accord these nonexistent laws the respect recommended by liberalism. Therefore, when technique develops, both the liberal attitude and its doctrine become impossible. I have posed the problem at its most acute by placing it at the point of contact between liberalism and the economic techniques of intervention (which are the very negation of liberalism). But my thesis is just as true for the simple techniques of production which influence the economy. As I have already shown, every mechanical technique supposes a corresponding organization. And organization is the diametrical opposite of free enterprise; and the organizational state of mind is the diametrical opposite of the liberal state of mind.

It will doubtless be pointed out, by way of refutation, that production techniques were developed during the ascendancy of liberalism, which furnished a favorable climate for their development and understood perfectly how to use them. But this is no counter-argument. The simple fact is that liberalism permitted the development of its executioner, exactly as in a healthy tissue a constituent cell may proliferate and give rise to a fatal cancer. The healthy body represented the necessary condition for the cancer. But there

was no contradiction between the two. The same relation holds between technique and economic liberalism.

Here, then, is the locus of the conflict between technique and the liberal economy, which Jünger, among others, has studied. Technique is inevitably opposed to the liberal economy because the end of technique is efficiency and rationality, and the end of liberalism is money profit. Technique requires of the liberal economy nonprofitable decisions and risks. For example, when expensive new machines are developed before the old ones have been amortized, the industrialist is forced to liquidate the old machines or he runs the risk of being eliminated from the market. This conflict holds good on all levels.

When the state controls the economy, it faces similar problems. But such problems affect every economy. In this perspective, planning is criticized as wasteful. Yet the very criticism shows that the liberal mentality is still in force.

Even in a capitalist context, however, judgments concerning wastefulness are modified with time and according to the sector. In a report, the ILO has compared ordinary mechanization with the mechanization of offices: "The mechanization of labor in offices will often, against standard practice, be considered justified from the viewpoint of profits, even if it increases the expenses of the office. This is the case when mechanization increases the yield of the productive unit of which the office forms the administrative section" (Mas). But even taking into consideration such partial exceptions, it remains true that conflict between technique and the liberal economy is inevitable because the liberal economy is essentially based on profit. It does not exist without profit. To a planned economy, however, profit is not the highest value. Certainly, the planned economy does not neglect the profit motive completely, but profit represents only one element in its calculations. The principal criterion of the planned economy is rationality (or efficiency): in a word, technique.

In the conflict between technique and the liberal economy, technique, then, is victorious over the liberal economy and bends it to its laws. The process is furthered, as I have shown, by the fact that the liberal economy, insofar as it is thought out, itself becomes technique. The unity between economy and technique is thus restored, but liberalism is eliminated. Economists may seek to justify

this by speaking of "public service" or the "common good," but such talk represents no more than a justification a posteriori, an ideological smoke screen. It is, as such, not without value, but it is not comparable in importance with the major fact of technical invasion.

Liberalism is softened and progressively eclipsed in direct proportion to the growth and imposition of techniques. The relation between the degradation of liberalism and the development of these techniques is unavoidable. The oft-heard assertion that liberalism is capable of production but incapable of distribution represents the broadest view of the matter. How is it that liberalism is capable of producing? The answer is that, in free enterprise, production is not a part of the liberal framework. It is, rather, subject to extensive planning, and it could not well be otherwise. What is specifically liberal is the passage of consumer goods and their distribution in the various consumer sectors; and it is precisely the distributive process which works so poorly and which is constantly being hampered, since technique throws such enormous unmeasured quantities of ill-considered products onto the market.

The same is true of the tendency toward monopolies and trusts. In all sectors of the economy, this tendency is the plague and the destruction of liberalism. It ends either in a straightforward monopoly with no competitive freedom (whether the monopoly is private or of the state, the result of the contest between state control and liberalism is the same), or monopolistic competition, which is no less ruinous than outright monopoly because of the waste it causes. It is technique alone, in two different aspects, which gives rise to these facts. First, financial techniques are encouraged, which permit the establishment of institutions such as trusts and concerns (this would be unthinkable without a prodigious development of means) and assure the flexibility of these institutions on the level of banks and stock exchanges. Second, competition is encouraged, which, when it becomes established among several enterprises under a liberal regime, is in reality a competition of techniques in the microeconomic phase. To the extent that techniques remain static, different enterprises are able to exist side by side, each with its own clientele for its own products. Some of the enterprises may be powerful and some weak, but the weak ones are nonetheless still able to subsist. It is not magnitude of enterprise which destroys

the equilibrium, but technical progress. The moment an enterprise applies new procedures (for example, new public-relations techniques, machines that increase yield and decrease unit cost, business organization that makes labor more efficient, financial modalities that assure greater stability), it finds that these technical elements give it an advantage over its competitors and allow it to eliminate or absorb them.

Competition is thus an incitement to such technical progress as will bring victory over the competitor. This means that competition tends to destroy liberalism. It will be objected that competition does not destroy the liberal economy completely because all the competitors will adopt technical development. (In practice, certain sectors of the economy are completely monopolistic.) In reply to the objection, I reiterate that technique engenders itself and that anyone who succeeds in making a headstart in the technical domain increases his advantage without limit.

For these reasons I am unable to agree completely with Vincent's position. For Vincent, as for me, technique and liberalism are incompatible. But, it seems, his reasoning does not take account of all the facts. Vincent's thesis can be summarized as follows: "How will the advantages of technical progress be divided in a pure liberal regime, supposing perfect competition and nonintervention of the state? It is clear that in this hypothetical case the producers who have achieved technical progress would not be able to benefit from it, since, by hypothesis, competitors will arise to bring sales price to the level of decreased cost price." We conclude that only the consumer would be in a position to benefit from technical progress. This implies an unexpected conclusion: since progress would bring no special advantage, no one could be expected to want or seek it. The affirmation is inescapable that pure liberalism in essence compels stagnation.

This way of putting the problem is rather hypothetical and abstract. Vincent himself admits it. But, even so, the reasoning is not convincing in itself. It is too easy to reply (and the liberals will not fail to do so) that the application of such simon-pure liberalism has never been an issue. What is important to liberals is a liberalism adapted to economic conditions and then stabilized. This liberalism would permit technical progress.

Vincent's arguments are convincing only in regard to one side of

the following dilemma: either liberalism remains true to itself, and is forced to challenge technical progress according to the arguments given above; or it adopts technical progress, and is obliged to repudiate itself. But the first alternative, that is, to stabilize the limitations on liberalism, is impossible. The second alternative will be the actual issue. The more technical progress advances, the more constricted will be the role of liberalism.

Could we not pass between the horns of the dilemma by means of the less and less likely possibility of competition? Just as technical progress never attains the absolute, so freedom of competition will doubtless never disappear absolutely. But there is a point at which it is no longer possible to speak of liberalism. In the most authoritarian regime, some freedom remains. It is nonetheless an authoritarian regime. The perspective changes depending on the time and the psychology; the point at which we stop saying "liberalism" and say "controlled economy" also varies. But the process cannot be checked. No personal choice is possible. Certainly, it is not that a strict automatism comes into play. To clinch the system and complete the process, human decision and intervention are necessary.

It might nevertheless be objected that economic laws have existence insofar as they are understood—that a choice is possible between technical intervention and a return to the free operation of economic laws. Unfortunately, illusions and hopes are more tenacious than realistic considerations. When technical progress intervenes, it modifies not only the application of economic laws but also the essence of the laws. We may consider this in two ways. First, economic laws are not eternal like the laws received by Moses on Mt. Sinai. Our economic laws are valid only for a certain type or form of economy. When technical progress occurs, it is integrated into the economic system not as a foreign element but organically. Technical progress is a part of the essence of an economic system, not a mere accidental event. When some chemical substance changes the metabolism of a body, the result is a new situation which follows certain laws that did not hold for the preceding situations. The chemist studies a new combination from which he must extract new laws. When the facts change, the constants, as well as the laws, are modified.

Second, even if we insist on making value judgments, on declar-

ing a certain state to be normal and the laws that control it alone to be just, if, in other words, we want economic laws to be as rigorous and eternal as the laws of physics, the situation does not change. The laws of physics are known to be relative; the laws of microphysics in force today are not the laws we learned from our schoolbooks. The situation is exactly the same in economics. A change of scale is not merely a change of magnitude; it is a modification of nature. In fact, technique has modified the scale of human economy, and the laws that held for the average economic system at the beginning of the nineteenth century no longer apply in the new scale of the economy we know today. Liberalism is only conceivable if technical progress is choked off so that the system remains at a fixed stage of equilibrium and of middling force.

The antinomy between liberalism and technique is further accentuated when we consider that technique can give rise to nothing but a mass economy. We refer here not only to the fact that the expanding and developing economy embraces an ever increasing number of human individuals and that demographic growth requires such an expansion. Here we are not using the word *mass* in the sense of great numbers, but in the usual sociological sense of mass opposed to community. It is recognized that our civilization is becoming a mass civilization. But we generally neglect the twofold fact that technique is one of the important factors of this "massification" and that the economy takes from it a particular form. Technique makes the economy a mass economy, that is to say, the economy taken as a whole to which we give the name *macroeconomy*. (This hypothesis is necessary in order to account for the free play of economic techniques.) Economic problems must be posed in global terms, in terms of global income, global employment, global demand, and so on. This global, macroeconomic conception corresponds to mass society, which is extremely differentiated, as we know. Just as technique breaks down the barriers between economic sectors, so an economy based on technique tends to burst asunder the traditional sociological frameworks.

The macroeconomy is only a framework and an element of an economic technique. It is indifferent to free enterprise and to the concept of the nation, which it destroys, not voluntarily but indirectly. It has no personal, private goal. It does not seek at all to modify a given social or economic reality. Nevertheless, the break-

down of all the traditional particularisms occurs in economics (as I have already described). The result of the macroeconomic method, to the degree that it proves itself efficient, will be to smoothe out economic contradictions and to encompass within the artificial what previously belonged to the natural. To the degree that macroeconomics brings us to think in global and statistical terms, it leads to the suppression of the causes of fractionation, for example, national frontiers.

The macroeconomic movement toward universalism will be stronger the more it is reinforced by other, convergent factors. The first step is the constitution of an intercontinental economy (which technique, in any case, renders inevitable for other reasons). The movement toward an intercontinental economy leads to a mass economy.

A second characteristic of this "massification" is summarized in Sartre's profound remark that "statistics can never be dialectics." There is an opposition (even a mutual exclusion) between statistics and dialectics. They differ not merely in their mode of explaining but also in their very mode of apprehending the world and action. Statistics is necessarily a univocal method that expresses an aspect of reality which is uncombinable with any other (except other statistics) and which cannot tolerate contradiction or evolutionary development. Statistics conceives evolution only in its formal aspect, fastening on its strictly numerical element and proceeding discretely along the number continuum which it connects by extrapolation. It sets up this linear formulation as the very essence of evolution. But it is incapable of grasping in any degree the internal and continuous mechanism of evolution and the interplay of negations involved in the affirmations. Statistics (and every technique) can proceed only by affirmation, by exclusion of negations, refusal, and destruction. It implies and prescribes a logical evolution, but not a dialectic evolution. An economics founded on this method is of necessity antidialectical; it is one of the profound betrayals of Marxism on the part of modern Communism.

The movement of masses is likewise univocal and antidialectical. (The interested reader is referred to Reiwald's *L'Esprit des masses.*) There is therefore a fixed connection between statistics and the economics of mass society. But only opposition exists between statistics and organic society: the life of an organic, dialectic

society cannot be completely enclosed in a technical operation like statistics. Statistics even implies a mass society. Economically, this technical operation presupposes that all members of society participate, privately and without concern for the whole, in the economic system that techniques progressively elaborate. It is not only that everyone is inescapably a consumer and producer and as such participates in economic life. More important, all members of society (not each member) are integrated in the mass into a pre-established system. It is the facts of "all" and "pre-established," required by the use of technique, which involve the mass.

The "all" is involved because technique yields results and demands effort to such a degree that no individual can remain outside. But if technique demands the participation of everybody, this means that the individual is reduced to a few essential functions which make him a mass man. He remains "free," but he can no longer escape being a part of the mass. Technical expansion requires the widest possible domain. In the near future not even the whole earth may be sufficient.

The "pre-established" is involved because technique has its laws and its motives (which I have already outlined) and fashions the frameworks that are most auspicious to it. We are experiencing this in the modern world. Despite the preoccupations of humanist economists, the economic mechanism tends to become stricter, adhering to reality through its technique but, at the same time, absorbing it. Men must enter into a pre-established framework. Technique cannot act otherwise than to "pre-establish" them too; if it did not act so, it would not even exist itself.

We now see why the social complex, on contact with technique, becomes mass, rather than a community or an organism. Technique demands for its development malleable human ensembles. We have already encountered this characteristic in our discussion of technical expansion, and we find it again (in a very typical way) in our study of the influence of technique on the economy. The economy, oriented in this direction, supposes mobile masses of men available to needs which are simultaneously economic and technical.

Every undertaking involving a real community is necessarily antitechnical on the economic level, not only because it is relatively static but because of its particularism. If genuine communities were

to develop, no further economic technique would be possible. I am, of course, speaking here of true communities, not of counterfeit communities such as the corporations have represented since 1935. We conclude, then, that the social form most auspicious to economic technique is the mass. In this form, the calculus of probabilities and planning both have free play.

The Antidemocratic Economy. All this being so, we touch upon a new characteristic of economic technique: it is inevitably antidemocratic. At first glance, this comment sounds surprising, even shocking. After all, technique does bring the masses of men into the economic circuit, allowing them to participate in it as they never did before. In the technical affirmation of the present, we can point to the fact that we are witnessing the forward movement of socialism: management committees, autonomous administration of social security, profit sharing, workers' councils (which exist not only in the Soviet Union), and the achievement of recognized status by the labor unions, which thus can play a positive (not merely a revolutionary) role.

How, under these circumstances, is it possible to speak of the technical economy as antidemocratic? In reply, it would be easy to show that all these different kinds of "progress" become feasible only to the degree that men are subjected in advance to the action of technique. The opposition men manifest to this slavery (and it *is* a kind of slavery) is merely superficial, a matter of self-interest, and is not due to any basic revolutionary orientation. Men are unable to exert genuine influence on the direction of the economy. They can change certain modalities of wages. They can alter the direction of enterprise and intervene in certain economic forms to compensate for certain mechanical drawbacks; and they can give opinions on fabrication, procedures, and financial methods. None of these is negligible and I have no desire to minimize their importance. But they do not add up to economic democracy.

Collective ownership of the means of production (from the point of view of nationalization, collectivization, or state socialism) is an abstraction, an even greater abstraction than political democracy. We well know to what degree of abstraction political democracy has been pushed and how little the vote of the citizens actually counts despite all the talk about "popular sovereignty." The means

of production are said to be the property of the people. But can the people do with them what they wish? Can they actually nominate their leaders? These are the real questions. If the people directly concerned in some business affair (for example, the workers in an industrial plant) were to decide to exploit the plant in some other way, or not to exploit it at all, or even to destroy the machinery, would anyone listen to them? If no one listened, under the pretext that the decisions in question were senseless, the real reason would be that there are criteria superior to the popular will according to which popular will is judged. Popular will can only express itself within the limits that technical necessities have fixed in advance. Can the people select engineers? Or accountants, or organizers? Can they pass judgment about methods of work? If they could, it would amount to the system (which has actually been attempted) in which judges are elected by the governed, tax collectors by the taxpayers, generals by the privates. Such a system would represent the only truly democratic method. Why is the democratic method not applied in the areas cited, whereas we do elect politicians. For the simple reason that the functions of judge, general, and engineer are considered to be functions of technicians, but the politician is deemed to be a nontechnical functionary: good for everything, good for nothing.

The Russian and French Revolutions introduced popular election of judges and generals: this was consistent with their concept of democracy. But the results were so disastrous that it was soon necessary to repeal this procedure.

Technique is the boundary of democracy. What technique wins, democracy loses. If we had engineers who were popular with the workers, they would be ignorant of machinery. In our time, technique is the court of last appeal. The worker is master neither of his factory nor of his bosses.

The democracy of popular "control" is purely formal. The situation in this respect is the same in all representative democracies in which all things technical are taken out of the control of the electors, who must thenceforth repose their faith in an ideology of political function superior to all others and encompassing every human activity. By its intermediacy, the elector would still be master of his destiny. Unfortunately, when the politician intervenes

to advance the cause of his constituents, he succeeds only in disturbing the proper functioning of technique, in making everyone discontented, and ultimately in losing his powers.

Are we, then, to believe today that by some secret alchemy the workers, who hold title to a purely abstract property, really intervene in the economic game? Were it really so, it could only be on condition that they had to do with an extraordinarily flexible, not to say slovenly, economy. It would certainly be nontechnical. If such an economy were even conceivable, it would be a noncapitalist liberalism, that is to say, anarchy.

When the economy becomes exact and technical, it cannot tolerate the intervention of the working man's desires. Certainly, there is such a thing as benevolent and rational regulation of labor, human industrial relations, hygiene, and so forth. But this is the internal regulation that a good technique *supposes and requires.* The only possibility of obtaining a high, continuous, and profitable productivity is by taking adequate account not only of immediate, bare yield but also of the conservation of human material, which also represents a kind of capital. At present the working man's wishes happen to coincide well with the imperatives of a rather exact and profound technique. This is the only reason his wishes are taken into account. The real function, then, of the worker's desires is to advance and improve technique, and not at all to enhance his freedom. This fact has a political parallel: in elections under authoritarian regimes, ballots may be cast only for the regime. Although the authority of the government is thereby increased, the elector draws material advantages from his vote, for the government, officially relying on the people, will commit itself to great efforts in their behalf.

There can be no doubt that this kind of democratization leads to a certain improvement in the lot of the people. But it is an improvement brought about not by the people themselves, who are mere servitors, but by technique, to the degree and according to the conception of life dictated by technique.

It is possible to envisage the democratic effect of technique in another perspective, that of consumption. It is currently argued that technique eliminates social privileges and suppresses preexisting social distinctions (although we must recognize that it establishes certain others in their stead). The Italian economist

Bertolino gives a good example of this argument in his study of standardization. Standardization produces certain democratic effects, according to this economist, for two reasons. First, it reduces prices; consequently consumption is increased, welfare is more widely distributed, and living standards are equalized. Second, it reduces the types of available merchandise; there is less diversity on the market and choice is limited. These two factors tend toward democratic equalization. The search for what is "distinctive," which is based on a diversity of economic powers, is rendered impossible. Hence, technique should operate in the direction of democracy.

This argument represents exactly the same attitude as that of a Henry Ford driven by democratic sentiment to mass-produce automobiles so that everyone might benefit from this luxury article. But the mass production of automobiles required the employment of tens of thousands of workers on the assembly line. Bertolino passes very lightly over the disadvantages thus occasioned, but we must pay close attention to them. For example, there is the danger of unemployment. In case of substantial unemployment, there is no increase in the public welfare even though prices decline. Bertolino's argument does not seem to me to be decisive.

No more decisive is the argument that technique produces social equality. To argue, as Mumford does, that social equality exists because the poor man's electric light is identical with the rich man's, whereas in the middle ages an enormous difference existed between a pitch pine torch and a luxurious candle, is to risk proving the exact opposite of what was intended. The life of the lord of the manor was in many ways closer to that of a serf than the life of a modern industrialist is to that of a worker. The serf and the lord shared the same nourishment and the same discomfort. There is certainly at least as much difference between the poor man's cheap radio and the rich man's Telefunken, or between a motor scooter and a Chrysler, as between the pine torch and the candle. We could adduce an endless number of such comparisons.

The question may be asked: what is the price we must pay for standardization? Bertolino indicates this price very clearly. In the first place, it is essential that cost reduction not be expressed in wage reduction or unemployment. The state must intervene to see to this. In the second place, cost reduction must be translated into reduction in sales price. The state must enforce obligatory reduc-

tions in sales prices. In the third place, standardization must be applied in its totality; it must not be merely of limited effect. It must be applied to a whole industry, and if the industry is sufficiently important this will inevitably lead to the standardization of related and complementary industries. Here again the state must intervene with either persuasive or coercive measures.

It is already clear that standardization, as a "democratic" effect, implies extremely authoritative state action, extensive controls, a more and more forced centralization, and a pronouncedly undemocratic state of mind. Moreover, one cannot fail to be somewhat surprised to learn that the reduction of "types" is a democratic process. Bertolino says that this reduction leads sometimes to a single type and, one must suppose, the consequent nullification of choice. But until now it has seemed that the very essence of democracy was precisely the choice among several solutions, several types, several doctrines, and that, moreover, this choice was left freely to the people. The exercise of democracy was the exercise of choice. Where there is no longer any choice, dictatorship exists.

But we must analyze this notion of choice further. We often say: "It is not democratic that certain persons are excluded by poverty from certain blessings, which deprives them of any possibility of choice. If we extend well-being by standardization, we will improve the democratic conditions of the poor." Unfortunately, this is not the case. If we admit the fact (which is certainly true) that the absence of choice occasioned by poverty is antidemocratic, it is not by removing the more or less great freedom of choice—which the majority still possess—that we will have democracy. In all countries the majority still have some choice, and to take this away from them is to consecrate the opposite of democracy. Bertolino is aware of this: he attempts to compensate for his risky assertion in two ways. First, he tells us that standardization must be accompanied by inquiry into human tastes and desires, a procedure which will reintroduce personal choice within standardization, so to speak. The proposal appears to be completely utopian. Standardization implies a certain investment of funds over long periods. But, clearly, these investments will never be seriously questioned just because the public taste changes. Furthermore, technical development follows its own proper laws, not the tastes of the public. It was not the public which demanded air travel and television. Technical prog-

ress created these things, and they were technically diffused and imposed on the public. The mechanism of standardization is identical with that of every technique.

Second, Bertolino supposes standardization to be democratic insofar as it represents the conviction of the individuals who accept it. It is not sufficient that it be egalitarian in fact. It must be accompanied by the popular consciousness that an egalitarian situation and a more complete equality are being realized through its agency and that the people are thus making progress toward a social democracy. If a regime is sanctioned by the people, it can indeed be maintained that it is democratic. But, of course, that is precisely what Hitler said of his regime. We must not lose sight of the fact that today popular support can be secured with great ease by means of certain precise techniques. But this point does not matter much here. What is important is the fact that Bertolino's desire to show at any price that technique is democratic leads to a strange conception of democracy. We may best illustrate this by means of two quotations: "Democracy is the adhesion of each citizen individually to the opinion of the majority. This majority opinion becomes an irrefragable and indisputable line of conduct. The individual is duty bound to look upon the line (economic or political) dictated by the majority as the best for society. The individual *becomes* democratic in this way. . . ." "Democracy consists in the practice of regarding and using certain goods in a common way. Democracy supposes that the individual transcends himself in order to realize social values with the others, and in the same way as the others."

These textual citations recall some strange speeches we have heard. The transition of the majority to a condition of unanimity through the adhesion of the individual, who renounces his individuality to meld with the collectivity, is precisely the transition from democracy to dictatorship. It is true that standardization *demands* this kind of democracy and that it could not be reconciled with any other democratic form. But *democracy* in this case is only a name superimposed on the reality of dictatorship. Whatever aspects of economic technique we examine, we always find this opposition between technique and democracy.

The conflict between technique and democracy appears clearly in Soviet planning. The Soviets maintain that the Five-Year Plan (in its second phase) moves from the base to the summit, and that

the decision of the base is decisive. However, the following question cannot be avoided: since technicians establish both norms and details, how is it possible to reconcile production directives, which originate at the summit, with the desires of the workers' cells at the base? Soviet studies maintain that this antinomy can be resolved by so-called "production conferences." But what we witness in fact is a technical centralization of wages and norms. Particularly instructive and worthy of note is the history of the plan of 1955. Khrushchev, in denouncing the errors of Stalin, declared that until then planning had been "bureaucratic," "authoritarian," "based on mere statistics"—and, moreover, that the plan of 1950 had been fulfilled by only 30 per cent of enterprises. He said that it was necessary to democratize the plan because the "active participation of the workers was indispensable. . . ." What, in fact, has been the result of Khrushchev's good intentions? (1) The workers have been given latitude to increase the goals set by the plan, but not to decrease them; (2) the workers have had freedom to study ways and means to obtain maximum productivity; (3) a propaganda campaign for increasing productivity has been launched which has turned out to be the most intensive since the original introduction of five-year plans. In this campaign the slogan is repeated ceaselessly: "The State Plan is the law for every enterprise." Democratic freedom is clearly discernible in all this!

The decisive point in the development of these "production conferences" is the necessity of technical progress, which may not be held back by the desires of the workers.[3] A workers' committee cannot regulate the complexity of technical problems. Moreover, a view of the whole (which the worker certainly cannot have) is necessary in order to unify wages and norms on the plane of the macroeconomy. Without this, social inequality and economic disequilibration would be inevitable. Along the same line, a stringent control of production tempos and distribution of revenues is mandatory—whatever the efficiency of the plan.

All this leads, both for the elaboration of the plan and for its execution, to the primacy of technical demands imposed authoritatively on all democratic orientations. All that is demanded of the man who carries out the plan is that he adapt himself to its norms

[3] See Kerblay's *Les Normes dans l'économie soviétique.*

and that he find a stimulus to his productivity in the overfulfillment of these norms. All that can be conceded to him is sufficient time to adapt himself to the norms. To save face, there is endless talk about psychological climate, environment, and socialist rivalry. (We shall study this point in detail in the last chapter.) It suffices, for the present, to make the following comparison: a soldier who takes part in an attack because he is forced to do so and a soldier who is moved by patriotic enthusiasm do not share the same psychological climate. But both bring themselves to kill in the same way. As far as efficiency and collective results are concerned, psychological methods have been discovered and elaborated which give the first soldier a belligerence equivalent to the patriotic ardor of the second. Democracy has nothing to do with the matter.

Democracy did not enter either into the theorem (conceded by the majority of economists) that full employment, which is necessary to the sound development of economic technique, demands an authoritarian method of worker placement. As Fourastié indicates, technique implies a transformation that makes "production due to human labor the very foundation of social progress; so that no social progress can occur without transference of the working population." But where is the democratic element in displacing the human being from his familiar surroundings, separating him from his traditions and from his human and geographic milieu? I know that the uprooting of human beings counts for little in respect to economic law and that where economic necessity exists (for example, in the struggle against unemployment) all other human needs are unimportant and must vanish. I am, moreover, cognizant of the seeming truth that where there is nothing to eat there is no longer a stable milieu. This new version of the *primum vivere* in a materialist form is only an apparent truth. But even if it were true, we would have to say then that the human being is constrained by economic necessity, and this is the exact opposite of democracy.

This method presupposes the destruction of our social structures and, in reality, deprives a civilization of any chance to give itself form. The primary element in any civilization is a stable relation between man and his environment. When man becomes the plaything of abstract decisions, a civilization can no longer be created. Here we have, on the economic plane, the same effect of technique

which we previously studied in a more general way. Man indeed participates in the economy, but technique causes him to participate not as a man but as a thing.

It is in the realm of economic technique that we experience most clearly the great and dramatic process of modern times, in which both chance and natural laws are transformed into decisions of accountants, rules of planning, and decrees of the state. It is exactly at this point that technique begins to be concerned with natural fact—with the fact of total human behavior, with man's spontaneous obedience to so-called sociological currents, with his conformity to certain general types, with his responses (almost everywhere the same) to given stimuli. Whether the question is one of understanding public opinion, or of stochastics, or of statistics as a whole, the technical starting point is always the human behavior of the majority. From this behavior, technique draws a number of consequences and modes of action, erecting on it the system into which it will necessarily insert itself. Moreover, it makes this behavior obligatory. It allows certain minor modifications (we shall not concern ourselves with the problem of aberrants), but its real problem is to transform a law spontaneously obeyed into a law made consciously obligatory. In no other domain is this procedure of technique as clear-cut as in the present forward movement of the economy. The effects of technique in other areas are not as evident; for example, the effects of "human techniques" such as propaganda have not yet been rendered obligatory to the same degree as technique in the economic field.

Thus, economic techniques, despite their still rudimentary nature (often more pronounced in this respect than mechanical, psychological, or judicial techniques), nevertheless express better than any others the transition, implied by every technique, from the natural to the artificial. It is not that economic techniques are better developed than the others, but that here, more than elsewhere, the artificial evolves from the natural.

Every technique tends, more or less, to constrain nature; accordingly, the artificial is opposed to the natural. There is a struggle, but whether it be expressed in terms of man against nature or in terms of the conflict of systems, the desideratum is a mastery that excludes, eliminates, and replaces the natural. Thus, for example,

the directed and planned economy replaces liberalism. But we note in this domain another more subtle, integrative movement. Economic technique tends less to eliminate the natural than to integrate it. (In this sense it approaches the mode of action of physical techniques. And François Perroux's criticism of planning, relative to its "lack of rationality," rests on the fact that planning suppresses the free mechanism of the economy instead of adhering to it and interpreting it. The latter, for Perroux, should be the ideal of economic technique.)

But when the natural is integrated, it ceases to be natural. It becomes part of the technical ensemble. It is an element of the mechanism, an element which must play its role, and no more. The role may be plotted in advance. Even when, as in the case of servomechanisms, the improvement of technique introduces unforeseen elements and leaves a large part of the operation in the realm of the natural, it is nonetheless integrated.

I will be asked whether there is anything evil in this integration. I make no value judgments; I merely note that the human being who acts on his own personal decisions, following what is in essence a common tendency, a sociological current, acts freely, but that the same tendency, once integrated into a system, becomes essentially and expressly obligatory.

It might be asked whether man had not lost his freedom even before this integration, since he was obeying an already existing although hidden imperative, now revealed by modern techniques. Is man more constrained than formerly merely because this imperative is recognized and written down in textbooks? This does not seem clearly evident. Even without reference to the danger represented by monopoly of the secrets of our actions on the part of a few (and it is always the few who succeed in gaining control of the instruments of technique), the simple act of writing it down changes human obligation. In the sociological and economic world, the result is comparable to the long-recognized transition from morals to law. There, too, sanctions appear to have been decisive. What is the sanction against violating the moral law, or refusing to follow a sociological tendency, or disobeying natural economic law? And what is the sanction against a challenge of the law of the state and the plan? Is not the difference clear? What is at stake here is all of man's liberty, the liberty to take chances, even to

gamble with the death penalty. We see in this loss of liberty the downward path into which technique is leading us.

Economic Man

Let us not overdramatize; it is not the goal of the technical movement to drive men to the death penalty. Happily, its goal is more subtle. The death penalty is only a straw, the existence of which testifies to the fact that technique is in a transitory phase.

The transformation of natural law into technical law is accompanied by the shaping of the human being; he is adapted and made to harmonize with what is to be. Social individualism corresponded to economic liberalism. The economic man corresponds to the planned economy.

I am aware that economic man was a creation of the liberal period and the first economic doctrinaires, but the question is to understand the problem. The term economic man generally referred to a purely theoretical concept. For the liberals, economic man was an abstraction created to satisfy the demands of economic inquiry. The conception was a working hypothesis. It was framed by omitting certain human characteristics, which man undeniably possesses in order to reduce him to his economic aspect of producer and consumer. The abstraction corresponded to a complete anthropology, current at the beginning of the nineteenth century, which can only be characterized as dichotomous.

This conception of man has had a changing history. The studies of Jean Mérigot on economic man undertook to demonstrate that, in terms of the doctrine and economic theory of the present, this abstract simplification is no longer admissible, for two reasons. First, the human being is a whole and this whole changes in the very act of being analyzed; and second, economic phenomena act and react correlatively to the totality of the human being. Consequently, Mérigot asserts, it is impossible to be satisfied with this one-sided view. But all this remains on a purely intellectual plane and the "progress" he describes is to be found only in textbooks of political economy. The great satisfaction manifested by certain authors that the *homo economicus* is dead remains purely theoretical.

I should like for my part to note another set of developments.

Technique, and especially economic technique, does not encounter man in textbooks but in the flesh. One of the facts which seems to me to dominate the present epoch is that the further economic technique develops, the more it makes real the abstract conception of the economic man. What was merely hypothesis tends to become reality incarnate. The human being is changing slowly under the pressure of the economic milieu; he is in process of becoming the uncomplicated being the liberal economist constructed. The transition of the purely theoretical image to its incarnation is what concerns us here. It is occurring at a time when the theoretical economist is beginning to take account of the real complexity of man, a complexity which, however, man is in process of losing (if he has not already lost it altogether). The result is that the modern economist still runs the risk of theorizing about an abstraction because he is speaking either of a man philosophically conceived or of some historical and traditional image. He is not speaking of the man of today, the man we do not dare to recognize because we cannot bear to find in him our own faces or to meet in him the prefiguring of our own destiny.

The economic man, that reduced schema of economic activity, was formulated in the second half of the nineteenth century by a twofold movement. The first was the absorption, to a greater and greater extent, of the entire man in the economic network. The second was the devaluation of all human activities and tendencies other than the economic. Thence arose the validation of the producing-consuming part of man, while all his other facets were gradually erased. This reduction of man is the first movement to come to completion under the reign of the triumphant *bourgeoisie*. It is hardly necessary at this point, by way of explanation, to recall the predominant importance that money assumed during this period. Everything happened through its agency, in the economic and social structure, in the business world, in private life. Nothing happened without money; everything happened by means of it. All values were reduced to money values, not only by the theoreticians but by practice. The only important human occupation seemed to be to make money. And this became, in fact, the symbol of human submission to economies, an internal submission more serious than the external. For primitive man, hunting likewise represented economic submission, but this submission was more a magical and

virile act. The bourgeois domination of the nineteenth century was a rational domination. It excluded all romantic enthusiasm. It sought not paradise but temporal power, and marveling at what had come to pass, it took the newly discovered economic forces as its instruments of choice. But to use these instruments meant submission to them. The *bourgeoisie* itself submitted and compelled everyone else to submit. The world was divided into two classes: those who created the economy and amassed its rewards, and those who submitted to it and produced its riches. Both classes were possessed by it. The *bourgeoisie*, in a two-pronged attack, constructed an economic morality which exhausted the totality of its values and subordinated men to economic power. A new spiritual situation was created that was ultimately destined to make the new bourgeois morality collapse, leaving intact the primacy of the economic.

The bourgeois morality was and is primarily a morality of work and of métier. Work purifies, ennobles; it is a virtue and a remedy. Work is the only thing that makes life worthwhile; it replaces God and the life of the spirit. More precisely, it identifies God with work: success becomes a blessing. God expresses his satisfaction by distributing money to those who have worked well. Before this first of all virtues, the others fade into obscurity. If laziness was the mother of all the vices, work was the father of all the virtues. This attitude was carried so far that bourgeois civilization neglected every virtue but work.

It is understandable that for the adult bourgeois the only important thing became the exercise of a métier, and for the youth, the choice of an occupation and preparation for it. A kind of economic predestination was established in the great families. Human destiny seemed to revolve about the making of money or the failure to make it. Such was, and is, the viewpoint of the bourgeois.

For the proletariat the result was alienation, which likewise represented the grip of the economic on the human being. In the proletariat, we see human beings emptied of all human content and real substance, and possessed by economic power. The proletarian was alienated not only because he was the servant of the bourgeois but because he became a stranger to the human condition, a sort of automaton filled with economic machinery and worked by an economic switch. But human nature cannot long tolerate such a condition. In creating it, the *bourgeoisie* signed the death warrant of its

own system. The spiritual situation of alienated man implies revolution, and his subordination without hope demanded the creation of the revolutionary myth. It might be thought that the primacy of the economy over man (or, rather, the possession of man by the economy) would have come into question. But unfortunately, the real, not the idealized, proletarian has concentrated entirely on ousting the *bourgeoisie* and making money. The proletarian instrument for winning this revolution is the labor union. And the union subordinates its members even more closely to the economic function in the process of satisfying their revolutionary will and exhausting their will with regard to purely economic objects.

The bourgeois himself is losing ground, but his system and his conception of the human being is gaining. For the proletariat, as for the *bourgeoisie*, man is only a machine for production and consumption. He is under obligation to produce. He is under the same obligation to consume. He must absorb what the economy offers him. Indeed, in the face of a historically unparalleled consumption of goods, it is ridiculous to explain crises of overproduction as crises of underconsumption.

The counterpart of the necessary reduction of human life to working is its reduction to gorging. If man does not already have certain needs, they must be created. The important concern is not the psychic and mental structure of the human being but the uninterrupted flow of any and all goods which invention allows the economy to produce. Whence the measureless trituration of the human soul, the true issue of which is propaganda. And propaganda, reduced to advertising, relates happiness and a meaningful life to consumption. He who has money is the slave of the money he has. He who has it not is the slave of a mad desire to get it. The first and great law is consumption. Nothing but this imperative has any value in such a life.

This summary description enables us to grasp quickly the subjective and incoherent way in which the human being tends to permit himself to be reduced to the two closely related variables of the economic man. All other dimensions are excluded in this idealized concept. Money is the principal thing; culture, art, spirit, morality are jokes and are not to be taken seriously. On this point, there is once again full agreement between the *bourgeoisie* and the Communists.

The phenomenon we witness here is the birth in reality of the economic man the classical economists postulated. Man is not essentially *homo economicus*. But the concept is relatively simple; and the pressure of economic events, greater than ever before, has made it necessary to put man through this rolling-mill in order to obtain the indispensable material substratum. The operation has not always been easy. Sometimes the machine has gotten stuck. The *bourgeoisie* did not succeed entirely in eliminating the life of the spirit. In the working class, a true spiritual life developed about the turn of the century. Literature with Rimbaud and painting with Van Gogh were enormously attractive in comparison with the rolling-mill. Man remained, if not whole, at least dissatisfied with his castration, the more so as the promises which had been made were not kept and economic crises continually endangered the new blessings.

The second phase of this development was the attempt of the human being to find spiritual satisfaction within the economic sphere itself. Karl Marx carried out the encircling maneuver, taking over from the *bourgeoisie* and continuing its work. On the plane of the human and of spiritual life, Marx was—in a deep and not merely formal sense—a faithful representative of bourgeois thought. He did not represent the official thought of the *bourgeoisie* in the manner of Thiers or Guizot. But he did represent the current thought of the average man, which ideologically was materialistic and in practice was even more so. Marx sought to make a going concern of what, he was convinced, the *bourgeoisie* was in the process of losing. To the spiritual force of the emergent proletariat, he added economic force. He integrated the revolution, as well as all life, into the economic world. He consecrated, theoretically and scientifically, the common sentiment of all the men of his century and furnished it with the prestige of dialectic. Proudhon and Bakunin had placed spiritual forces in rivalry with the economic order. Against them, Marx upheld the bourgeois order of the primacy of the economic, not, however, as a merely historical primacy but as a primacy in human hearts. If economic conditions are changed, men are changed. Marx made a success of the terrible confiscation. The spiritual resources released from oppression were to be put at the service of the oppressor, not, indeed, the bourgeois oppressor but the economic one. (In my *Présence au monde mod-*

erne I have studied in detail this mutation of the revolutionary idea.)

The second prong of this double movement (the subordination of men to economic power) did not apply to all men, only to those who ventured to escape from the subjective creation represented by the *homo economicus*. We have been studying how this concept was slowly and circuitously brought into being by certain modes of thought, social conditions, and doctrines. Its progress was insidious and sometimes groping. But the individual still had certain possibilities of escaping it. The escape hole was narrow and growing narrower. Sometimes escape was found only in dreams. Poetry is useful to this end. Rostand, for example, faithfully served to satisfy the *homo economicus* by giving him an illusion of the spiritual. And Péguy taught us, not in his writings but in his life, that the whole man was still possible. In proportion as the milieu became more restrictive, the economic world approached completion. It became more and more difficult for anyone to do anything except work in order to live. But for what? Exclusively for consumption. Leisure was granted to man, but only the leisure of the consumer. Man's primordial functions of creating, praying, judging disappeared in the rising tide of material goods. Conditions were at last ripe for bringing off the decisive operation. Technique completed its movement of encirclement and put the finishing touch to the economic man, in accordance with its unchanging procedure of transforming what is into what ought to be and making out of mere gropings an irrefutable and simple line. Technique was no longer a spontaneous movement; it was a concerted action to shape the economic man it needed.

In order for economic technique (for example, planning) to succeed, men had to satisfy its requirements. There is no such thing as technique by and in itself. In its irresistible forward progress, it forced the human individual, without whom it is nothing, to accompany it. For this reason economic man, a working hypothesis when economics was only a doctrine, was *forced* to become reality when reality became technical. This mutation (which had been prepared in the manner we have studied) was not completely a creation of technique, but technique found in it what it required. Stalin, as well as the liberal economists, considered man as "capital." And Jacques Aventur has shown that, from the technical

point of view, man *must* be appraised as capital. To recoil before this conception is merely a sentimental reaction. No efficiency is possible for economic technique in the absence of exact calculation of average human production costs and human profit-making ability. Man *is* capital, and he must become perfectly adapted to this role. The actions proposed by technique to educate man for this role fall into two distinct categories. The first is essentially economic and does not lead to immediate and direct action on human beings. The second, however, implies the combination of various special techniques and their intervention into human life.

In the first category is found the union of the two concepts, producer and consumer. Although traditionally a distinction was made between them, planning brings them together. It is true that man is thereby restored to a certain unity, but the new reality takes in everything. All human functions are mobilized in the "production-consumption" complex. This restoration of unity is, in a certain sense, a step forward, for it holds that production and consumption are perfectly adapted to each other and that two correlative and interdependent functions may no longer be separated, as in liberal capitalism. But what in one sense restores unity represents in another a circumscribing of the whole human being. To be in technical equilibrium, man cannot live by any but the technical reality, and he cannot escape from the social aspect of things which technique designs for him. And the more his needs are accounted for, the more he is integrated into the technical matrix. It may seem paradoxical to hold that man becomes technicized as his needs are respected. But technique itself teaches him that needs are not individual, or, put more exactly, that individual needs are negligible. What technique envisages as needs is social needs as revealed by statistics. Technique can and will take into consideration only man's social requirements. Of course no one denies the existence of individual needs. But when all human forces are attracted by the labor of satisfying social needs, when these forces include education, orientation, proper environment, and hygiene, when at the same time the goods necessary to the satisfaction of social needs are numerous and easy to come by while those satisfying individual needs are rare and hard to find, it is pure utopian abstraction to say that nothing prevents the existence of individual needs. On the contrary, human nature does. Technique entails socialization of

needs because it takes only social needs into account. This explains why technical research is more and more compelled to act on the basis of objective criteria of value. The measure of value, which has been made objective, better integrates man into his economic condition. A hierarchy can better be established when precise rules are specified which are based on the economic value of the human being.

A second category of technical actions that are addressed directly to man and modify him attests strongly to what has just been said. It is necessary to act upon the individual in his capacity of producer so as to make him contribute his small share in carrying out the plan—that part of the operation, negligible in itself but indispensable to the whole, which technique has assigned to him. The operations of hundreds of workers depend with mathematical rigor on the work done by a single individual. The joint responsibility of all the workers subject to the same technique is rigorous. In the name of this common responsibility, it is binding on every worker to execute his task strictly with the kind of enthusiasm that calls for personal devotion. The technical means for compelling this devotion are well known, from human-relations techniques to the different kinds of propaganda: shock brigades, Stakhanovism, socialist rivalry, and so on. The study of these technical means lies outside our study of the economic sphere. But it may be noted in passing that they are closely connected with the technique of economics, which cannot be realized without them.

It is likewise possible to exert pressure upon the individual in his capacity of consumer. Roughly speaking, the problem here is to modify human needs in accordance with the requirements of planning. The constraints that operate on man as consumer are not as sharp and brutal as those which operate on him as producer. As I have shown, the "spontaneous" creation of social needs among almost all men in our time justifies the application of economic technique. But although planning must satisfy both needs and the technical data, it is not at all certain that the correspondence between the two will be perfect. What is required then is a small adjustment. After all, only social needs are in question here; there is small cause for us individualists to become upset. A sociological current is to be modified, but not the conscience of the individual. Moreover, should not the means to this end reassure us? The more tech-

niques develop, the more unobtrusive they become. The use of the police, or even more radical means such as famine, as in the first years of the Soviet Union, shows a certain technical deficiency and a want of tact.

The necessary adjustments are effected through price manipulation and public relations. (Psychoanalysis has shown the malleability of needs under the influence of public relations.) The same influences are here at work on social needs as were operative in the liberal economy. The only difference lies in the orientation of these means and in the person who uses them. Scientific, willed utilization systematically and definitely creates the economic man, who ultimately comes to be nothing more than the "needs-yield complex." But the human being no longer feels any particular distress at this, because the almost magical results of economic technique come from perfect adjustment. The man who suffered under capitalism because of its spasmodic fits and starts and its spiritual unsatisfactoriness, the individuals who suffered under a Communist regime because of fear and restraint, find themselves released from suffering by this adaptation, when in either regime technique assumes primacy. In both situations, man's spiritual needs are partially gratified by propaganda and, in both, technique demands active participation of him. It even requires of him that he become intelligent, the better to serve the organization and the machine. The stage in which the human being was a mere slave of the mechanical tyrant has been passed. When man himself becomes a machine, he attains to the marvelous freedom of unconsciousness, the freedom of the machine itself. A spiritual and moral life is required of him because the machine has need of such a life: no technique is possible with amoral and asocial men. Man feels himself to be responsible, but he is not. He does not feel himself an object, but he is. He has been so well assimilated to the economic world, so well adjusted to it by being reduced to the *homo economicus*, in short, so well conditioned, that the appearance of personal life becomes for him the reality of personal life.

Thus, the development of economic techniques does not formally destroy the spiritual, but rather subordinates it to the realization of the Great Design. Henceforth, there is no more need for the hypothesis of the economic man. The whole of man's life has become a function of economic technique. In its realization, technique

itself has far transcended the timid hypotheses of the classical economists. Man knows himself to be more and more free, for technique has eliminated all natural forces and in this way has given him the sense of being master of his fate. The new man being created before our very eyes, correctly tailored to enter into the artificial paradise, the detailed and necessary product of the means which he ordains for himself—that man is I.

CHAPTER

[4]

TECHNIQUE AND THE STATE

The ponderous economic organization described in the preceding chapter requires the formation of a political technique. Nothing else could administer the decisions of economic policy. I am not speaking here merely of economic planning, to which the state alone can give a direction and a foundation. The whole of economic technique is confronted by the following dilemma: either it receives from the state that sanction which alone can render it efficacious, or it must remain a mere abstraction, an offer without a taker. But who believes that such a noble edifice can remain an abstraction? There is, in any case, one agency which asks nothing better than to intervene: the state. But then the state itself will become technique.

The State's Encounters with Technique

Ancient Techniques. The state has always exploited techniques to a greater or lesser degree. This is not new. But the techniques of the state, corresponding to the limited functions of the state, were hitherto encountered only in limited domains. Let us consider briefly the techniques employed by the state on the eve of the French Revolution.

There was, first of all, a military technique. This technique represented even then a very advanced system. It had undergone a great development in many respects and it involved a loosening of the traditional rigidities. There had been much improvement, for example, in the art of fortification and, above all, in tactics. Logistics, recruitment, and military hospitals had all experienced improvement. In my *Mémoire sur le recrutement,* I have shown that the study of Le Tellier and Louvois on this subject fails because they confuse civil and military administration.

In logistics and related fields, France had experienced the highest development. Tactics made an extraordinary leap forward in the eighteenth century and became a technique of extreme precision under Frederick the Great. According to Frederick's conception, battles were to be won through the execution of certain movements, with a minimum of combat and with minimal use of soldiers. Skill in position and movement would necessarily lead the enemy to surrender. According to Guglielmo Ferrero, economy of means and an almost guaranteed success were characteristics of this technique—already far advanced.

The French Revolution, however, brought about a decisive regression in tactical technique through its introduction of popular armies and mass levies of soldiers. With the Revolution, tactics sank little by little into obscurity. Military strategy and its related services developed and gave rise to innumerable techniques; but tactical science remained inert. Thus, in modern wars enormous masses of human and material means are employed, and, more often than not, are sacrificed to a dubious outcome. To offset this, medical and supply services have at their disposal a vast apparatus

that operates with great efficiency as a result of technical improvements. (The American Army in 1944 was the most remarkable example of this.) Epidemics, for instance—hitherto the universal accompaniment of war—claimed no victims in the last two wars (with the exception of the year 1918–19). Military technique, taken as a whole and in its various forms, represents a very old technique which at the present is executed entirely by the state and devised by its employees.

A *financial technique*, corresponding to the financial function, had likewise evolved and by the time of the Revolution was already of great age and comparatively highly developed. In fact, of all techniques, financial technique had evolved most rapidly; it had already arrived at a stage at which no further improvement was thought necessary. Here, too, the state was the prime mover. Philip IV had initiated a number of financial techniques which were completed between the fourteenth and the sixteenth centuries. Among Philip's innovations were double-entry bookkeeping, budgetary management and forecasting, separation of the services of the Budget and the Treasury, and the theory of loan management.

The state, however, did not play an exclusive role in matters relating to financial techniques. There were financiers who were also merchants and who used for their own ends a merchandising technique they helped to develop. But although the role of the state was not exclusive, it was decisive: it was in connection with the state that these techniques reached their apex. After the progress that had already been made, the system seemed scarcely susceptible of further development. Napoleon's reforms were limited to certain trivial alterations and to restoring certain features which had fallen into disorder. By and large, financial technique remained what it had been. It is true that its objects (taxes) and its organs (administrations) were profoundly perturbed, but these two elements did not, properly speaking, represent financial technique, and the technique itself continued to give satisfaction up to the beginning of the present century, when a rational and general systematization began to penetrate this domain. But the technique itself was still so well articulated that it was and is very difficult to change. Everyone recognizes that it no longer squares with other techniques and that its influence is retardatory. But its very power of resistance shows the excellence of its mechanism. There are two

necessary conditions for the initiation of a real change: the integration of the finances into the general economy, and the transformation of the concept of public finance. These are the problems that confront us at the moment.

The functioning of justice very rapidly produced a judicial technique, less certain and rigid than the financial technique because ideological and human factors have always played an important role in it. For this reason, judicial technique was never completely able to take over the law as a whole. A certain conflict continued, after the Roman era, between justice and technique and, in the period under consideration, this conflict seems to have become fixed. I shall treat this problem in all its complexity later on.

An administrative technique corresponded to the administrative function. But this technique was much less clearly defined than the others I have enumerated. As in the relation between law and judicial technique, administrative technique represented an uncertain area because of the human element. The state never possessed the means, during the course of history, to convert its wishes into techniques, that is, to make them efficient. Louis XIV assumed the tone of an absolute monarch, but he did not possess the practical means to make his subjects obey his will in any well defined way. He had neither police nor administrative cadres. All he could do was coerce a few persons and make examples of them. However, terror is only exceptionally a technical means. The whole French administrative system was based on mere empiricism. Napoleon was able to systematize the administration in a rational way and to create a technical organ. But there were still no means for securing efficient action. It is difficult to see how there could have been, in the absence of both material substratum and method. A very simple example of the material substratum is the means of communication. It was scarcely possible to have a technicized administration when orders from the central administration in Paris took at least eight days to reach Marseille. Every kind of local latitude was encouraged by such delay. As to method, it was not known how the administration ought to act with respect to the persons administered. Only constraint by force was recognized, and even that was merely empirical. Likewise, the choice of the persons upon whom constraint was to operate was not made with any rational rigor.

Much more technical rules of organization and administrative

action began to appear toward the end of the nineteenth century; they formed the content of administrative law. The concepts of public function, of centralization and decentralization, and so on, began to assume more precise outlines. But these concepts still represented a mere theory. Out of it, however, emerged the technical improvements necessitated by the very existence of great masses of people. But the actions dictated by this theory still offered a very great latitude of choice. There was no certainty as to which method was really the most efficient because experimentation was possible only on a very limited scale. In this theoretic domain, all choices and all arguments were still possible. Administrative law was still not radically and indisputably the best system. It may be said, therefore, that at the beginning of the twentieth century administrative technique did not yet exist.

Finally, the state fulfilled a political function, a function of general direction into which all the others were combined and which addressed itself to foreign as well as to domestic affairs. But on the eve of the Revolution this political function was in its infancy. There was no political technique of any sort; "secret diplomacy" could not possibly have been called a technique. Policy was delivered over to the whims of a Minister of the Interior, or an ambassador, or a Chamber of Deputies, or a dictator. There was nothing but flair, personal ability, special interest, routine. Political theories never gave rise to any realistic practical application, only to bad copies of historical situations and to political circumstances which had to be endured with fortitude. In spite of the frequent mention of Machiavelli's *Prince*, the truth is that until the beginning of the twentieth century no one ever drew the technical consequences of that work. What existed, then, was a kind of original chaos in which the man of genius always outclassed his adversaries because they never had at their disposal a technique which sufficed to redress the balance. The beginnings of a political technique had to await the appearance of Lenin. And even Lenin's political technique in many respects had to be based on certain other techniques which he did not have at his disposal; for example, techniques for obtaining scientific knowledge of the masses and the modes of action applicable to them, techniques of temporal and spatial co-ordination, techniques of strategy, and social tech-

niques on a global scale. All these are only today in the process of being elaborated.

The most important technical activity of the state remained completely empirical until the beginning of the twentieth century. Nevertheless, the state did press into service a certain number of other techniques which we have already examined. However, the techniques used by the state had one characteristic in common: all of them were limited both in their objects and in their means. They referred to particular questions and did not extend beyond the framework of the particularities. Moreover, they were merely co-ordinated and were only sporadically applied. Nevertheless, there were, in the immense field of state activity, certain technicized points which offered some degree of permanence. Whatever real relation these sustained to one another was effected by the organism common to them all, the state.

New Techniques. The state was fated sooner or later to come into contact with other methods. Since the end of the eighteenth century it has gradually encountered all techniques and finally the technical phenomenon itself. From the political, social, and human points of view, this conjunction of state and technique is by far the most important phenomenon of history. It is astonishing to note that no one, to the best of my knowledge, has emphasized this fact. It is likewise astonishing that we still apply ourselves to the study of political theories or parties which no longer possess anything but episodic importance, yet we bypass the technical fact which explains the totality of modern political events, and which indicates the general line our society has taken much more surely than some painful revival of Marx (who was not acquainted with the technical fact) or some spiritualistic theory. These so-called "explanations" are mere utopias and flourish only as utopias flourish.

This ignorance of the technical phenomenon springs perhaps from an obdurate traditionalism which causes us always to live in the past and explain the present without understanding it. Thereby, our grasp of social events lags by half a century. Or it may spring from an unconscious repression. We simply *will* not to see whatever is too difficult for us to bear or whatever bulks too large for our understanding. However the case may be, it is striking to note that such political thinkers as Max Glass interpret the facts of the

present by means of concepts that date from the turn of the century. At best, they talk about "technical barbarism" without taking into account that such terms do not represent anything real and that the term *barbarism* in this domain can only come out of the decadent society of 1900. If one quits this kind of traditionalism, one falls straightway into an extravagant metaphysic, such as that of the Jesuit Father Teillard de Chardin, which has no more substance.

We take it, then, that in the present century the state has encountered the technical phenomenon in a far different framework from the traditional. How has this encounter been effected? There are a multiplicity of causes. We shall not concern ourselves with general causes such as the diffusion of ideas, demography, nationalism and colonialism, the influence of finance on the state, and so on. All these factors are well known and are dealt with in numerous textbooks. We shall apply ourselves here to those causes which stand in direct relationship to technique.

The first cause is the rapid extension of techniques formerly employed only by individuals into domains which the state had never before penetrated. Among these techniques were those of transport, education, aid to the helpless and indigent, and even spiritual techniques (as represented by the Congregation "de Propaganda Fide" or the spiritual exercises of St. Ignatius Loyola). The use of these techniques had two effects: on the one hand, they produced clearer and more distinct results so that they attracted the attention of the state; and on the other, they allowed a considerable extension of the field of activity to which they were applied. For example, they were able to reach the masses of men. But the moment they proved themselves able to operate efficiently on the masses, they ceased to be purely private. The state could no longer remain disinterested.

When instruction was imparted by a few masters on the Pont des Arts, or in a small number of episcopal colleges, there were only a handful of students—and *de minimis non curat praetor.*[1] By the time the technique of organization and pedagogy permitted the creation of the university, however, the state's attention was

[1] A Roman legal maxim: "The praetor [the state] has no concern for trifles." (Trans.)

inevitably attracted by this much more grandiose phenomenon. It was impossible for the state not to feel directly concerned, especially when in the eighteenth century certain ecclesiastics such as Jean-Baptiste de la Salle aspired to make education free and compulsory by way of a new pedagogy which could be directly addressed to all children.

Put another way, these techniques, because they were applicable to the masses, allowed individual persons to transform their sphere of activity from a private to a public one. These techniques seemed designed for this very purpose. And to the degree that their influence increased, they had to come into contact with the state itself, since they collided with the fundamental principles of state power. In any case, the private persons who had developed these techniques gradually ceased to be able to utilize them because they came to exceed the possibilities of any individual. When appeal was not made to the state, it was necessary, for their exploitation, to set up organisms as vast and powerful as the state itself. Thus, trusts and corporations were rendered necessary by the technical apparatus. This occurred even in the absence of the profit motive, after wealth had become incommensurable with the individual and therefore abstract. The prime purpose of state or corporation might even be to rob and despoil the individual by the exploitation of these techniques. I repeat that it could not have been otherwise. From a certain degree of development onward, every technique concerns the collectivity of men.

It would be unthinkable for us today to leave in private hands really efficient instruments such as atomic energy. In 1949 a report was presented to the Congress of the United States emphasizing the fact that the study and production of atomic energy must remain in the public domain. It would likewise be unthinkable that a private citizen have the radio at his disposal in order to unleash a campaign of agitation on a world scale. In every country the radio is at least under the supervision of the state, whether it is under direct state control or in private hands. No matter how liberal the state may be, it is obliged by the mere fact of technical advance to extend its powers in every possible way.

The second cause of the interrelation of state and technique is directly related to the first: the application of techniques is ex-

tremely expensive. Whatever realm we survey, we note that it becomes gradually impossible for personal or familial capital, however concentrated, to answer technical requirements.

Modern research in nuclear physics implies that the state must pay the bill. No private person could support the cost of cyclotrons and their auxiliary apparatus. Once a certain degree of technical progress has been achieved, continual improvements give rise to instrumentation so complex and large that the cost price is inaccessible to the individual. The present growth of cost price in all technical domains is unparalleled, even in recent history. The public has gained some faint conception of this through the prices of some of the recently discovered "wonder drugs" such as streptomycin. But it fails to realize the magnitude of the growth of other cost figures. For example, one hour of flight in a B-17 bomber (comparable to the larger commercial passenger aircraft) cost 60,000 francs in 1944. The B-36, which replaced the B-17, cost 400,000 francs per flight hour in 1950. There is a comparable growth in the cost of the machines themselves. The B-17 cost 120 million francs; the B-36, 1 billion 600 million. These cost prices, officially recognized in 1951, have been far surpassed. Thus, the prototype of the B-52 cost, on the day of its commissioning, 40 billion francs. An analogous growth of cost price applies to all techniques. The prices indicated are virtually the same for commercial aviation, equipped with the latest technical improvements. Private companies no longer exist which are able to support such expense. A blast furnace for a modern steel plant costs 8 billion francs; a hot rolling-mill, 12 billion; a cable mill, 7 billion. Altogether, a plant capable of producing a million tons of steel annually requires a primary investment of 125 billion francs. It is impossible not to appeal to the state to make up with subventions the insufficient resources of private enterprise. We have already noted the alternative: the slowdown of technical progress occasioned by private capitalism. Such a slowdown would be regarded as intolerable, and could not last very long.

The problem has nothing to do with debates about "nationalization." No more relevant is the allegation that the state frequently applies techniques with "less ability" than private enterprise, or that it "wastes money." What I am emphasizing here is that the principal menace to capitalistic individualism is not some theory or

other, but technical progress. To take another example, it is clear that, as city-planning techniques develop, they will give rise to more extended and precise urban research, to urgent reconstruction plans, and to a new and completely indispensable conception of the city. It is impossible to go on indefinitely contemplating these plans on paper; a technique *must* be applied. The only question is: who shall apply it?

Electrical networks may remain for some time independent of one another. But this situation cannot last when it is found that independence gives rise to general costs of no inconsiderable magnitude, difficulties in arranging the courses of the lines, and even practical difficulties in electrical technique. The interconnection of electrical networks is demanded by all technical men. Again, the only question is: who will execute it? And it is immediately clear that only the state is in a position to do so. The problem is even more acute when it is a question of the interconnection of the lines of several nations, not merely the domestic lines of a single country. (An international European network is already projected.)

Whatever the area of interest, problems are raised by technology which demand technical solutions but which are of such magnitude that they cannot be solved by private enterprise: for example, pollution of water supplies and of the urban atmosphere. These phenomena, which have assumed such proportions that they threaten the whole of city life, are of purely technical origin. Only rigorous and authoritarian measures of general control can solve these problems if they are to be solved at all. That is to say, appeal to dictatorial state action is indispensable.

These problems all exceed the powers of private individuals. Technique, once developed to a certain point, poses problems that only the state can resolve, both from the point of view of finance and from that of power.

The third cause of the interrelation of state and technique is the transformation of the role of the state and of its conceptions of its role. The state takes on increasingly extended and numerous activities. It considers itself the ordainer and preceptor of the nation. It takes charge of the national life and becomes the nation-state. The phenomenon of the nation-state has appeared as a result of the coincidence of a variety of circumstances upon which it is

useless to insist here. Let us simply note, first, that the state seeks to organize national life and to govern its various collectivities, most often because *natural* communities have disappeared and it is necessary to create new ones. Second, the state seeks to fashion the "individualist" society (the role the twentieth century has elected to play) and to penetrate into men's private lives on the ground that they are no longer able materially to manage their own affairs. Finally, all kinds of theories, both socialist and nonsocialist, are influential; but, whatever their nature, they all appeal to the state to secure a greater degree of justice and equality. In all these ways the state assumes functions which were formerly the province of private groups. And in performing these functions, the state encounters techniques hitherto employed by individuals.

When, for example, the state takes charge of education, it encounters two technical elements originally developed by private persons: a complete educational organization and a pedagogy. The state, in taking over any activity, encounters the techniques of that activity and sees its technical potential augmented thereby. The augmentation of potential reciprocally brings the state into closer relation with the technique. Nowhere is this relation clearer than in the economic field. When the state establishes itself as producer and consumer, it enters the older domain of exploitation by individuals. It is confronted with a complete technical system the broad outlines of which have already been drawn and focused. But basically the state enters this domain because productive and economic techniques, the development of which we have already studied, render such action indispensable. Thus, we have a two-way street: technical development inevitably brings about state intervention in the economic world; and, reciprocally, when the state intervenes it finds a technical apparatus which it develops further.

The economy, to a greater or lesser degree, conditions the creation of the nation-state. Alternative explanations—political and intellectual—are given for the creation, let us say, of the Fascist state. But the most profound cause of this phenomenon was the economic impasse in which Italy and Germany found themselves. The nation-state was primarily a response to the cessation of economic evolution. That there were other causal factors is clear, but we are seeking to locate the central cause. The problem of the adaptation

of the whole of society to the economic movement in all its ramifications is not to be solved by economics alone. It is a technical problem. The economy, with its enormous productive capacity, volume of trade, mobilization of society, and economic techniques which thirst to be applied, is no longer a closed circle, a single activity among others. It engages the life of the whole society and of all men in it.

Economic problems are now problems of the whole of society. The relation between the economy and all other human activities can no longer be merely empirical. Liberalism sufficed for the economy of a century and a half ago. Today it has no meaning. No economic theory is eternally valid; every period demands its own. The problem of the adaptation of society to economy (and it is in this sense rather than in the inverse, traditional sense that the problem must be posed) is a technical problem. That is to say, the problem has a solution only in a certain arrangement, through the mediation of the social apparatus and social mechanisms. This supposes an adaptative intervention having as its object the whole of society and conscious of end and methods. Only a superior power, limited by nothing and possessing all instrumentalities, is in a position to proceed to this adaptation. This is what will bring about the mobilization of all means by the state; in our day it is completing the encounter between state and techniques which was already necessitated by the other factors we have studied.

Private and Public Techniques. The techniques first developed by individuals and later on encountered by the state present very different characteristics from those of traditional political techniques. In their origin and development they manifest the following traits:

1) They are better perfected and better adapted than the techniques of the state. They represent the inspirations of individuals acting out of personal interest or for those higher motives we call *vocation.* In either case the individual devotes himself to his task wholeheartedly and with passion; such a devotion is rarely to be found among the creators of state techniques. There genuine enthusiasm is found only for very limited periods. Thus, the councilors of Philip IV, the prefects of Napoleon, the Nazi Führer, the people's commissars of the Soviet Union alone seem to have been capable of rivaling the ardor and technical devotion of free workers who have made technical progress. Isolated individuals working for

personal motives seem to display more imagination. When the same problems are posed simultaneously to the state and to individuals, the individuals are usually the first to find the correct method and solution. Whenever it has been of importance to secure acceptance for some brand of goods, doctrine, product, or action, private persons (businessmen or religious groups) confronted with the same necessities as the state have tended to respond much more rapidly. The Church created propaganda; later, private commercial interests created publicity. The state and its propaganda came in a poor third. Even then, it was private persons who applied propaganda long before the great systems of Lenin and Hitler. In France the Maison de la Presse inaugurated efficient propaganda operations in 1916. In England, a private organization, The Central Committee for National Patriotic Organization, performed the same function. Commercial interests found the most efficient propaganda methods by exploiting the discoveries of psychology and psychoanalysis.

In the private creation of techniques there is a very great diversity of methods. No one acts in accordance with a general schema. The individual always lives a much more realistic and real life than a collectivity, especially the state. The individual considers the problem as it really exists in its individuality and, as a consequence, seeks the method that represents the best solution. The state, on the other hand, acts on masses of men and on multiple problems, and it is inevitably drawn to schematize and to deny the complexity of problems. As a result, it is unable to discover the technique best adapted to their solution. This is why techniques created by individuals yield the best output and are better adapted to their objects, why they are techniques in the truest sense. We discover the same thing in the following fact: the individual possesses only limited financial resources and cannot allow himself the luxury of waste and excess. When he seeks the solution of a difficulty, expense is a factor. He must find the least costly mode of action; thus, he is brought around to economy of means, a characteristic of true technique which we have already examined. Corroboration of this is found even in domains which concern the state directly. Thus, the mechanization of state administration is a result of experiments made by private banking houses since 1914 and by German industry since 1926. Only around

1940 did public administration begin to apply the "new" principles. The state rarely discovers and applies any true techniques, for the simple reason that it has too much power and too many financial resources for its agents to seek out economy of means—the first requirement. Its methods are, generally speaking, ponderous and expensive and require an enormous apparatus to secure mediocre results. Its results are obtained, in fact, through the sheer enormity of the means employed rather than through their technical quality. (This is evident today in the French insurance industry.) The private person, on the other hand, is constrained by pecuniary necessity to develop true techniques. This also applies sometimes in the case of a poor state. Such was the case in the Third Reich. Another factor operated in favor of private persons throughout the nineteenth century: capitalistic competition. Then techniques had not yet produced machines and methods exceeding human possibilities; it was therefore mandatory to employ the most efficient techniques so as not to be crushed by the competition. Technical improvement usually conferred substantial competitive superiority. This favored an acceleration of private technical progress right up to the time when it was no longer possible for the finances of private entities to keep pace with technical progress.

2) Techniques elaborated by individuals were the result of specialization, which operated at first in the scientific domain but which was introduced into the technical world before long. During the nineteenth and the early part of the twentieth centuries, specialization was conducive to the development of different techniques along very divergent lines. Every technical branch operated independently of the others. Few or no relations existed among them. There was no organ to co-ordinate their efforts. (The situation was very different with the techniques of the state. Through the co-ordinating effect of the state's political function, as we have noted, these techniques had a certain degree of co-ordination among themselves.) But it mattered little whether private techniques were or were not co-ordinated, since the majority of them had as their end money profit, not the improvement of society. Every individual found his own way to success. This specialization produced very advanced techniques with which to deal with circumscribed problems in certain areas but it left large areas barren and unexplored. This led to the impression, up to about 1930, of

a certain incoherence and of an extraordinary inequality of development; it also led to the common error, which still persists, that technique and machine are identical. Undoubtedly it is this dispersion of technical operations that allows certain writers to deny that they are dealing with a technical society. These superficial observers do not deny that certain areas of society are affected by technique; but they assert that inumerable factors are independent of it. This is a backward view of things, based on traditional conceptions of society and completely removed from reality. But it is true that co-ordination of the different techniques has still not been completed; and wherever they remain in private hands they tend to remain specialized and unco-ordinated. However, technical co-ordination is rapidly being extended, and it is becoming less and less possible to speak of areas into which technique has not penetrated.

3) The techniques created by private individuals, contrary to those of the state, rarely slacken their pace. They are in constant forward movement and progressively affect all spheres of human activity. This has taken place only in the twentieth century, but it was always of the essence of private activity that its techniques had expansive power.

We have already studied the step-by-step development of private techniques. It must in justice be added that private activity has also been conducive to technical generalization. When in the past the state created its techniques, it was satisfied with them as they were and made no attempt at further progress, although this is no longer the case today. However, private activity has never wearied of the struggle, particularly since it has become necessary to exploit all possibilities in order to survive. The population explosion, for example, has encouraged the proliferation of private research. Suddenly there were too many people. It was impossible to employ all the new workers, and even industrial production could not absorb the extra manpower. It became a matter of prime necessity to discover new industries and to utilize new work forms. Technique proved to be just the right means for exploring the possibilities. The extension of the factory system, along with technical application in certain new domains, was the (unconscious) means of employing the surplus workers. Simultaneously, however, it precipitated crises of unemployment. (The two facts are intimately

related.) Thus, techniques rapidly came to be employed everywhere to a certain extent. They have taken over not only all working life but also man's diversions, which have been transformed into industrial enterprises. Very soon man himself became the object of technique, a mere means to the end of profitmaking. Among the most notable techniques developed and applied in this area are public relations and human relations, which have as their goal to associate, adapt, and integrate the human individual into the technical milieu in such a way that he will not suffer from it.

Private initiative, then, took the decisive step in the application of techniques to man. State action could never have brought this to pass. The state was too content with its coercive power to apply precise techniques.

The Reaction of the State to Techniques. When, as a consequence of the circumstances we have studied, the state comes into contact with the techniques elaborated by individuals, when it encounters a private sphere of action which techniques have transformed into a sphere of public interest, it reacts by taking over this sphere as well as the techniques which brought about the mutation.

Sometimes the state enters a field of action for very different reasons than the ones I have so far mentioned. The state will adopt techniques simply because it finds them already functioning. However evident this fact may be, it is necessary to emphasize it; to neglect it is to occasion many misunderstandings. The state will not act otherwise than as individuals have already acted. Insurance companies have developed insurance techniques; when these companies are nationalized, the state retains the old mechanism. After all, there are only a limited number of ways of using actuaries or establishing a police force. When an automobile manufacturing enterprise passes under state control, the tempo of the operations and the assembly line are not modified. This is particularly clear with regard to material techniques, because techniques seem to us the more constraining the more they are material. But, in fact, immaterial techniques display exactly the same characteristics.

When the French Revolution tried to suppress the systems of education and of charities that the old regime had established through the efforts of private persons, the attempts miscarried lamentably. The effort to create a system of public assistance (hospitals and homes for the elderly, for abandoned children, and for the poor)

and a system of state education was a major enterprise of the Convention and of the Constituent Assembly. But these systems were failures. Excessive systematization and theoretical precision sometimes represent the exact opposite of a good technique. In these instances, the state encountered an organization which was indeed imperfect but which was, after the technical improvements of the seventeenth and eighteenth centuries, very nearly sufficient. Confronted by these institutions, the state, for theoretical reasons, set out to destroy and to re-create on paper systems of education and of public assistance which corresponded to the theoretical decisions and doctrines of the Convention, although they turned out to be neither efficient nor technically sound. (In the realm of education, the state sought to break the power of the Church and establish a wholly laicized system. In public assistance, the state set the concept of justice in opposition to that of charity and desired to give its support only to citizens.) The new systems, unfortunately, were never able to function. With the Directory and the Consulate, a backward movement set in. The revolutionary innovations made with such difficulty were repudiated and the techniques that had preceded them were restored. The university and the colleges were reorganized in nearly the same way as the schools of the eighteenth century. The pedagogical system created by the Jesuits was restored; hospices and hospitals were reconstituted as they had been before the Revolution. And since it was difficult to secure new specialized personnel, the old personnel, monks and nuns. were restored to duty. The great difference was that now all the institutions were under the control of the state. But although they functioned as organizations belonging to the state, they were in fact identical with the earlier private organizations. The arbitrary creations of the Revolution having failed, it was necessary to use already existing technical creations.

The same phenomenon appeared in the realm of finance under the Third Reich. Hitler's revolution claimed to have done away with all the classical methods of finance; it wanted to be revolutionary in the management of nationalized enterprises, in the organization of commerce and monetary relations, and even in financial technique. Insofar as National Socialism was a party, it emphasized the struggle against capitalism. Feder's program provided for a complete transformation of economic and financial life;

manipulation of money, prices, and wages would lead to the disappearance of capitalism, and to this end completely new financial forms were recommended. But, little by little, financial necessity in its most traditional form reasserted itself: to accomplish reforms, money was needed. In 1938 Schacht reaffirmed the old position that only the orthodox financial technique of capitalism was capable of furnishing the funds necessary to the Nazi state. Rejection of inflation, short-term financing, refusal to use currency for financing—all these were traditional principles of financial technique. The financial machinery of the Third Reich was nearly identical with that of the Empire in 1914. All this is characteristic of the submission of state and revolutionary doctrine to enemy principles through the effects of techniques, which, when they are efficient, are necessarily common to both. In essence, the Nazis turned from technically untenable inventions back to an efficient financial technique, a technique identical with the one that dominated in the capitalistic countries and in the Soviet Union. At a given moment and in a given framework, there are only a limited number of techniques for attaining a given result.

The technical phenomenon is not modified when an organization passes under state control. According to Simone Weil, this explains why a system of industrial rationalization, which ought normally to develop into socialism, in fact can only exacerbate the worker's condition. Fourastié agrees (perhaps involuntarily) when he writes: "If technical development has been intensive, then, whatever the nature of judicial conditions, profits, unearned income and even political regime, there has been improvement in consumer purchasing power. This is the essential source of the social progress brought about by the last century and a half." This amounts to saying that technical progress breaks down all barriers and technique imposes its structures and social progress. This forward motion of technique is a constant, whatever the variables of the question may be.

The state cannot modify technical rules; and should it attempt to do so for doctrinal reasons, it suffers an inevitable setback. For this reason, the transition of the economy to state control can create only state capitalism, not socialism. Socialism implies the suppression of the state. (We shall see further on what it implies with respect to technique.) Insofar as the state continues to exist, noth-

ing prevents it from calling itself socialist, but in reality nothing has changed. It is only a sleight-of-hand trick to say that the same institution with the same rules, applied in the same way and having the same results, is socialist when it is at the service of the people and capitalist when it is at the service of capitalist institutions. What does it mean to be at the "service of the people"? Such an expression can only designate the service of a state which *calls itself* socialist, although it does not proceed democratically from the people. But what does it mean to be socialist under these conditions? It means to be at the service of the people. We are going around in a circle. One of the gravest symptoms of our times is that technique has little by little emptied socialism of any content. Beyond evident facts—such as the relation of Stakhanovism to Taylorism, or the identity of police methods in the Soviet Union and in Fascist countries—a major example is the persistence of the capitalist's so-called "surplus value" (in reality, profit) in socialistic regimes. The financial system of the Soviets is based, to the extent of 80 per cent, on the difference between wages paid to the workers and the value of their product. This profit, which the socialist regime professes to have eliminated, has actually been extended. The only difference is that it goes into the coffers of the state instead of the corporation's cash box. But in capitalist regimes the corporation tends to become a public entity. Mikoyan, in his speech of October 17, 1953, declared: "Capitalist commerce has certain technical features that we ought to study. By reason of competition and the difficulty of attracting customers, capitalist countries have developed exact methods of commercial organization. These ought to be applied in those areas of the Soviet Union where they are likely to prove efficient."

I could go on and show that all technical rules and institutions are identically reproduced in the socialist state. This means that there are no longer any specifically socialist institutions. Nor are there any adminisrative or economic organizations which are peculiarly the result of socialism. The socialist state, because it is efficient, has been obliged to adopt the technical principles of capitalism. Hence, in order to distinguish the socialist situation from the others, socialism always falls back on that vaguest of all concepts, teleology. Capitalism, it is said, has regard only for itself; it seeks but to preserve itself. Socialism, on the other hand, is a

constructive force on the march. But nothing warrants the belief that the means employed will result in socialism. Teleology can only create a stir for a short time as an instrument of propaganda; but it is far from certain that such propaganda can give character to socialism, which more and more is losing its specific reality as a result of technique.

The state, by taking possession of all technical spheres and instrumentalities, becomes of necessity a capitalist state, substituting itself for private capitalists. And when it has come to understand its real interest, it adds nothing and modifies nothing that, technically speaking, pre-existed. When the state realizes the use it can make of techniques, when it understands the usefulness of techniques in all spheres, it moves deliberately to appropriate them.

In the past (and to a certain degree today), circumstances led the state to appropriate a given technique. The fortuitous development of some political trend, the encounter of technique with the state—these led the state, a bit haphazardly, to adopt a technique. But instances of premeditated action on the part of the state in this direction are beginning to be discernible; for example, the exploitation of propaganda and atomic research. We must expect this movement to gain greater and greater amplitude, for when the state has once undertaken some action, it generally goes on to the end.

Repercussions on the State

The conjunction of state and technique is not a neutral fact. For many it is not surprising and implies nothing but a growth of state power. They ask whether, after all, it is not a good thing that the state perform its functions as well as possible and be well equipped to this end. We have indeed known a state which had only a laughable police force, powerless and incapable of checking criminals. It is a good thing for technical progress in this sphere to collate all other techniques, thus enabling the state to perform its role of arresting crime. These techniques, when utilized by the state, enable it to restore order, to guarantee certain liberties, and even perhaps to master its political destiny. This is how current opinion interprets the conjunction of technique and the state. I be-

lieve that such attitudes are superficial and inaccurate. Technique, in its present state of development, is no longer merely a passive instrument under state control, as it was under the control of certain individuals. The question now is what we see when we examine contemporary facts instead of antiquated principles.

Evolution. The first consequence of the conjunction of state and technique is the progressive transformation of the old techniques of the state after they have come in contact with the new techniques—formerly private but now becoming public. When a comparison is made between private and public techniques, it is noted that private techniques are incomparably more efficient. (I have already indicated certain reasons for this.) To the extent that techniques remain private, they lie outside the framework of the state. When they come under state control, however, the question inevitably arises why these techniques should not be incorporated into the traditional framework of the state. But private techniques seem to have been created to answer different requirements; they have different dimensions, and this poses a problem. Private methods are intimately connected with their objectives, and these objectives are of human dimensions. Consequently, they are not adaptable to the much more extended needs of the state. This incompatibility ceases to be true, however, as private business begins to assume dimensions equal to and sometimes greater than those of the state. It is clear that enterprises such as Citroën or Bata are of such dimensions that their administrations are comparable to the administration of the state. Standard Oil has international interests of such magnitude that its international policy is like that of a state. The financial power of the Insurance Trust is such that a parallel can be drawn between its financial system and that of a state. It appears that, starting with a certain critical mass, sociological and technical laws are identical for private and public enterprises.

We may exclude from the technical framework states such as Luxembourg and San Marino. And we may soon be forced to exclude nations which do not prepare themselves quickly enough to face up to technical demands, such as Belgium, Holland, and Denmark. These three have already been obliged to combine in order to meet modern technical problems. European nations in general are being compelled to renounce political sovereignty and form

associations designed to realize certain far-reaching technical operations, as, for example, research projects in atomic energy (1958), the exploitation of the Sahara (1958), the launching of an artificial satellite (1960). Conversely, we must include in the technical framework the great private enterprises, whose technical principles are identical with those of the state. Indeed, it may be said in general that the state lags behind the great corporations in this respect and that it is compelled to modify and rationalize its administrative, judicial, and financial systems on the model of the great commercial and industrial enterprises. This is the point that Hrant Pasdermaidjan makes in his book about the government of great organizations. He shows in particular that all administrations—civil or military, state or industrial—must rest on identical principles of technical organization if they would be efficient. If these principles are not followed, the administration is condemned to being overtaken and passed by private enterprises. In this respect, France is alarmingly backward. Because our administrative and financial system was the world's best a century ago, we carefully persist in maintaining it, whereas the plain truth is that certain techniques would guarantee much better results. Even our newly created administrations, such as Social Security, refuse to be guided by well-known technical rules. This is not the case in the so-called progressive countries, in which the administrative and financial systems are aligned very rapidly (too rapidly, perhaps, when the social order is not on the same plane as the technical organization) with industrial and commercial techniques.

This new organization of administration results in part from the creation of a technique of administration and in part from the introduction of the machine into all organizations. The two are related, not only because mechanization entails, as I have already pointed out, a reorganization of administrative units but also because mechanization solves the major problem of administration, the problem of paper work. All organizations are founded on paper work. And when paper work transcends human capacities by virtue of sheer quantity and complexity, the problem of what to do about it arises. The machine is the solution.

To get some idea of the magnitude of this mechanization, let us consider the two over-all categories of office machines, accounting and statistical. The first category is divided into seven major types

and their subdivisions. The second is divided into four types and fourteen species. The operations effected by these machines involve a modification of the administrative structure: administrative tasks must comply with mechanical requirements. Mas says that "the operations cannot be carried out except by breaking them down into homogeneous tasks and functions so that they can be committed to mechanical organs." The operations may be grouped by cycles as a function of the end sought; or they may be brought together into a single task combining all operations of the same technical nature. This last is the so-called functional grouping, which results in an administration divided into "performance function," "arrangement function," "interpretation function," and "control function." It is easily seen how far removed all this is from the traditional type of office and from the customary division of administrative tasks.

What is true in administration is also true in finances. The traditional principles of public accounting, such as the separation of the funcions of comptroller and accountant, the control of monies paid out, etc., have clearly been affected. A tremendous leap was necessary for the Cour des Comptes, twenty years in arrears with its inspection of finances, to deliver in 1948 the results for 1944 and 1945. The guiding principle of finance today is that security is sacrificed to speed. Finance no longer represents, as it did in the nineteenth century, the rule, the criterion, and the check. It has become the instrument of an efficient general policy. It must never act as an obstacle to a decision which is *technically* valid. Its traditional role as a check and constraint has been rendered questionable through the adoption of new techniques in imitation of private enterprise.

The financial regime of a modern state is highly reminiscent of commercial affairs. The rules of accounting are modified by the application of business machines, for example, punched-card machines. Here machine intervention directly voids an older administrative technique. A certain flexibility is necessary but is rarely found in state structures, which are, for various reasons, rigid. Nothing less than revolution brings about the adaptation of political regimes to the technical improvements which have become mandatory as a result of private enterprise. This is only a corollary of what I have been saying—namely, that political moti-

vations do not dominate technical phenomena, but rather the reverse. The state is usually unable for doctrinal reasons to revolutionize the techniques of public finance. But when technical progress makes this revolution mandatory, the state is obliged to capitulate.

This is clear enough with respect to army, police, administration, and finance, but it is perhaps less clear with respect to law. Here is one of the major problems contemporary jurists ought to be considering; but all too often they waste their time in textual subtleties. The judicial regime is simply not adapted to technical civilization, and this is one of the causes of its inefficiency and of the ever greater contempt felt toward it.

Law is conceived as a function of a traditional society. It has not registered the essential transformation of the times. Its content is exactly what it was three centuries ago. It has experienced only a few fragmentary transformations (such as the corporation)—no other attempts at modernization have been made. Nor have form and methods varied any more than content. Judicial technique has been little affected by the techniques that surround us today; had it been, it might have gained much in speed and flexibility.

Faced with this importance of the law, society passes to the opposite extreme and burdens administration with everything that is the product of the times in the judicial sphere. Administration, because it is better adapted from the technical point of view, continually enlarges its sphere at the expense of the judicial, which remains centered on vanishing problems such as codicils, community reversions, and the like. These last, and all similar problems that are the exclusive concern of our law, are problems that relate to an individualistic society of private property, political stability, and judicial subtlety.

Law is radically vitiated by its backwardness. We ought to be concerned not only with making laws but with rediscovering judicial principles that might possibly put into some kind of order the constructions made necessary by modern technique. All the traditional legal principles are collapsing; for example, the principle of the nonretroactivity of laws or that of the *personalité des délits et des peines*. This is not due to the particular evil of our society, but simply to the fact that the law, insofar as it is a system, is not adapted to absorb necessary innovations. This is the resistance to

social upheaval of a long-tested and traditional technique. And in the judicial sphere, unlike the others, there is no fund of private experiment to render it more efficient. As I have pointed out, private experiment remains the principal source of the advance of technique, even when technique has passed into the hands of the state.

Another striking example of this is found in pedagogy. Educational method was stabilized after the state nationalized education and adopted the Jesuits' technique. But the pedagogic movement dating from the turn of the century is at present rendering the whole edifice questionable. The older framework was coherent, but the combined technical discoveries of psychologists, physicians, and educators have given birth to a new system which is progressively penetrating the educational milieu. The state is moving in the direction of these discoveries. It has created the so-called *new classes*, which do not yet correspond exactly to the principles of modern pedagogy but which do represent the first step of integration into the body of the state of a method worked out by private persons. Once again we see the traditional techniques of the state being modified by the influence of private techniques, subject to a certain lag and to difficulties that result from the enormity of the operations, which concern not a few individuals but millions.

The Technical Organism. A second consequence of the penetration of the state by techniques is that the state as a whole becomes an enormous technical organism. Thus, nationalization of certain industrial plants not only makes the state an industrial "boss" or technician, but also compels it to revise its techniques of organization and administration. Indeed, in Great Britain, France, and even the United States the dimensions of the newer industrial organizations of the state far surpass those of private enterprise. We are witnessing the creation of technical bureaus of a new character and the creation of hitherto unknown types of organizations designed to redistribute power internally on the different levels. All this, unbeknown to the public, doubtless produces repercussions on the structure of the state, the effects of which are decisive but will only make themselves felt some years hence. It may be added that these changes are much more widespread in Great Britain than in France.

In order to gain some conception of the full range of techniques

applied by the modern state, consider the following enumeration of techniques which lie outside the traditional domains already examined:

Industrial and commercial techniques of all orders (the state becoming state-boss to an ever greater degree)

Insurance and banking techniques, including social security, family allotments, and nationalized banks

Organizational techniques, including co-ordinating commissions among all services, and new inspection systems

Psychological techniques, including services of propaganda, vocational guidance, and psychotechniques

Artistic techniques, including radio, television, a more or less official motion-picture industry, city planning, and controlled tourism

Scientific techniques, including the various centers of scientific research

Planning techniques (with arbitrary objectives), including general economic planning, transport planning, and city planning

Biological techniques (already a reality, although rare), including human stud-farms, euthanasia, obligatory vaccination and medical inspection, and social assistance

Sociological techniques (for the management of the masses and the study of public opinion)

Each of these comprises various subsidiary techniques, complex mechanisms, and specialized methods. The state, since it applies these methods where necessary, can itself no longer be anything other than technical. Persons who become panic-stricken before such administrative proliferation and aggrandizement of state activities, who criticize social security, for example, because it employs too many civil servants, who hold that a return to liberalism would suppress this proliferation, show thereby that they have not understood the development of modern times. No deliberate choice on the part of the state, no theoretical decision, has brought about this growth of technique; its causes were independent of the personal or collective. The modern state could no more be a state without techniques than a businessman could be a businessman without the telephone or the automobile. The businessman does not employ these objects because he is particularly enamored of progress. The state does not employ propaganda or planning be-

cause it is socialist. The circumstances are such that the state cannot be other than it is. Not only does it need techniques, but techniques need it. It is not a matter of chance, nor a matter of conscious will; rather, it is an urgency which expresses itself in the growth of the technical apparatus around a rather slight and feeble "brain." The motive force behind the state does not develop in proportion to the state apparatus. This motive force (theological interpretations aside) is man. And man has no more capacity to function when he is at the center of the technical organization than when he is a simple citizen lost in the machinery. In other words, the politician is demoted to minority status by the enormity of the techniques the state has at its disposal. The state is no longer the President of the Republic plus one or more Chambers of Deputies. Nor is it a dictator with certain all-powerful ministers. It is an organization of increasing complexity which puts to work the sum of the techniques of the modern world. Theoretically our politicians are at the center of the machinery, but actually they are being progressively eliminated by it. Our statesmen are impotent satellites of the machine, which, with all its parts and techniques, apparently functions as well without them. The state machine is, to be sure, not yet well adjusted, but we are only at the beginning, and its adjustment is already good enough to give the unmistakable impression that it will tolerate no outside influence.

I know there are some who believe the political factor to be predominant. These people will cite the sovereign authority of men such as Stalin, who for political reasons modified the technical organization by excluding certain techniques and retaining others. Some will cite the authority of Hitler, which was exercised for doctrinaire, not technical reasons. In these cases, and in many others, it would seem that politicians make real political decisions which coerce and determine the technical machinery. Were this true, the state would not be primarily technical. But we must not be taken in by appearances. Gabriel Ardant has clearly shown that today the search for efficiency is the law of the state's administrations and services. Where purely administrative technique is not the chief goal, government is no longer possible. It is not sufficient to improve one or another governmental service, or to create isolated new organisms. The whole structure and methodology must

be considered; in this process the politician does not count for much.

The Conflict Between the Politicians and the Technicians. The intrusion of techniques into the machinery of the state involves the conflict of politicians and technicians. "Let the technicians speak" is a leitmotiv of all the journals of the opposition. Dardenne, in his *Trois mois chez les paysans noirs,* concludes his African inquiry by noting the necessity of allowing the "era of the technicians to succeed the era of authoritarian administrators." He sees in this the solution of all the human problems of the Negro peasantry. For example, he contrasts the political decisions of administrators to build barracks and strategic military roads with the technical decisions of agronomists and economists to develop the African cotton industry and to furnish cheap cotton goods to the natives. But Dardenne overlooks the fact that the first decision was not made by politicians, but technicians: the military. He holds too firmly to the idea that technician means engineer. He neglects the technical character of both the army and the air force, and sometimes even of the administration.

This oversight, which is widespread, often leads to a misinterpretation of certain well-known conflicts of interest. In 1938 many people insisted that there was hostility between the Nazi Party and the technicians (and even the army). But this "conflict" came to nothing, unless it was the attempt on Hitler—which was made in 1944 *after* his power had been effectively broken. A. Ciliga and Stolypine report that a similar situation exists in the Soviet Union. According to Ciliga, alongside the Communist bureaucracy which holds the political power through its mass organizations and labor unions, there is a "technical intelligentsia," the ITR, which is strongly organized and nonpartisan and which has created its own corporative organization. All technicians belong to the ITR, and its role has become more important in proportion as the economic structure is increasingly based on the activities of technicians. The five-year plan implies a technical framework without parallel. An alleged conflict exists between the Communist Party and the ITR; the ITR seeks to turn out the Party on the grounds that the Party (*a*) hampers technical development, (*b*) provokes discontent among the workers, and (*c*) intrudes into its decisions certain

motives which the technicians cannot accept. It is possible that such a conflict exists. Certain signs suggest it. The Communist Party's fear of the saboteur is doubtless not just propaganda. But there are not enough signs to enable us to form a judgment.

Moltchanowski presents another aspect of this alleged conflict. He writes of a class of very bureaucratic and backward technicians, incapable of modifying their methods to adapt them to technical developments. Preoccupied with the realization of the plan, they ignorantly increase the number of workers or the hours of work, instead of increasing efficiency. The insistence on the old methods of work paralyzes the new mechanical means and diminishes yield even further in view of the magnitude of the labor force employed in the upkeep of equipment. The problem then becomes: Who ought to take responsibility for adapting the worker to the machine? Who is to educate the worker? The answer is: the local branches of the Communist Party.

The complexity of the elements of this conflict is evident; and it is difficult to accept without reservation the image of the technician-archangel sallying forth to do battle with the megalomaniac and rotten politician. Nevertheless, it is probable that in the Soviet Union, as in Nazi Germany, there is a conflict between the two classes. But this conflict cannot be counted on to bring about a change in the regime. As C. Wright Mills has shown, the managers under any regime whatsoever are never anything but executive agents. They are never in a position, publicly or institutionally, to assert themselves against their masters. Conversely, the masters become totally powerless without the complex (and secretly all-powerful) managerial cadre.

In democratic regimes, there is indeed a conflict between politician and technician, but it is apparently much less acute. Two questions arise. First, how does it come about that the conflict is greater in the dictatorships? Second, how does it come about that the technicians do not take the upper hand in a democracy and overwhelm the politicians, who possess no serious means of resistance? The answer to the second question enables us to dispose once and for all of the idea that there is a natural and inevitable hostility between politicians and technicians. As for the first question, there is an easy reply: in a dictatorship the politician is more demanding and makes his weight felt more heavily, so that the technicians find

his decisions rather difficult to tolerate. But then how to explain the fact that dictatorships make the most of the technician, submitting everything to his judgment and integrating everything into the technical system? How to explain the fact that the ITR takes its meaning from the five-year plan, the plan itself being a product of politicians? How to explain the prodigious technical rise of the Soviet Union and Nazi Germany under the sway of the politicians? The orientation of both these regimes was technical. Why do the technicians complain?

The answer is that the conflict is not between politicians and technicians but among technicians of different categories. In the dictatorships, the politician *aims*, successfully or unsuccessfully, to comply with the demands of a political technique. In democratic systems, the politician complies only with the requirements of a technique for getting himself elected; he has an altogether inadequate grasp of the various technical services. He has no direct relation to any of the innumerable technical activities. The politician in a dictatorial system, on the other hand, tends to become a technician and *ipso facto* collides with other techniques.

The new political technique claims to be concerned with *all* techniques, indeed to effect a synthesis among them. Synthesis is very likely its real function. But synthesis cannot be achieved at the first attempt, and the claim is not easily accepted by the other technicians. We are witnessing a crisis of adaptation. Political technique is far from realization; it is only in its first stammering stages. Yet it claims to be the science of synthesis, as did theology in the Middle Ages or philosophy in the eighteenth century. When the engineer protests against the politician's decisions, he may be justified on the grounds that the politician is deceiving himself and in reality is quite ignorant. But the engineer may also be ignorant of the technical motives behind the politician's decision; the engineer has no conception of the elements necessary to judge political technique on the plane of synthesis. This is indeed a crisis of adaptation; but precisely because adaptation is involved, the conflict does not lead to the overthrow of the regime.

A similar crisis, practically speaking, does not exist in democratic systems where the attempt to form a political technique has just begun. The English, however, have wanted for a long time to introduce technique into governmental operations and thus to resolve

conflicts between politicians and technicians before they become acute. Since the eighteenth century the English have been preoccupied with the technique of lawmaking. In the nineteenth century, with Arthur Seymonds and Bellanden Ken, their express goal was the rationalization and systematization of legislative operations. Their motto was: Codification, Consolidation, Purification. Their technical reforms resulted in the creation of offices for the technical editing of legal projects, in uniformity of method, in the use of marginal notes, and in the editing of résumés and tables. This effort has been resumed in the last few years in Great Britain on the ministerial level; to be able to compete with the technicians, the politicians have undertaken governmental reorganization on the Cabinet level, with a view to greater efficiency. They have divided up their work systematically by developing numerous so-called "standing committees," each of which has its rigorously defined specialty. The co-ordination of these committees is assured by the Cabinet Office, an organ of great originality. The cabinet office consists of a small group of highly trained civil servants under the direction of a permanent secretary. Its function is to prepare the agenda of the Cabinet and its committees and to take minutes of the meetings. It is interesting to note that the importance of this office is growing. The technical function which it assumes gives it a kind of supremacy over the whole political complex.

Similarly, the United States has shown a desire to establish a truly independent corps of political technicians as opposed to politicians, and to separate completely the political organ of decision from the technical organ of preparation. The task of the expert is to furnish the politician with information and estimates on which he can base a decision. A clearly defined division of responsibility corresponds to this functional division: that is, the expert has no responsibility. The problem is, above all else, to maintain the independence of the technician; he must avoid pressures, involvement in contests of influence, and the personal quarrels of the members of the administration. When the technician has completed his task, he indicates to the politicians the possible solutions and the probable consequences—and retires.

Unfortunately, the Americans do not consider the inverse problem, which is, objectively speaking, becoming more important. When the expert has effectively performed his task of pointing out

the necessary ways and means, there is generally only one logical and admissible solution. The politician will then find himself obliged to choose between the technician's solution, which is the only reasonable one, and other solutions, which he can indeed try out at his own peril but which are not reasonable. At such a moment the politician is gambling with his responsibility since there are such great chances of miscarriage if he adopts technically deviant solutions. In fact, the politician no longer has any real choice; decision follows automatically from the preparatory technical labors. Jungk even claims that in the United States, on very advanced technical levels, unchallengeable decisions have already been made by "electronic brains" in the service of the National Bureau of Standards; for example, by the EAC, surnamed the "Washington Oracle." The EAC is said to have been the machine which made the decision to recall General MacArthur after it had solved equations containing all the strategic and economic variables of his plan. This example, which must be given with all possible reservations, is confirmed by the fact that the American government has submitted to such computing devices a large number of economic problems that border on the political. Even admitting that we are not yet at this stage, we must recognize that every advance made in the techniques of inquiry, administration, and organization in itself reduces the power and the role of politics.

Consequently, the opposition between technicians and politicians places the politician squarely before a truly decisive dilemma. Either the politician will remain what he is in a democracy, in which case his role is fated to become less and less important in comparison to the role of technicians of all sorts (a state of affairs already evident in the financial sphere); or the politician will take the road of political technique, in which case the crisis of adaptation will inevitably arise. If the politician really wishes to continue to exist, he must choose the second solution as the only possible one. The existence of techniques in all other spheres forces him to this choice. Even so, little by little he is being stripped of any real power and reduced to the role of a figurehead. These techniques entail for him both the possibility and the obligation to devolve a political technique. This does not mean dictatorship, which is a provisional, trial form. It means, as we shall see, an inevitable and radical transformation of the political perspective.

The Nazi dictatorship and Stalin's regime ought not to be completely identified. I have already stated that Lenin was the first man to create a political technique. For Lenin—and Stalin understood this in a remarkable way—the politician was neither a theoretician nor a chief of state in the traditional sense, but a technician.

Lenin's concept makes politics a technique like the others, but actually superior to them since it is basically charged with co-ordinating the other spheres of activity. Political decisions are taken by virtue of technical motives, and it is this fact which differentiates this kind of politics both from the purely doctrinaire Communism of the left and from the older opportunism that makes its decisions on the basis of subjective motives, impressions, and reasonings bearing on the immediate situation and varying with circumstance. When Stalin modified a given organization or changed the content of a plan, he did so not under pressure of facts but as a function of facts, by applying a precise technique. Of course, it is possible to apply the technique badly; certain errors may persist because the technique has not yet been fully developed. But the important thing is that the politician is forced to follow the line laid down by the technician. This is the tendency which has become classical in Communism. According to this tendency, Marxism is not a doctrine but a method, a method of thought as well as of action. This political technique is not well understood and may not even be recognized—above all because its ends are not clear. Is it directed toward Communism as a whole? Or must the distinction be made, with Lenin, between strategy (which is indeed directed toward Communism) and tactics (representing the more specifically technical part, in which immediate political problems are resolved in relation to strategy). Tactical decisions are all made rationally to satisfy all possible technical data arising from all co-ordinative bureaus and organisms. The distinction between strategy and tactics enables us to understand the most sensational zigzags of the party line; for example, the 1937 stand against the older Communism, the 1940 pact with Nazism, the admission in 1943 of the Church into the Communist framework, the 1947 stand against "formalism," that of 1949 against the authors of the plan. These tactical changes can all be explained on the basis of technical reasons of great precision; they do not repre-

sent arbitrary decisions of hard-pressed politicians. The growing influence of technicians was further emphasized in 1953 by the selection of five technicians to be the five vice-presidents of the Council of Ministers.

The problem posed by Hitlerism was very different. Hitler was a politician who made his decisions without the advice of technicians, and often even despite their advice. His decisions were motivated by subjective, internally generated impulses. This attitude was the more extraordinary in that the Nazi apparatus appeared to be among those which had best understood and applied the fusion between state and technique. It utilized all techniques to the maximum possible degree, reducing them unconditionally to its service, with the exception of the borderline case of politics. Even so, it is not always correct to assume that politics intervened haphazardly. Very often, the firmest doctrines of Nazism had to yield to technical necessities. Thus, the Nazi propaganda technique twice resorted to actions which were publicly popular but which were at the same time completely contrary to Nazi doctrine. One such instance was the great propaganda drive of 1935, at the time of the "confirmation" plebiscite: "We are more democratic than the democracies." The plebiscite was intended to show that the Führer was the true incarnation of the people and that, consequently, the Nazi regime was a real democracy, not an artificial one, as France's was. The second instance was the great propaganda campaign in behalf of liberty: "We are defending the liberty of European man." These two themes, widely used but formally opposed to the Hitler doctrine, arose from the technical necessities of propaganda. It is also known that the financial technique of the Nazis often led them to act contrary to doctrine; for example, in the case of Jews who were made "honorary Aryans," or in the case of certain capitalists who became mainstays of the regime and were integrated into the financial organism of the Third Reich. However, the personal political decisions of Hitler frequently did upset the techniques of the state. The conflict was particularly keen between Hitler and the general staff; but it also existed with the Geheim Polizei and with the organs of foreign trade. Hitler ordered the adoption of certain measures the technicians disapproved, and after the fall of Nazism, they blamed every difficulty and misfortune on these arbitrary decisions. In any

case, it can certainly be said that the majority of Hitler's personal decisions were unfortunate, notably from the military point of view.

It is clear that the future belongs not to Hitler's kind of political action but to Stalin's. Some important political chieftains may still bypass these techniques; but their situation appears more and more precarious.

In the conflict between politician and technician, corruption is a much more serious matter. Political milieus are very generally corrupt. The fact is indisputable, both in democratic regimes such as France and the United States and in authoritarian systems such as Fascism, Francoism, and Nazism. We cannot really speak about the Soviet Union. The vertigo of power and the opportunity to become rich corrupt politicians very quickly. To the degree that the state becomes more and more technical, there is increasing contact between politicians and technicians. Though technique tends more and more to have primacy over politics, and technical decisions seem unassailable by parliaments, the takeover of technique can be arrested by corruption. The technician is a man, and in contact with corrupt men he may well allow himself to be corrupted. He can sidetrack his technique, annul the decisions demanded by its strict application, and grant some favor or special privilege which perverts technical action. In such an instance, general interests (the only true objects of politics) no longer control technique; particular interests (which are much more efficient in checking technical action) do. Pure technique represents the general interests, the true politics, and is opposed to the politician who represents the corrupting element for private, and hence politically nonexistent, reasons. The corruption of politicians is the only factor which can retard the total transformation of the state into a gigantic, exclusively technical apparatus. Even so, the impetus of this movement of transformation is being intensified; and public opinion is oriented towards its success. Public opinion, which counts for a great deal even in authoritarian regimes, is almost unanimously favorable to technical decisions as opposed to political ones, which are usually described as either "partisan" or "idealistic." One of the current reproaches made against politics is that it fetters the normal activity of techniques, which the public generally considers good in themselves. Citizens become angry, for

example, when they see the state holding back the development of aviation. In case of a conflict between politician and technician, the technician has public opinion behind him. A characteristic instance was furnished by Spain. Spanish Fascism ought clearly to have been censured by the democracies in 1945, as was Italian Fascism. There were political, sentimental, and doctrinal reasons for doing so. But the military technicians proclaimed that this would be a disaster, and the economic technicians agreed. The United States and Great Britain let Franco survive, and France was ridiculed for closing the frontier. Public opinion, which, particularly after 1944, was sharply anti-Fascist, ought to have reacted favorably to this action of the French government. Indeed, the first impulse was to condemn Spain. But after the technicians had shown that such a move would be harmful economically and financially (on the plane of foreign commerce), public opinion began to shift. A callous comparison was made between an ideological action, a noble gesture which yielded nothing, and the judgment of the technicians, who were demonstrating the stupidity of such an ideology. Public opinion wavered for a time, only to turn, after about six months, in the direction of the technicians.

Can it be said that this was a matter of personal interest? The overwhelming majority of Frenchmen had no direct interest in the matter; yet, it ought not to be forgotten that adherence to a technical decision is always a matter of personal interest. As for the technicians, it may be asked why they made the judgment they did. Clearly because they were applying their technical instrument, in which generous or sentimental motives had no place. The technicians as technicians told us that the closing of the frontier was disastrous; as men, they might have approved of the action for ideological reasons. It is not at all certain that technicians are still capable of making humane judgments; that, however, is another question.

The transformation of the state and the consequent predominance of technicians involves two elements. First, the technician considers the nation very differently from the politician. For the technician, the nation is essentially an affair to be managed, for (rightly) he remains imbued with the private origin of technique; as a consequence, the private and the public spheres are poorly delimited. All that the technician can take into account is the ap-

plication of his instruments—whether in the service of the state or of something else is of small importance. For him, the state is not the expression of popular will, or a creation of God, or the essence of humanity, or a modality of the class war. It is an enterprise with certain services which ought to function properly. It is an enterprise which ought to be profitable, yield a maximum of efficiency, and have the nation for its working capital.

The influence of the technician on the state does not reside solely in the conditions he imposes through his administrative decisions or in the schema of good organization he draws up. It resides also in the judgments he makes concerning governmental and administrative efficiency. I have discussed the transformation of the system of public accounting. A new and remarkable example of this is furnished by the Netherlands. The problem there is to evaluate the efficiency of governmental services as a function of their cost prices. Every organization, we are told, must in principle establish a valid relation among men, ends, and means in respect to their productive efficiency. Productivity, which seemed heretofore to be a purely economic concept, has made its appearance in the last few years in the political framework. It is necessary to evaluate the cost of every administrative operation and to apply the law of marginal yield. Funds are assigned to each department on the basis of a standard cost established through service. By introducing modern double-entry bookkeeping, it is possible to carry out a constant inspection of activities on every level and to establish the relation between actual and standard expenses. In this way, the law of the technician transforms the administrative perspective. Every administration becomes an object, as formerly the worker became an object in Taylor's hands. Politics assigns the goal; but the technician dictates the means to the last dot. We have a detailed description of this orientation in Gabriel Ardant's book.

The entire administration is only a machine whose operations must become more and more rigorous. In this way, that ideal theoretical situation is attained in which, to use the words of James K. Feely, Jr., the "margin of chance between intention and realization" is almost nil. For, according to Feely, the smaller this margin becomes, the more a check on execution appears possible, and the more the coefficient of predictability is increased. Such a situation would give maximum security in all the different administrative

units, and what Feely proposed as a theoretical ideal becomes practical. The only price tag on its attainment is the conversion of the administration into an apparatus, the civil servants into objects, and the nation into a supplier of working capital.

The nation becomes the object of the technical state in that it furnishes all the different kinds of material substratum: men, money, economy, and so on. The state becomes a machine designed to exploit the means of the nation. The relation between state and nation is henceforth completely different from what it had been before. The nation is no longer primarily a human, geographic, and historical entity. It is an economic power whose resources must be put to work, and to which a "yield" must be returned. In connection with this yield, the older technicians used the term *maximum* but the newer ones use the term *optimum*. Maximum yield is yield that exhausts and debases the resources of the state in a short interval of time; optimum yield is yield that attempts to safeguard substance and vitality, the typical example being the TVA. However this may be, we must regard the nation as an entity whose total resources are to be brought into action precisely because all the different techniques, mutually conditioning one another, have come into play. Once the technician has commenced his operations, he cannot recognize any limits. He cannot esteem or respect anything in the nation except the "nature of things." This promotes the greater coherence of the state-nation which is so characteristic of our times.

What is true on the national level is also true on the level of international organization. In view of the radical setbacks experienced by the political organisms designed to foster international agreement, it was decided to entrust further exploration along these lines to a group of technicians. It was believed that international consideration of the areas to be exploited, rather than purely national interests, would be more propitious to an entente. Thus, in 1949 a great assemblage consisting of 550 scientists and technicians opened its deliberations at Lake Success to consider how best to exploit the world's natural resources. International projects of this kind are much less advanced than similar intranational projects, and the reactions of politicians to the technicians are correspondingly more enthusiastic. This was evident at the 1949 Strasbourg assembly of the Organisation Européenne de Coopération Éco-

nomique, a purely technical group. The Americans were of the opinion that this organization did not progress as quickly as the technical situation permitted. We are witnesses at the inception, on the international level, of the same "takeover" by the technicians which we have already observed on the national level.

The second element implied in the transformation of the state and the predominance of the technician is the progressive suppression of ideological and moral barriers to technical progress. The old techniques of the state were a compound of purely technical elements and moral elements such as justice. The moral elements are not completely negligible even today, although they by no means occupy the place of honor accorded them in official discourse. The techniques employed by private persons are usually techniques in a pure state, and contain no admixture of moral elements. (We shall see later on that this is no random fact, but the result of the very nature of technique.) The state is charged not only with maintaining respect for law and order but also with establishing just relations among its citizens. It therefore imposes limits on the pure technique of private persons. Thus, from the beginning, the liberal state forbade the free manufacture of explosives and substances pernicious to health. On a higher plane, it struggled by means of antitrust laws (as in The United States) against the trust, an economic organization notorious for social injustice. It also established labor legislation limiting the abuse of the workers by mechanical techniques. In the area of justice, the state has been a barrier and a check against private technical abuses. But when technique became state technique, when technical instrumentalities passed into the hands of the state, did the state adhere to its old wisdom? Experience must answer in the negative. The techniques, to which the state opposed checks when they were in the hands of private persons, become unchecked for the state itself. There is no self-limitation in this respect.

The English state forbade traffic in narcotics but made wide use of them in India and China. An omnipotent state, Fascist or Communist, ceases to respect laws made for the protection of labor. (The Communist state proclaims this to be a provisional solution pending the establishment of the dictatorship of the proletariat; but we can make no judgment of future events.) This is not merely

a case of *princeps legibus solutus est*,[2] but something much more profound. The state is the only barrier between men and the techniques of individuals, but it ceases to be a barrier when technique, increasing geometrically, encounters the ancient *raison d'état*.[3] This last, which perhaps has nothing to do with the nature of the state, has nevertheless existed almost continuously throughout history. But the *raison d'état* never possessed the means to express itself. It operated sporadically and incoherently and its decisions often miscarried. It remained more an intention than a reality but was always latently there. Primarily, it represented the justification by the state of itself. It was the negation of morality by the state. But the means at the disposal of the state were themselves subject to a strong moral influence. They were consequently neither technically nor morally adapted to the *raison d'état*, which was deprived of any force without these arms.

The French Parliament under absolute monarchy, or the French administration under the Restoration, for example, were not adapted to this objective. But when new techniques refined the old ones, the old ones lost their internal curbs. The state then found itself in possession of means agreeable to the *raison d'état*. As soon as it had these means, it applied them without hesitation because it entertained no doubts at all as to the excellence of its ends. At the same time other techniques, the result of the activity of individuals and until then restrained by the state, came into the hands of the state, which well understood their usefulness for realizing its constant objective. How could the state be expected not to exploit a judiciary without independence and a police without any faculty of judgment? But the most noteworthy fact in this complicated development is that henceforth the *raison d'état* could only be the expression of the multiplicity of techniques which it had employed to realize itself.

Technique and Constitution. French administration remained, until about 1940, as Napoleon had created it in 1800. It had, of course, undergone certain modifications in detail; there had even been certain reversions to pre-Napoleonic practices. But no serious

[2] "The prince is not bound by the laws." (Trans.)

[3] The state's "higher" interests, which may be invoked as an excuse for state action contrary to justice or its own laws. (Trans.)

changes had taken place either in orientation or in structure. Constitutional monarchy, monarchy with absolutistic tendencies, bourgeois and socialist republics, the Empire—these French regimes all accepted or suffered Napoleon's instrument because it was a good one. There is no doubt that one of the gravest problems of the Third Republic, if one seldom explicitly considered, was that an administration created by and for an authoritarian state should be in the service of a state which wished to be thought liberal. This is the situation of the state today in all areas. Only with difficulty can the technical apparatus be varied; only with difficulty can it be employed in one way rather than in another.

To take a simple example: it matters little, in driving an automobile, whether the regime be republican or Fascist. Techniques are becoming less and less material, and really important differences from state to state tend to fade progressively away. A given state technique must be exercised on its own terms, though the political opinions of successive ministers differ. This continuity can be expressed in terms of the dictatorship of bureaus. It explains the often-noted fact that socialist ministers, once in power, act in all countries very much as did their nonsocialist predecessors. This is the result not of so-called Marxist treachery or of weakness of character, but of the specific weight of techniques. Ardant, in his book on the technique of the state, emphasizes that there is a technique of state that no regime, whatever its nature, can do without.

Every statesman is faced with the dilemma: either he must apply these techniques on their own invariable terms, or he must renounce them and forego the results they tend to produce. We must not lose sight of the fact that techniques furnish the best possible means, each in its own sphere. A country's economic minister will be forced to plan the economy or abandon it to anarchy. We have already studied the unfeasibility of a half-planned economy or of planning which contents itself with making recommendations. Technique will not tolerate half measures.

What is true of a political personality—a minister, for example—is in part true of a political regime. It makes little difference whether or not the constitution provides for a separation of powers, for one or more chamber, or for a democracy on the model of East or of West. From the technical point of view the results will be very nearly the same. Any type of administration other than that

which is technically the most efficient is impossible. A different financial regime is also an impossibility. In the case of taxes, for example, it is said that a rightist regime will favor indirect taxes that bear hardest on the general population because this population represents the "masses," but that a socializing regime will favor direct taxes that bear hardest on the great fortunes. This only shows that a scientific tax technique is not being applied. It seems incontestable that such a rigorous technique, in view of the yields it can produce, will in the end carry the day. There is an optimum tax structure which can be completely determined. It gives the best yield to the state, and at the same time equalizes the fortunes of the citizens and saves the fiscal substance. There is no valid reason for not implementing it. This optimal system is making headway in all states and is gradually overcoming the associated and adventitious ideological motives.

In the same way, planning imposes itself little by little on every regime. It is ideologically puerile to profess to see differences between Soviet and Nazi planning. Planning is not reserved to authoritarian states. Democratic states which tend toward socialism, such as France or Britain after 1945, or nonsocializing democratic states such as Denmark, today employ the system of planning. Even states which are completely liberal, such as South Africa, are engaged in planning. This does not mean that the whole economy is necessarily planned; it means that the technique of planning is making headway even in political systems unfavorable to it. Whether it is a question of an immigration plan, an export plan, a transport plan, or a city-planning operation, the same technique is involved.

Planning is being extended to all domains of political life as well as to all state regimes. In 1951, Chancellor Adenauer declared that German youth had not responded to the efforts of the regime, that the youth were anarchic and disorganized, that it was impossible to have any hopes for them, and that planning represented the sole means of reintegrating this wayward youth into the German community. He announced that a German Youth Plan was being elaborated to cope with the necessity of bringing youth into rigid organizations, giving youth an ideal and a collective soul, discipline and a fixed way of life. Adenauer went on to say that all this had to be planned. In a way, he was suggesting a return

to totalitarian methods. France in 1952 took steps to provide planning for scholarships and tourism. In 1956 it planned youth organizations, and in 1960 sports. It is to be noted that planning is becoming more and more widespread in the United States, where there is a tendency to apply it not only to economic problems but also to social (for example, city planning) and political questions. Indeed, American planning is becoming a basic element; it is no longer an accidental fact or a mere adjunct. In the United States there are nearly two thousand planning organisms in the service of the various states, not to mention national organisms, some of which are public (The Council of Economic Advisors) and some private (The National Planning Association).

We must not lose sight of the fact that nations are more and more closely connected. Moreover, when one nation engages in planning, there is an inevitable repercussion on the others; they are more or less obliged to engage in planning too. And the planning of one element implies first the understanding, then the mastery of many others, and little by little the planning of these others. It is not possible to establish a plan for a small corner of the economy and permit all the rest of the economy to remain free. Gaston Bardet has shown that good city planning requires the mobilization of the entire economy. Then, it will be said, the best thing is not to do any city planning at all. But planning cannot possibly be avoided; the explosive increase in the population means that no one will have any living space unless the area at our disposal is organized rationally. Moreover, certain inconveniences of urban life are daily becoming more serious; for example, traffic density, air pollution, and excessive noise. None of these problems can be effectively resolved except by means of a truly regulative plan. In the last few years, numerous medical and administrative congresses have of necessity been concerned with this cluster of problems.

Similar problems are raised by immigration. No country is today in a position to allow free movement in or out: free movement would result in excessive population displacement in the direction of countries with high wages or political stability. Conversely, countries with dictatorial regimes would see their populations dwindle, a state of affairs they would not welcome since it means diminution of power. Democratic countries would see an exag-

gerated rise in their populations, which they certainly do not desire because of the danger to their economic equilibrium and the risk of a fifth column. What is to be done? Put a complete stop to population displacement? Such a solution is neither possible nor desirable for reasons of manpower and colonization. But this presupposes a plan for immigration, subject moreover to international agreement. Immigration planning will be identical whether we have to do with a dictatorship or a democracy. It will require identical police, economic, and administrative mechanisms. Present-day democracies cannot escape these technical necessities.

These examples help us grasp the fact *that the structures of the modern state and its organs of government are subordinate to the techniques dependent on the state. If we were to consider in turn each of the indispensable services of the modern state, we would find that they are becoming more and more alike, regardless of the theories of government under which they operate.* We must insist on the *more and more;* the final identity has not yet been achieved. There is no greater similarity among the techniques of the state than among mechanical techniques. There are backward countries with respect to both. But the direction of the evolution is plain, and there is, practically speaking, no way of arresting it. We shall see why.

The supremacy of technical instruments is a result of their exact correspondence to social necessities. When society did not have constantly to appeal to the state, when problems of all kinds were not as numerous or acute as they are today, the state was relatively free with respect to its instruments. In spite of all the worthy persons who reassure themselves by saying that all historical epochs are alike, that the crises of the fourth century resembled those of the ninth, and so on, the fact is that no one ever before saw world economies, world wars, or world and national populations which, on the average, double every forty-five years. The state is no longer in a position to reject the most efficient means possible. Its problems are more difficult and complicated than any ever encountered before. If the state desires to have an effect on society (and it has no alternative), there is only one way to have this effect. Parliamentary discussions, the hesitance of theoreticians, the protestations of humanists, democratic elections—all of these signify very little. The state has no more real choice than the worker on the

assembly line; it is led to the technical society by the very terms of the problem.

Let us consider two examples. The concentration camp is generally taken as characteristic of dictatorial and Fascistic regimes. Such institutions undeniably exist in the Soviet Union, Poland, and Bulgaria. But they existed in France under the Third Republic and in England during the Boer War. We must not be misled by differences in name. Work camps, re-education camps, refugee camps —all represent the same fact. And we are only too aware of how important the use of concentration camps was in Algeria. We are speaking here of the concentration camp in its pure form, which has nothing to do with crematoria or hanging up the inmates by the thumbs. Such tortures are imputable to men, not to technique. The camp as an institution is making its appearance everywhere, under the most varied political regimes, as a result of the conjunction of social problems and police technique. The terms of the problem can be enumerated in this way: given the nationalistic organization and conversely the existence of fifth columns, given the administrative character of the supervision of territory and the population expansion, it is absolutely necessary to establish a police power based not on individuals but on categories of individuals. There is no way of escaping the establishment of police power by categories—which implies, for example, preventive arrest, concentration of masses of innocent persons not for judging but for sorting, and so forth. To effect sorting and checking operations, highly perfected systems have been developed, as, for example, the MVD in the Soviet Union, the FBI in the United States, and the CIC in occupied Germany. Such systems, obviously, often require a considerable length of time for their operations. Suspects may be detained for years before the system finishes its investigations. Its precision and rigor cause it to move slowly. The technical system of concentration camps has proved so efficient and satisfactory to the state that it is increasingly being incorporated into our society. It no longer represents the activity of aberrant dictators, but rather the activity of every good administrator.

The concentration-camp system of today is closely linked to the nationalistic state. But it fits so well into administrative systems in general that there is no chance of its disappearing, even if the nationalistic structure of the modern world were to change. Certain

categories of undesirables would remain, social misfits for whom the camp is the ideal solution, at least until a more efficient technique allows the resolution of the problem at even less expense. But it is highly improbable that this will happen in the near future.

The second example is the system of sales engineering, originally conceived in the United States to facilitate private commerce within the country. Now the system exists on the level of international commerce under state direction. There are firms which specialize in psychological and sociological prospecting of markets. The products of one nation cannot be sold on the markets of others unless they meet certain conditions, not only of manufacture but of design and usefulness. It would be clearly inefficient to ship products abroad which one knew in advance would not sell. It is said that there is not a single American firm which would dare launch a new product, even a hairpin, and itself assume responsibility for design, color, etc. The firm takes its problem to one of the three or four large industrial-design consultants whose job it is to give to the object in question its optimum external appearance, that is, the appearance which best suits the public taste.

This approach to consumer research is recognized by American producers as the only correct one. It is nevertheless freely chosen. As soon as commerce becomes international, however, it enters more or less into the province of the state. The problem might then be how a nation with a foreign trade deficit could wipe it out. To accomplish this, it must comply with the law of the creditor's market. One of the organizations described would have to be consulted, and what was hitherto choice based on interest then becomes obligatory. Once more we see that a technically backward nation is forced to model itself after the most advanced nation as soon as organic relations are established between the two. The situation is not due to American desire to dominate or to American pride. It is a technical situation. There is one and only one efficient method for establishing a system of international commerce, and it is necessary to comply with this method, no matter what the view of the state. Of course, the state could conceivably choose to go bankrupt. . . .

I have taken two examples as different as possible in order to emphasize the degree to which technical facts act upon the state in all areas.

But the facts lead us further. State constitutions do not alter the use of techniques, but techniques do act rather rapidly on state structures. They subvert democracy and tend to create a new aristocracy. Almost all sociologists are in agreement here; it is sufficient to refer to the writings of Georges Friedmann to be convinced of the unanimity which exists on this point even among sociologists with the most pronouncedly democratic and socialist leanings. Political equality becomes a myth—unattainable through the agency of technique. On the contrary, technique, to an ever greater degree, produces on the technical level a majority of servants and a minority of governors. Friedmann has studied the matter scientifically and has shown in a completely nonpartisan way that the worker-slaves are reduced to the lowest possible human value when their functions are specialized to completely particular tasks. We see in this phenomenon of specialization what technique makes of man in the aggregate. For example, the precision of police mechanisms makes it possible to train a good policeman in a few weeks. But the man so trained has no knowledge at all of the techniques within which he works. Men are shifted unceasingly from job to job, never attaining a true calling; they are vocationally downgraded by technique. But a vocation is a major part of life and culture. Under these circumstances, even a pervasive culture rapidly disappears.

We must also consider the influence of agricultural techniques which result in the exhaustion of certain types of soils while medical techniques lead to overpopulation. The interaction of these two factors brings about the creation of masses of underdeveloped human beings who are considered by some as unfit for democracy because they are incapable of reacting with the necessary speed to the problems of life.

In contrast to this mob there is a limited elite that understands the secrets of their own techniques, but not necessarily of all techniques. These men are close to the seat of modern governmental power. The state is no longer founded on the "average citizen" but on the ability and knowledge of this elite. The average man is altogether unable to penetrate technical secrets or governmental organization and consequently can exert no influence at all on the state.

Friedmann, in order to do something constructive about this downgraded and overspecialized manpower, has put his hopes in the evolution of socialism, which, by giving man the feeling of socialist brotherhood and the consciousness of working for the common good, would give him pleasure in his work. But this psychological remedy (whose value I am not trying to deny) could do nothing at all to bridge the gap between the intellectual incapacity of the mob of specialized workers on the one hand and the monopoly of technical means by a technical elite on the other. The new elite *is* an elite even when it is popular with the people. This split is obvious in all domains. For example, in the administrative domain, the intervention of a technique of organization and mechanization results in the creation, as Mas puts it, "of two classes very far removed from one another. The first, numerically small, understands the means to conceive, organize, direct and control; the second, infinitely more numerous, is composed of mere executants . . ." The latter are hacks who understand nothing of the complicated techniques they are carrying out. It is not conceivable that the normal operation of democracy would be acceptable to those who exercise this technical monopoly—which, moreover, is a hidden monopoly in the sense that its practitioners are unknown to the masses.

Technique shapes an aristocratic society, which in turn implies aristocratic government. Democracy in such a society can only be a mere appearance. Even now, we see in propaganda the premises of such a state of affairs. When it comes to state propaganda, there is no longer any question of democracy.

Let us consider ordinary propaganda as it occurs in republican countries. It is innocently said that since there is a plurality of parties and propaganda machines they counterbalance one another. The elector is therefore free to make a real choice between rival candidates. However, certain persons, perhaps no less innocently, claim to be able to mathematicize everything. Specifically, the propaganda which is most technical, the most skillful and urgent, gets the greatest number of votes. As far as I am concerned, neither of these positions in itself perverts democracy. What does is the very accumulation of propaganda techniques, the very deployment of technical means for exerting pressure. It is not

true that two opposed propaganda apparatuses cancel each other out. Or rather, it may be true politically, but it is false psychologically.

The real problem lies in the psychological situation of the individual assailed by a number of equally skillful propagandas acting upon his nervous system, and now, with the discovery of new methods, probing and disturbing his unconscious, working over his intelligence, and exacerbating his reactions. The individual can no longer live except in a climate of tension and overexcitement. He can no longer be a smiling and skeptical spectator. He is indeed "engaged," but involuntarily so, since he has ceased to dominate his own thoughts and actions. Techniques have taught the organizers how to *force* him into the game. He has been stripped of his power of judgment. If he has not been "fixed" in advance, he oscillates at random, in obedience not to his own power of judgment but to the law of large numbers. The intensive use of propaganda destroys the citizen's faculty of discernment. In a truly democratic regime, everything rests on judicious choice and free will. But it is precisely in democracies that propaganda machines proliferate. Where only a single propaganda machine exists, that of the state, it conditions individuals directly and could not be really intensive since there is no competition. In the so-called democracies, propaganda *must* become more and more intense in order to dominate its rivals. It becomes thereby more and more insidious.

Thus, technique disturbs immediately the operation of a democracy. It leads public opinion in one direction only, because the means at the disposal of a state directed by a technical aristocracy are generally more powerful than those at the disposal of parties. The very presence of technique, therefore, poses a grave problem.

But for every political system a further problem arises: the changing variety of available machines, which entails the disordering of traditional strategic and tactical military conceptions. It is of course possible to concoct grand theories on the art of war and strategic doctrines, to organize armies in accordance with philosophic principles, and so on. But one factor always upsets everything: the machine. The machine has in fact conditioned modern strategy. Hitler, because he understood this, achieved certain successes. The technical problem can be simply stated: given a certain machine, how can it be used most efficiently? What ac-

tions concerning logistics, liaison, and co-ordination of weapons must be taken? What plan must be created to make optimal use of the machine? And so on. For example, the tank conditioned combat between 1939 and 1943. Today aircraft, guided missiles, and intercontinental rockets are of major importance. But beyond the effect of technique on strategy, the changing machinery of war *forces political choice.* The United States, in a Congressional report (1949), recognized that because of the rapid advance of technique it was no longer in a position to pay for complete armament—for a land army with an unlimited number of vehicles of every type, plus a navy and an air force. The military aircraft of 1946 were already out of date by 1949. It seemed impossible to continue the construction of machines by the thousands which would never see service and would so soon be outmoded. A political choice had to be made.

Similarly, Britain abandoned most of its prototypes in order to devote itself to constructing a unique kind of army judged to be decisive. The fact of forced political choice was confirmed by the distribution of military tasks among continental Europe, the United States, and Great Britain as a consequence of the Atlantic Pact. With further developments, it became necessary to seek new modes of financing to support the burden of a military technique distributed as described. This reminds us of the interdependence of techniques in general and in particular of the influence of technique on military concepts and through this on political choice. In this connection, recall Bevan's biting remark in one of his last lectures: "The techniques of modern war have destroyed democracy." This is precisely our point.

Let us reason by analogy. In the same way that military machines condition strategy, organizational and other techniques condition the structure of the modern state. Wiener was not speaking idly when he said that the different systems of broadcasting and air-transport networks make a world state inevitable. Technique puts the question, not whether a given state form is more just, but whether it permits more efficient utilization of techniques. The state is no longer caught between political reality and moral theories and imperatives. It is caught between political reality and technical means. The problem is to find the state form most adequate to the application of the techniques the state has at its dis-

posal. Doubtless, it is free to prefer a certain doctrine and to look with disfavor on a given technique. It is free to dream of the realization of a certain kind of justice rather than to make use of technical means. But then it must expect almost inevitable retribution such as the French Army suffered in 1940. Our generals had their doctrine and their military conceptions, but they neglected the influence of the machine—a heroic example, it was said, of getting yourself killed at the outposts of progress. Face to face with technical efficiency, the state owes it to itself to give this efficiency free rein. Ardant has written: "Good methods bring about good structures."

These factors doom parliamentary government, which is burdened with considerable excess baggage which hinders technical progress: the numerous persons involved in decision making, the ponderousness and slowness of democratic mechanisms, the complete inability of a representative assembly to apply political technique, the frequent turnover in parliamentary personnel in contrast to the stability of the technicians in the service of the administration, etc. As a result of these factors, technical advance gradually invades the state, which in turn is compelled to assume forms and adopt institutions favorable to this advance. The importance of "commissions" in French parliamentary life is already recognized, and, it might be added, these commissions have clearly got out of hand. In the United States the system of lobbyists (a group of individuals who hang about the corridors of Congress) assures liaison between the legislative organ and the technical organ. All the great American corporations and technical groups have representatives accredited to Washington who are charged with looking after the interests (not necessarily in the capitalist sense) of the groups they represent in the legislative branch. The system is perfectly legal in the United States and allows the retention of some connection between politicians (who are more and more detached from reality) and the technical conditions of life. Such institutions represent very weak modes of adaptation. It is certain that the modern state will eventually be compelled to *total* adaptation. Total adaptation may come about through a revolution, such as the one which created the Hitler state. It may be, however, that the constitution will not undergo even the slightest of alterations and that the whole problem will be reduced to the elimination of political

powers, which will have become purely formal, a mere matter of show. The conclusion seems unavoidable that this is the road upon which our democracies have already entered.

But if the state adapts itself completely to technical necessities and becomes nothing but a huge machine, will it still be recognizably a state? Let us first of all remark that the question in no sense presupposes a theory of a technological state. Things happen today in the political sphere without the benefit of the minutest theory. There is no longer any question of a state in the classic sense. To think otherwise is a laughable error on the part of the majority of those who talk about the state, be they philosophers, theologians, publicists, politicians, or professors of constitutional law. They are speaking of the state in terms and forms appropriate to the state of the nineteenth century, or to that of Napoleon. The situation today is radically different.

The political power is no longer precisely a classical state, and it will be less and less so. It is an amalgam of organizations with a greatly reduced organism for making decisions, reduced because, in the interplay of techniques, decision making has less and less place. The situation is comparable to the elimination by an automatic machine of the individual, who retains no function except that of inspecting the machine and seeing that it remains in working order; the political power is like any well-adjusted organization which functions with a minimum of decision making. Such an organization is not too rigid and knows of itself how to adapt to current problems. We are admittedly not yet in this situation, but we are rapidly approaching it.[4] This is the state form which Lenin forecast for the socialist world. "The state," he said, "will be reduced to census taking and statistics." Lenin of necessity described the future role of the state in a very summary fashion; the techniques of organization were not yet developed in 1920. But what he discerned is exactly what we observe in outline today behind

[4] We shall not consider here "machines for evaluating military situations and determining the best action." These machines are no mere fantasy. Wiener, Shannon, and Morgenstern—among the elite of American mathematicians—are working on such a machine and speak of it as "imminent." Wiener even thinks that this will lead to a machine to evaluate political situations. Cybernetic devices will make the state conduct politics as one plays a game of chess. If this apocalyptic possibility is realized, we clearly cannot foresee the consequences for the state. We therefore shall not consider the hypothesis.

the old-fashioned republican mask. It is not necessary that such a society be socialist. What seems to be important is that the state Lenin foresaw and the purely technological state which modern organizations imply are in fact identical.

That such a state is socialist is debatable. That it is technical (a statement not intended as a theory) is not debatable. At this very moment, technical synthesis could bring about the total elimination of the state in the traditional sense. The framework in which society exists could get along well enough without the traditional state, and perhaps even do better without it. The technological state corresponds directly to modern society itself since it is technically constructed and exists in the very soul of men who worship efficiency, order, and speed. The classical state corresponds to vanished forces of an entirely different nature.

Technique and Political Doctrines. The structure of the state is not the only thing modified by technique; political doctrines are modified too.

We note, first of all, that the same thing holds for political doctrines as for political structures, that some are adapted to technical usage and some are not. In general, the new doctrines (those, for example, of the people's democracies, which it would be stupid to lump together naïvely as "Stalinist") are so adapted. "No freedom for the enemies of freedom"; "Only the worker is a citizen"; "the state guarantees freedom; the stronger the state, the more freedom is guaranteed." These slogans are representative of an idea which is becoming prevalent. Doctrinal elements coincide exactly with the development of state techniques; doctrine expresses the social situation exactly and is therefore vital. It is believed in by a large number of citizens; it tends toward effective application and possesses a contagious force. On the other hand, the doctrines of traditional democracy—the rights of man, the abstract conception of the citizen, equality in voting, the clash between power and liberty —are not adapted to modern social reality. For this reason, we are witnessing the rapid sclerosis and obsolescence of these doctrines; and it is becoming harder and harder to defend them. Public opinion no longer holds with them, except possibly among the Americans, who seem still to believe in individual freedom, a somewhat theoretic concept. But democratic peoples as a whole are more attached to traditions than to precise doctrines. Democratic doctrine

is, in any case, unadapted to technical progress, a fact which robs it of any compelling force or power to make new conquests.

Documents such as the United Nations Declaration of Human Rights mean nothing to a mankind surrounded by techniques. It is our responsibility to study man's situation vis-à-vis techniques and not vis-à-vis some no longer existent force. No one gets worked up about declarations which may be violated with impunity, whether by private enterprise (as exemplified by the attitude of employers on the subject of strikes in 1948) or by the state itself (as in the case of the law of September 15, 1948, concerning war crimes, a direct violation of the declaration of rights).

Technique has rendered traditional democratic doctrines obsolete. This should be regarded as a normal situation, for no political doctrine is eternal. When situations change, doctrines must change too. Evolution is necessary, whether it takes place under the influence of technique or in some other way. But one fact does seem new: what is in question is not merely a change of doctrine; political doctrine is being called upon to play a fundamentally different role. In the nineteenth century, political doctrine was strongly prescriptive and constitutive; this was consonant both with the whole idealist and romantic movement and with the belief in progress. Men were convinced of the omnipotence of ideas and were prepared to put into action doctrines which appeared to them to be just. Doctrinal motives played a role of prime importance in the Revolution of 1789. Napoleon I was disgraced because of his lack of doctrine, a deficiency which Napoleon III sought to overcome. Republics and even monarchies were anxious to apply that doctrine which was most just. Political doctrine, whatever its content, established an end to be attained. It represented the best form of government, founded in reason (rather than in history) and in philosophy. The problem was to realize the ideal. Doctrine was the criterion of action; it was the judge not so much of whether the action was well or ill done as of whether the action was valid with respect to the doctrine itself. Even Marx was of this mind; for him also, doctrine represented the end and criterion of action. Manifestly, doctrine dominated political life; it was no mere conceit but a reality.

With the introduction of technical development into the life of the state, the situation becomes completely different; doctrine is

merely explicative and justifying. It no longer represents the end; the end is defined by the autonomous operation of techniques. It is no longer the criterion of action; the sole criterion of action consists in knowing whether or not technique has been correctly used, and no political theory can tell us that.

Political doctrine, since about 1914, works in this way: the state is forced by the operation of its own proper techniques to form its doctrine of government on the basis of technical necessities. These necessities compel action in the same way that techniques permit it. Political theory comes along to explain action in its ideological aspect and in its practical aspect (frequently without indicating its purely technical motives). Finally, political doctrine intervenes to justify action and to show that it corresponds to ideals and to moral principles. The man of the present feels a great need for justification. He needs the conviction that his government is not only efficient but just. Unfortunately, efficiency is a fact and justice a slogan.

We conclude that the political doctrine of today is a rationalizing mechanism for justifying the state and its actions and is the source of the dangerous intellectual acrobatics indulged in by official journalists and statesmen. Sometimes the preoccupation of these gentlemen is to square some totally unjust action with democratic principles. A good example of this was the British intervention of 1944 in Greece as a function of the Yalta agreements. This intervention resulted in the crushing of a popular movement (represented by ELAS and EAM) under the pretext of organizing a Western-style democracy. Sometimes the aim of these men is to create a judicial doctrine in order to justify purely pragmatic action. The masterpiece of this species of rationalization was the theory of "trusteeship." Judicially, the theory was extremely well constructed, but its application led the United States inevitably to occupy the Japanese islands while forbidding the Soviet Union to occupy any enemy colony whatever. The direction of this "theory" is clearly visible. All the theories concerning "crimes against humanity" are of this order; the charge of genocide is in fact the judicial justification of the need to condemn the vanquished as war criminals.

The French Constitution of 1958 is another example of this tendency; it was devised to justify a *de facto* situation. The Communists, however, are the real virtuosi of this genre. They have re-

moved all the bones from Marxist doctrine and reduced it to a method. Once this is achieved, no contradiction between doctrine and action is possible. Take, for instance, the Soviet doctrine of the necessity of the "national stage" in the development of all peoples, a doctrine intended to justify Soviet intervention in Africa. All Soviet actions are a consequence of their method, which, being at the same time a doctrine, serves to justify action.

The only real problem, then, is to know whether action has been effective by virtue of the correct application of method. The problem thus becomes purely technical. In ordinary democratic governments, the unity of doctrine and method resolves all contradictions that show themselves as bad conscience. Nowadays, it is enough if fidelity to method is assured—this fidelity, as all techniques, is tested by results—for justification to be assured also. Justification, no doubt, only in the eyes of those who already believe in the doctrine. It is illusory to think that political doctrine can justify action in an objective way, *erga omnes*. The adversary is never really taken in by this "justification," although he may well accept it, since he uses it himself.

This transformation of the role of political doctrine demonstrates the complete vanity of present-day political theories. When we see such theoreticians as Max Glass or Röpke proposing a new world structure to resolve all problems, or a new political regime to satisfy all exigencies, we stand confounded before such innocence (in the etymological sense of the word). These political innocents always suppose that theories have educational force, that mobs can bestir themselves to apply principles, and that ideal doctrines will become ends. The plain truth is that such opinions have been overtaken and left behind.

The role of doctrines is fixed with precision by political technique, and since nothing else can stem the tide of history or of techniques, there is no room for the supposition that political doctrines will change roles in the near future. Because of the vanity of their pretentions, our political theoreticians cannot be taken seriously. How could we possibly take seriously, on the political level, anyone who does not even know how to view fundamental events? Or who takes as fundamental what he reads in the newspaper?

In many ways this profound transformation of political doctrines is perhaps not very new. What was new was the attention paid to

doctrine in the eighteenth and nineteenth centuries. Before that time, political theories incontestably played the role of justifiers, as they do today. Thus, the counselors of Philip IV, armed with the whole apparatus of Roman law, used it for the sole purpose of lending an appearance of legitimacy to the acts of their king. The same applies to Richelieu and to the theory of the divine right of kings. (I purposely do not cite Machiavelli because his theories were never applied.) In reality the brutal reversal we are witnessing at present is essentially a return to a long tradition. Power is power; but it cannot be exercised without at least the appearance of justice. Doctrine is charged, therefore, with the task of furnishing power with this semblance of justice. We repeat, it has not always been so. But since, at present, power is technique, these intellectual constructs no longer have any usefulness beyond supplying justification.

The Totalitarian State. Finally, technique causes the state to become totalitarian, to absorb the citizens' life completely. We have noted that this occurs as a result of the accumulation of techniques in the hands of the state. Techniques are mutually engendered and hence interconnected, forming a system that tightly encloses all our activities. When the state takes hold of a single thread of this network of techniques, little by little it draws to itself all the matter and the method, whether or not it consciously wills to do so.

Even when the state is resolutely liberal and democratic, it cannot do otherwise than become totalitarian. It becomes so either directly or, as in the United States, through intermediate persons. But, despite differences, all such systems come ultimately to the same result. I shall not repeat these facts since I believe that I have sufficiently emphasized them.

Technique engenders totalitarianism by another expedient: its mode of action. Let us take a simple example, that of total war. There has been a theory of total war, and consequently, it would seem, some will and choice in the matter. But the action of techniques nowadays makes war of necessity total. The use of guided missiles such as the V2 weapons and rockets which had an error of about nine miles in three hundred, presupposed that the great majority of them would fall among the civilian population. The same holds for the Intercontinental Ballistic Missile: one ICBM is capable of destroying all life over very considerable areas. Auto-

matic steering mechanisms can give great precision to the flight of antiaircraft missiles. But precision of aim has no meaning when targets are terrestrial objects closely grouped together. A formation of bombers is isolated in the sky, and a missle fired at them necessarily hits a military target. But this is not so on the ground.

The situation is even more acute with an H-bomb which can destroy everything within a radius of thirty miles. Despite any and all possible precautions, the H bomb would destroy civilians and nonmilitary structures. There is no need here to decide whether or not to make total war. Even if one wished to limit it, war is total because the means are totalitarian.

The same applies to civilian techniques. It is no longer possible to limit their effects even if there is a desire to do so. Censoring films may sometimes limit their subject matter, give them a conformist tone or a moral content; but it does not touch the essential, that is, the psychic modification of the individual by means of the violent impression films make upon him. The emotion he inevitably feels modifies the psychological *tonus* of the individual and tends to make him a component of a mob. Such effects lie outside the range of possible means of rectification. Or, put more precisely, new means of rectification will be invented. One might, for example, try psychoanalysis or one might limit the number of performances each week. But such measures only represent a new attack on the human soul or a new limitation of freedom.

It would be possible to consider in turn every element of state technique and to show that each one, pushed to the limit, leads to totalitarianism. Jacques Driencourt has unwittingly done this for propaganda and Ernst Kohn-Bramstedt for police techniques.

Driencourt attempts to show that propaganda is consistent with democracy, but he recognizes parenthetically that democratic government is obliged to integrate propaganda into its institutions for reasons outside its own principles. He recognizes that democracy is obliged to exploit the same practices, the same violation of human conscience, and the same encouragement of conformism as does totalitarianism. He has, in fact, shown that propaganda is in itself totalitarian. And when he asserts that propaganda is democratic if it is not a monopoly, he forgets what he proved at the beginning of his book, that propaganda always tends to monopoly. The fact is that when the state employs a complete and technical

propaganda system, it inevitably becomes totalitarian. Driencourt notes with surprise that "the country which boasts of being most liberal [that is, the United States] is the country in which the technique of thought direction is, by its perfection, the closest to totalitarian practices; and is the country in which people, accustomed to living in groups, are most inclined to leave it to the experts to fix lines of spiritual conduct."

As for the police power, it is to be noted that when it becomes technical, it assumes the leading position in the state and becomes a fundamental institution, not merely a supplementary one. It affirms itself as the "essence of the state." It appears as a mysterious entity which evades all laws and assumes complete autonomy. As Hamel says: "It is the irrational nucleus which escapes all definition and limitation by the sovereignity of the state." In fact, we might as well have an undisguised totalitarianism which controls everything, since the simple use of techniques produces a totalitarian structure of the state, as it does in the economy.

Why is this so? The answer is that technique is a mass instrument. One can think of technique only in terms of categories. Technique has no place for the individual; the personal means nothing to it. We certainly cannot deny in theory that every individual is particular; we even concede him his particularity willingly. But in the case of rules of organization and action we are unable to take this particularity into account. It must remain carefully concealed; the particular is identical with the subjective and is not allowed to show. If it could appear it would have to do so by way of technique, and in technique there is no particular. Technical procedures, therefore, abstract from the individual and seek traits common to masses of men and mass phenomena. Without these common traits, neither statistics nor the use of the law of great numbers nor the Gaussian curve—indeed, no organization—would be possible. Abstraction from the individual is doubtless intended only as a formal procedure for the convenience of reasoning. But the formal has become terribly real. It has produced the world which constrains man on every side, which leaves him no outlet to that realm which was ostensibly excluded merely for the convenience of reasoning. There no longer exists any form in which the particular can be concretely incarnated because form has become the domain of technique. Technique, in the form of psychotechnique,

aspires to take over the individual, that is, to transform the qualitative into the quantitative. It knows only two possible solutions: the transformation or the annihilation of the qualitative. It is precisely by way of the former that technique is totalitarian; and when the state becomes technical, it too becomes totalitarian; it has no alternative.

The words *the totalitarian state* inevitably evoke clichés and passionate opinions. But these no longer represent anything but historical reminiscences. The totalitarian state we are discussing here is not the brutal, immoderate thing which tortured, deformed, and broke everything in its path, the battleground of armed bullies and factions, a place of dungeons and the reign of the arbitrary. These things did certainly exist; but they represented transient traits, not real characteristics of the totalitarian state. It might even be said that they were the human aspects of the state in its inhumanity. Torture and excess are the acts of persons who use them as a means of releasing a suppressed need for power. This does not interest us here. It does not represent the true face of the completely technical, totalitarian state. In such a state nothing useless exists; there is no torture; torture is a wasteful expenditure of psychic energy which destroys salvageable resources without producing useful results. There is no systematically organized famine, but rather a recognition of the pressing necessity of maintaining the labor force in good condition. There is nothing arbitrary, for the arbitrary represents the very opposite of technique, in which everything "has a reason" (not a final but a mechanical reason). Irrationality might appear to exist—but only for the person who knows nothing of technique; it is like trying to tell a man who does not know the radio that there is music all around him although he cannot hear it.

The totalitarian state does not necessarily have totalitarian theories, nor does it necessarily even desire them. On the contrary, what we call totalitarian doctrines litter up the clear line of the technical state with aberrant elements such as "race," "blood," "proletariat." The technical state is the technical state only because it exploits certain technical means.

There is, however, a great difference between the democracies and the so-called totalitarian states. All are following the same road, but dictatorial states have become conscious of the possibilities of

exploiting technique. They know and consciously desire whatever advantage can be drawn from it. The rule, for them, is to use means without limitation of any sort. The democratic states, on the other hand, have not attained to this consciousness and are consequently inhibited in their development. Scruples concerning tradition, principles, judicial affirmations, the maintenance of a façade of public and private morality—all these still exist in the democratic state. It may be going too far to say that scruples concerning human beings also exist in democratic states; the democratic state is preoccupied most of all with a very special type of man: the voter.

All these scruples, in any case, are without force or reality. They are merely verbal smokescreens, and the democracies disregard them every time it is necessary to do so. This façade no longer corresponds in any way to a real community; it represents only vestiges of a community. Nevertheless, however without substance such talk may be, it still has great importance in democratic life, especially as it acts to prevent democratic governments from launching themselves along the road of technique without some other justification. Here, more than anywhere else, justification is necessary. Even so, democracies have a bad governmental conscience which no one has succeeded in dispelling. The state has not taken the decisive step of affirming that only technical necessity counts; it has therefore failed to do two things: to become conscious (of what the state can accomplish by exploiting techniques) and to sow its wild oats (by deciding that there are no compelling moral reasons to get in its way). Thus, at present every time the democratic state exploits a given technique, it must begin all over again to justify itself, to debate the necessity of the proposed measure, and to question everything. In the long run it will have to capitulate, but in the meantime its scruples act as a drag on it, if not in the actual application of techniques (which would, in any case, be impossible), at least in its enterprise. In order to force the democratic state to come to any decision there must always be a "present danger," some direct competition with the dictatorial state, in which action becomes a matter of life or death.

The superiority of dictatorship stems wholly from its massive exploitation of techniques. Democracy has no choice in the matter: either it utilizes techniques in the same way as the enemy, or it will

perish. It is clear enough that the first term of this proposition will prevail. For this reason, wars always bring about a prodigious advance in the use of certain techniques in democratic societies. The democracies are, of course, careful to assert that they are using these techniques only because of the state of war. But there are always wars of one kind or another: war preparations, cold war, hot war, new cold war, and so on, ad infinitum.

Indeed, cold war is as productive as hot war in forcing the democracies to imitate the dictatorships in the use of technique. The officers of the French Army, for example, have been obliged to engage in psychological activity and subversive war to counter the enemy's use of these. Here is a good example of technical imitation of a dictatorship by a democracy.

Up to this point we have contrasted the democratic state with the dictatorial state. But we have not distinguished among the different forms assumed by the dictatorships. There are two major lines followed by these states, represented, respectively, by Communism and Fascism. The question might be put whether or not these two are identical. A superficial, bourgeois survey will immediately come up with an affirmative answer, on the basis of certain massive facts of the present day. It might be noted, for example, that both sides have concentration camps, enormous police apparatuses, torture, ration cards, economic and other kinds of planning, plebiscites in place of elections, a single party (Nazi or Communist) dominating the state, a single individual exercising plenary powers, and so on. This adds up to a complex of identical forms; as a consequence, the regimes are alike. The intellectuals, however, will protest against such a hasty assimilation of the two; and in a deeper sense, the differences are real.

In Communism, despite its methods, there is an indubitable will to human liberation. It has the genuine support of millions of poverty-striken persons and, consequently, a humane aspect which Fascism never possessed. It recruits its adherents from many different parties—on the one hand from the true proletariat and on the other from the "Lumpen-proletariat," that is to say, a sub-proletariat without positive value. Communism has the honesty not to affirm bogus spiritual values or make pacts with international capitalism. In addition, the fact that Nazism was anti-Semitic has a

special significance for Christians—a point which Karl Barth has emphasized. Communism as such does not imply this, even though it may become anti-Semitic for short periods.

Upon closer analysis, however, we find a similarity between the two: a comparable attitude toward techniques. This relation may appear to some a bit thin, but it is the very essence of the twin movement represented by Communism and Fascism, both of which owe their origin to techniques, and uniquely so. Communism emerges when the development of certain techniques endangers the very society which has allowed them to flourish. Communist dialectic makes its appearance as an explanation of the way in which technical progress first produced a society, then transcended that society's economic and political forms, finally provoking their inevitable decline. Marxism orders this succession of events into a precise doctrine. It furnishes the key to an understanding of the modern world and at the same time ties its own fate to that of technique. Recall in this connection the famous remark of Lenin concerning socialism and electrification. Marxism is, in fact, nothing but an epiphenomenon of technical development, a phase of the painful marriage of man and technique. "Neither with thee, nor without thee." It is an attempt at dialectic reconciliation, so to speak.

Fascism stands in exactly the same relation to technique. It can be stated without exaggeration (in spite of the scandalous character of such an affirmation) that both Fascism and Nazism are approximations derived from Marx for the adaptation of man to his techniques. They represent that part of Marxism which is centered on the narrower problem of the state and technique, whereas Marxism itself is a broader theory encompassing the totality of the problem of society and technique. Nazism, however, far from being opposed to Marxism, completes it and confirms it. It gives the solution to numerous problems of adaptation. Hitler's methods stem directly from Lenin's precepts; and conversely, Stalinism learned certain lessons about technique from the Nazis.

If we suppress the episodic in order to get at the essential, we find in the two fraternal enemies the same phenomenon of awe at the power to be had from technique, and the same enthusiastic pursuit of the same objective. The Guelphs and the Ghibellines made merciless war on each other to decide which party was to exercise

world supremacy. But they had the same objective: the greatest possible power of the state whose sovereignty had no limits, the earthly hope of all whom feudal anarchy had exhausted.

The dictatorial state has efficiency as its goal. It submits to the law of techniques, for it understands that only by giving techniques free rein can it hope to derive the maximum profit from them. Whatever techniques are involved—human or physical, economic or educational—the state musters around it all available technical instruments. This occurs spontaneously, by chance; but in dictatorial states it is voluntary, calculated, studied (and therefore the process occurs more rapidly). It is the end sought by all forms of state. The Communist knows that technical progress means the progress of the proletariat. The Nazi knows that he is the instrument of state power; he cannot conceive that anyone would allow its limitation.

Nazism gave its goals an ideological veneer, but this veneer was futile insofar as it was not an instrument of propaganda and proceeded too rapidly. Communism, in its fusion of technique and state, proved much more prudent and in that sense more humanistic. It was in this way closer to reality and less shocking to the conscience of the average man. Hitlerism caused the essential barbarism of the thing to explode in men's faces. Behemoth showed his true face, and it proved to be too terrifying for the man of 1930, who still sought to hold on to some of his illusions and to preserve for himself at least the semblance of freedom. In this, Nazism committed a grave error which the Communists knew well enough how to exploit. However, both Nazism and Communism were working toward the total exploitation of the means which man had created to vanquish necessity.

Summum Jus: Summa Injuria

The function of justice provokes an unending major debate between the claims of justice and those of judicial technique.

Judicial technique is in every way much less self-confident than the other techniques, because it is impossible to transform the notion of justice into technical elements. Despite what philosophers may say, justice is not a thing which can be grasped or fixed. If one

pursues genuine justice (and not some automatism or egalitarianism), one never knows where one will end. A law created as a function of justice has something unpredictable in it which embarrasses the jurist. Moreover, justice is not in the service of the state; it even claims the right to judge the state. Law created as a function of justice eludes the state, which can neither create nor modify it. The state of course sanctions this situation only to the degree that it has little power or has not yet become fully self-conscious; or to the degree that its jurists are not exclusively technical rationalists and subordinated to efficient results. Under these conditions, technique assumes the role of a handmaiden modestly resigned to the fact that she does not automatically get what she desires.

A certain equilibrium is established between the pursuit of justice and the judicial technique which flourishes in a period of natural law.[5] Judicial technique has a place, but in many respects it is not easily defined.

There are indeed very different definitions of the role of judicial technique. For Saleille, judicial technique constitutes the arrangement of judicial concepts, the reduction of rules to a coherent system. This limits it to a highly theoretical notion, essentially an intellectual operation. The same holds for Savigny's contention that judicial technique is concerned with the scientific elaboration of law by jurists, as opposed to the spontaneous creation of law by the people. This is doubtless not inexact, but Savigny is referring rather to the consequences of judicial technique. It is true that when judicial technique develops, the spontaneous creation of law declines and dies; that the popular source of law is sterilized by learned law; and that this gives the jurists a free hand. But then, Savigny is describing an aspect of judicial technique, not the purpose of judicial technique. We come much closer to actuality with Kohler, who assigns to judicial technique the role of adapting legal texts to practice. And it is Kohler's concept which has guided the major authors who have studied the problem of judicial technique, albeit with individual differences (Gény, Dabin, Haesaert, Perrot).

In this context, judicial technique consists in setting reality in a framework of means through legal decisions and in rendering these

[5] On these points, see my *Fondement théologique du droit.*

decisions effective. It can then be reasonably argued that political function and judicial technique are complementary. Political function consists in supplying the substance of the rules, that is, the goal to be attained, the political or social ideal which the law is to realize. By its laws the state will also indicate ways and means of reaching the political goal, and in so doing will approach reality to a sufficient degree, without, however, grappling with it directly. It is the task of the jurists to give form to the instructions and decisions of the law, not only by rendering them systematic but by implementing them. Legal form is clearly not a mere verbal, external matter, but a means of effecting something. It has a broader scope than Perrot suggests when he defines legal technique as an "operational procedure meant to secure the goal sought by the will by causing the will to enter onto the legal plane."

But this exclusive relation between technique and will, which leaves out the whole judicial expression of social and economic reality, is far too restricted. Judicial technique is not merely a technique of adaptation but one of creation of law in its entirety.

The great task of judicial technique then is to arrange the elements furnished it by the political function in order that the law not be merely a verbalism, a dead letter. And this takes a whole arsenal of proofs, civil and penal sanctions, guarantees, in short, the whole detailed mechanism created to secure the realization of the ends of the law.

Haesaert seems to me to have defined this judicial technique excellently as "the ensemble of means by which the subjects of law are induced to take, in the social system in which they exist, the legal attitude," the active or passive behavior judged necessary. It is really, therefore, a question of obedience, and this is in fact the end toward which judicial technique aims.

For the technician of the law, all law depends on efficiency. There is no law but in its application. A law which is not applied is not a law. Obedience to rule is the fundamental condition of its being. Legal abstraction is unreal. The whole technical apparatus (expression of legal norms, publication of laws, applications in jurisprudence or doctrine, voluntary or forced realization) has but one end: the application of the law. And this complex corresponds exactly to the notion of technique in general, that is, an artificial search for efficiency. In this definition, efficiency is taken in its

pure state; we are forced to admit that law does not exist without it. The term *artificial* is used in the same way; law is no longer obeyed spontaneously, and the popular consciousness which originally created law does not adhere spontaneously and naturally to this system. Application of law no longer arises from popular adhesion to it but from the complex of mechanisms which, by means of artifice and reason, adjust behavior to rule.

This technical creation of law is, then, requisite and gains its scope through two operations:

1) By means of the first the judicial element is separated from the law as such. The judicial element (which becomes principally organization) is no longer charged with pursuing justice or creating law in any way whatsoever. It is charged with applying the laws. This role can be perfectly mechanical. It does not call for a philosopher or a man with a sense of justice. What is needed is a good technician, who understands the principles of the technique, the rules of interpretation, the legal terminology, and the ways of deducing consequences and finding solutions. The removal of law from the concrete is a great step forward in the process of technicization. The judicial element is charged with certain practical questions but, as we have said, not with making law. It is in a position to become technical in detail because the problem of justice is no longer one of its concerns. It does not have to be judge of the rules which it is commissioned to apply.

2) The dissociated judicial element gains more efficiency to the degree that it is made completely technical. It becomes possible to divorce judicial reasoning from a "dangerous empiricism, by confining the infinite diversity of judicial situations to a limited number of conceptual frameworks." Fundamental legal institutions thereby derive simplicity and vigor because they are more directly based in the techniques which give them their logical foundation. This logical foundation is doubtless compensated by a certain sclerosis of the legal framework and by a certain stiffness of judicial will. If, moreover, because of the invasion of techniques the judicial factor exists apart from concrete problems, it comes under state control.

There is, in addition, another problem: the perpetual problem of justice. Justice is no longer conceived of as a practical requirement vis-à-vis individual problems, but rather as a mere idea, an abstract

notion. Then it becomes simple to discard it entirely. Even so, men of law have certain scruples and are unable to eliminate justice from the law completely without twinges of conscience. But it is not possible to retain it because of the difficulties it involves, the uncertainty of operation and unpredictability it entails. In a word, judicial technique implies that bureaucracy cannot be burdened any longer with justice.

But, in that case, how shall another and newer meaning be given to the law? It is a remarkable fact that all societies which have arrived at a certain degree of state control and legal evolution have found the same answer to this question. In Egypt, in Rome in the fourth century after Christ, in fifteenth-century France, and in all of twentieth-century Western civilization, the concept of order and security is substituted for justice as the end and foundation of law when judicial technique becomes sufficiently developed.

The formula then becomes: "Better injustice than disorder." The notions of order and security are at least as easily reduced to technique as is the impossible notion of justice. One knows exactly what measures must be taken to achieve order. The definition of order may vary, but the means are always the same. One knows and is in a position to specify the conditions of legal security. Even though these means imply injustice, it is impossible to object, in view of the changeable character of the concept of justice. The more explicit judicial technique becomes, the more the law tends to ensure order. This is, moreover, one of the major objectives of the state. Therefore, the law and the police become identical, for the law is no longer anything but an instrument of the state. At such a price judicial technique blossoms and yields its consequences. Today we are in a position to study this phenomenon in all its vigor.

At most, a possible inconsistency in the laws (to which the need for order constrains the state) might trouble the conscience of jurists. But since there is no longer any foundation of law in justice, legal inconsistency cannot have any very far-reaching effects or endanger the judicial technique.

The schematism I have described is found over and over again behind the complexity of modern legal phenomena. Under such conditions the traditional equilibrium between the technical and human elements is quickly lost. In affirming that there is no law without efficiency, we in fact announce the implicit sacrifice of jus-

tice and the human being to efficiency. With this lack of equilibrium, the door is wide open to further technical invasion. We are witnessing the result—the takeover of law by technique—among nations which have a less firmly rooted legal sense than the French.

Until now I have been speaking of judicial technique still as a recognizable part of the world of law. The jurist, although turned technician, adhered to a general line which prevented technique from reaching a "pure" state. But once the pure technical mentality, technique-in-itself, has penetrated the legal world, legal technique, which no longer has its roots in law but in the physical sciences or perhaps even in biology, brings about certain decisive upheavals in social life. The technician rejects both the school of natural law and the historical school, so that, according to F. Jünger, the law becomes merely a complex of technical norms. The demands of conscience, as well as those of society (to use the traditional language), become subordinated to normative technique. It is no longer considered necessary to secure popular adherence to law or to be limited to legal means in order to secure the application of law. The enormous simplicity of technique has deprived the whole ensemble of judicial mechanisms of meaning—mechanisms which had as their end to guarantee the law and to cause it to be obeyed without excessive use of force. The whole apparatus of devices such as penalties, distraints, and the like, no longer makes sense. There is no need of such finesse. Adherence and obedience are secured by extralegal means (among which the police are very often the most innocuous).

We are today in the process of transcending the traditional position. That is to say, law ensures order instead of justice. Hans Kelsen represents the culmination of this development; and it was expressed in certain of the legal forms of Nazism. The Nazis recognized that a science of human behavior would make it possible to dispense with many legal rules. If the people to be administered were "persuaded," if they were made to understand by sufficiently powerful means that the observation of the rule was in their own interest, that rule would become more and more useless. If a sufficiently functional, realistic, and coherent pattern is established for the organized human milieu (and the technique of organization can furnish such a plan in short order), a great part of the administrative apparatus is rendered superfluous. In this way society is di-

rected toward a progressive emptying of legal forms and a consequent gain in the human techniques which render a gendarmery useless.

A further consequence of the technicization of the law is that the distinction between political technique and judicial technique disappears, for all practical purposes. The subject and object of the law are no longer social, but rather technical, exigencies. The technician approves of proceeding in this way: the very matter of law becomes his object. He has good reason to desire such a situation. He is no longer burdened with absurd methods of procedure. His judgments become completely rational since he understands the social necessities and the economic situation and can take them into account in his calculations. But it should not be thought that the technician merely translates these necessities into law. Above all, he elaborates them, and they are essentially subordinate to him and his technique.

This explains the enormous proliferation of laws. The technician analyzes and predicts; he cannot endure the indeterminate or tolerate any initiative which upsets order. These two traits explain the multiplicity of laws. In the past, this multiplicity was attributed to inefficiency. The repeated promulgation of a law, or the indefinite multiplication of laws, accentuated the fact that laws were going unobserved. Legal multiplicity today is something else again. Whatever a technician believes is true must be made into law. But his inferences only concern details. His analytic spirit leads him to perceive, understand, and affirm strictly localized truths; and thus strictly delimited, they then become the objects of law. There must be a law for each fact; whence the indefinite proliferation of the legal apparatus.

The modern proliferation of laws can also be explained by the legal technician's complete antipathy to the notion of a doctrinal law, to a jurisprudence of "concepts." A legal system which merely establishes principles and lays down general lines of procedure entrusts to the judge the creation of the living law under the maxim *praetor viva vox juris civilis*.[6] Such a state of affairs is intolerable to the technician, who dreads above all else the arbitrary,

[6] "The magistrate is the real voice of the civil law." M. Ellul points out elsewhere to what a degree Roman law depended on the magistrate's interpretation of very general, not to say vague, legal maxims. (Trans.)

the personal, and the fortuitous. The technician is the great enemy of chance; he finds the personal element insupportable. For that reason he finds it advisable to enclose the judge or the administrator in a tighter and tighter technical network, more and more hedged about with legal prescriptions, in such a way that the citizen will understand exactly where he is heading and just what consequences are to be expected.

Law, then, must provide for every contingency, so that man cannot disturb its operation. The traditional development of law involved a kind of competition between judges and crooks; but with the progress of technique, this is no longer the case. Society, through the application of extralegal means, is beginning to guarantee public obedience to the law. Its real problem now is to restrain the activities of those who would apply the law only to distort it, from the judge down to the lowest prison guard.

The smallest detail must therefore be invested with the majesty of the law: after all, law concerns an organized society. The law of persons, for example, is now the law of persons technically organized. Even property law has been profoundly modified by the disturbances to which technique has subjected property ownership. We see once more that all the fundamental technical data verify and reinforce one another.

As to the consequences, I believe they may be reduced to two: law becomes a mere instrument of the state; and, in the end, law disappears. The first of these statements is in no way connected with a general theory of law. I am not saying that the essence of law is reduced to the will of the state. I confine myself to the observation of facts. When the law becomes technical, it must be formulated on the basis of technical methods; it is necessary to propound an "edict" from some center (exactly as in the Latin *e-dicere*). Technical law implies a close relation with the state; and the more technical the law becomes, the more this relation becomes exclusive of all but technical content. The movement is reinforced by the fact that the state simultaneously becomes technical too.

This concordant development results in an actual identification (apart from any doctrinal position) of the expression of the law with some purely administrative proceeding. It is always possible, of course, to affirm the supremacy of aspects of the law other than

its actual expression; they are completely detached from reality, being separated from it by a formidable arsenal of strictly administrative texts and the specific turn of the technical mentality. The law at present is an affair of the state. The state, whenever it expresses itself, makes law. There are no longer any norms to regulate the activity of the state; it has eliminated the moral rules that judged it and absorbed the legal rules that guided it. The state is a law unto itself and recognizes no rules but its own will. When, in this way, technique breaks off the indispensable dialogue between the law and the state, it makes the state a god in the most theologically accurate sense of the term: a power which obeys nothing but its own will and submits to no judgment from without. This godlike will of the state is for modern man the most precise expression of technique.

In the second place, we are witnessing the disappearance of the law in the legal proliferation described. This dissolution is notable in two things, the loss by the law of its end and of its domain.

In connection with the first point, law, whether we like it or not, is dependent on justice. This is no arbitrary affirmation; further, I do not have in mind a justice which is subject to all manner of intellectual tortures. When law is detached from justice, it becomes a compass without a needle. The substitution of order for justice, useful though this may be for the purpose of making law technical, itself quickly becomes a contributory factor in this dissociation. For what does order signify? In effect, the same thing as efficiency. Law must assure order. Order is the application of the will of the state. Law must be efficient. Efficiency is itself order. Once more we witness a general transformation of means into ends. Law thus becomes an activity without any end and without any meaning. It is efficient for efficiency's sake; and individual laws are conceived solely with a view to being efficient. The whole functional theory of law is in accord with this. The idea that every man has a function in society, that the law exists to give him the means of fulfilling this function and to see to it that he does fulfill it, represents justice *in abstracto*. The idea is not new; it dominated the whole of medieval law. What is new (and is in process of completely changing the meaning of the idea of function) is the relation between function and technique. Law no longer poses the problem of the finality of man's functions. Law no longer co-

ordinates man's functions in their relation to justice. As soon as that function is keyed to technique, it becomes valid in and of itself. Everyone's function, once it has become technical, finds in technique its meaning and validity; its proper results and destiny are of little importance. The law has become a mere organizer of individual functions. It thus constitutes only a part of the larger science of social relations and connections.

This development is clearly taking place today in property law, contract law, and so on; similarly it is contributing to the dissolution of the law. Traditionally, there was a specific domain of law which could easily be defined, for example, by comparing different legal systems, present and past. Legal domain always remained the same; today, however, the frontiers have expanded. It is no longer possible to distinguish between what is law and what is not. Every application of technique to the social sphere becomes part of the domain of law. A clear example of this is the problem of planning: the true legal domain, today, is that of planning. Everything affected by planning must be transformed into law. The domain of law is therefore no longer defined by object or by end, but by method.

This transition represents a triumph of technique. No longer is the preoccupation of the law and justice its measure. The law's concern is to apply new means to all accessible areas. The very being of the law is thus dissolved. In itself the law has come to represent nothing but a terminology and a travesty on tradition which happens to be useful to the new lords and masters. People who today hold the law in contempt are at least not deceived by false impressions. Nevertheless, in consenting to be robbed in this way, man renounces one of his highest vocations.

Repercussion on Technique

It is not merely the state which is being transformed by the technical movement. For the past thirty-odd years, when the encounter between the state and technique has become more explicit, technique has developed with greater rapidity than ever before, not only according to its own internal logic but also with the aid of the power and support of the state. The advantages of private

and public techniques have complemented each other in such a way as virtually to cancel out the inconveniences of either. We have seen, for example, that the immobility to which the technique of the state tends is compensated for by the activities of private techniques—initiative remaining with the individual even when private technique has become state technique.

But we must admit that the state's appropriation of technique has dispelled much of technique's familiar magical appeal. Man is gradually losing his illusions about technique and his bedazzlement with it. He is becoming aware that he has not created an instrument of freedom but a new set of chains; this appears with compelling clarity when the state exploits technical instruments. Man, however, is still not willing to believe in the reality of this new situation; he tends to reject, above and beyond bad technical uses and doctrines, the results of this conjunction between state and technique.

But this rejection is the result of an oversimplification. It is technique itself which has changed. Either that, or it has followed its own law, a law man was ignorant of at the beginning of this glorious era. In any case, man sees that technique has changed, but he is unwilling to examine it too closely for fear of losing his last hopes.

Technique Unchecked. At present there is no counterbalance to technique. In a society in equilibrium, every new cultural tendency, every new impulse, encounters a certain number of obstacles which act as the society's first line of defense. This is not due to the interplay of conservative and revolutionary forces in general, nor in particular to the play between the means of production and the organs of consumption. It is rather due to the simple fact that every new factor must be integrated into the cultural framework, and this process requires a certain period of time because it entails modifications of the two interacting elements. It is never initially clear that the new factor will be acceptable to the cultural complex. On one hand is a kind of process of selection and, on the other, a resistance that gradually abates. A number of different forces play this restraining role. I shall discuss four of them.

The first is morality. Every civilization has rules of precise conduct, which are covered by the term *morality* in either its French or its Anglo-Saxon meaning. They may be conscious and thought

out, or unconscious and spontaneous. They determine what is good and what is bad and, consequently, admit or reject a given innovation.

Very close to morality, public opinion comprises a set of much more irrational reactions which are not necessarily related to good and evil. For reasons still poorly understood, public opinion may be impelled in a certain direction under the influence of a given impulse, or it may remain refractory. Obviously, public opinion is decisive in the interaction between morality and a new factor. It can render morality obsolete or lead it to triumph.

A third restraining force is social structure, which includes both social morphology and economic or legal structure. The social structure reacts strongly whenever new factors threaten to modify it. (This, incidentally, is the only one of the four factors retained by Marxism.) Systems or ideas are no longer the sole operative factors; economic relations or sociological factors can disturb the equilibrium even of a situation the stability of which was previously thought assured.

Finally, there is the state, the special organ of defense of a society, which reacts with every means at its disposal against all disturbing forces.

We may now ask what position we are in today with respect to these factors insofar as technique is concerned. Let us put aside the problem of morality and concern ourselves with public opinion. It is completely oriented in favor of technique; only technical phenomena interest modern men. The machine has made itself master of the heart and brain both of the average man and of the mob. What excites the crowd? Performance—whether performance in sports (the result of a certain sporting technique) or economic performance (as in the Soviet Union), in reality these are the same thing. Technique is the instrument of performance. What is important is to go higher and faster; the object of the performance means little. The act is sufficient unto itself. Modern man can think only in terms of figures, and the higher the figures, the greater his satisfaction. He looks for nothing beyond the marvelous escape mechanism that technique has allowed him, to offset the very repressions caused by the life technique forces him to lead. He is reduced, in the process, to a near nullity. Even if

he is not a worker on the assembly line, his share of autonomy and individual initiative becomes smaller and smaller. He is constrained and repressed in thought and action by an omnivorous reality which is external to him and imposed upon him. He is no longer permitted to display any personal power. Then, suddenly, he learns that the airplane his factory manufactures has flown at 700 miles an hour! All his repressed power soars into flight in that figure. Into that record speed he sublimates everything that was repressed in himself. He has gone one step further toward fusion with the mob, for it is the mob as a whole that is moved by a performance that incarnates its will to power. Every modern man expresses his will to power in records he has not established himself.

Public opinion is all the more important in that it is a two-pronged element. In the first place, there is modern man's collective worship of the power of fact, which is displayed in every technique and which is manifested in his total devotion to its overwhelming progress. This adoration is not passive but truly mystical. Men sacrifice themselves to it and lose themselves in the search for it. In this sense Mussolini was right in speaking of men realizing themselves in and through the state, the collective instrument of power. The martyrs of science or of the air force or of the atomic pile give us the most profound sense of this worship when we see the deference the crowd pays them. "I have faith in technique," declared Henry Wallace, the former Secretary of Commerce of the United States. His faith indeed dwells in men's hearts. Man is scandalized when he is told that technique causes evil; the scourges engendered by one technique will be made good by still other techniques. This is society's normal attitude.

In the second place, there is the deep conviction that technical problems are the only serious ones. The amused glance people give the philosopher; the lack of interest displayed in metaphysical and theological questions ("Byzantine" quarrels); the rejection of the humanities which comes from the conviction that we are living in a technical age and education must correspond to it; the search for the immediately practical, carrying the implication that history is useless and can serve no practical ends—all these are symptomatic of that "reasonable" conviction which pervades the

social hierarchy and is identical for all social classes. "Only technique is not mere gab." It is positive and brings about real achievements.

In these two ways, the mystic and the rational, public opinion is completely oriented toward technique. And at present another precise technique molds public opinion with reference to any given question. This technique has never been fully exploited because public opinion is favorable enough to technique without it. But if a sudden change should occur and public opinion should turn against technique, we would see the propaganda machinery set into motion to re-create a favorable atmosphere, for the whole social edifice would be at stake.

As to the third traditional restraining force—the social structure —the question is whether the social structure of our world acts as a brake on technical evolution. By way of answer, I have shown that progress has been rapid only because social morphology has favored it. This phenomenon has not fluctuated very much; and at present we are witnessing the penetration of social structure by techniques. The life of the modern world is to an ever greater degree dominated by economics, and economics in turn is more and more dominated by technique. The whole of the material world in which we live rests on this technical base. (It is a commonplace of science-fiction writers to imagine what would happen if the use of technical instruments were to be suddenly stopped.) Likewise, our analysis has led us to recognize that as technique progresses in a given society, it tends to reproduce in that society the social structures that gave birth to it.

The individualist and atomized society of the nineteenth century was, from the sociological point of view, favorable to technical development. Today we are witnessing a kind of technical reconstitution of the scattered fragments of society; communities and associations flourish everywhere. Men seem overjoyed at this creation of new social frameworks independent of the state. The social solidification of today contrasts sharply with the fluidity of the nineteenth century. Does this phenomenon then present an effective opposition to techniques? The answer must be in the negative. If we examine these new sociological forms in detail, we find them all organized as functions of techniques. We hardly need to examine industrial associations, but the same applies to all other

twentieth-century associations. They may be associations for sport or for culture, the goal of which is clearly recognizable (Dickson). They may be labor unions, which have their characteristic relation to life through the economy, this last being conditioned by technique. They may be communities like the *Kibbutzim*, whose object is to exploit techniques while allowing man a normal life. In every kind of modern society there is a predominance of techniques. The social morphology of these societies indeed differs radically from that of traditional societies. Traditional societies were centered upon human needs and instincts (for example, in family, clan, seignory). Modern societies, on the other hand, are centered on technical necessity and derivatively, of course, on human adherence. Man, in modern societies, is not situated in relation to other men, but in relation to technique; for this reason the sociological structure of these societies is completely altered. There is no longer any question of autonomous collectivities or groups with specific values and orientations. Modern collectivities and groups have no existence beyond technique—they are representative of the major tendency of our time.

In the transition from the individualist to the collectivist society, there are then two stages of evolution, both of which are favorable to technique, not two different attitudes of society toward technique. Comparably, it is clear that collectivist society cannot be established, or even conceived of, except as growing out of an extreme technical development. This might not be true in a communal society (although the communities that exist today are markedly dependent on technique); but we do not seem to be moving in the direction of such societies.

Hence, we must conclude that our social structures, viewed in any light whatsoever, are unanimously favorable to technique and could hardly act as a check upon it.

Only the state remains, then, as a possible brake upon technique. But we have already seen that the state has abdicated this function, renouncing its directive role in favor of technique. Indeed, since the nineteenth century every social element which traditionally acted as a restraint on innovating forces has been overthrown as far as technique is concerned. *Inverted* might be a better term; the factors which formerly acted as hindrances have today become powerful auxiliaries to technique. (We have only to reflect on pub-

lic opinion and the expansion of the economy to realize this.) Technique, therefore, encounters no possible obstacles or checks to its progress. It can advance as it will, since it encounters no limiting factors other than its own powers (which seem unlimited and inexhaustible).

A technique without limits is not in itself disquieting. If we look at our technical society without our idealist spectacles, what seems most disquieting is that the character of technique renders it *independent of man himself*. We do not mean by this that the machine tends to replace the human being; that fact is already well-known. The important thing is that man, practically speaking, no longer possesses any means of bringing action to bear upon technique. He is unable to limit it or even to orient it. I am well acquainted with the claims of those who think that society has technique under firm control because man is always inventing it anew. I know too of the hopes of those who are always prescribing remedies for this sorcerer's apprentice whom they feel free to invoke without discernment. But these claims and hopes are mere words. The reality is that man no longer has any means with which to subjugate technique, which is not an intellectual, or even, as some would have it, a spiritual phenomenon. It is above all a sociological phenomenon; and in order to cure or change it, one would have to oppose to it checks and barriers of a sociological character. By such means alone man might possibly bring action to bear upon it. But everything of a sociological character has had its character changed by technique. There is, therefore, nothing of a sociological character available to restrain technique, because everything in society is its servant. Technique is essentially independent of the human being, who finds himself naked and disarmed before it. Modern man divines that there is only one reasonable way out: to submit and take what profit he can from what technique otherwise so richly bestows upon him. If he is of a mind to oppose it, he finds himself really alone.

It has been said that modern man surrounded by techniques is in the same situation as prehistoric man in the midst of nature. This is only a metaphor; it cannot be carried very far, even though it is as exact as a metaphor can be. Both environments give life but both place him in utter peril. Both represent terrifying powers, worlds in which man is a participant but which are closed against him. In

the joy of conquest, he has not perceived that what he has created takes from him the possibility of being himself. He is like a rich man of many possessions who finds himself a nonentity in his own household. The state, man's last protector, has made common cause with alien powers.

The Role of the State in the Development of Modern Techniques. The state plays a role of prime importance with respect to techniques. We have noted that until recently different techniques were unrelated to one another. This unrelatedness was true of state techniques because they were localized and their domains were not contiguous; it held for private techniques because they were the result of highly unco-ordinated activity which, while fruitful, was also anarchical and was dominated, moreover, by specialization.

The basic effect of state action on techniques is to co-ordinate the whole complex. The state possesses the power of unification, since it is the planning power par excellence in society. In this it plays its true role, that of co-ordinating, adjusting, and equilibrating social forces. It has played this role with respect to techniques for half a century by bringing hitherto unrelated techniques into contact with one another, for example, economic and propaganda techniques. It relates them by establishing organisms responsible for this function, as, for example, the simple organs of liaison between ministries. It integrates the whole complex of techniques into a plan. Planning itself is the result of well-applied techniques, and only the state is in a position to establish plans which are valid on the national level. We are, at present, beginning to see plans on a continental scale, not only the so-called five-year plans, but the Marshall Plan and plans for assisting underdeveloped countries.

It is only in the framework of planning that such operations are arranged and find their exact place. The state appears less as the brain which orders them organically and more as the relational apparatus which enables the separate techniques to confront one another and to co-ordinate their movements. We find concrete evidence of this again and again; in the co-ordination of rail and automobile traffic, the co-ordination of the production of steel and motor vehicles and aircraft, in the co-ordination of the medical profession and social security, the co-ordination of foreign and colonial commerce, and of all commerce with finance, and so forth.

The more closely related the different sectors, the more does a discovery in one involve repercussions in the others, and the more it becomes necessary to create organisms of transmission, cogs and gears, so to speak, connecting the different techniques. This is an impossible task for private enterprise, not only because the phenomenon in question is a global one but because the technicians themselves are specialists. The state alone can undertake the indispensable task of bridging these specializations. The state knows approximately the available resources in men and techniques and can undertake the still embryonic function of co-ordinator. Since discoveries in one technical sector are so useful in others, the role of co-ordinator is bound to become more and more important.

Consider, for example, the diversity of techniques necessary for the production of a motion picture. There are financial, literary, and cinematographic techniques; there are lesser techniques, such as make-up techniques and the techniques of light and sound. There are completely new techniques, such as script techniques, and so on. These cinematic techniques, though complicated, can be grasped by the brain of a single man, and hence there are still some cases of one-man management. But consider the magnitude of the task of co-ordinating, on a national scale, even more complicated clusters of techniques which offer active resistance to being co-ordinated. In such cases the role of organizer, manager, co-ordinator—whatever it is called—becomes more necessary in proportion as the state takes over that function. Moreover, the state alone can fulfill it. This state of affairs is already a reality; the state is already engaged in bridging the isolated technical specialties. Individual specialized disciplines—for example, those of the biologist, the engineer, the sociologist, the psychologist—are combined to yield new techniques such as psychotechniques and industrial relations. But these individual disciplines are also joined together in a more organic way, as, for example, when the so-called human techniques, physics and politics, are combined in propaganda.

In addition to co-ordinating the different techniques, the state furnishes material means far beyond the power of any individuals to supply. An expedition to the North Pole, which only a half century ago was within the resources of one or at most a few private persons, is no longer possible on a private basis. Formerly all that was needed was Eskimo equipment, such as a boat, sledges,

dogs—and, above all, courage. Today complicated mechanical equipment is necessary: airplanes (especially equipped for the cold and for ice landings), caterpillar trucks, radio and radio telephones, prefabricated housing, and so on. Every possible means to lessen danger is available to him who dreams of exploring unknown territory. It would doubtless be possible to revive old traditions—by risking one's life. But why reject the new means? Why endanger one's life when one can do a better job without that? Obviously, bravado is unreasonable. One must employ the maximum means to assure optimal results with the least danger. But no private person has the means to set into motion the enormous apparatus that is needed. The means must be requisitioned by the state, which alone is in a position to find indefinite supplies of cash and to exploit financial techniques forbidden to individuals. The same applies in submarine exploration. When one leaves the domain of the merely amateurish and desires to give one's work status, legal or otherwise, it is necessary to solicit the support of the state to cover expenses and to resolve administrative problems.

But the state demands something in return for subventions. The state does not think it important for an individual to go to the North Pole, either for sport's sake or for honors. The state desires tangible *technical* results. It agrees to furnish assistance for purposes of scientific research and for the acquisition of certain rights it hopes to exploit; for example, mineral resources and aviation. The result must be the technical aggrandizement of the state; that is the only condition under which a contract between state and individual is possible.

That the state acts to promote scientific research is not new; in the eighteenth century the state offered recompenses to inventors, and these recompenses had much to do with the discovery of certain navigational methods (compensating chronometer, mathematical tables, and so on). The state thereafter seemed to lose interest, but for the last thirty years it has resumed the policy of recompensing technologists and inventors.

There are multiple examples of this, for the modern state, to a greater degree than ever before, alone has the means to put to work what technique has to offer man. It suffices to mention agricultural machinery, automatic threshers and reapers, and so on. Although in France this machinery is of comparatively small size,

it is, even so, far beyond the resources of the average individual farmer to buy. An intermediary is necessary, either a capitalist who leases machines to the farmers, or a farmer–co-operative which buys the machines. Yet both of these hesitate to invest the requisite capital because large-scale farm machinery is used only for a small part of the year and is idle the rest of the time. (Such machinery must therefore be deemed technically backward.) Airplanes are being used increasingly for sowing, seeding clouds for rain, distributing chemical substances, and so on. But these techniques exceed the resources of peasant co-operatives.

There are only two ways to resolve the situation. One is to expropriate the land in favor of capitalist corporations which will exploit vast areas with the latest technical improvements. The other is to unite the farmers in state collective farms which would have at their disposal instruments furnished by the state. A choice is still possible between the two alternatives. But almost certainly the balance will swing in favor of state collectives; only through state collectives can technical progress be fully realized and technical means exploited without fear of financial setbacks.

The state offers technique possibilities of development which no other agency could offer. It gives research men the necessary means to expedite their research, and, as a consequence, to expedite technique. Only the state is in a position to make available to scientists the results of scientific investigations from other parts of the world; the state can exploit information techniques which no lesser agency could possibly exploit. It can buy necessary new instruments in any country. It even lures foreign scientists into its laboratories with hard cash (it may even kidnap them into semi-slavery, as in the case of the German scientists who were "distributed" among the victorious Allies). Only the state can purchase essential scientific equipment and, in addition, give the scientist the indispensable support of its authority.

Technique, as I have remarked, has no meaning if it is not applied. But in its application it encounters certain concrete difficulties, especially with individuals. This in no way contradicts what I have already said about public opinion. Public opinion is completely and resolutely favorable to technical progress. But it is favorable retrospectively, so to speak. Technical progress is what we *already* know. In actual instances, however—in respect to some

new discovery, for example—the reaction of the public is not so simple. If a discovery does not concern the public directly, its reaction is generally enthusiastic, as, for example, in the case of supersonic aircraft. But if the public is directly affected, if the discovery may in fact be applied to it, enthusiasm is notably diminished, the more so because there is always a difference of opinion among the technicians themselves. Here the state intervenes. In innumerable cases it has had to resolve the quarrels of technicians and scientists, as formerly it resolved the debates of theologians. Recall the strife concerning the antitubercular vaccines of Calmette and Guérin; also the reservations of some scientists concerning the "polyvalent vaccination" which is now obligatory in France. The state alone decided what was to be done in these cases. Moreover, the state clothed its opinion in its authority, which, in a short time, became the authority of the technician. Where necessary, authority was reinforced by compulsion. A complicated system developed. The child who has not been vaccinated cannot be admitted to school; and the child who does not attend school has no right to family subsidies. Thus the state overcomes the objections of individuals to technical progress. Friedmann writes: "It is clear that in a society in which the psychotechnician's important task is not invested with the authority of the state . . . his position is ambiguous and his recommendations do not always have the weight they should." And Friedmann goes on to remark that state authority frees technique from the grip of private persons. Through the authority of the state, technique is no longer at the service of private interests; and this gives the state, if not real freedom, at least additional justification.

The authority with which the state invests technique becomes a factor in its development. But it ought not to be forgotten that this state has itself become technical; it does not act on whim.

Institutions in the Service of Technique. The state then proceeds to create organs to meet the demands of technique, and here arise a number of possibilities.

The system created in France involves a certain decentralization. The CNRS (National Center for Scientific Research) is fairly autonomous. But it is necessary right off to dispel a misunderstanding. The name includes the word *scientific*, but the work of the Center is is above all else technical. However, the persons who created and

who champion the work of the Center associate the two concepts very closely. Consider the statement of Louis de Broglie and Frédéric Joliot-Curie: "For France it is not a question of maintaining *scientific and technical* research in spite of the fact that the nation is poor; it is a question of developing it, precisely because the nation is poor." This statement, incidentally, confirms my conclusion about the exploitation of the nation by the technicians. Scientific research is justified in a poor country because it produces certain techniques which permit more complete use of the country's resources.

This sheds light on the real meaning of scientific work. Science is becoming more and more subordinate to the search for technical application. Numerous scientists, who are attached to the laboratories of the CNRS and with whom I am personally acquainted, have confirmed to me its preoccupation with results and its emphasis on technical investigations. The CNRS is not an institution for disinterested and objective research nor is it a purely cultural entity. It represents a further step toward the union between the scientific and the technical. We must recognize, however, that the French state still does not understand exactly what is to be expected from this union.

The politicians distrust the technicians; the petty war which is being fought between them over the CNRS is another example of the competition I have described. Biquard, *chef de cabinet* of the Undersecretary of State for Scientific Research, has written that the reason for which the CNRS ought to remain independent of the National Ministry of Education is that "The tasks of the CNRS—recruitment, training, equipment, co-ordination, organization, and management—are sufficiently heavy to justify the existence of an administration appropriate to scientific research; an administration in which scientists ought to play the most important role."

This quotation discloses two things: first, that this state organ performs with respect to technique precisely the functions we have already indicated: co-ordination, organization, and management; second, that in it technicians must play the principal role, to the exclusion of politicians represented by the National Ministry of Education.

But the creation of the CNRS is clearly only a first step. It represents a commitment; and it is impossible to stop there. The demo-

cratic state has proved to be clearly unequal to the task of developing techniques, and the CNRS does not have the prestige or the means it would possess in an authoritarian state. In comparison with the authoritarian state, of course, the CNRS is still relatively free in its activities and its research. Although its general orientation is toward the technical application of discoveries, certain possibilities (incidentally, more and more restricted) are still left men for pure research which cannot in principle terminate in immediate application. The well-known margin of unpredictability in research is thus protected. Which discoveries are susceptible of applicability is never known in advance. Research is blind; it advances gropingly and by means of a thousand experiments which miscarry. One experiment will make a breach and allow an explosive technical advance. But the thousand fruitless experiments were nevertheless necessary. We recognize this. But—and this is the important thing—technical exigence is dead set against science in this respect, because technique cannot tolerate the gropings and slow tempo of science.

We have already examined the requirement of immediate applicability; here we meet it again on the state level. The state is not disinterested any more than private capitalists, but it is concerned in a different way. The state claims to represent the public interest and hence to have the duty of being a "good manager," dispensing the public revenues only on condition that they mean something, that they pay off. Disinterested activity on the part of the state is inconceivable. Some may say that such activity should not be impossible; but in fact it is impossible. Neither individuals nor public opinion nor the structure of the state is oriented toward the acceptance of the kind of culture pure scientific research would represent.

The state demands that anything scientific enter into the line of "normal" development, not only for the sake of the public interest but also because of its will to power. We have previously noted that this will to power has found in technique an extraordinary means of expression. The state quickly comes to demand that technique keep its promises and be an effective servant of state power. Everything not of direct interest to this drive for power appears valueless. Just as financiers seek their interest in money profit, the state seeks it in power. In neither case is the motivation disinter-

ested; technical discovery must pay off. Capitalists and state alike become impatient at delays in research, at experiments which a priori "lead to nothing," and at the "uncertainty" of the scientist when he indulges in pure research without knowing in advance which research will pay off and which will not. Moreover, the tendency is to eliminate from the legitimate concerns of the state all sciences that have no immediate practical application: history, philosophy, grammar, and so on.

In the case of sciences susceptible of practical application, there is an immediate demand for this application. This is, of course, unfavorable to science; but it must not be imagined that it is the work of imbeciles.

The state begins by assigning a precise task to scientific research, issuing directives to the effect that it must find solutions for certain pressing problems, for example, a more rapid method to produce a part of a machine, a jet engine for aircraft, and so on. These directives are veritable commands to scientific research to summon all its resources to solve the problems as soon as possible. In a democratic system there are no sanctions against scientists who fail to fulfill the state's demands, except suppression of financial support. A dictatorial regime, however, goes very much further to secure the compliance of the scientists. Even though it still leaves a rather broad area to personal initiative, it nevertheless tends more and more to become specific on this score. This is evident in different ways both in the Soviet Union and in the United States.

In the Soviet Union the Academy of Sciences appears to be the state organism which directs research and determines the framework in which scientific activities will be carried out. The Academy constitutes the "general staff of the army of technicians." Article 2 of the statutes, definitively fixed in 1935, charged it with providing for the "progress of the theoretical and applied sciences." But the technical sciences administered by the Soviet Academy have ceaselessly outstripped the theoretical sciences. The Academy plans the course of research and assigns objectives to the institutes. On the initiative of the Academy, the education of higher technicians has been accelerated; in 1960 the Soviet Union claimed to have 7,500,000 technicians of all classes. The Academy directs more than twenty institutes for research in applied science, em-

ploying altogether 2,000 researchers. One of its institutes (the Institute for Information) is charged with collating the technical publications of the entire world; for this task alone it employs 2,000 people full-time. All this makes it clear that the Academy plays an important role in technical activities. The system, however is on the whole poorly understood. It would appear to be less authoritarian than the Nazi system. But one should not forget the decision of the state, on the initiative of the Communist Party, in the Lysenko affair. Here the state, faced with two opposed biogenetic theories, decided for scarcely scientific reasons that Lysenko's theory was true and ordered its application forthwith.

The Gosplan,[1] whose function is essentially to co-ordinate new scientific elements, is closely related to the Academy. The Gosplan is kept informed by the Academy about technical discoveries, and maintains a central file of all data of economic and statistical techniques. In this way, a systematic and rational evaluation of scientific research is possible, the results of which are then integrated into the state plan itself. In the reform of 1946, in which co-ordinating bureaus took the place of the former district offices, a technical bureau was set up whose function was to plan scientific research. At present this research is being directed on the basis of the over-all plan and of the needs of the state, and the whole is evaluated from the point of view of the individual techniques. The technical bureau channels research by distributing financial credit of great magnitude; for example, in 1949 it allocated approximately 10 billion rubles to scientific research, a sum equivalent to 20 per cent of all budgeted industrial investment.

The organization of scientific research in the United States is still far from complete. There are, in principle, private entities which perform research in all imaginable domains—such as the various committees for political research, committees for social research, and so on. In addition, there are entities for gathering and evaluating statistics, for polling public opinion, and for the study of policy. Closer and closer relations are being established among these entities, which for the most part have been set up either by private

[1] The Soviet State Planning Agency. (Trans.)

industry or by the state and then attached to the universities. (Seventy per cent of these entities have been set up by the large corporations.)

It is standard procedure for public services in need of information to have recourse to these research centers. Specialized bureaus have also been set up to handle relations between research organizations and the public services. These bureaus receive requests in all areas (agricultural, industrial, and so on) and orient research. Subsequently, they act as transmission media for discoveries, and study the possibilities of technical adaptation. Then the appropriate administrations are in a position to make contracts with the industrialists charged with practical implementation.

Technical operations of this kind and scope become more and more necessary as the state finances technical investigations to a greater and greater degree. The state is compelled to finance research which exceeds the financial means of, say, the universities. The state has direct interest, therefore, in such institutions; it will therefore not leave unexploited the possibilities thus uncovered. All this means a much freer movement among government, industry, and technical research centers than would otherwise be the case.

In addition, the American state has organized research services of its own. The Bureau of the Census, for example, encompasses more than fifteen centers of statistical studies. The National Resources Planning Board, which existed from 1923 to 1943, was another such center. There are today other much more specialized agencies, the most comprehensive of which is the Atomic Energy Commission. The government owns the laboratories and furnishes the raw materials and equipment, but the actual research of the Commission is conducted by universities and by private industry. The Associated Universities, Inc., operates the Brookhaven National Laboratories; Union Carbide operates Oak Ridge; the University of California operates Los Alamos; and General Electric operates the center at Hanford.

Finally, it might be mentioned that the United States feels a strong need to co-ordinate the research carried out by the different agencies. Two associations seem fitted for this operation, the Public Service Administration and the Government Research Association. In due course, the work of these agencies will result in the realiza-

tion of a project which is already underway: the creation of a center of scientific research oriented toward technical goals, a Federal Research Board.

In principle, it is still possible for science to be independent. But we must take note that the state calls on the best scientists for its research (in the United States, scientists are eager to work for the state, in view of the low salaries paid university professors); that these scientists, in view of the state's heavy demands, have little time to do anything else; and that the state employs an ever increasing number of them. Moreover, the greatest part of the funds devoted by corporations to research goes into technical research. Only 4 per cent goes into basic scientific research. When, after the Steelman report of 1947 and certain public statements of Einstein, it seemed indispensable to promote scientific research, the state was appealed to, and in 1951 the state created the National Science Foundation. When, in the wake of the Sputnik, a new report (the Waterman report) made a new appeal for state intervention, the state responded by creating the post of an adviser to the President for science and technology, a National Scientific Committee, and so on. These events imply a greater and greater degree of intervention. Scientific and technical competition between the United States and the Soviets must inevitably produce centralization and growth of political power in the United States. It seems impossible therefore that independent research can survive; a system such as *Zweckwissenschaft* ("practical or purposive science," which the Nazis applied too soon) will gradually take over. In it there is no longer any question of free research. The state mobilizes all technicians and scientists, and imposes on all a precise and limited technical objective. It forces them to specialize to a greater and greater degree, and remains itself the ordering force behind the specialists. It forbids all research which it deems not to be in its own interests and institutes only that research which has utility. Everything is subordinated to the idea of service and utility. Ends are known in advance; science only furnishes the means.

In *Zweckwissenschaft* the development of technique reaches its highest point, to the detriment of science. What is socially most important is the prohibition of all research other than that willed by the state. But in view of the conjunction of state and technique, the situation could hardly have been otherwise, and on the whole,

it cannot be said that the system has yielded poor results. Arguments to the contrary could doubtless be drawn from the Nazi suppression of research in the area of radar, to take one example. The Nazi government forbade research on short radio waves because it thought such inquiry had no future and could not be applied. Great Britain's "free" research in this area, however, led to the creation of radar and represented a great setback for the Nazis' *Zweckwissenschaft*, a setback which had important consequences for the war. On the other hand, the Nazis' "directed" research produced impressive results. In the case of tanks, V1 and V2 missiles, and the heavy water bomb, in the fields of surgery, optics, and chemistry (not to speak of organization or agricultural methods), *Zweckwissenschaft* seems to have had rapid and efficient results. And after the war, the United States and the Soviet Union took these inventions and profited from them.

The lesson is not lost. We too are advancing progressively toward this conception, which may in the long run prove to be ruinous despite the dazzling fireworks it produces today.

In view of what has been said, it may be affirmed with confidence that, in the decades to come, technique will become stronger and its pace will be accelerated through the agency of the state. The state and technique—increasingly interrelated—are becoming the most important forces in the modern world; they buttress and reinforce each other in their aim to produce an apparently indestructible, total civilization.

CHAPTER

[5]

HUMAN TECHNIQUES

The last techniques to make their appearance are those which relate directly to the human being. They are today the subject of great discoveries—and great hopes. We hear everywhere: "They will save everything." Before we study them, let us inquire why they have appeared.

Necessities

Human Tension. Never before has so much been required of the human being. By chance, in the course of history some men have had to perform crushing labors or expose themselves to mortal peril. But those men were slaves or warriors. Never before has the human race as a whole had to exert such efforts in its daily labors as it does today as a result of its absorption into the monstrous technical mechanism—an undifferentiated but complex mechanism which makes it impossible to turn a wheel without the sustained, persevering, and intensive labor of millions of workers, whether in white collars or in blue. The tempo of man's work is not the tradi-

tional, ancestral tempo; nor is its aim the handiwork which man produced with pride, the handiwork in which he contemplated and recognized himself.

I shall not write (after all, so many others already have) about the difference between conditions of work today and in the past—how today's work is less fatiguing and of shorter duration, on the one hand, but, on the other, is an aimless, useless, and callous business, tied to a clock, an absurdity profoundly felt and resented by the worker whose labor no longer has anything in common with what was traditionally called *work*.

This is true today even for the peasantry. The important thing, however, is not that work is in a sense harsher than formerly, but that it calls for different qualities in man. It implies in him an absence, whereas previously it implied a presence. This absence is active, critical, efficient; it engages the whole man and supposes that he is subordinated to its necessity and created for its ends.

This is the first time in history that man has been so affected in so many untraditional ways. Carried along by events, he has been plunged into war at periodic intervals. But today's war is total war, a unique and unbelievable phenomenon. It is the onus and concern of all men. It subjects everyone to the same way of life, puts everyone on a level with everyone else, and threatens everyone with the same death. Under its sway men have to endure unheard of sufferings and fatigue. War is now beyond human endurance in noise, movement, enormity of means, and precision of machines; and man himself has become merely an object, an object to be killed, and prey to a permanent panic that he is unable to translate into personal action. Man is subjected by modern war to a nervous tension, a psychic pressure, and an animal submission which are beyond human power to support. But, involved and committed to the machine, he does contrive to support all this, admirable machine that he is! In the process, however, he is stretched to the limit of his resistance, like a steel cable which may break at any moment.

The conditions of war may still be abnormal and exceptional. Nevertheless, even four or five years of war are significant in the life of a man. And the conditions of war eventually become very nearly his daily state; for the "abnormal" and the "exceptional," with a somewhat lesser intensity, are reproduced regularly during

the course of each day. Man was made to do his daily work with his muscles; but see him now, like a fly on flypaper, seated for eight hours, motionless at a desk. Fifteen minutes of exercise cannot make up for eight hours of absence. The human being was made to breathe the good air of nature, but what he breathes is an obscure compound of acids and coal tars. He was created for a living environment, but he dwells in a lunar world of stone, cement, asphalt, glass, cast iron, and steel. The trees wilt and blanch among sterile and blind stone façades. Cats and dogs disappear little by little from the city, going the way of the horse. Only rats and men remain to populate a dead world. Man was created to have room to move about in, to gaze into far distances, to live in rooms which, even when they were tiny, opened out on fields. See him now, enclosed by the rules and architectural necessities imposed by overpopulation in a twelve-by-twelve closet opening out on an anonymous world of city streets.

Every man is in this fix, not merely the proletariat, and nothing can be done about it. What was once the abnormal has become the usual, standard condition of things. Even so, the human being is ill at ease in this strange new environment, and the tension demanded of him weighs heavily on his life and being. He seeks to flee—and tumbles into the snare of dreams; he tries to comply—and falls into the life of organizations; he feels maladjusted—and becomes a hypochondriac. But the new technological society has foresight and ability enough to anticipate these human reactions. It has undertaken, with the help of techniques of every kind, to make supportable what was not previously so, and not, indeed, by modifying anything in man's environment but by taking action upon man himself. Psychology is resorted to more and more; everybody knows how important morale is! Man can support the harshest and most inhumane living conditions, provided his morale holds. Innumerable psychological examples and experiments confirm this.

In a world where technique demands the utmost of men, this maximum cannot be attained, maintained, or surpassed—as sometimes is required—except by a will that is always steady and taut. Man does not by nature possess such a will. He is by no means naturally prepared for such a sublime condition, and if he sometimes does attain to it naturally, the exaltation endures only a few moments. Yet it must be prolonged. Psychological conditions must

be created to enable the individual to give his utmost to war (or peace) and to resist prostration and discouragement in the face of the dreadful conditions of life into which technique has forced him.

At the beginning of 1914, a short war was predicted; the morale of the troops, it was said, could not endure a long one. The same prophecy was made in 1941 at the beginning of the all-out bombardment of Germany; human beings, it was said, could not long endure such a pounding. In 1917 it was announced that the misery attendant on the Russian Revolution would soon bring about the collapse of Communism. None of these predictions came true; morale, and morale alone, sustained human stability. Depending on the side men adhered to, they glorified faith in Hitler, their country, Communism. But it was not a question of *faith;* it was really a question of an extremely efficient technique of morale building designed to make the insupportable supportable. Between the intensive Allied bombardment and the intensive German propaganda, the German propaganda carried the day. The Strategic Bombing Service of the Americans was forced to conclude that, despite all the bombardments, there was by 1944 no noticeable lowering of industrial production and that the German workers were working with the same enthusiasm as before.

Conversely, when psychological motivation is lacking, industrial production immediately falls. Man is able to endure famine, discomfort, and the most abnormal conditions; he can make intensive and lasting efforts, provided he is psychologically doped. Our society places him in a position in which he is always near the breaking point and demands just such effort of him. In order that he not break down or lag behind (precisely what technical progress forbids), he must be furnished with psychic forces he does not have in himself, which therefore must come from elsewhere. This is sometimes a very simple matter, as, for example, with the system of the "self-arresting" production line. When, through fatigue or discontent, one of the workers lags behind the others who have finished their operation, the production line comes to a halt and the other workers are obliged to pause. According to Friedmann, "the lagging worker sees that he is keeping his fellows from earning the wages they might earn. He feels guilty toward them, and this feeling acts as a psychological stimulant which effectively compels

him to resume the collective tempo in spite of fatigue or discontent." These psychological stimulants are innumerable and are very often the spontaneous product of the conditions of life. Ideologies are a good example. I am not alluding here to political ideologies, but to a whole complex of ideologies of a much more restricted kind such as are to be found in the *Reader's Digest.*

Technique, then, brings its own ideology; and every technical realization engenders its own ideological justifications. A recent study of the Tennessee Valley Authority by Wengert examines this phenomenon in detail. The TVA originally was an exclusively technical program to develop hydraulic power and prevent dangerous flooding. The program was carried out and the power generated was duly distributed to neighboring localities. It proved to be a profitable venture, in spite of what some people may say about it. In the beginning the TVA did not have cultural implications. But even before the program yielded concrete results, the myth began to develop, and today the TVA has become a symbol of regionalism in the United States. To it is ascribed the function of co-ordinating and integrating diverse activities; a role in the methodical development of natural resources; a task of decentralization affecting public and private federal and local institutions; and even a mission of education. We hear of "democracy on the march" and other such panegyrics. But nothing in this myth corresponds to facts; it is a set of ideological constructions which do indeed start from concrete, technical, and true facts. But these facts in no way imply such constructions. Mythical constructions such as these lie in the realm of those moral fables for which politicians, economists, and sociologists are often responsible. The press and the radio then take up these fictions and popularize them; and the public, always uneasy about its failure to find solutions to the problems perpetually dinned into its ears, falls eagerly upon what seems to be a solution and gives it currency.

At such a moment an ideology is born and, in the democratic countries, becomes public opinion. After the public has taken it up, other technical schemes are elaborated on the basis of the myth. Thus, as a function of ideologies in no way implied by the TVA, corresponding programs were proposed for the Missouri River. But the correspondence is mere appearance.

Not technique but man is responsible for this wholesale manu-

facture of symbols. Perhaps it is closer to the truth to say that the contact between man and technique brings this about, of necessity. It is literally impossible for the public to believe that so much effort and intelligence, so many dazzling results, produce only material effects. People simply cannot admit that a great dam produces nothing but electricity. The myth of the dam in France springs from the fact that mass man worships his own massive works and cannot bring himself to attribute to them a merely material value. Moreover, since these works involve immense sacrifices, it is necessary to justify the sacrifices (a fact I shall return to in my study of propaganda). In short, man creates for himself a new religion of a rational and technical order to justify his work and to be justified in it. The mechanism of the TVA affords a remarkable example of this process.

It is thus possible through psychological means to draw from man his last measure of effort and at the same time compel him to bear up under the disadvantages with which the new society hinders him. This is the first goal of psychological techniques. The only thing that matters technically is yield, production. This is the law of technique; this yield can only be obtained by the total mobilization of human beings, body and soul, and this implies the exploitation of all human psychic forces.

After these reflections, we cannot accept the often quoted statement: "The effort to increase production must cease when the equilibrium of the whole man is endangered." This statement would be acceptable if equilibrium were stable or static. But what does *equilibrium* mean when it is possible to re-create it more or less arbitrarily by purely artificial means? What can limits mean when psychological devices make it possible to push back all limits? A fixed structure no longer exists for man. We exact of him what he would never yield of himself. The machine allows him to comply with the material demands made upon him and psychological manipulation permits it spiritually. The modification of the human psyche that results from the interrelation of all techniques makes nonsense of the statement quoted. The equilibrium of the whole man? The technical society is capable of re-creating man as a very different whole from what he was a century ago. It is able to re-establish "equilibrium" at a higher or lower point (according to the

criteria employed); but, in any case, to establish it at a different level from the one maintained before the technical era.

Modification of the Milieu and Space. Technique has penetrated the deepest recesses of the human being. The machine tends not only to create a new human environment, but also to modify man's very essence. The milieu in which he lives is no longer his. He must adapt himself, as though the world were new, to a universe for which he was not created. He was made to go six kilometers an hour, and he goes a thousand. He was made to eat when he was hungry and to sleep when he was sleepy; instead, he obeys a clock. He was made to have contact with living things, and he lives in a world of stone. He was created with a certain essential unity, and he is fragmented by all the forces of the modern world.

Admittedly, the machine has enriched man as it has changed him. The machine's senses and organs have multiplied the powers of human senses and organs, enabling man to penetrate a new milieu and revealing to him unknown sights, liberties, and servitudes. He has been liberated little by little from physical constraints, but he is all the more the slave of abstract ones. He acts through intermediaries and consequently has lost contact with reality. The interested reader may wish to consult Friedmann's admirable work concerning the separation of the worker from his material. Man as worker has lost contact with the primary element of life and environment, the basic material out of which he makes what he makes. He no longer knows wood or iron or wool. He is acquainted only with the machine. His capacity to become a mechanic has replaced his knowledge of his material; this development has occasioned profound mental and psychic transformations which cannot yet be assessed.

Men with scientific knowledge of materials are found only in research institutes. But they never use these materials or see them and have merely an abstract knowledge of their properties. The men who actually use the materials to produce a finished product no longer know them. They follow engineering specifications, using the only object they will ever know firsthand: the machine. Even so, it cannot be said that man is adapted to the machine. The pilot of the supersonic aircraft at its maximum velocity becomes, in a sense, completely one with his machine. But immobilized in a net-

work of tubes and ducts, he is deaf, blind, and impotent. His senses have been replaced by dials which inform him what is taking place. Built into his helmet, for example, is an electroencephalographic apparatus which can warn him of an imminent rarefaction of oxygen before his senses could have told him. We can say he "subsists" in abnormal conditions; but we cannot say he is adapted to them in any really human sense. And his situation is not exceptional.

It is not only in work (which takes up a great part of his life) that man encounters this transformation. His environment as a whole—everything that goes to make up his milieu, his livelihood, habitat, and habits—is modified. The machine has transformed whatever is most immediately connected with him: home, furniture, food. His dwelling place becomes more and more mechanized, like a factory, through an extreme division of labor and the organization of housework. Catherine Esther Beecher's[1] analysis of the domestic function caused many people to feel sympathetic in some degree toward the systematization of housework in the nineteenth century, even though it seemed strange at first. Since the thirties, however, the systematic organization of kitchen space has been completely accepted, with its three "centers" of work (for preparation, cooking, and washing), along with the "taylorization" of the motions of cooking. Technical rigor has penetrated into the domain of the unco-ordinated, the unconsidered, the individual, and has resulted in the avoidance of motion, steps, time, and fatigue. It has also put the housewife into a laboratory, into a minutely ordered network of relentless motions representing slavery a thousandfold more exacting than anything she knew in the past. It is useless to insist on this point. France is on the threshold of this transformation; it is already far advanced in the United States. Even the most superficial observers can see that this transformation of housework by the machine has brought about a completely different style of living. Wife and children no longer fulfill their traditional function. A new relation exists between husband and wife and between parent and child. The "hearth" no longer has any meaning, and the patient building of family relations no *raison d'être*. A different state of mind necessarily corresponds to

[1] Miss Beecher (1800–78) wrote extensively on education for women. She held that woman's domestic function was paramount and for this reason opposed female suffrage. (Trans.)

a radically different state of affairs. But what state of mind? As yet, no one seems to know. One's first reaction is simply to say: "No state of mind."

The machine is modifying household furnishings to an ever greater degree. The interested reader is referred to Siegfried Giedion's work, which describes not only this modification of household furniture but also the modification of the whole structure of housing. Giedion's conclusion is that mechanization is "tyrannizing over housing." Furniture and housing must of course comply with the necessities of mass production. Both must undergo modification because of the mechanization of household interiors; a house must be conceived less for the comfort of its occupants than for the accommodation of the numerous mechanical gadgets to be installed in it.

In a different area of private life, there is the wide range of effects mechanization has had upon food, for example, through the various new methods of preservation and storage. I have already mentioned the profound modification of bread, which has become a chemical substance of very different composition from that produced from simple cereal grains. Beginning with Sylvester Graham's *Treatise on Bread*, a number of studies have shown to what degree the organic structure of bread has been modified by the machine and by the science of chemistry. The result was a profound modification of taste, as if "the consumers, by an unconscious reaction, adapted their taste to the type of bread which corresponded exactly to the demands of mass production." Mechanization shattered the age-old character of bread and converted it into a valueless article of fashion. This statement is not an aesthetic judgment or a lingering romanticism, but rather the result of exact technical studies, a technical fact established by technicians; this in itself presupposes it is not a value judgment. We are registering a fact and not nostalgia for the old whole-wheat bread of our ancestors. It is a fact of the same order as the retreat of wine before Coca-Cola; the ancient "civilization of wine" is becoming obsolescent as a result of an industrial product.

Just as material surroundings—the nearest, humblest, and most personal—have been modified, so have the broader and more abstract elements of life. Work, rest, and food, and time, space, and movement as well, no longer have any connection with traditional

forms. It is commonly said that with the new modes of transport distance no longer exists; and, indeed, man has vanquished space. He is able to travel about the entire globe. He meets men of other races. He becomes a cosmopolite and a citizen of the world, less, it may be added, through his own will and ideals than through the mechanical fact of easy transport.

But only a small minority of people use airlines, enter into relations with the world, and see space stretch out before them. For the overwhelming majority, although space has not remained traditional, it has undergone an inverse evolution. The world's population has increased tenfold in a very short time. In particular, the population of France has almost trebled in a century and a half, so that we have, in effect, only one third the amount of room per capita that we formerly had. No longer are there any lonely mountains and deserted seacoasts. Solitude is no longer possible; space is at such a premium that men jostle one another everywhere. Quite apart from the solitude of relaxation, we no longer have even the normal solitude which implies sufficient space to live other than as if in a prison cell or at a factory workbench. Living and working traditionally meant open space, a no man's land separating a man from his fellows. But there is no longer any possibility of that.

Man has always known wide horizons. Even the city dweller had direct contact with limitless plains, mountains, and seas. Beyond the enclosing walls of the medieval city, was open country. At most the citizen had to walk five hundred yards to reach the city walls, where space, fair and free, suddenly extended before him. Today man knows only bounded horizons and reduced dimensions. The space not only of his movements but of his gaze is shrinking. The paradox is characteristic of our times, that to the abstract conquest of Space by Man (capitalized) corresponds the limitation of place for men (in small letters). It is scarcely necessary to emphasize the fact that this diminution of *Lebensraum* results indirectly from techniques (through population growth) or directly from them (through urban and industrial agglomeration).

Modification of Time and Motion. In much the same way technique has modified human time. That man until recently got along well enough without measuring time precisely is something we never even think about, and that we do not think about it shows to what a degree we have been affected by technique. What means

there were in the past for measuring time belonged to the rich and, until the fourteenth century, exerted no influence on real time or on life. Until then, there were mechanical *horologia* which did not so much mark the hour as indicate it very approximately by bells or chimes. The clocktower, with its public clock, made its appearance toward the end of the century. Until then, time had been measured by life's needs and events. At most, life had been regulated since the fifth century by church bells; but this regulation really followed a psychological and biological tempo. The time man guided himself by corresponded to nature's time; it was material and concrete. It became abstract (probably toward the end of the fourteenth century) when it was divided into hours, minutes, and seconds. Little by little this mechanical kind of time, with its knife-edge divisions, penetrated, along with machinery, into human life. The first private clocks appeared in the sixteenth century. Thenceforward, time was an abstract measure separated from the traditional rhythms of life and nature. It became mere quantity. But since life is inseparable from time, life too was forced to submit to the new guiding principle. From then on, life itself was measured by the machine; its organic functions obeyed the mechanical. Eating, working, and sleeping were at the beck and call of machinery. Time, which had been the measure of organic sequences, was broken and dissociated. Human life ceased to be an ensemble, a whole, and became a disconnected set of activities having no other bond than the fact that they were performed by the same individual.[2] Mechanical abstraction and rigidity permeated the whole structure of being. "Abstract time became a new milieu, a new framework of existence." Today the human being is dissociated from the essence of life; instead of *living* time, he is split up and parceled out by it. Lewis Mumford is right in calling the clock the most important machine of our culture. And he is right too in asserting that the clock has made modern progress and efficiency possible through its rapidity of action and the co-ordination it ef-

[2] Enrico Castelli's study *Le Temps harcelant* extends our observations into the realm of the psychological. He shows how the man of the technical world lives without past or future and how the loss of the sense of duration deprives law and language of their meaning. According to Castelli, modern man lives in a universe in which technique has divested language of its meaning and value. If this formula seems exaggerated, I would direct you to Castelli's book, to see its essential truth.

The book stresses the fact that technique, as a result of the perfection of means which it has placed at the disposal of modern man, has effectively suppressed the

fects in man's daily activities. All organization of work and study of motion is based on the clock.

There is a third general, nonmaterial element of human life which, along with space and time, has been profoundly modified by technique: motion. Here, too, we observe the same process. Motion is the spontaneous expression of life, its visible form. Everything alive chooses of itself its attitudes, orientations, gestures, and rhythms. There is, perhaps, nothing more personal to a living being —as far as the observer is concerned—than its movements. In reality there is no such thing as movement in general; there are only the movements of individual things.

Technique, however, considers the matter very differently. Gilbreth's ingenuity consisted in analyzing the notions of an individual and thus rendering them abstract. There was no longer a being in motion, but a point; not a series of acts, but a curve, a trajectory in abstract space and time. It is true that human activities bear certain resemblances to one another, and by synthesizing them it is possible to arrive at precise laws of their motion. Moreover, every human skill in action is based upon a complex of fundamental principles common to all. It is therefore possible to specify not only the laws which govern them but also their exact trajec tories. This supposes, first, the abstraction of motion, and second, its analysis. Motion is dissected into discrete aspects so that its form appears phenomenally, point by point. The immediate consequence of such analysis is that motion becomes completely disjoined from personal and internal life. Technical analysis concentrates on the efficient cause of human actions and eliminates as secondary everything that expresses human personality. Action is no longer a real function of the person who performs it; it is a function of abstract and ideal symbols, which become its sole criteria.

As long as we restrict ourselves to scientific investigation, such at-

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respite of time indispensable to the rhythm of life; between desire and the satisfaction of desire there is no longer the duration which is necessary for real choice and examination. There is no longer respite for reflecting or choosing or adapting oneself, or for acting or wishing or pulling oneself together. The rule of life is: No sooner said than done. Life has become a racecourse composed of instantaneous variations of the universe, a succession of objective events which drag us along and lead us astray without anywhere affording us the possibility of standing apart, taking stock, and ceasing to act.

tempts to analyze motion are completely acceptable. But as far as concrete reality is concerned, they must be judged futile. However, these analyses soon showed their compelling power, and were applied to an ever increasing degree to the modification of the worker's practical motions. The problem of the regulation of these movements in industry is so well known that I need not refer to it here. But this type of regulation is gaining ground outside the sphere of manual labor. All the machines of our technological society presuppose to an ever greater degree the perfect motions Gilbreth defined in his trajectories. The more rapidly our machines operate, the more precise they must be, and the less we can allow ourselves the luxury of using them arbitrarily. This is as true of the machines we have in our houses as of the machines we meet on the street. Our movements must approach perfection to the degree that the machines approach it and continue to increase in number. Our motions are no longer entitled to express our own personalities. It suffices to take one look at distracted and panicky elderly people in the middle of a Paris street to understand that modern velocities render motion abstract and no longer tolerate imperfect motions just because they are human.

We still do not know the ultimate effects of these transformations on the human being. We have only begun to study them. Precisely what is modified in man by this violent upheaval of every element of his environment? We do not know. But we do know that violent modifications have taken place, and we have a foreboding of them in the development of neuroses and in the new behaviors with which contemporary literature acquaints us. In ceasing to be himself, modern man bears testimony to these phenomena not only when he suffers anxiety but even when he is happy. For the last decade scientific studies have been accumulating which demonstrate man's psychological, moral, and even biological incapacity to adapt in any real way to the milieu technique has created for him. Careful studies have analyzed the nervous afflictions brought on by industrial work; but contact with other kinds of machines (for example, automobiles, television) or the life of the technician in general apparently produce the same effects. The November 1960 issue of *Semaines médicales de Paris*, on the basis of information contributed by 4,000 physicians all over the world, offers a study of a new disease of great complexity which

is brought on by modern city life and which might be called *urbanitis.*

Some investigators have already become engrossed in the question of a better adaptation of man to his new milieu. For example, they are concerned with the necessity of giving man the means of "assimilating the machine," or of assimilating its lessons, of causing it to become a part of human life. It is generally agreed that without such assimilation it is impossible to transcend the machine or to arrive at a new form of society. This assimilation is the prime objective of the so-called human sciences, the sciences which have man as their subject.

Furthermore, it is necessary to protect man by outfitting him with a kind of psychological shock absorber. Only another technique is able to give efficient protection against the aggression of techniques. This protection is the second objective of the human sciences.

We shall examine later on whether it is reasonable to hope to create a genuinely human civilization by transcending the machine with the aid of the human sciences. At this point let us remark merely that it is precisely the need to diagnose and cure this disease that is offered as both justification and demand for the creation of new human techniques.

The Creation of the Mass Society. There is a third area in which human techniques are applied, and it represents a further cause of disequilibration for the human being seeking to adapt to his new milieu.

It is a truism to state that contemporary society is becoming a mass society. The "process of massification," "the accession of the masses" have been thoroughly studied and understood. Less well understood, however, is the fact that the man of the present is not spontaneously adapted to the new form of society. Previous societies took their character to a very large degree from the men in them. Technical or economic conditions imposed certain sociological structures, but the human being was in essential agreement with these structures, and the form society took expressed the psychology of the individual. This is no longer true. The process of massification takes place not because the man of today is by nature a mass man, but for technical reasons. Man becomes a mass man in the new framework imposed upon him because he is unable

to remain for very long at variance with his milieu. The adaptation of men to a mass society is not yet an accomplished fact; and recent research in the field of psychoanalytic sociology has revealed the gap which still exists between man and the collective society, a gap which is the cause of disequilibration. Every society has norms which represent a criterion of the normal. When these norms change their character, a disturbance of equilibrium ensues and, for the man who has not kept pace with the changes, neurosis. There is no doubt that the norms of our civilization have changed for reasons which are not "human"; men as a whole had no desire for the changes that occurred nor did they work toward them consciously. Indirect influences have operated on the norms of modern society, and these norms have been transformed without men knowing what was happening.

It seems to me that Karen Horney's analysis of this disequilibration is accurate. According to Horney, our civilization (or so men believe) still attests to a secularized Christian ideology which sets the highest value on brotherly relations. But the structures of our world and its real norms represent diametrically the opposite. The fundamental rule of the world today is the rule of economic, political, and class competition—and this competition extends to the social and human relations of friendship and sex. The disequilibration between the traditional affirmation and the new criterion has produced the climate of anxiety and insecurity characteristic of our epoch and of our neuroses, and corresponds exactly to the distinction between the individualist society and the mass society.

The human being does not feel at home in the collective atmosphere. This is true of societies that differ in many ways among themselves; it applies to the primitive sociological collectivism of Africa, to the individualistic civilization of Europe, and to the collective adaptation of a higher type in the United States. In all these societies everyone is affected by a certain malaise. The change of sociological structures is occurring at a very rapid tempo and affects everyone; and the state demands an immediate collective effort from all the citizens. A sufficient respite is never afforded the individual to allow him to assimilate all the new criteria.

The process of massification corresponds, moreover, to the disappearance of anything resembling a community. The majority of

American psychosociologists insist on the importance of human social relations for the individual. As Jerome Scott and R. P. Lynton put it: "Every man requires emotional and intellectual satisfactions which alone secure for him his belonging to a community." When this need is suppressed, neuroses result. Some experts even maintain that most obsessive neurosis springs from a failure of social adaptation and from the suppression of community relations, for which technical relations are substituted, as Roethlisberger has pointed out.

This new sociological mass structure and its new criteria of civilization seem both inevitable and undeniable. They are inevitable because they are imposed by technical forces and economic considerations beyond the reach of man. They are not the result of thought, doctrine, discourse, will. They are simply there as a condition of fact. All social reforms, *all social changes, are located wholly within this condition of fact,* unless they are purely utopian. When social change is truly realistic, it accepts this condition buoyantly, vindicates it, and exploits it. Only two possibilities are left to the individual: either he remains what he was, in which case he becomes more and more unadapted, neurotic, and inefficient, loses his possibilities of subsistence, and is at last tossed on the social rubbish heap, whatever his talents may be; or he adapts himself to the new sociological organism, which becomes his world, and he becomes unable to live except in a mass society. (And then he scarcely differs from a cave man.) But to become a mass man entails a tremendous effort of psychic mutation. The purpose of the techniques which have man as their object, the so-called human techniques, is to assist him in this mutation, to help him find the quickest way, to calm his fears, and reshape his heart and his brain.

When we look into technical rather than theoretical works on this subject, the design emerges with great clarity. "It is a question of strengthening the environment in such a way that, in practice, all subjects come more or less quickly under its influence," says Claude Munson, from a pragmatic American point of view. If integration proves impossible, it is then necessary to uproot the individual from one social environment and place him in another where adaptation is possible. Somehow provision must be made for the individual to reach the glorious state of equilibrium so desired by those who guide human destiny—the state in which the individual

is so adapted that his personal difficulties are no different from those of the collectivity. He is no longer a man in a group, but an element of the group.

It is remarkable that mass participation distracts the individual from his miseries and even dispels them. After all, the process of massification was itself the origin of man's psychic difficulties!

Another aspect of this adaptation is the adjustment of the individual to technical instruments. The instruments in our possession are, in effect, mass instruments, both in the realm of material action and in that of psychological action. If at present we desire to exert any influence on man, it is possible to do so only through the mass media and only to the degree that man is a mass man. I shall return to this fact with reference to mass education and to propaganda methods, both of which are able to move the mass individual only by "massifying" him more and more.

The nonspontaneous union of the individual and the collectivity is one of the essential conditions for the development of techniques in the special sociological form they take in our society. This union is, as we shall see, one of the most noteworthy results of the techniques devoted to man. In this connection it is an oversimplification to speak of "collectivization" or "human guidance." This complete mutation of the human species has not been produced by a collectivist theory or by someone's will to power. The cause is much more profound, at once human and inhuman; inhuman because it is occasioned by things and circumstances, human because it answers the heart's desire of *every* modern man, without exception.

We have studied the threefold foundation of the indispensable human techniques: the superhuman demands made on man by present-day society, the complete modification of the human environment, and the alteration of sociological structures. Man, in fundamental disaccord with his universe, must of necessity be restored to harmony with it.

Human Techniques. It thus became imperative to rethink the whole situation of man in his new world. But thinking things through seemed altogether insufficient; it was necessary to act. Action upon the techniques themselves appeared to be impossible. The question therefore became: Is it not possible to act upon man himself? To help him resist? To protect him, perhaps; to educate

him, certainly? The applications of the human sciences were worked out along these lines of thought.

In our day human techniques offer great hopes to man, sorely beset by anxiety. Not long ago an extensive survey of the different scientific disciplines appeared under the title: *The Sciences of Man Re-establish His Supremacy.* Man, menaced by his own discoveries and no longer capable of mastering the forces unleashed by them, is to have his greatness restored by human techniques. The grounds for hope given in the survey by Georges Friedmann, Alain Sargent, Jean Fourastié, Georges Weill, Chombart de Lowe, J. Guéron, and others are reducible to three elements:

First, the liberation of man, not by technique in general, but specifically through the agency of human techniques, a liberation which proceeds as much from within man as from without. With the help of the human sciences, man will be freed from *technocracy* itself. Technique will combat slavery. According to Chombart de Lowe, research in this area must be completely disinterested and free from any preoccupation with immediate application. Techniques are in a position to offer man a saner and more balanced life and to free him from material constraints, whether these arise from nature or from the actions of other men. The human being is freer when he is no longer in danger of famine and when he has some leisure from labor. Technique is in great part the basis of this freedom. In addition, the human techniques purify and free the inner man; this, for example, is the grand design of psychoanalysis. Man, freed and returned to himself, will be much better adapted to life and to the mastery of the difficulties with which the modern world confronts him.

The second element is less hackneyed: the world of techniques is no longer the abstract and mechanical world imagined by its critics and by the technocrats themselves. We have known for some time that technique is of little value if it has not been rendered tractable by man. Humanism, then, has been restored to its place of honor; to act contrary to the profundities of human nature is to act irrationally. This represents, for the most part, a merely verbal and ideological humanism. There may have been some genuinely humanistic aspects in modern discoveries, but for the most part they have been primarily technical. A good method applied by an imbecile does not yield good results; and a technique used by a

man full of rancor, disgust, or resentment, or by a man who detests it, will not be very efficient. Research therefore has taken two directions. It has concerned itself with making the interests of man and technique correspond, thus rendering technique flexible. It has also attempted to take human nature into account in order to keep man from being crushed by technique, thereby becoming an obstacle to technique. On both these counts there has been an unceasing effort to refine our knowledge of human techniques in order to bridge the gap between man and technique. The claims of the human being have thus come to assert themselves to a greater and greater degree in the development of techniques; this is known as "humanizing the techniques." Man is not supposed to be merely a technical object, but a participant in a complicated movement. His fatigue, pleasures, nerves, and opinions are carefully taken into account. Attention is paid to his reactions to orders, his phobias, and his earnings. All this fills the uneasy with hope. From the moment man is taken seriously, it seems to them that they are witnessing the creation of a technical humanism.

The third element of hope is the fact that these human techniques have tended to reconstitute the unity of the human being which had been shattered by the sudden and jarring action of technique. The grand design of human techniques is to make man the center of all techniques. He has been torn in every direction by the technical forces of the modern world and is no longer able of himself, at least on an individual level, to preserve his unity. But this lost unity can be restored by technique on the abstract level of science. There is no doubt that technique can counter technique; and abstractly man can thereby be restored to unity. A group of techniques is to be formed, therefore, centered on a concept of man and activated by the human techniques.

There is a fourth glorious element: the prospect of the creation of a "superman." He will not appear tomorrow. But serious biologists already speak of the possibilities of chemical conditioning in the near future, and, more distantly, of parthenogenesis and ectogenesis, and embryonic conditioning. It is useless to dwell on these theories here; they are only remote possibilities. However, it is instructive to see how many intellectuals hope to find in the creation of superman the solution of all the otherwise insoluble problems posed to the common man by the technical world in which

he lives. Of course the superman I speak of has nothing to do with Superman, the American comic-strip character. Man's power is not the issue here, but his intellectual and psychic life, to say nothing of his spiritual life.

It would be idle to deny all reality to such hopes. To a great degree these auguries are justified. Technical knowledge does give us new insights into human reality and can serve toward its unification.

Among the elements I have summarized, the most important is undoubtedly the second. The concrete details of man's life with respect to technical apparatus must be taken into consideration on the human plane. The fatigue factor is important; and the individual's labor must be planned to reduce fatigue. It is essential in constructing machinery to avoid uncomfortable or dangerous situations for the operator, and to modify the wage earner's milieu to give him more pleasure, light, and the freedom and fellow feeling indispensable to him. It is desirable to show concern for the worker's dwelling place, for the comfort of the housewife's kitchen, for the lighting of the children's rooms; in short, for any factor that will obviously be of advantage to all. Who could believe the contrary or plead for slums or worker casualties?

However, a certain misunderstanding must be avoided. The word *humanism* is often spoken in connection with the situation I have described. Humanism is essentially a certain conception of man. And, it develops, this is an astonishing conception of man, a conception that involves contempt for man's inner life to the advantage of his sociological life, contempt of his moral and intellectual life to the advantage of his material life. This position is admissible for conscious materialists; but I cannot admit it for the unconscious materialists who are always prating of their spirituality. The argument that moral development will follow material development can only be characterized as hypocrisy. Moreover, it has not always been a voluntary and conscious humanism which has presided over this progress. If we seek the real reason, we hear over and over again that there is "something out of line" in the technical system, an insupportable state of affairs for a technician. A remedy must be found. What is out of line? According to the usual superficial analysis, it is man that is amiss. The technician

thereupon tackles the problem as he would any other. He has a method which has hitherto enabled him to solve all difficulties, and he uses it here too. But he considers man only as an object of technique and only to the degree that man interferes with the proper function of the technique. Technique reveals its essential efficiency in discerning that man has a sentimental and moral life which can have great influence on his material behavior and in proposing to do something about such factors on the basis of its own ends. These factors are, for technique, human and subjective; but if means can be found to act upon them, to rationalize them and bring them into line, they need not be a technical drawback. Of course, man as such does not count.

When the technical problem is well in hand, the professional humanists look at the situation and dub it "humanist." This procedure suits the literati, moralists, and philosophers who are concerned about the human situation. What is more natural than for philosophers to say: "See how we are concerned with Man?"; and for their literary admirers to echo: "At last, a humanism which is not confined to playing with ideas but which penetrates the facts!" Unfortunately, it is a historical fact that this shouting of humanism always comes *after* the technicians have intervened; for a true humanism, it ought to have occurred *before.* This is nothing more than the traditional psychological maneuver called rationalizing.

Since 1947 we have witnessed the same humanist rationalizing with respect to the earth itself. In the United States, for example, methods of large-scale agriculture had been savagely applied. The humanists became alarmed by this violation of the sacred soil, this lack of respect for nature; but the technical people troubled themselves not at all until a steady decline in agricultural productivity became apparent. Technical research discovered that the earth contains certain trace elements which become exhausted when the soil is mistreated. This discovery, made by Sir Albert Howard in his thorough investigation of Indian agriculture, led to the conclusion that animal and vegetable ("organic") fertilizers were superior to any and all artificial fertilizers, and that it is essential not to exhaust the earth's reserves. Up to now no one has succeeded in finding a way of replacing trace elements artificially. The technicians have recommended more care in the use of fertilizers and moderation in the utilization of machinery; in short,

"respect" for the soil. And all nature lovers rejoice. But was any real respect for the earth involved here? Clearly not. The important thing was agricultural yield.

It might be objected: "Who cares what the real causes were if the result is respect for man or for nature? If technical excess brings us to wisdom, let us by all means develop techniques. If man must be effectively protected by a technique that understands him, we may at least rest assured that he will be better protected than he ever was by all his philosophies." This is hocus-pocus. Today's technique may respect man because it is in its interest and part of its normal course of development to do so. But we have no certainty that this will be so in the future. We could have a measure of certainty only if technique, by necessity and for deep and lasting reasons, subordinated its power in principle to the interests of man. Otherwise, a complete reversal is always possible. Tomorrow it might be in technique's interest to exploit man brutally, to mutilate and suppress him. We have, as of now, no guarantee whatsoever that this is not the road it will take. On the contrary, we see all around us at least as many signs of increasing contempt for man as of respect for him. Technique mixes the one with the other indiscriminately. The only law it follows is that of its own autonomous development. To me, therefore, it seems impossible to speak of a technical humanism.

Review

Right at the beginning, let us emphasize that we are studying technique.

It was thought for a long time that man's conduct belonged to the realm of art, and it can certainly be said that Freudian psychoanalysis is an art. Behavior based on flair, on intuitive as well as reasoned knowledge, and on personal relations; the spontaneous devising of means for influencing heart and mind; the wholehearted participation of man in his acts—all these are characteristic of art. Great leaders, great teachers, and agitators have all been artists. But art and artistry no longer suffice. We must find solutions to the problems raised by techniques, and only through technical means can we find them.

The means of exerting action on men must answer to the following three criteria: (1) Generality. Every man must be reached in every area of life because everyone is involved. Individual action is unimportant. (2) Objectivity. Action, since it is a function of society itself, cannot be dependent upon the transient and subjective acts of individuals. The means must be rendered independent of the individual who employs them so as to make them applicable by anyone at all. This criterion alone would imply the transition from art to technique. (3) Permanence. Since the technical challenge to man concerns his whole life, psychic action must be exerted upon him without letup, from the beginning of his existence to its end.

Localized intervention by the great or powerful can no longer be relied upon. And action by fits and starts is not enough; it must be steady and uniform. Because the transition to practical application must be effected quickly, it is scarcely possible to speak of science. The problem is to discover the most effective means; one is therefore obliged to call the whole complex *technique*, in spite of the lofty tone taken by people who put their faith in the "human sciences." When Serge Tchakhotin writes, with reference to propaganda, that "the understanding of the mechanisms of human behavior entails the possibility of managing them at will". . . and that "calculation, prediction, and action according to verifiable laws are possible," he is describing human techniques accurately.

Three facts demonstrate the reality of the transition of action from art to technique. The first is the state of mind common to the technicians who make use of human techniques. They arbitrarily select only those scientific data which seem useful and are disdainfully condescending toward whatever data are not utilizable. In psychology and psychoanalysis, for example, vocational counselors and propagandists make a definite choice. In the field of practical psychology known as "public relations" (as practiced by, say, Dale Carnegie or Claude Munson), a certain suspicion of theoretical and abstract psychology prevails; and certain indispensable simplifications are made. Munson writes that "the mechanism of morale building is neither simpler nor less technical than a problem in mechanics. Both require a clear conception of the objective, the elaboration of a plan of methodical execution, the knowledge of all the co-operating factors, a central agent entrusted with the direc-

tion and verification of the operations, a thorough study of methods, and so on." Munson, moreover, calls attention to "a remarkable unpredictability" for which every technician must make allowance. He writes: "Without being able to point out in advance the solution for a particular case, one at least knows that the solution will fit into a determinate type to which certain general principles are applicable." Munson has in mind a program of all the different forms of deliberate persuasion, a program with technical precision and flexibility.

A second characteristic of the transition from art to technique is the extensive application of mathematics. Biometry, psychometry, sociometry, and cybernetics have become the chief intermediaries for creating these techniques. It is considered illusory to think it possible to construct a true system of action from nonquantitative laws and observations. This was the traditional stumbling block for psychological techniques. When the attempt was first made to create a true technique of propaganda, for example, biology, an exact science, was taken as the basis. Subsequently, other exact disciplines were called upon; for example, public opinion polls and statistics. Progress in this and other human techniques came about only when the human sciences took on the exactitude of mathematics. Only metric methods can analyze and predict efficiently. It is striking to note, incidentally, that metric methods applied in different kinds of political regimes by different kinds of technicians come to the same result. This too is characteristic of techniques. In this respect, I find a remark made by Paul H. Maucorps very much to the point. Speaking of American sociometry, Maucorps says: "It is interesting to observe that this sociometry has the same practical conclusions as the so-called Stakhanovism." Rubinstein makes the same observation from the Soviet point of view.

The third characteristic element in the transition from art to technique is the appearance of the technical-experimental state of mind. It is admittedly difficult to test human techniques experimentally. This is so for two reasons. These techniques cannot be manipulated freely by the experimenter. Moreover, human society forms a complicated whole, so that it is very difficult to achieve the two conditions necessary for technical experimentation, isolation of phenomena and analysis of elements.

However, without having recourse to the dangerous and over-

hasty methods of totalitarian states, experimenters in the field of human techniques have found a particularly good experimental field: the army. The army is a singularly favorable environment because the soldier is away from his customary framework. His social ties have been severed, and he has been divested of his traditional personality. He then forms completely new social ties; the resultant collectivity can be studied from its inception, and isolated from secondary and complicating influences. Such a collectivity, moreover, lends itself to study and is easily observed from day to day. The personality of each man is completely new, for with the new uniform he assumes a new psychology.

The experiments on the army serve a twofold purpose. First, the recruits are directly influenced in their actions and carry this influence back into civilian life, where their behavior will be predictable and they themselves will be easily manipulated. The civilian population, therefore, can be influenced through the intermediacy of the army, which is connected with the rest of society by links that are being drawn tighter and tighter. Second, the knowledge gained through experimentation on soldiers has indirect importance. This knowledge can be applied to other, more complex milieus which might not lend themselves readily to experimentation, even though they are similar to the army in kind. Examples which come to mind are business organizations and, particularly, great industrial plants. Methods found effective in the army are applied to the plant; and in the process there is an inevitable tendency to simplify human relations and to model after the military the industrial collectives in which these techniques are applied. This indirect action is only slowly being felt; but the massive displacement of workers, which is constantly increasing even in liberal countries, shows that, involuntarily, technique in the form of human techniques is gradually gaining the upper hand.

Human techniques are of such multiplicity that any attempt to describe them adequately would require a whole library. Even an attempt to enumerate them would entail the loss of a cohesiveness and compactness. There are techniques addressed to man as an isolated individual and techniques addressed to man as a social being. Some concern his mind and some his body; others touch his will; still others that secret place where matter becomes spirit and soul animates matter. Techniques are addressed to the child and

to the man, to the fetus and to the commissioner. They should be ordered into a system, as in fact they are. In such a system the same technique would be represented on different levels corresponding to different ends. For example, psychoanalytic technique enters into the mechanisms of propaganda, the modern school, and vocational guidance. Here, however, I shall try only to describe as soberly and briefly as possible the basic themes, subjects, and principles of the problem. It would be useless to describe them at length or in great detail. A condensed description will bring the facts into sharp relief, and that must suffice.

Educational Technique. All of us who were adult in 1950 in France preserved a vivid memory of dismal schools where teachers were enemies and punishment was a constant menace; of narrow, barred windows, gloomy brown walls, and uncomfortable benches hollowed out by generations of bored students. The smell of sour milk, dirty smocks and snot-nosed kids made a unique impression that a young instructor would never forget. We well remember books without illustrations, incomprehensible lessons learned by rote, discipline, and boredom. We had a healthy fear of the masters, upon whom we played our tricks. We feared some of our fellow pupils too, especially those who sat behind us, against whom we were unarmed. The students were divided into the weak and the strong, much like an embryonic political structure where the weak quickly band together. There was pitiless competition in respect to studies, marks, and places. Categories were simple then: work was a curse, the school was a hostile world, and the greater society outside its walls seemed to be the same. All superiors were enemies. There were the snivelers who wanted only to get by, and the tough characters strong enough to dispense with the kind of success school life offered. All the rest were either cowed or rebellious, according to their natures. These were the ancient and familiar categories of school life which were suddenly overthrown by the extension of a series of techniques that we call *techniques de l'école nouvelle*—progressive education.

Progressive education has as its end the "happiness" of the child. It entails bright classrooms, understanding teachers, and pleasurable work. Its educational formulas are well-known: the child in school must be "relaxed" and enjoy himself; he must exist in a "balanced environment," get rid of his "complexes," and "play

while he is learning." All this represents a perfectly valid program. It has the elements of genial scholarship derived from the celebrated saying of Montaigne to the effect that we must stop cramming children's skulls to pass the baccalaureate; supercharging their brains with encyclopedic knowledge to the detriment of all other activities. Education must seek, rather, to develop in a balanced way all their faculties, physical, manual, psychic, and intellectual, and in this last, it must seek to stress personal observation and reasoning instead of rote learning. Moreover, the whole process is supposed to take place with the minimum possible use of force. It is essential to respect the person of the child and to individualize instruction to the maximum. Instruction is part of total education and is not addressed to the intelligence alone. Its method, based on the *maieutic*[8] of Socrates, consists in bringing the child himself to discover the properties of objects or, starting from facts he himself observes, the principles which underlie them. This educational procedure is, however, a highly refined technique, detailed and rigorous; and it makes the most exacting demands on the technician himself, who must indeed be a remarkable pedagogue to be able to apply it. It is not a mechanical technique that applies itself almost *ipso facto*. The same holds for the majority of the human techniques we shall discuss. The person of the technician counts for a very great deal, especially since these techniques are in their infancy.

Clearly, the child so educated will be much better balanced and in a better position to develop his own personality. It is beside the point to note how inadequately this program has been applied in France and how meager have been its results. It has been a problem, for example, to recruit enough qualified teachers to make it possible to assign students to classes of no more than fifteen. Difficulties have been experienced in adapting the new methods to the old-time examination programs, which remain unchanged; this of course vitiates the system and results in overburdening the child. There are difficulties with regard to school location and equipment. But these stumbling blocks seem to me only of secondary importance. They represent transitional problems of adaptation which,

[8] *Maieutic* (from the Greek word for "midwife"): a term applied by Socrates to his method of teaching which was designed to bring to clear consciousness what was already present but hidden in the recesses of the mind. (Trans.)

in the normal course of events, will disappear. In a "normalized" society the new school is the only possible system; and when the importance of the education it has to offer has been understood, no sacrifice will be spared to secure the application of its method. Recall the sacrifices of the Hitler regime and of the Communists in behalf of education. The new education is a governing principle of every modern political system and of technique as a whole.

We come here to one of the most important problems raised by the new method: the child's personality development. The problem is to put the child in the best possible situation and to prepare him optimally for the tasks that await him. These are phrases that are heard everywhere, as for example in the following statement drawn from a speech of Mme Montessori to UNESCO:

> We must awaken the child's social conscience. I know that it is a complicated educational question, but the child who will become the man must be able to understand life and its needs, the fundamental reason for all existence, the search for happiness . . . He must know exactly what he must do and what he must not do for the good of humanity . . . To reach these ends, we must prepare the child to understand the meaning and necessity of the *entente* among the nations. The organization of the peace devolves more on education than on politics. To secure peace practically, we must envision a humane education, *psychopedagogy*, which affects not one nation but all men on earth . . . Education must become a truly humane science to guide all men to judge the present situation correctly.

This statement seems to me truly remarkable in that it designates candidly the end of psychopedagogic technique in the best possible circumstances, within a liberal and democratic conception of man, state, and society. (Mme Montessori is a liberal and speaks for liberal countries.) I have taken Mme Montessori's statement by way of example; but one could examine the purpose of this technique in numerous other pedagogical studies published in the past few years.

We note first of all that this technique must be implemented by the state, which alone has the means and the breadth to carry it through. But the rigorous application of the psychopedagogic technique means the end of private instruction—and therefore of a traditional freedom.

Second, this technique is "pantocrator."[4] It must be exercised over all men. If one man is left who is not trained according to its methods, there is the danger of his becoming a new Hitler. The technique cannot be effected unless all children are obliged to participate and all parents to co-operate. There can be no exceptions. If only a minority are educated to comply, this technique can resolve none of the problems it is intended to meet. Mme Montessori's statement is therefore neither a metaphor nor an exaggeration; all human beings, without exception, must be reached. We note again the aggressive character of technique. Mme Montessori emphasizes the fact that "it is necessary to free the child from the slavery of school and family" for him to enter the cycle of freedom proper to this technique. However, this freedom consists in a profound and detailed surveillance of the child's activities, a complete shaping of his spiritual life, and a precise regulation of his time with a stop watch; in short, in habituating him to a joyful serfdom. The most important aspect of this technique is the forced orientation toward it. It is a social force directed toward a social end.

The education of the child, however, is not directed toward some merely abstract social end. Concretely, the child must develop a social conscience, understand that the meaning of life is the good of humanity, and grasp the need for an entente among all nations. These ideas are much less vague than one might think. The good of humanity, for example, is not the obscure notion the philosophers pretend it to be. At most, it varies somewhat with the political regime; and even this variability is becoming less and less pronounced. Compare *Life* magazine with the *Soviet News* and you will see that the "good of humanity" is conceived in almost identical terms in the United States and in the Soviet Union; the difference lies mainly in the persons charged with securing it. In both cases, the social good can be reduced to a few concrete and precise factors. The corresponding educational technique, as a consequence, takes a completely determinate direction. Social conformism must be impressed upon the child: he must be adapted to his society; he must not impair its development. His integration into the body social must be assured with the least possible friction.

[4] *Pantocrator*—a Greek word signifying "omnipotent." It was an epithet applied to Yahweh, Lord of Hosts, and to the Byzantine emperors. (Trans.)

This technique of alleged liberation of the child cannot be oriented differently, even if it were so desired. The technique permits the broadening of the child, the development of his social personality and happiness, and consequently, of his equilibrium. Opposition to society, the lack of social adaptation, produces serious personality difficulties which lead to the loss of psychic equilibrium. One of the most important factors in the child's education therefore is social adaptation. This means that—despite all the pretentious talk about the aims of education—it is not the child in and for himself who is being educated, but the child in and for society. And the society, moreover, is not an ideal one, with full justice and truth, but society as it is.

When a society becomes increasingly totalitarian (and I say "society," not "state"), it creates more and more difficulties of adaptation and requires its citizens to be conformist in the same degree. Thus, this technique becomes all the more necessary. I have no doubt that it makes men better balanced and "happier." And there is the danger. It makes men happy in a milieu which normally would have made them unhappy, if they had not been worked on, molded, and formed for just that milieu. What looks like the apex of humanism is in fact the pinnacle of human submission: children are educated to become precisely what society expects of them. They must have social consciences that allow them to strive for the same ends as society sets for itself. Clearly, when modern youth are fully educated in the new psychopedagogic technique, many social and political difficulties will disappear. Any form of government or social transformation becomes possible with individuals who have experienced this never-ending process of adaptation. The key word of the new human techniques is, therefore, *adaptation*, and we shall come upon it repeatedly as we consider each of these techniques separately.

The new pedagogical methods correspond exactly to the role assigned to education in modern technical society. The Napoleonic conception that the *Lycées* must furnish administrators for the state and managers for the economy, in conformity with social needs and tendencies, has become world-wide in its extent. According to this conception, education no longer has a humanist end or any value in itself; it has only one goal, to create technicians. A

survey conducted by the newspaper *Combat* in 1950 appeared under the headline: *Higher Education Has No Relation to Industrial Needs.* A survey conducted by *Le Monde* in 1952 began with the words: "There are too many half-baked intellectuals and not enough technicians." It would be useless to multiply such references. They are literally infinite in number since they express everybody's feelings in the matter. Instruction must be useful in life. Today's life is technique. It follows, then, that instruction must above all else be technical. This is all very well for the individual preoccupied with finding a trade or a profession; but we find the same tendency when we look at society as a whole. Technique has again effected the reconciliation of individual and society.

Education, even in France, is becoming oriented toward the specialized end of producing technicians; and, as a consequence, toward the creation of individuals useful only as members of a technical group, on the basis of the current criteria of utility—individuals who conform to the structure and the needs of the technical group. The intelligentsia will no longer be a model, a conscience, or an animating intellectual spirit for the group, even in the sense of performing a critical function. They will be the servants, the most conformist imaginable, of the instruments of technique. As Louis Couffignal puts it, the human brain must be made to conform to the much more advanced brain of the machine. And education will no longer be an unpredictable and exciting adventure in human enlightenment, but an exercise in conformity and an apprenticeship to whatever gadgetry is useful in a technical world.

The Technique of Work. The day is still a long way off when we will have at our disposal men educated in accordance with the new methods. It will be another half century at the earliest before they mature; time is needed for organizing them. In France we must count on two decades for generalizing them and breaking them in and on another two decades for the results to become evident in the whole generation so educated. The tempo of change will perhaps be more rapid in the United States and in the Soviet Union and less rapid in the rest of Europe.

In the meantime, society must continue to function. During the interim period, another powerful system of adaptation will be put into effect: the complex of work techniques. This technical complex

includes vocational guidance, the organization of labor, the physiology of work, and so on. Here again we find the assertion that progress is in the direction of a certain "humanism."

Work techniques began with the world of the machine and displayed scant regard for human beings. Machines were invented and assembled, buildings were put up around them, and men were put inside. For fifty years the procedure was completely haphazard. Then it was noted that the worker's productivity could be markedly increased by imposing certain rules on him. The result was the system associated with the names of the Americans Frederick Winslow Taylor and Henry Ford. As Georges Friedmann has shown, they took nothing into consideration beyond the necessities of production and the maximum utilization of the machine; they completely ignored the serfdom these factors entail—with their production lines, their infinite subdivision of tasks, and so on.

The objection will be raised, and rightly so, that this system was gradually changed and eventually became concerned not so much with questions of maximal exploitation as with optimal results. Worker fatigue (a topic we still don't know enough about) became the subject of intense investigations. The importance of the human factor was recognized. And it even began to be recognized that this was insufficient, that man was still only one "factor" among many, and not the most important. It became necessary to recognize the primacy of the whole human being, to adapt the work to the man, and to take the worker's psychological equilibrium into consideration. It goes without saying that the motive force behind all this was the recognition that human psychology reacts directly upon productivity. When the worker feels that he is in a hostile environment and in an economic system opposed to his interests, he will not work (and this is involuntary) with the same ardor and skill. All this, according to Friedmann, posed the problem of the economic regime as a whole. Economic improvement is not of itself a strong enough tendency to allow the worker as producer to benefit from technical progress, although he may have benefited greatly from it as consumer. Purely material transformations in the conditions of labor are insufficient. They are doubtless necessary to begin with, but physiological adaptation is not the only kind. Hygiene and safety must indeed be improved; the best location must be selected, and even music may have to be exploited

to make labor more rhythmic and less disagreeable. But this is still not enough. The true problem is psychological. The worker is confronted by cut-and-dried procedures that must be carried out in unvarying sequence in order that work be systematic, rational, and efficient; he is bored, slowed down, and psychologically constrained. It is necessary to arouse in him reflective thought and to make him participate in the life of the entire plant. He must be made to feel a community of interest; the idea that his labor has social meaning must be instilled in him. In short, he must be integrated into the enterprise in which he is working. This integration will take different forms in different countries. It may take the form of a manufacturing structure like that of Bata,[5] or it may consist of social, sports, or educational arrangements. Integration may mean worker participation in finance or management or, in an extreme case, the application of a thorough system such as "public relations" or "human engineering." It suffices here to point out some of the many techniques of integration without going into their quite varied mechanisms.

Some excellent results have been achieved along this line. For example, the tendency to adapt the machine to man and to assert man's primacy over the machine has produced a body of respectable research. Until recently, very few designers and manufacturers of machine tools bothered much about the workers who were to use the tools. It represents enormous progress for them to acknowledge that machines should be built with the workers in mind, that the human being ought to be the point of departure. However, the further they advance in this direction, the more complicated the problem appears. They were at first concerned primarily with the elimination of physical fatigue; having succeeded in this, they find that nervous or mental fatigue is now a problem. Business machines are highly adapted to the worker from a material point of view; physical effort has been almost completely reduced by the progressive elimination of fatigue due to standing, sensory overburdening, and the need for overtime work. But the reduction of physical effort has only served to increase fatigue due to mental concentration, reflex attention, and dissymmetry of motion, factors which rapidly produce nervous exhaustion. It was certainly not

[5] Thomas Bata (1876–1932) was a Czech industrialist who made his shoe factories at Zlin into a federation of independent "studios." (Trans.)

anticipated that machines designed for man, and well adapted to him physically, would occasion even more rapid deterioration and an accelerated aging of their operators. Indeed, worker productivity markedly decreases after only four years, and, in general, becomes marked at age twenty-two. The optimum age of an employee who operates business machines would seem to lie between sixteen and twenty-two. Now, this last fact comes from the machine in itself, from its tempo, and so on. The human problem has been intensified, rather than resolved. It even seems insoluble. The concern for the human being that is evident in these attempts must, one supposes, be reckoned progress; the same holds for the technician's concern with the person of the worker, and the attempts to furnish him with means for self-improvement by establishing libraries or by helping him resolve his personal problems.

But on further consideration, are not these efforts and this interest part of an abstract ideal? What do they really signify? Leon Walther, the great theoretician of the adaptation of machine to man, states that this adaptation has as its end "the maximum productivity with the minimum expenditure of human energy." But such a goal represents a primacy of efficiency, with reference both to man and machine. The greater concern is to make men work effectively; and, marvelous dispensation, advantages for production turn out to coincide with advantages for the individual.

One of the principal creators of libraries for workers has described the concept of "practical utility" which ought to govern such libraries. Books are to be selected on the basis of "their eventual moral yield." If a book enables the worker to escape the direct control of the bosses, "it ought to be authorized only to the degree that the subject treated allows the management to exercise control indirectly." With this proviso, a book can be an invaluable auxiliary, since it introduces personal interest, serves as a source of initiative, and satisfies curiosity; but on the condition that the worker is ignorant of what he ought to know and that management has the "duty" to choose for him.

It might, incidentally, be asked: "Are these ideas capitalist or Communist?" Anyone who could give an unambiguous answer to this question would indeed be an expert, for the same conceptions occur as frequently in one system as in the other. They do not represent theories, but are the direct expression of the fact that

work technique necessitates the complete integration of the worker. It is inadmissible that the worker's reading matter should occasion slowdowns, rebellion, or displacement of the center of interest. Such things are unthinkable, whatever the regime. Culture must conform to technique and encourage productivity. Censorship in this area ought therefore not to be regarded as an evil, but as an unavoidable condition of objective technique. The same holds for the surprising creation of the post of "counselors," of which Friedmann has written. After it had been observed in certain industrial plants that the conditions of modern labor provoke psychological difficulties, psychologists were hired to act as "safety valves" for employee grievances and dissatisfactions. Employees may express their feelings to these "counselors" with the assurance that the counselors will say nothing to management. But the counselors never actually counsel anything. Their activities have nothing whatever to do with a positive cure of the soul, a mission which would suppose at least the possibility of profound changes, new orientations, and an awakening consciousness on the worker's part, all of which are highly dangerous. Nor are the counselors concerned with investigations of concrete modifications that might be binding on the company. Their sole duty is to encourage the voicing of complaints and to listen to them. It is well-known that suffering expressed is suffering relieved. It has been observed that certain psychological disturbances are provoked simply by being silent and that rebellions are nourished in secret. To let people talk does them good and quashes revolt. It is dangerous to allow the workers to talk over their problems among themselves. It is far more prudent to give them a safety valve in the form of a discreet company agent, a psychological technician, than to let them air their grievances in public. These "counselors" play the same role on the industrial level as the Soviet magazine *Krokodil* does on the political. It is difficult to find a human interest in any of this. The concern here is primarily with technical development. The palliation of the human difficulties raised by technique is secondary. Michel Crozier asserts that this is true also for the technique called "human engineering."

This situation exists also in other disciplines (for example, in sociology), which forces us to conclusions that seem in no sense subjective. Social research establishes the primacy of the socio-

logical over the human: it is not concerned only with man's individual psychology and physiology, but also with his relation to the body social. Here the important problem is to make him really belong to the social group. The problem is the same for a socialized as for a capitalist economy. A solution may perhaps be more feasible for a capitalist society, but both are faced with the problem of convincing man and gaining his allegiance. This gives rise to yet another human technique, which I shall refer to later on. At this point let us consider its aims.

In *Aspects sociaux de la rationalisation*, the 1931 report of the International Labor Organization, we read that "it is necessary to rationalize not only manufacturing, but also employer-employee relations." And in 1941 the ILO asserted that "only when industrial technique succeeds in developing concern for the human being will American capitalism win the confidence of its workers, customers, and bond holders, of the public individually and collectively." As Friedmann puts it, the purpose of the scientific organization of labor, before and after the advent of psychotechnique, industrial relations, and technical humanism, was and is to "assure maximal yield with minimal loss of effort or material. But these latter represent means which are becoming complicated and refined to the point of transforming little by little the face of the scientific organization of labor." The system of human relations which is being re-created in the industrial framework is constructed, according to its originators, on the basis of an industrial model. In this respect the study of W. E. Moore is significant. According to Moore, human relations must correspond to the functions of individuals engaged in the production cycle. Moore assigns the following four characteristics to human relations:

First, human relations must be restricted to the technical demands of their vocational role. They must not become deep relations involving profound ideas, tendencies, and preoccupations. Individuals who are part of the industrial tempo must remain human and sustain mutual human relationships, but only those that relate to technical activity.

Second, human relations must be universal; they must be "based on criteria which the members of an arbitrary grouping of the population can satisfy, independently of prior social relations or prior membership in other groups unconnected with the work in

hand." In other words, human relations must not have an extra-technical basis. The individual's prior milieu is of little importance; neither are his prior preferences or tendencies. Technique compensates for everything else. It is therefore reasonable to speak of technical "universalism." Technique is the bond between men; it is both objective and indeterminate; it makes up for individual deficiencies, admitting no excuses or individual dissociation.

The third characteristic of human relations is rationality. Human relations are indispensable to the proper functioning of the organism as a whole. The organism is strictly rational, and relations integrated into it must be conceived on a rational basis. Emotion or sententementality must not be allowed to disturb the mechanism. When the problem of emotion is considered, as, for example, in "molar microsociological analysis," it is treated as a function of the greater rationality of the group and of a more objective equilibrium.

In the fourth place, these relations must be impersonal, established not on the basis of subjective choice and for personal reasons but on the basis of their optimum validity. Of course, subjective choice and personal reasons must also be dealt with insofar as they influence the technician, but they are stripped of spontaneous validity; they are only one element in the situation.

Scott and Lynton, in a rather more versatile study made in 1953, confirm Moore's analysis. According to them, in the technical complex which our society has become, and which is destroying every kind of community, it is necessary to compensate for man's natural incapacity to sustain human relations in a technical universe. This must be done not only for man's sake but also because human relations are technically indispensable to the progress of great enterprises. It is necessary, therefore, to organize groups in these enterprises, groups which are responsible but also sufficiently directed to serve the common end, productivity. Then it is necessary to reproduce natural conditions artificially, so that human relations can be established. For example, the enterprise can be given an administrative structure that reproduces a spontaneous organization.

The technique of so-called human relations, developed to adapt the individual to the technical milieu, to force him to accept his slavery, to make him find happiness by the "normalization" of his

relations with his group and integrate him into that group to an ever greater degree—this technique is characteristic of the fakeries and shams with which men must be provided if the conflicts provoked by life in a technicized environment are to be avoided. As a remedy it does not amount to much, but as a symptom of technical reinforcement, it is important. We can say that these personal relations are also techniques, that they are not a counterweight to other techniques, but that they bring about the application of technique in the most personal and immediate area of human activities: man's relations with other men. They alleviate the rigors of the human condition—but only by forcing man to submit to them more completely. They facilitate both human life and the action of the machinery, improve production while subordinating human spontaneity to the mathematical calculations of the technicians. In short, they are a kind of lubricating oil, but scarcely a means by which men can recover a sense of worth, personality, and authenticity. On the contrary, they are a delusion which desiccate the individual's desire for anything better. Man is doubtless made more comfortable by techniques of human relations; but these techniques are wholly oriented toward compelling man to submit to forced labor. Machine and productivity are in the driver's seat.

All I have said concerning the technique of human relations is as true of a socialist as of a capitalist society. "Socialist rivalry" is only a psychological tool to force men to work harder. The effort to integrate man into large-scale enterprises is not restricted to capitalism; it stems from technical investigations which are universally valid. The most that can be said is that under capitalism psychological techniques are concentrated on the problem of integrating the individual into private enterprise. Under socialism they are more generalized.

None of this arises from human malevolence, or from some "system," but from the simple fact that other techniques are sought to answer the problems of industrial mechanization. There is no opposition between mechanical techniques, on the one hand, and organizational and psychological techniques, on the other, so that the latter balance the former. Such a relationship is valid, but only within the larger technical phenomenon, within the universal scheme whereby men are determined as objects by the whole tech-

nical complex with a view to efficiency. Hence, as I have observed in so many other connections, the instrumentalities which permit man to survive, and even be happy, subject him as much and even more than the other techniques to the technical ideal, which is independent of all real humanism. The correlated growth of machine and organization prove this point. The organization of work, psychological research, the apparent adaptation of the machine to the human being—these in fact permit the aggrandizement of the mechanical. The greater the aggrandizement, the more society requires that countermeasures be taken; but since the countermeasures are themselves of a technical nature, they allow the sphere of the mechanical to develop even further in a vicious circle. To believe that humanist remedies will indeed palliate the drawbacks of the machine is to think of the machine as a static fact. It is nothing of the kind. The progress of the machine depends on the proposed humanist remedies, and they in turn are rendered obsolete by each new mechanical development.

I should like to point out one last fact; it touches upon a tender point, and such a brief treatment may shock some people. Labor and trade unions made their appearance as the great human protest against the inhuman character of capitalism and its exploitation of the workers. However, in all countries labor unionism has completely lost its original character and become a purely technical organization. This seems to be undeniable, whether we study unionism in its Soviet form as a state organism or in its American form as an adjunct to production. In both cases trade unionism no longer represents a fighting force, but rather a technical administration. At the moment unionism is still a fighting force in France and Italy, but in such an impersonal and organized form that the outcome is clear.

Once again, the result appears to be technical. The worker is becoming more and more "organizable." He is trapped in labor organizations which are becoming increasingly compulsory and increasingly efficient. He gets habituated to them and even feels a need for them. Moreover, the modern separation between personality and work favors surrender to organization. The worker easily yields to the conviction that by contributing to his own organization he will be able to modify the broad outlines of the system and

alleviate his own discomforts. He does not realize that the organization he is enrolled in is itself part of the complex of technical organisms of depersonalization. What we have here is a *hoax*, in the Marxist sense of the term. The actual function of unionism is to support technical progress. It seeks a profound transformation of the condition of the workers through objective industrial organization, independent of the idea of capitalist profit. It finds unorganized labor insupportable; this is also its attitude toward the independent workers who have not felt the burden of the machine on their life and work. Unionism has no concept of the worker except in the double framework of factory and union, both in a technical sense.

When workers are organized, they are complying with the law of technical progress which requires all forms of human life to become organized. This explains the facility with which the unions, once they have been tightly constructed, pass into the condition of total social organization. They continue to constitute an opposing force to certain men and economic tendencies, but they no longer represent a revolutionary force with respect to basic structures. On the contrary, they have become a part of these structures. The worker thinks that he is organizing freely and expressing his personality; but in so doing, he is merely yielding to the technical imperatives to which he is subject through the mechanical element in his work.

I have no thought of denying the educational value of the unions or the contributions they have made to the improvement of the workers' lot. I have been concerned merely to reflect (on a very different plane) to what a degree trade unionism has developed concurrently with technical progress and how it stands in immediate relation to technical imperatives. The worker through his unions is intensifying his own thralldom to techniques, augmenting their powers of organization, and completing his own integration into that very movement from which, it may be, unionism had originally hoped to free him.

Vocational Guidance. Research on human beings at work has led to the differentiation of a number of categories of individuals according to their greater or lesser aptitudes for adaptation, for example, to rationalized industrial labor. Some workers adapt themselves without difficulty to assembly-line production, whereas others be-

come neurotic. This poses the problem of distinguishing various human categories of adaptability.

A new technique, vocational guidance, is the answer here. It claims to be able to reveal every person's vocational aptitude and to guide him into the most suitable vocation, the vocation he will be naturally adapted to, the vocation in which he will do the best job with the most enjoyment.

Unfortunately, the first-rate work of Pierre Naville concerning this technique has demonstrated that its claims are not in complete correspondence with technical reality. I do not wish to consider the first part of his argument, which is exclusively Marxist. There are no natural aptitudes, he states; therefore vocational guidance could not possibly discover them. This point is of course, debatable for non-Marxists. The remainder of his argument is independent of the first part and self-sufficient.

Before turning to Naville's work, I would like to add that there is no question here of denying the value of testing. Tests as a whole yield trustworthy and worthwhile information. Except for certain reservations about detail, we can consider this technique efficient. But in order to estimate its value correctly, we must "situate" it. Techniques in the modern world cannot be separated from one another; and as a consequence the technique of vocational guidance must be integrated into the complex of all the other techniques, for example, into the system of political and economic techniques.

Naville shows with precision that what we call vocational guidance answers the requirements of capitalist economic techniques. As though by accident, the technique "discovers" in the individuals examined precisely the aptitudes which are essential to the needs of the capitalist economy. Thus, in France during the period of unemployment from 1932 to 1937, vocational guidance systematically diverted young people from such overcrowed trades as mechanics, textile work, and so on. The period from 1937 to 1939 witnessed the development of metallurgy, and vocational guidance "discovered" the vocation of metallurgist. In 1940 it was turning up a great number of agricultural vocations.

This should not be taken to mean that vocational guidance is the tool of capitalist or governmental whim. Nor does it mean that vocational guidance is an imprecise technique. It means simply

that there is a great flexibility in human potentialities and that vocational guidance modified these potentialities in accordance with the suggestions of other techniques.

Consider what would happen if vocational guidance proceeded to isolate itself from other techniques; for example, if it considered first and exclusively the aptitude of the individual. The result would be Otto Neurath's nonsensical system, which would nevertheless be the only logical system if one were to insist that the exclusive preoccupation of vocational guidance is to find the best job for the individual in terms of his aptitudes. Neurath envisages a kind of plan of three to five years' duration, based on the individual's aptitudes as discerned by vocational guidance. The economy would be founded on these aptitudes. If vocational guidance discovered no mechanics, machine shops would be suppressed. If, presumably, it discovered no teachers, the schools would have to be closed. If, on the other hand, vocational guidance were to uncover a supply of mechanics after a number of years, the dismantled machine shops would be reopened. It need scarcely be said that chaos would reign in the field of economics. But such a system would be the only logical one if we really were concerned exclusively with the primacy of the individual. If we really wished to take into consideration only the individual's aptitudes, we would have to tailor the economic system to them. The obvious impossibility of such a system demonstrates that it is senseless to apply the rule of the primacy of the individual and that vocational guidance cannot be isolated from the other techniques.

Naville, on the other hand, wishes to integrate vocational guidance as far as possible into the technical complex; he maintains that this can be realized only under socialism. He takes as his example the Soviet Union, where vocational guidance tries to discover not so much intrinsic aptitudes as potentialities for adaptation, that is, adaptability. Basically, the Soviets believe it necessary to discover not the individual's predestination but his adaptability. Vocational guidance then has the task of adapting the individual, through education, to planned manpower requirements. Vocational guidance is thus subordinated to planning technique. For example, a five-year plan may require a certain number of miners for that period. Vocational guidance then has the task of seeking out from among the twelve- and thirteen-year-olds the

ones adaptable to this function. It institutes forthwith a twofold operation of general education focused on the particular trade and on the psychic, mechanical, and physiological adaptability of the candidates. The plan thus obtains the necessary manpower; the individual candidates are effectively adapted to the required labor, since they have been recruited at an early enough age and educated from the beginning in a precise direction. The emphasis again is on insuring the happiness of the individual through adaptation. The assumption is that the individual will be happy when he is synchronized with his trade.

Soviet orientation toward vocational guidance is identical with certain recent tendencies which have appeared in America. In a report to UNESCO on technical education and vocational guidance, Margaret Mead wrote: "Since education must respond, not to the present but to the future needs of society, it is necessary to forecast constantly and as far as possible in advance the evolution of vocational structures." This can only mean that the individual must be educated and adapted in advance to his future job as a function of anticipated technical progress. In Mayo's analyses and in Lynton's report to UNESCO, one finds similarly precise expressions of the conditions of community survival in the technical world. The issue in all these cases is the rigorous adaptation of the individual to the world of technique, even going as far as the "reproduction of certain modes of action and forms of spontaneous organization." More precise expression of technical intrusion into life could scarcely be imagined.

It must not be thought that Naville's version of vocational guidance restricts human potentialities. On the contrary, it is meant to enlarge the child's possibilities of adaptation. By means of this technique, according to Naville, "certain newly acquired habits will appear, thanks to which the individual will be able to participate in the whole continuum of social effort . . . His needs will be guided into a system of new habits which the economic milieu bequeathes to him . . . Adaptation will no longer be something natural, but will be acquired at the cost of efforts which will be of short or long duration depending on the complexity of the task."

In this connection, we are assured that "vocational guidance will permit the basic satisfaction of any rational need." I am con-

vinced that this statement is exact. The individual so educated will be satisfied. But it is the flimsiest make-believe to pretend that vocational guidance is in the service of human beings. An arsenal of preconceptions and undemonstrable formulas would be needed to sustain such a thesis. These presuppositions are as follows: (1) The moment the individual finds himself in a socialist system, his complexes disappear. (2) The moment an institution is integrated into a socialist system, it changes character. (3) The moment the individual's needs are satisfied, he becomes happy. (4) The moment social harmony is established, every man integrated into that harmonious system realizes his human vocation. (5) The moment the individual escapes from capitalism, he is free. Such nonsense is only a way of refusing to consider facts or to look reality in the face. The facts are clear enough. In isolation from certain other techniques, vocational guidance is useless. Put back into its true context, it becomes simply a means for subordinating man to the requirements of economic technique. Even when the task of discovering aptitudes is attributed to vocational guidance, as, for example, in Antoine Mas's "personnel mechanograph," there is nevertheless a substantial consideration of "ad-aptitude," to use Naville's word, and selection is made in terms of it.

Once again we are confronted with a mechanism of adaptation which deprives man of freedom and responsibility, makes him into a "thing," and puts him where he is most desirable from the point of view of another technique, that is, where he is most efficient.

We can also state that a kind of encounter is taking place between vocational guidance and the "new school." Vocational guidance is not obligatory in France. It might even be said that it does not yet exist as a technique. It is still an advisory organ, nothing more. The trend, however, is unmistakable. The number of children counseled went from 60,000 in 1944 to 250,000 in 1950, and, it is estimated, an average of 75 per cent of the parents followed the advice of the vocational counselor. (The actual figure grew slowly from 73 per cent in 1944 to 78 per cent in 1950.) As to the long-term effects of guidance upon those guided, it need only be remarked that either the counselor was right or the counseled child, once embarked on a trade, is faced with an accomplished fact. Practically speaking, there is no retreat, and in fact, a retreat is

seldom desired. The statement that vocational guidance, considering its rate of growth, is not obligatory in reality signifies very little.

An analysis of the method itself should be made. Although the tests employed at the moment are not very dangerous, the aim of vocational guidance is to card-index the individual totally (naturally, for his own good), and it is unlikely that its practitioners will remain very long content with the common psychotechnical tests. They will want to go much further, to make systematic investigations of emotional tendencies and to explore the child's instinctive nature, to inquire into the basic elements in the child's psychic and moral make-up. Tests like the so-called TAT ("Thematic Apperception Test") already aim in this direction. Another and balder way of putting it is that vocational guidance represents a totalitarian takeover of the young.

But since such a takeover lies in the logic of the system, I hardly think it can be prevented. I shall content myself with referring the interested reader to the excellent critique of the system contained in William Hollingsworth Whyte's *The Organization Man.*

Propaganda. Here we are faced with a new system of human techniques, more complex than the others we have studied, since it involves techniques of different natures, partly hierarchical and partly synthetic. We do not even have a term to describe this system. *Propaganda* is too limited, but it comes closest to the fact.[6] The term supposes state action and also mass action on public opinion. However, the broader phenomenon we are considering here includes private action and individualized action as well.

The prime consideration is the union of two very different categories of technique which yield this new system of human technique. The first is a complex of mechanical techniques (principally radio, press, and motion pictures) which permit direct communication with a very large number of persons collectively, while simultaneously addressing each individual in the group. These techniques possess an extraordinary power of persuasion and a remarkable capacity to bring psychic and intellectual pressure to bear. The second category consists of a complex of psychological (and even psychoanalytical) techniques which give access to exact

[6] Here I am giving the briefest summary. The interested reader may refer to my book, *Propagandes* (1962), which will shortly appear in English.

knowledge of the human psyche. It can thus be motivated with considerable confidence in the results.

A number of techniques have here been brought to a common focus so as to produce a nearly certain result. It is known in advance that the projected image will almost infallibly produce the desired reflex. The technical phenomenon under consideration unites the two categories into an inseparable whole. The question arises how and why this has come about and whether man has willed it.

If the press had been devoted exclusively to serial stories, and the radio to music, it might not have been necessary to bring in psychoanalytic methods. But even this is not certain. What could be more innocent in appearance than comic strips? The deep influence of these "comics" on the reader is demonstrable, as is their usefulness from the sociological point of view. And what could seem more harmless than an American musical comedy film? Yet we are all aware of their economic importance.

Even if the radio or the press had been exclusively devoted to amusement, however, there would be this problem: on what basis could or should these techniques be restricted? The moment they could be applied to other spheres (politics, for example), they were applied, and applied guilelessly, without anyone having, at least in the beginning, any clear idea of their utility. As soon as they entered the realm of politics, it became evident that they had to serve not only to educate but also to convince. There is no such thing as purely objective information. To object that it was man's fault that technique did not remain objective is tantamount to stating that it was man's fault to be human. From the moment these techniques were put to use, they had to operate as efficiently as possible, which meant that other techniques for understanding man had to be drawn into the system.

The totalitarian state is very often accused of having originated the conjunction of techniques. This is Monnerot's opinion. The fact is that private capitalism did indeed initiate this conjunction; conditions under capitalism were more propitious than elsewhere. Advertising, well before propaganda proper, introduced the conception of efficiency in this field. The problem was to convince a large number of persons, all typed as "average," to perform some simple action, for example, to buy a given object. It was necessary to be

convincing with limited arguments and few words, which might well be lost among hundreds of others. Conditions in advertising were much more favorable to the conjunction of mechanical and psychological means than, say, political conditions at the beginning of the twentieth century. At that time attempts at political persuasion were addressed only to the elite. There was a multiplicity of political and doctrinaire arguments, but only a few propagandistic means. Propagandistic inertia in politics was the result. Political persuasion had as its aim purely intellectual conviction, whereas in advertising the end was to produce reflex action.

Large commercial enterprises were the first to supplement mechanical techniques with the very efficient means available through psychological technique. By 1910 this conjunction was an accomplished fact. A kind of maladroit political propaganda first came into use during the First World War. It was often completely inept because it disregarded psychological laws and was, in effect, pure hokum. But it became scientific with the Russian Revolution and then with Hitlerism. Today all states without exception exploit the system of political propaganda created by the union of the two technical complexes.

What then are the principal directions taken by propaganda techniques? The system of conditioned reflexes has been exploited on a large scale. The technique of measuring and producing such reflexes has been greatly developed. The reduction of political doctrines to programs, of programs to slogans, of slogans to pictures (the direct reflex-stimulating images) has been studied. Systematic efforts are available to create conditioned reflexes, either through education (as, for example, under Nazism or under Communism) or on the basis of already existing, spontaneous reflexes (for example, the American use of erotic reflexes in war propaganda).

The propaganda mechanisms of the totalitarian states have been studied in detail by Tchakotin. Propaganda techniques in the United States have been stressed much less. But that does not mean that instances of propaganda on a grand scale are lacking there. It became necessary, for example, to force the American people to participate in the war and to impress a war psychology upon them by creating certain reflexes. The Americans, protected by their two oceans, did not "feel" they were at war. War for them

was not a living reality and had to be made so. Understandably, the feeling of war and civilian involvement in it could be produced only by the enormous pressure of advertising and total propaganda on the human psyche. It was necessary to use the so-called obsessional technique, to subject the citizen to propaganda without letup, never allowing him to be alone with himself. In the street he is confronted with posters, loud-speakers, ceremonies, and meetings; at work, with handbills and "industrial mobilization"; in his amusements, with motion-picture and theatrical propaganda; at home, with newspaper and radio propaganda. All these means converge on the same point. All exert the same kind of action on the individual and are of such overpowering magnitude that he ceases to be consciously aware of them.

This last is the greatest importance. Propaganda must become as natural as air or food. It must proceed by psychological inhibition and the least possible shock. The individual is then able to declare in all honesty that no such thing as propaganda exists. In fact, however, he has been so absorbed by it that he is literally no longer able to see the truth. The natures of man and propaganda have become so inextricably mixed that everything depends not on choice or on free will, but on reflex and myth. The prolonged and hypnotic repetition of the same complex of ideas, the same images, and the same rumors conditions man for the assimilation of his nature to propaganda.

In addition, human emotions such as hate and resentment are exploited. The procedure is not so much obsessional as suggestive, and depends on the collective fixation of these emotions on a given adversary. Here we witness the crowning absurdity, a completely automatic development of emotions. To exploit resentments, it is sufficient merely to send the individual on his way, equipped with a very simple set of "directions for use." Later on, one observes a reconstitution of the individual personality around the selected "fixed point" on the basis of the strength of his resentments. Suppose, for example, that the adversary has been designated as the author of all the individual's misfortunes and sufferings. (The *bourgeoisie* plays this role for the Communists, as the Jews played it for the Nazis.) After such suggestions have been launched, there is a surge of human resentment among the people. Like a flock of sheep, they stampede much further than they had actually been

commanded to go, in obedience to another instinct which comes into play and which causes them to hurl themselves on the object of their resentment like a dog on a cat. Incidentally, this explains why there is no "criminal" in these cases. Pogroms are seldom ordered by the authorities. One need only manipulate popular resentments to bring them about.

The will to self-justification, which is latent in every individual, can also be exploited. It involves the need for a scapegoat; but individuals have difficulty finding a personal scapegoat. Propaganda offers them a collective goat to which they are able to transfer evil and sin, thereby feeling justified, authenticated, and purified. In all countries where this form of propaganda is effective, crime diminishes (not the least of the boasts of totalitarian regimes, Communist and Fascist alike). Morality makes headway. We no longer have to create for ourselves enemies to slay. We have enemies, ready-made for us by propaganda, whom it is lawful to kill. It is as plain as a pikestaff that to kill a bourgeois is not a crime. Moreover, the introduction of scapegoats means that conflict is no longer on a social or political plane but on a moral plane of good and evil. In exploiting the device of the scapegoat, propaganda leads people to transfer evil to the adversary. The adversary here becomes the generalized incarnation of evil, whereas in the exploitation of resentment the adversary appears as the cause of misfortune. This incarnation indicates that there is no rational basis for hate; it results solely from subconscious mechanisms. This explains a surprising statement made by Hitler in *Mein Kampf:* "It is necessary to suggest to the people that the most varied enemies all belong to the same category; and to lump all adversaries together so that it will appear to the mass of our own partisans that the struggle is being waged against a single enemy. This fortifies their faith in their rights and increases their exasperation against those who would assail them." Hitler's statement would have been completely irrational if it had been made about person-to-person combat, about personal reasons for conflict. But from the moment propaganda begins to operate, there is a loss of the sense of reality, a confusion of motives, an identification of opposites, and an interplay of accusations—all of which greatly enhance the operation of subconscious influences. Everything more or less confusedly resented as being evil is transferred to the official enemy. Through

the influence of propaganda, a subconscious transference takes place. But instead of the psychoanalyst who causes the transference of guilt feelings to himself, there is a propaganda machine which causes us to make the transference to the generalized enemy. Technique thus creates a separation between all "absolutely good" persons, who are collectively justified and who represent political, social, and historic virtue, and all "absolutely evil" persons, in whom no worth or virtue is to be found. The phenomenon made a feeble appearance, on the national plane, in the 1914 "War of Law and Civilization," but it was too weak to bring about complete collective transference. Today we are more successful, but the line of demarcation between good and evil is less national than social and political.

Propaganda also manipulates, on a lesser scale, the so-called Oedipus complex and our emotions concerning the "father." These techniques are still halting, but it is quite probable that they will become efficient in the near future.

Propagandistic manipulations take place under all forms of government and in all walks of life. It may be said that we live in a universe which is psychologically subversive. Even so, modern man has no clear conception of the extent of the phenomenon. Experience cannot reveal it to him; he would have to be outside looking in. We in France are fortunate in living in a country where propaganda is still remarkably inefficient. In addition, we are acquainted with the technique of "social psychoanalysis," as reported by the pre-1938 Berlin Institute of Applied Psychology and by numerous American institutes and research committees.[1] It is scarcely necessary to add that all propaganda technicians in search of the "one best way" loudly proclaim the value of exploiting the great subconscious motifs I have described.

It is only fair to wonder what consequences these propagandistic manipulations will have. The real consequences are not discernible because the mechanisms have been operating for too short a time. And, of course, when the consequences finally appear, we still will not recognize them. We will have been so absorbed and manipulated, rendered so indifferent that objective knowledge on

[1] For example, The Committee of Human Development, Chicago; The Institute for Public Opinion Research, Princeton; The Heller Committee, California; and so on.

this score will be impossible. We will no longer even have any idea of what men might once have been.

Some effects of propaganda, however, are already clear.

1) The critical faculty has been suppressed by the creation of collective passions. The well-known phenomenon of "reciprocal suggestion" has made collective passion a very different force from individual passion. We know that individual passion is itself inimical to the critical faculty, but the critical faculty can still be exercised if some equilibrium can be established between criticism and passion. In the collective passion created by technique (of which technique itself is sometimes the object), the critical faculty, which is peculiar to the intellectual organization of the individual, is excluded. As Monnerot says flatly: "There is no such thing as a collective critical faculty." Because technique acts upon men collectively, the passions it provokes—which exist in everybody—are amplified. The suppression of the critical faculty—man's growing incapacity to distinguish truth from falsehood, the individual from the collectivity, action from talk, reality from statistics, and so on—is one of the most evident results of the technical power of propaganda. Human intelligence cannot resist propaganda's manipulation of its subconscious.

2) A good social conscience appears with the suppression of the critical faculty. Technique provides justification to everybody and gives all men the conviction that their actions are just, good, and in the spirit of truth. This conviction is the stronger because it is collectively shared. The individual finds the same conviction in his fellow workers and neighbors and feels himself strengthened in it through the implicit communion of media such as the radio. In countries where propaganda technique is exploited, there is a decrease in neurosis as well as in crime. We can believe the wartime statistics of the Nazis and the Americans because they fit so well with everything else we know. Conversely, whenever for some reason propaganda technique fails to instill a good collective social conscience, there is a sudden and brutal collapse of the sense of individual justification, and individual morale falls drastically. This, among other things, would explain the extraordinary increase in neuroses in the United States after 1945. A similar situation among the Germans may have other explanations, but I am convinced that the sudden halting in the Nazi propaganda ma-

chine played a significant role in German postwar neurosis. The problem in the United States has been so serious that it has led to the dramatic development of psychoanalytic therapy in the past few years. This development in reality represents a resumption, on an individual level, of the activity which collective technique had abandoned. When a good collective social conscience has been created, the individual becomes addicted to it, as to a drug. And when the Americans realize that individual psychoanalysis is more costly, less efficient (because it cannot integrate the individual), and more difficult, they will return to a collective psychotherapeutic technique.

3) Propaganda technique, moreover, creates a new sphere of the "sacred." As Monnerot puts it: "When an entire category of events, beings, and ideas is outside criticism, it constitutes a sacred realm, in contrast to the realm of the profane." As a result of the profound influence of the mechanisms of propaganda, a new zone of the forbidden is created in the heart of man, but it is artificially induced, in contrast to the taboos of primitive societies. When there is propaganda, we are no longer able to evaluate certain questions, or even to discuss them. A series of protective reflexes organized by technique immediately intervene.

To summarize: the suppression of the critical faculty, the formation of a good social conscience, and the creation of a sphere of the sacred are all aspects of a single manifestation, the first and clearest consequence of the application of psychoanalytic mass techniques. Incidentally, our analysis confirms a social phenomenon frequently analyzed by modern sociologists: the "creation of the masses." These three elements add a new dimension to the masses; the masses thereby gain an internal cohesion they did not possess naturally. A unifying psychism has come into being.

A second consequence of the application of propaganda techniques is the creation of a kind of manipulability of the masses. Here again Monnerot gives a definition worth repeating. According to Monnerot, propaganda technique "has for its object the production and cultivation among the masses of certain *predispositions* and a special facility for doing at a given moment whatever is strategically opportune. As political circumstances change, it is necessary at intervals to cultivate successive predispositions." This

is a remarkable notion; the use of certain propaganda techniques is not meant to entail immediate and definitive adhesion to a given formula, but rather to bring about a kind of long-range vacuity of the individual. The individual, his soul massaged, emptied of his natural tendencies, and thoroughly assimilated to the group, is ready for anything. Propaganda's chief requirement is not so much to be rational, well grounded, and powerful as it is to produce individuals especially open to suggestion who can be easily set into motion.

Two categories of propaganda must be distinguished. The first strives to create a permanent disposition in its objects and constantly needs to be reinforced. Its goal is to make the masses "available," by working spells upon them and exercising a kind of fascination. The second category involves the creation of a sort of temporary impulsiveness in its objects. It operates by simple pressure and is often contradictory (since contradictory mass movements are sometimes necessary). Of course, this dissociation can be effective only after the propaganda technique has been completely fused with the popular mores and has become indispensable to the population. This stage may be reached quickly, as, for example, in Germany in 1942, after only ten years of psychic manipulation. The same result seems to have been obtained in the Soviet Union, where the masses have been conditioned to the fluctuations of the party line.

A third consequence of technical propaganda manipulations is the creation of an abstract universe, representing a complete reconstruction of reality in the minds of its citizens. The new universe is a verbal universe, to use the excellent phrase of Armand Robin, our keenest student of radio propaganda. Men fashion images of things, events, and people which may not reflect reality but which are truer than reality. These images are based on news items which, as is the case in much of the world, are "faked." Their purpose is to form rather than to inform. Faking the news is systematically practiced by the Soviet radio, but the procedure is found to a lesser degree in all countries. All of us are familiar with the "innocent" fraud of the illustrated newspapers in which a photograph is accompanied by an ambiguous caption. A shipyard, for example, is indifferently described as a plant in one of the democracies, or in the Soviet Union, or wherever. This kind of thing

represents the first step toward a sham universe. It is also indicative of an important element in today's psychology, the disappearance of reality in a world of hallucinations. Man will be led to act from real motives that are scientifically directed and increasingly irresistible; he will be brought to sacrifice himself in a real world, but for the sake of the verbal universe which has been fashioned for him. We must try to grasp the profundity of this upheaval. The human being has enormous means at his disposal, and he acts upon and in the real world. But he acts in a dream: he seeks other ends (those the incantational magic of propaganda proposes for him) than those he will really attain. The ends he is expected to reach are known only to the manipulators of the mass subconscious, and to them alone.

At this point, the reader will protest that our analysis may apply to others, but not to him. But if he listens regularly to the radio, reads the newspapers, and goes to the movies, the description does fit him. He will not be aware of it because the essence of propaganda is to act upon the human subconscious but to leave men the illusion of complete freedom. The objection will be raised, in another vein, that some countries do not exploit these propagandistic manipulatory devices; for example, the democracies in general and the United States in particular.[8] But here certain distinctions must be made. Some democracies do not exploit the propaganda arsenal simply because they cannot afford to do so. Others, like the United States, exploit it only to a limited degree, during certain restricted periods (for example, during wars, hot and cold) and only in certain areas. However, such restraint cannot be imputed to democratic scruples; these democracies simply do not yet feel the compelling necessity to exploit propagandistic technique. As the present global struggle intensifies and world domination by one nation or another becomes inevitable, the utilization of propaganda by the democracies will also become inevitable. The high priests of efficiency will not recoil before the use of an instrument as efficient as propaganda, the more so because it fits the tenor of their culture and no longer shocks anyone's "humanitarian" sentiments. When once the masses have become inured to the practices of propaganda techniques, it is impossible to turn back.

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[8] Ellul: *Propagandes* (1962).

Propaganda activity entails two further consequences of a sociological nature. Because these are obvious, they may be briefly summarized. First, as we have already seen in our treatment of the techniques of work, there is the psychological factor, which manifests itself in the arrested spiritual development of the worker. Friedmann believes that the worker would not experience this arrest in a congenial environment, that is, in a favorable economic system. He has in mind a socialist regime, which he contends would be the most propitious working environment. In such an environment the worker, working without constraints, could mature. But it is clear that socialist manipulation of unconscious tendencies by means of propaganda produces the same results as a real modification of conditions. For example, in the social movement in the Soviet Union, which concentrates on productivity, it is not economic facts that carry the workers along, but socialist propaganda, the creation of a purely verbal universe. Workers react in exactly the same way under capitalism if they are sufficiently overwhelmed by propaganda. This is what happened in the United States on a temporary basis during the war years. And there is a permanent factor operating in the United States to facilitate the application of propaganda technique: the rapidly developing and remarkable mechanism of public relations. This technique is a system of propaganda applied to all economic and human relations.

A second consequence, in the political sphere, is the devaluation of democracy. I revert here to an idea which we have already considered but which is difficult to drive home. All of us, more or less, take propaganda to be the defense of an idea or system. We hear constantly that it cannot therefore be of any harm to the democracies. After all, there are a plurality of political parties employing propaganda to maintain opposing or even contradictory ideas; the citizen has a free choice among them. Such a misapprehension comes from a frighteningly elementary conception of propaganda. I have made it quite clear that propaganda is not the defense of an idea but the manipulation of the mob's subconscious. The hope reposed in the contradictions of propaganda comes to this: the citizen receives a blow in the face from his neighbor on the right, which, fortunately, is compensated for by another blow from his neighbor on the left. If propaganda involved calm exposition of political theories among which the citizen might choose intelli-

gently, contradictions would be beneficial and would leave the citizen a free man. But this is an impossibility, from the moment the propagandist possesses material means for exerting action on the mob and knowledge of the secret recesses of the human psyche. The man who upholds a political theory presumably believes in it. I take the case of a politician who acts from conviction and not from personal interest. He will indeed strive to present his convictions in the best possible light and to secure the adherence of the greatest number of his fellow citizens. To do this he will of course make use of the most efficient means. So, like any totalitarian, he will proceed to rape the mob propagandistically. And rape remains rape though it be effected by ten political parties ten times in a row. Altering the outward form does not alter the substance. Think of the parades, for instance, of Nazi Germany, the somber and fanatical rites of "blood and soil." In the United States, the equivalent for the most part revolves about rites involving scantily clad girls. It is all a matter of temperament; the psychic aim is the same. And it is ruinous to democracy.

In the operation of political parties, the exploitation of technical means on a large scale presupposes great financial resources. This tends to eliminate all minor parties completely or to reduce them to the shadowy role of hangers-on. The more intense the political propaganda struggle (and the more costly its execution), the greater the tendency to reduce the operation of democracy to the opposition between two blocs. A citizen may have an original, valid, and true political idea, one which might even have had every chance of success with his fellow citizens. But if he does not possess the millions necessary to elaborate it the length and breadth of the country, it counts for nothing. The American democracy is no longer in its youth, when propaganda consisted of one man speaking directly to other men.

In the devaluation of democracy, the influences of the propaganda technique work on men as well as parties. The individual, forced to submit to contradictory streams of propaganda, not only is incapable of preserving freedom of choice, of choosing between different doctrines, but is eliminated from the political operation completely. He literally no longer exists—and this comes about in proportion to the contradictoriness of the propaganda. He is integrated into a sociological group and votes as the group votes.

We come here to an important conclusion: to the degree that propaganda is a technique, it has its own personal identity and specificity. But it acts toward an unalterably fixed end. It is mere vanity to wish to distinguish a technique as good or bad according to its end. Whether technique acts to the advantage of a dictator or of a democracy, it makes use of the same weapons, acts on the individual and manipulates his subconscious in identical ways, and in the end leads to the formation of exactly the same type of human being. Whether 99 per cent of the citizens cast their ballot for a dictator or for the various parties in a democracy, whether or not the political structures of the different regimes formally differ, the well-kneaded citizen, upon whom both regimes ultimately depend, becomes through the operation of technique progressively indistinguishable in either. The problem is not merely political; we have come upon it in every area of life. But we must distinguish between two planes here: formal opinion and personal decision. Through propaganda, we can train a man not to kill or not to drink alcohol; or we can train him to kill or to smoke opium. The objective result is different in either case. Sociologically, there is admittedly a world of difference between dictatorship and democracy. But in both the moral problem is suppressed; the individual is simply an animal broken in to obey certain conditioned reflexes. Indeed, there may be a difference between dictatorship and democracy on the plane of public health or statistics; but on the moral plane there is a fundamental identity when democracy achieves its ends through propaganda. The human effects of technique are independent of the ideological end to which they are applied.

Amusement. The techniques of amusement and diversion are different from the other human techniques we have considered. Materially, these techniques are identical with those of propaganda: films, radio, newspapers, and, to a lesser degree, books and phonograph records. But the hierarchy of these means is not the same. For example, the cinema has first place and plays a more important role than the radio. By comparison, in the propaganda hierarchy radio is the instrument of choice.

Here too we find the exploitation of techniques of the subconscious, but they are exerted with much less pressure. Moreover, the range and sphere of these subconscious techniques is different. Amusement seeks to distract, propaganda to lead. The principal

difference, however, relates to spontaneity. Propaganda technique is calculated and deliberate, whereas amusement technique is spontaneous and nondeliberate. The former is the result of the organizer's decision; the latter, of the mob's need.

Consider the average man as he comes home from his job. Very likely he has spent the day in a completely hygienic environment, and everything has been done to balance his environment and lessen his fatigue. However, he has had to work without stopping and under constant pressure; nervous fatigue has replaced muscular fatigue. When he leaves his job, his joy in finishing his stint is mixed with dissatisfaction with a work as fruitless as it is incomprehensible and as far from really productive work. At home he "finds himself" again. But what does he find? He finds a phantom. If he ever thinks, his reflections terrify him. Personal destiny is fulfilled only by death; but reflection tells him that for him there has not been anything between his adolescent adventures and his death, no point at which he himself ever made a decision or initiated a change. Changes are the exclusive prerogative of organized technical society, which one day may have decked him out in khaki to defend it, and on another in stripes because he had sabotaged or betrayed it. There was no difference from one day to the next. Yet life was never serene, for newspapers and news reports beset him at the end of the day and forced on him the image of an insecure world. If it was not hot or cold war, there were all sorts of accidents to drive home to him the precariousness of his life. Torn between this precariousness and the absolute, unalterable determinateness of work, he has no place, belongs nowhere. Whether something happens to him, or nothing happens, he is in neither case the author of his destiny.

The man of the technical society does not want to encounter his phantom. He resents being torn between the extremes of accident and technical absolutism. He dreads the knowledge that everything ends "six feet under." He could accept the six-feet-under of his life if, and only if, life had some meaning and he could choose, say, to die. But when nothing makes sense, when nothing is the result of free choice, the final six-feet-under is an abominable injustice. Technical civilization has made a great error in not suppressing death, the only human reality still intact.

Man is still capable of lucid moments about the future. Propa-

ganda techniques have not been able wholly to convince him that life has any meaning left. But amusement techniques have jumped into the breach and taught him at least how to flee the presence of death. He no longer needs faith or some difficult asceticism to deaden himself to his condition. The movies and television lead him straight into an artificial paradise. Rather than face his own phantom, he seeks film phantoms into which he can project himself and which permit him to live as he might have willed. For an hour or two he can cease to be himself, as his personality dissolves and fades into the anonymous mass of spectators. The film makes him laugh, cry, wonder, and love. He goes to bed with the leading lady, kills the villain, and masters life's absurdities. In short, he becomes a hero. Life suddenly has meaning.

The theater presupposed an intellectual mechanism and left the spectator in some sense intact and capable of judgment. The motion picture by means of its "reality" integrates the spectator so completely that an uncommon spiritual force or psychological education is necessary to resist its pressures. In any case, people go to the movies to escape and consequently yield to its pressures. They find forgetfulness, and in forgetfulness the honied freedom they do not find in their work or at home. They live on the screen a life they will never live in fact.

It will be said that dreams and hope have been the traditional means of escape in times of famine and persecution. But today there is no hope, and the dream is no longer the personal act of an individual who freely chooses to flee some "reality" or other. It is a mass phenomenon of millions of men who desire to help themselves to a slice of life, freedom, and immortality. Separated from his essence, like a snail deprived of its shell, man is only a blob of plastic matter modeled after the moving images.

There is a vast difference between the dreams and hopes of the past and those of the present. Formerly, with the conviction that "things would change," hope was a beacon illuminating the future. Dreams represented flight, but flight into one's own self. In motion pictures, however, the future is not involved. On the strip of film, what ought to change has already changed. And the flight of cinematic dreams has nothing to do with the inner life; it concerns mere externals. When people leave the movie theater, they are full of the possibilities they experienced in the shadows; they have received

their dose of the inner life. Their problems too have undergone a transformation. They are now problems posed by the film. And they have the blissful, if contradictory, impression that these cinematic problems, which occupy the whole field of their consciousness, are both strong enough to put all vexations to flight and unreal enough not to be troublesome. The modern passion for motion pictures is completely explained by the will to escape. Just as the tempo of work or the authority of the state presupposes spiritual adhesion and hence propaganda, so the human condition under the regime of technique supposes the escapism which diversional techniques offer. One cannot but marvel at an organization which provides the antidote as it distills the poison.

Man, emptied by the technical mechanism of all personal interests, sometimes finds himself at home. What shall he talk about? Man has always had one unfailing subject of conversation, life's vexations. Not fear, nor anguish, despair, or passion. All that has always been suppressed in his subconscious. But he has always been able to talk companionably about vexatious things, hail on his vines, mildew, machinery out of order, a troublesome prostate, and so forth. Now technique intervenes, repairs everything, and creates a world in which everything works well, or well enough. Even if some petty vexations persist, the individual feels no need to speak of them and turns toward the efficient silence-fillers, television and radio, prodigiously useful refuges for those who find that family life has become impossible. Jean Laloup and Jean Nelis evince a curious optimism when they write that radio and television have reconstituted the family. Television doubtless facilitates material reunion. Because of it the children no longer go out in the evenings. The members of the family are indeed all present materially, but centered on the television set, they are unaware of one another. If they cannot stand or understand one another, if they have nothing to say, radio and television make this easy to bear by re-establishing external relations and avoiding friction. Thanks to these technical devices, it is no longer necessary for the members of a family to have anything at all to do with one another or even to be conscious of the fact that family relations are impossible. It is no longer necessary to make decisions. It is possible for a married couple to live together a long time without ever meeting each other in the resonant emptiness of television. This too is a curious

means of escape, of hiding from others instead of from oneself. It is the modern mask man puts on every evening, which unfortunately, lacks the virtues of the ancient mask, demoniac and divine.

One of the best studies of the problem of the radio, that of Roger Veillé, reminds us that the ear is the great *"fault"* in man. Through it he perceives the "silence of the infinite spaces"; it is the point of origin of his great disturbance. The ear, unlike the eye, evokes mystery and renunciation; it is the center of anguish and anxiety. And radio fills this opening, protecting man against the silence and the mystery by amusing him. The program makers know all this and create their programs as a function of this escapism, not for motives of crass commercialism or Machiavellianism (as some people seem to think), but because they themselves partake of the human condition and seek protection against its anguish. It follows, then, that the radio makes a clean break between everyday social reality and the dreams and narcotics which its duty is to dispense. To use the words of Veillé, it must be one of the "liberating distractions." It must deliver the individual from objective constraints. It is a public utility dealing in moral comfort, charged with offsetting the tragedies of family living, social pressures, and the vexations of modern life. The radio must compensate for the inhumanities of life in today's cities. In a milieu in which the human being is unable to make true friendships or to have profound experiences, the radio must furnish him with the appearances of reality, acquaintance, and human proximity; it must captivate and reassure him. But Veillé rightly inquires whether "the radio may not gradually habituate to mere auditory images those to whom it gives the illusion of belonging; and, what is worse, condition them to the absence of interlocutors." Unfortunately, the answer to Veillé's question is clear. There is no other comparable instrument of human isolation. The radio, and television even more than the radio, shuts up the individual in an echoing mechanical universe in which he is alone. He already knew little enough about his neighbors, and now the separation between him and his fellows is further widened. Men become accustomed to listening to machines and talking to machines, as, for example, with telephones and dictaphones. No more face-to-face encounters, no more dialogue. In a perpetual monologue by means of which he escapes the anguish of silence and the inconvenience of neighbors, man finds refuge in

the lap of technique, which envelops him in solitude and at the same time reassures him with all its hoaxes. Television, because of its power of fascination and its capacity of visual and auditory penetration, is probably the technical instrument which is most destructive of personality and of human relations. What man seeks is evidently an absolute distraction, a total obliviousness of himself and his problems, and the simultaneous fusion of his consciousness with an omnipresent technical diversion.

In diversion we are at a stage of development in which technique answers the needs of men in a technical society, but a society in which they are still free to use or not to use the available technical means. "If you wish to escape," says technique, "you are welcome to try." Modern men, however, are beginning to be aware of their need at all costs not to challenge the technical situation, and to recognize that technical means exist to meet this need. Take, for example, the extraordinary success of Butlin's vacation camps in Great Britain. Butlin grasped the fact that in a world at once exacting and depersonalizing in the extreme, the vacation most men prefer must be a genuine vacuum, an ever greater depersonalization which gives the impression of freedom but which never allows the individual to come face to face with himself, even materially. To achieve this end, Butlin in 1938 organized his "family vacation camps." The vacationer lives in a crowd on a strict timetable judiciously arranged so that each day will be different, giving the impression of constant novelty and variety. Games, songs, theater, eating, "fun" succeed one another at a rapid tempo from seven o'clock in the morning until midnight. "The important thing," says Butlin, "is that no one is ever left to himself even for a moment." Everything takes place in a spirit of gaiety and liveliness and under the direction of game leaders who are "specialists." All available means are employed to persuade the individual that he is happy. Since each camp can accommodate four thousand persons, there is little difficulty in arranging for the vacationer to pass his holiday, which lasts a fortnight, among a crowd of people. The whole thing represents an elaborate and rigorous enterprise for becoming unconscious, carried out by a technique described in detail by Butlin himself. Butlin minces no words. The problem, as he sees it, is to make his customers systematically lose consciousness, not as before from political motives, but from motives of pure entertain-

ment. Here is technique put to the service of a kind of Pascalian distraction. Not exactly the same kind, since it is not so much a matter of dodging the dilemma of man facing eternity as of dodging the conflict between man and his situation in this life; of forgetting to meditate not so much on the two infinitives (something most men are incapable of) as on the obvious crashing absurdity of life in a technical world. The average man is inevitably conscious of this. He must therefore becloud his consciousness at any cost, and in this, it seems, he is in essential accord with the needs of a technical society. Our thesis is verified by the prodigious success of Butlin's camps, a success which is perhaps the most astonishing thing about them. In 1947, four hundred thousand persons vacationed in them, and the number has been growing steadily. And bear in mind that these figures represent Englishmen, who by their very nature would seem the most hostile to this kind of thing.

This demonstrates the complete adaptation of technical amusements to technical society and to their sociological function. How illusory is the effort to make of the motion pictures an educative art and a means of instruction! Art films and films with philosophic or political intent simply do not correspond to the wishes of the movie-going public. It can, of course, be legitimately maintained that motion pictures are nonetheless a means of "educating" the public. But here we must guard against a certain confusion; education of the spectator's taste and understanding takes place, but only incidentally. The clouding of his consciousness is paramount, and art and science can contribute to this end. The film can succeed only if it puts art to the service of a sociologically necessary and technically possible enterprise; only if art (and indoctrination disguised as science) becomes the new means of wrenching men from reality. If this were not the case, the public would not have patronized films like the first ones of Orson Welles.

Spontaneous or organized mechanisms of entertainment such as I have described are useful only to the degree that propaganda technique is undeveloped. Propaganda, as it develops, tends to assimilate amusement, which either makes its appearance as an efficient propaganda medium or, at a later stage, is exploited for purposes of human adaptation.

This last makes it impossible to agree with Veillé's suggestion that the Swedish or Russian radio is not concerned with "distrac-

tions," with building up a social structure of lies and soporifics, because the citizens of these states have been "set free" and no longer "feel the wearisome continuity of daily obligations." Veillé, it may be noted, tends implicitly to see in this fact one of the beneficial effects of socialism. In reality, the condition he describes is due to the fact that the Swedes are the most "integrated" and adapted of all mankind. They have alienated themselves to the greatest possible degree in the organization, so that they are no longer conscious of any cleavage between personality and technique, and do not therefore need an artificial paradise. In the case of the Russians, propaganda has cleverly absorbed and replaced amusement. The Russian citizen subjected to his government's daily propaganda (the most highly developed in the world) is unaware of anxiety. But, then, the same was true of Hitler's Germany.

Sport. There is one last sphere where man can still frolic, but there too technique has stopped up all the gaps. I am referring to sport.

Sport has been conditioned by the organization of the great cities; apart from city life, its very invention is inconceivable. Country "sport" is but a pale imitation of city sport and has none of the characteristics of what we know as sport.

The sporting vocabulary is English; it was introduced to the continent when the continental nations came under the influence of English industrialization. After the industrial center of gravity passed to the United States, American sporting forms prevailed. The Soviet Union began to cultivate sport when it began to industrialize; the only country in central Europe which had organized sport, Czechoslovakia, was the only one which was industrialized.

Sport is tied to industry because it represents a reaction against industrial life. In fact, the best athletes come from working-class environments. Peasants, woodsmen, and the like, may be more vigorous than the proletariat, but they are not as good athletes. In part, the reason for this is that machine work develops the musculature necessary for sport, which is very different from peasant musculature. Machine work also develops the speed and precision of actions and reflexes.

Moreover, sport is linked with the technical world because sport itself is a technique. The enormous contrast between the athletes of Greece and those of Rome is well known. For the Greeks, physical exercise was an ethic for developing freely and harmoniously

the form and strength of the human body. For the Romans, it was a technique for increasing the legionnaire's efficiency. The Roman conception prevails today. Everyone knows the difference between a fisherman, a sailor, a swimmer, a cyclist, and people who fish, sail, swim, and cycle for sport. The last are technicians; as Jünger says, they "tend to carry to perfection the mechanical side of their activity." This mechanization of actions is accompanied by the mechanization of sporting goods—stop watches, starting machines, and so on. In this exact measurement of time, in this precision training of muscular actions, and in the principle of the "record," we find repeated in sport one of the essential elements of industrial life.

Here too the human being becomes a kind of machine, and his machine-controlled activity becomes a technique. This technical civilization profits by this mechanization: the individual, by means of the discipline imposed on him by sport, not only plays and finds relaxation from the various compulsions to which he is subjected, but without knowing it trains himself for new compulsions. A familiar process is repeated: real play and enjoyment, contact with air and water, improvisation and spontaneity all disappear. These values are lost to the pursuit of efficiency, records, and strict rules. Training in sports makes of the individual an efficient piece of apparatus which is henceforth unacquainted with anything but the harsh joy of exploiting his body and winning.

The most important thing, however, is not the education of a few specialists, but the extension of the sporting mentality to the masses. Insofar as this represents a vigorous reaction to the mere passivity of spectator sports, it is good. But the usual result is the integration of more and more innocents into an insidious technique.

It is needless to speak of the totalitarian frame of mind for which the exercise of sports paves the way. We constantly hear that the vital thing is "team spirit," and so on. It is worth noting that technicized sport was first developed in the United States, the most conformist of all countries, and that it was then developed as a matter of course by the dictatorships, Fascist, Nazi, and Communist, to the point that it became an indispensable constituent element of totalitarian regimes.

Sport is an essential factor in the creation of the mass man. It is,

at the time, a disciplinary factor, and this in a twofold way. It coincides exactly with totalitarian and with technical culture. In the "new" countries, an interpenetration of technique and the practice of sport is to be observed. The authoritarian states understand and exploit fully the efficiency of technicized sport in making their citizens into conformists and mass men. It is one of the chief boasts of Communist states that they fabricate champions in countries which hitherto had never heard the word *sport*. This is an effect of the totalitarian society, but it also represents one of its modes of action. In every conceivable way sport is an extension of the technical spirit. Its mechanisms reach into the individual's innermost life, working a transformation of his body and its motions as a function of technique and not as a function of some traditional end foreign to technique, as, for example, harmony, joy, or the realization of a spiritual good. In sport, as elsewhere, nothing gratuitous is allowed to exist; everything must be useful and must come up to technical expectations.

Sport carries on without deviation the mechanical tradition of furnishing relief and distraction to the worker after he has finished his work proper so that he is at no time independent of one technique or another. In sport the citizen of the technical society finds the same spirit, criteria, morality, actions, and objectives—in short, all the technical laws and customs—which he encounters in office or factory.

Medicine. Technique makes its major contribution in surgery and medicine. I will consider these technical forms only briefly, first because they are far removed from the area of my own special competence, and second because they are as uncertain as they are familiar.

How can we classify these techniques? A report published in the review *Esprit* states: "Thanks to our knowledge of psychophysiological correlations, it is possible to claim that we are in a position to modify the human being's interior energetics." These modifications may be achieved by the following means: (1) appropriate nutritional regimes involving vitamins and the like; (2) suppression of glandular secretions, as, for example, castration or sterilization to control antisocial and overaggressive reactions; (3) injection or grafting of hormones, as, for example, in attempts to increase bodily energy, virility, femininity, or the maternal in-

stinct; (4) prolonged synthetic medication to modify metabolism; (5) operative interruption of the nerve paths of intracerebral communication (to which must be added lobotomies and thalamotomies, both of which involve direct intervention on the brain and entail a "lowering of the psychic level").

We ought to add to the above the whole pharmacopeia of "police drugs," as certain narcotics have become popularly known. These so-called "truth serums," that do not extract the truth, have a bad reputation, and they are still limited to professional medical use. Because of this, we must insist that there are extremely few authenticated instances in which sodium pentothal, for example, has been employed for other than medical reasons. Even the accounts of the celebrated trials in the Soviet Union and its satellites in which the defendants accused themselves must be taken with a grain of salt. There is nothing to prove conclusively that truth serums were ever used, and there are good technical reasons for believing otherwise. In any case, no positive conclusions can be based on such evidence as we possess. What is clear is that these presumed techniques, as they are represented by the press, evoke spectacular public reaction and inquiries. The chief reason for the public's belief in the efficacy of truth serums is probably moral indignation and fear brought to a pitch of madness by anti-Communism, so that the real state of affairs becomes proportionately harder to analyze scientifically. It is undeniable, however, that it is possible to modify the human being effectively, but it is still uncertain just how this modification occurs or what can ultimately be expected from such technical intervention. From my point of view, these medical techniques of intervention have only secondary importance. I would not deny that they represent a major intervention; they affect the human being materially and modify him in far-reaching ways. Morally, such intervention is certainly a grave matter, but the problem, after all, is not essentially different from that posed by the death penalty.

As for medical technique, what is to be feared and hoped from its application? And with what other technical system will this technique be interrelated? The answer is: solely with the state. And this indicates what we have to fear. It is universally understood that technical means begin to be dangerous when the state begins to exploit them, utilizing them in connection with its arbitrary,

omnipotent decisions. When the individual undertakes to systematize a number of techniques, he seldom creates a sturdy structure. The technical framework of our world is linked together naturally, not by arbitrary human decision, and it is this which gives it its solidity. The field of application of these medical techniques will of necessity be very limited, since they will be applied only to persons expressly designated by the state as enemies or undesirables. These techniques can essentially serve only the state's designs—whether they are to break the spirit of the last remaining free men or to eliminate the old or to obtain sensational confessions or declarations during a fake trial. And these designs must be limited, since in the last analysis the state can have no interest in generalizing methods which appear to degrade the human being. The state, on the contrary, has need of whole, strong human beings, in full moral, intellectual, and physical vigor, who alone can serve it best. What the state requires is the technical means for integrating completely whole beings, and these means are on the point of becoming a reality. The technical state will not be a party to the deterioration of its material. Only with regard to already useless material (because it is refractory or weak) could the technical state be driven to use one of these techniques. It is certainly not altogether out of the question that the state might employ these techniques. But the state has many other means of attaining its ends. Since it has at its disposal concentration camps and the death sentence, it would hardly go out of its way to find more complicated means, except perhaps for the sake of occasional propaganda. And certainly the population need not become so alarmed about what is, after all, only a lesser evil.

Surgical and medical intervention have another defect from the state's point of view. They cannot be generalized, and are as a consequence indeterminate except for special cases. Each new case requires the state to make a special decision; these techniques cannot function with the autonomous regularity of such state organs as the police. Indeed, it is necessary to limit application, because the general public must be kept in ignorance. The citizens are far from ready to accept the use of these techniques, and would be easily aroused if they learned of it. The danger of a popular reaction, even a momentary one, against the state is too great to risk for the limited advantages the state might draw from their use.

It does not seem, therefore, that medical techniques are an important part of the body of human techniques. It is possible of course to envision a time when surgery will be able to modify brain structure instead of destroying it and thereby will be able to reconstruct a positive personality. But this is still speculative. My conviction is that there is little chance of practical application here, apart, perhaps, from the purely medical sphere. Surgical intervention must be relegated to a relatively distant future. And when we consider the remarkable development of psychosociology and social psychoanalysis, both of which are presently being applied on a mass scale, it is clear that with these the state can achieve anything it might hope to achieve through surgical modification of the human personality. Surgical intervention can only produce "consolidating" effects. We might ask whether the game is worth the candle, since such intervention, when undertaken by the state, confirms all our moral reservations and strictures concerning the state's contempt for the human personality.

The over-all efficiency of these techniques does not allow us to attach any great weight to them. Their real importance, which causes some disquiet, is that they are a "red herring." Since they are spectacular, the public pitches upon them fearfully and crystallizes about them its diffuse fear of technique in general. But it is relatively easy to prove to the public that in this respect its fears are groundless. The public, unable to see the real problem of technique because it gravitates unerringly to glaring superficialities and wavers between unreasoning fear and false security, never penetrates to the heart of the problem of modern society.

Echoes

Techniques, Men, and Man. Here ends the long encirclement of men by technique. It is not the result of a plot or plan by any one man or any group of men who direct it or apply it or shunt it in new directions. The technical phenomenon is impersonal, and in following its course we have found that it is directed toward man. In investigating its preferred loci, we find man himself. This man is not the man in the mirror. Nor is he the man next door or the man in the street. Proceeding at its own tempo, technique analyzes

its objects so that it can reconstitute them; in the case of man, it has analyzed him and synthesized a hitherto unknown being.

Technique never works on the man we meet in the street. The great scandal of Nazism was its indecency in applying its techniques to Otto Schultz, who had a family name and a given name, who practiced his trade and led his life in full view of hundreds of his neighbors. He was operated on without anesthesia, dragged off under duress to the accompaniment of the lamentations of his family. The physicians of Struthof were scandalous because of their cynicism and brutality. It was a glaring blunder for the Nazis to show such complete contempt for human feelings. We do better; we operate painlessly. Even when we use successive operations to demonstrate the evolutionary processes of the human embryo, the procedures are carried out on "volunteers," and no one complains very much. None of our techniques claims that it applies to the living.

Because it is first of all scientific, technique obeys the great law of specialization; it can be efficient only if it is specialized. In the case of human beings, efficiency has a double meaning. It means that technique must be applicable without raising storms of protest. And it means that it must not neglect the scientific aspect (which is the most important) of this specialization. Techniques are designed for application to a relatively limited number of cases; as a consequence, general applicability cannot be envisaged. Every human technique has its circumscribed sphere of action, and none of them covers the whole of man. As we have seen, there are psychological techniques, educational techniques, and many others. Each of these answers one and only one particular need. If one of them is applied, it does indeed encroach on some private sphere or other of the individual, but the greatest part remains private. There is therefore never any clear reason to protest. This relatively impersonal technical operation is a far cry from one which would hurl man brutally into a world of concentration camps where the most strident, dramatic, overwhelming techniques suddenly descend on him.

A further mistake of Nazism was to dress its techniques in a demoniac mask designed to inspire terror. Because the use of terror is also a technique, the Nazis made it an invariable accompaniment of all their other techniques, shocking the rest of the

world by useless excess. We do better. We dress technique in the aseptic mask of the surgeon. Impassivity is an attribute of the new god, as it was an attribute of the old. The true face of modern technique is far more like the Deist's triangle than the grimacing mask of Siva.

A single technique and its guarded application to a limited sphere is the starting point of dissociation. No technician anywhere would say that he is submitting men, collectively or individually, to technique. The biogeneticist who experiments on the human embryo, or the film director who tries to affect his audience to the greatest possible degree, makes no claim that he is working on man. The individual is broken into a number of independent fragments, and no two techniques have the same dimensions or depth. Nor does any combination of techniques (for example, propaganda plus vocational guidance) correspond to any part of the human being. The result is that every technique can assert its innocence. Where, then, or by whom, is the human individual being attacked? Nowhere and by no one. Such is the reply of technique and technician. They ask indignantly how it can be alleged that the human being is being attacked through the application of the new school of technique. According to them, the charge itself demonstrates an absence of comprehension and the presence of erroneous, not to say malicious, prejudices. And, in fact, every technician taken separately can affirm that he is innocent of aggressive designs against the human being. The biologist, working on a living embryo with the consent of the mother, is guilty of no assault on her life or her honor. Thus, since no technician applies his technique to the whole man, he can wash his hands of responsibility and declare that the human being remains intact.

A larger view of the technician's operations thus presents a totally reassuring and even edifying picture. Every technician working on a tiny particle (so tiny it could not be considered a man) of living flesh can claim that he is at work in the name of a higher being: Man.

Technicians are not very complicated beings. In truth, they are as simple as their techniques, which more and more assimilate them. The Communists are no doubt right in thinking that all moral problems will be resolved when all men have become technicians.

If it is an important part of the work of our "intellectuals" to

analyze the times and discover all the myths at work in the twentieth century, this task will demonstrate that the myths are deep-rooted and widespread. And when they turn their critical faculties to the myths of the technicians, they will not need to delve much or deeply. The technicians' myth is simply *Man*—not you or I, but an abstract entity. The technician intones: "We strive for Man's happiness; we seek to create a Man of excellence. We put the forces of nature at his disposal in full confidence that he will overcome the problems of the present," and so on. Other modern myths—for example, the myth of "progress" or of the "proletariat" —are immeasurably less real to the technician than the myth of the abstract entity Man, in which he finds his justification. This myth, moreover, represents a stage he cannot transcend, for he has small ideology and less philosophy. He understands his methods, which he applies with satisfaction because they yield immediate results. The technician anticipates results, but, be it said, they are not genuine ends but merely results. And then he makes the great leap into the unknown and finds the explanation of everything and the answer to all possible objections: the myth of Man. The technician either does not believe in the myth at all or believes in it only superficially. It respresents for him a ready-made and comfortable conviction, a ready answer to all criticism. It is a justification, but scarcely a conscious one. Why indeed should the technician justify himself? He feels in no way guilty; his good intentions are as clear as their excellent results are undeniable. No. the technician has no need of justification. And if ever the slightest doubt were to penetrate his consciousness, his answer would be as clear as it would be staggering: The Man for whom I am working is Humanity, the Species, the Proletariat, the Race, Man the creature, Man the eternal, even *You*. All technical systems, whether they be expressed in Communist or Liberal phraseology, come back in the final analysis to this abstraction. All technicians, too. The technicians, in any case, do not have sufficient intellectual curiosity to ask themselves what their favorite abstraction really means or what the relation is between this abstraction and technique. Not, one supposes, that intellectual curiosity would be worth much here. The abstraction, Man, is only an epiphenomenon in the Marxist sense; a natural secretion of technical progress.

Why then become agitated? We have, on the one hand, various

techniques, each of which exerts only partial action and can therefore be of no danger to man's total being. On the other hand, we have a myth, "Man," which more or less deifies him and in any case strongly affirms that technique is subordinate to the human being. What more could we want?

However, one important fact has escaped the notice of the technicians, the phenomenon of technical convergence. Monnerot has defined political totalitarianism as a convergence of a plurality of national histories with a plurality of political systems. Our interest here is the convergence on man of a plurality, not of techniques, but of systems or complexes of techniques. The result is an operational totalitarianism; no longer is any part of man free and independent of these techniques. This convergence might be likened to the convergence of theater projectors, each of which has a specific color, intensity, and direction, but each of which can fulfill its individual function only in conjunction with the others. The effect cannot be predicted on the basis of the individual projectors, only on the basis of the object illuminated. Such is the case with human techniques. A plurality of them converge toward the human being, and each individual technician can assert in good faith that his technique leaves intact the integrity of its object. But the technician's opinion is of no importance, for the problem concerns not *his* technique, but the convergence of all techniques. It is impossible to determine, by considering any human technique in isolation, whether its human object remains intact or not. The problem can be solved only by using the human being as a criterion, only by looking at this point of convergence of technical systems. This is why I have had to make a preliminary enumeration of the various technical complexes which have been applied to man.

Now, two additional remarks are in order. First, as I have said repeatedly, technical convergence is not brought about by the will of any technician or any group of technicians. No technician acts as conductor of the technical orchestra. Convergence is a completely spontaneous phenomenon, representing a normal stage in the evolution of technique. The technicians are not conscious of the mechanism and even sometimes do not approve of it. Some intellectuals have a dim awareness of the fact of convergence and recognize, generally optimistically, that the technical movement

is directed to the whole man. Some technicians are indeed seeking gropingly to unify a number of different techniques. Cybernetics and psychosomatic medicine are good examples of this, and confirm, incidentally, the phenomenon of technical convergence. At the midpoint of the twentieth century we begin to become conscious of the phenomenon.

It is difficult to exploit the techniques that already exist precisely because of the fact of technical specialization. Our highly specialized technicians will have a vast number of problems to hurdle before they are in a position to put together the pieces of the puzzle. The technical operations involved do not appear to fit well together, and only by means of a new technique of organization will it be possible to unite the different pieces into a whole. When this has finally been accomplished, however, human techniques will develop very fast. As yet unrecognized potentialities for influencing the individual will appear. At the moment such possibilities are only dimly discerned in the penumbra of totalitarian regimes still in their infancy. It should not be forgotten, of course, that, while our technicians are trying to synthesize the various techniques theoretically, a synthetic unity already exists *de facto*, and man is its object.

Our second remark concerns certain judgments we might be tempted to make. In discussing the effects of technique on man, we must avoid overhasty or superficial generalizations. We must not become too agitated or hold that man's nature is cut into bits and pieces. We must be wary of using a mystical vocabulary. We do not understand very well what man is, and nothing we know would justify us in declaring his character sacred or some part of it inalienable and purely personal or in asserting that he has supreme value. The values may be there, but they elude us as soon as we try to define them or to make precise their nature and location. Is this supreme value under attack? When we behold the individual, trapped in technical mechanisms, we are indeed tempted to reply in the affirmative. But if we analyze the situation concretely, we cannot discover the locus of the attack or even what is being attacked.

For this, another system of references is needed, a conception of man which is a priori and nonscientific. But then we must not be surprised at the divergent reactions we get when we speak of

the impact of techniques upon the human being. On the other hand, we must not say that the question is unimportant. It would be deceptive to ask, "What then is under attack?" and to enumerate analytically the components of the human psyche, as determined by the most up-to-date methods, in order to show that nothing humanly valuable is endangered by the progress of technique. For we never know whether there is not something in man which our analyses and scientific apparatus are unable to grasp. All of us, even the materialists, are sure that there is. For it is on the unmoving and unseen axis, which is the essence of the wheel and round which it turns, that all else depends.

But we cannot declare that it is unimportant if technique permeates everything human so long as it does not reach the unreachable center. This dualism is impossible because this "center" is not abstract but concretely embodied. If the quality of being human depends on it, and if this quality is modified by the ways in which technique mauls man's body and soul, we have no right to say that what is essential remains unscathed. There is, on the contrary, every evidence that what is called the "person" is being dangerously impaired. Similarly, it is escapism to say that what can be laid hold of in man is itself the result of many influences, many social currents and collective habits, so why worry about the influence of technique?

I do not believe there are many proponents left of the idea that man is something in himself, that he has an essence independent of his milieu. But there is a broad middle ground between the indifference to technique affected by the philosophical dualists who would maintain such a position and the indifference that the technical sycophants affect. Two reservations suffice. First, the fact that the individual is subject to a given influence is no reason to make him submit to another. Second, there is a difference between the spontaneous and lightly coercive influence of an individualistic social group and the calculated, precise, and efficient influence of techniques.

But here we are at the mercy of religious and scientific prejudices, which give rise to banal and superficial statements. In discussing the human effects of technique, I have made every effort to avoid passing favorable or unfavorable judgments and to shun journalistic commonplaces. My purpose is to inquire not so much into the

modifications of the human being that are being made as into the symptoms of the technical encroachment which is now more or less complete.

Let us not forget that every one of the human techniques is related to all other techniques. We must be on guard against attempting to isolate them. When we say that human techniques must compensate for the disagreeable consequences of other techniques, we are arbitrarily isolating different technical spheres. Human techniques are closely dependent on economic, political, and mechanical techniques, not only because of their origin and potentialities, but even more because of the necessity for their application. Economics and mechanics form a framework, a milieu, within which human techniques necessarily belong. Suppressing the context no doubt makes it easy to analyze these techniques and to draw reassuring conclusions. But the conclusions are also completely unreliable. Human techniques have no existence except to the degree that the human individual is subject to economic conditions and to the degree that mechanical conditions permit the means discovered to be exercised upon him. To neglect the technical context of these human techniques is to live in a world of dreams. To admit it is to perceive that human techniques in the real world (not in the world of philosophic abstractions where freedom is always possible) are conditioned by the economic, the political, and the mechanical. Human techniques, therefore, are never "dominants" because they can exist only in relation to all the others. They cannot be isolated in a pure state; and their means, tendencies, and results must be interpreted in relation to these others. If human techniques were ever to come into conflict with the others, they would inevitably lose out, for they would retain no real substance. To the degree that they might conceivably run counter to the necessities, for example, of economic productivity, they would ruin the condition *sine qua non* of their application. Without unremitting productivity, the men, money, and time necessary to their application would not be forthcoming. Human techniques, therefore, are obliged to become a part of the technical system; the reassuring conclusions drawn by some writers seem correspondingly less convincing.

The explicit problem then seems to be: If we can perceive certain

echoes of techniques in man, how do these echoes enable us to measure the degree of human technical encirclement?

L'homme-machine.[9] A progressively more complete technical knowledge of man is being developed. Will it liberate him? Man's traditional, spontaneous activities are now subjected to analysis in all their aspects—objects, modes, durations, quantities, results. The totality of these actions and feelings is then systematized, schematized, and tabulated. A human type is created which is the only recognizable "normal." As Sargent puts it: "Technique will furnish me with norms of life in whatever concerns work, food, housing, education, and so on."

It is to be understood, of course, that there is no absolute obligation for the individual to conform to the type. He can, if he will, despise it. But then he will always find himself in an inferior position, vis-à-vis the type, whenever the two come into competition. Our human techniques must therefore result in the complete conditioning of human behavior. They must assimilate man into the complex "man-machine," the formula of the future.

In the coupling of man and machine, a genuinely new entity comes into being. Most writers still insist on the modern tendency, which they profess to discern, to adapt the machine to the man. Such adaptation doubtless exists and represents a great improvement; but it entails its counterpart, the complete adaptation of the man to the machine. This last does not lie in a remote future. Man's nature has already been modified; and it is to an already adapted individual that technique adapts mechanical apparatus. Such adaptation is becoming progressively easier, and even takes place spontaneously when the human techniques co-operate.

A familiar case in point is the "fixation" of workers in their work. Polls reveal that when a worker begins work on an assembly line, he frequently experiences a certain malaise. He is simply not cut out for such work, and assembly-line workers are often tempted to abandon it or to request transfers. They become jittery and nervous, and evidence a profound uneasiness. But to make a living and to avoid the ever threatening unemployment, they must hold

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[9] Literally, "Man: a machine." A famous French phrase and the title of Julien Offroy de la Mettrie's celebrated work (1748) which argues the materialistic thesis that the soul, like the muscles, is the result of metabolism. (Trans.)

on to their jobs. They must force themselves to adjust to working conditions as they find them. They are "fixed." When they are questioned, they claim to be satisfied and disclaim any desire for change; the very idea of change, in fact, can call forth real fear. The results of such polls are taken to indicate that the working man is happy. But a completely different interpretation is possible: that the constant exercise of impersonal labor has resulted in the total depersonalization of the laborer. He has been shaped by his work, used by it, mechanized, and assimilated. Impartial psychological investigations reveal that the workers have been deprived of initiative and responsibility; they are "adapted" to the degree that they have become inert, unable to take risks in any area. Such findings do not, perhaps, apply to all workers, but they represent the current tendency. They are, moreover, readily understandable. Why should we demand that workers be supermen? Workers, like all other men in the technical society, have acquired a fear of change, and feel the need of the work that costs them so much. Their situation is analogous to that of the man who began by reacting to propaganda, progressively abandoned himself to it, ended by being manipulated by it, and is no longer capable of dispensing with this adjuvant to personality and excitant to thought and feeling.

Until recently it was possible to show that worker adaptation to a given machine did not represent excessive specialization in the important sense that the specialized worker could be adapted to a very great number of different machines. This statement is still perhaps true for the period we are passing through today. But the more monumental and exacting the machine becomes (and by machine I understand *organization*, too), the more indissoluble the complex man-machine becomes. The difficulty experienced by pilots of hypermodern aircraft in changing over to another type of machine, or even to another machine of the same type, is well known. This last seems a good example of the irreversible conditioning of the individual by technique. The more human factors are taken into account in the development of technique, the more man himself is a part of the development, not perhaps in a subordinate role, but irreversibly and indissolubly superordinated. But such superordination, even if we take it in its most favorable light, can scarcely represent human liberation; the human being be-

comes completely incapable of escaping from the technical order of things. Man and technique bear the same relation to each other as the social superstructure bears to the economic infrastructure in the Marxist scheme of things. Technicized man literally no longer exists except in relation to the technical infrastructure.

The theory might be advanced that in the man-machine complex man in some sense plays the role the soul plays in relation to the body in certain philosophies. But the contrary would rather seem the case, as J. M. Lahy implied long ago when he asked: "Will not this man have less and less time to be conscious of his own living presence?" No doubt, man will continue to steer the machine, but only at the price of his individuality.

Again the adaptability of man will be raised as an objection to my thesis. Why should not man be able to adapt to the technical context, since he has in the past adapted to so many new situations and to so many different conditions equally representative of profound change? Why should he forfeit his personal life now, after he has for so long been able to take new conditions in stride without forfeiting it? Technical adaptation will doubtless produce a new human type, but why should this be condemned? My reply to this theory (which has enjoyed great vogue in the past few years) is that man does indeed possess an extraordinary adaptive capacity, but this adaptability has produced very varied results. Some natives of Tierra del Fuego have succeeded in adapting to life on Cape Horn; but it can hardly be maintained that they represent a very desirable human type. I entertain no doubts whatsoever that a generalized human adaptability exists, but I am much less certain of the excellence of its results in what concerns men in the concrete. I must add that I am much more interested in real men who actually exist than in that ideal Man which has no existence except as an image and an abstraction.

The ideal Man is an escapism which eases every kind of enormity with tranquilizing abstractions. We should remember what the Nazis did with respect to this ideal in their extermination camps (which destroyed some millions of unimportant specimens). We ought to avoid the same mistake with respect to this all-virtuous ideal in the universal concentration camp we live in. What is important is not the adaptability of Man, but the adaptability of men. We shall find the answer, not in the immortal soul of the

Species, but in the preservation of our own individual souls, which are, perhaps, not immortal.

Our personal adaptability is limited. There are circumstances in which men as we know them cannot live at all. They cannot live, for example, in concentration camps, even when these exist without supplementary tortures. There are conditions in which they can indeed continue to exist, but only with the loss of everything which makes them peculiarly human. In this connection we have only to think of certain tribes terrifyingly close to the animal level (and, in some aspects of life, even below it). We need only think of the Nazi torture apparatus, or of the degradation experienced by the ordinary man in the ranks of the army in wartime. In view of these examples, we are entitled to ask what adaptation will really be like in the man-machine complex. The psychotechnicians have recognized that adaptation is not possible for everyone. In a completely technicized world, there will be whole categories of men who will have no place at all, because universal adaptation will be required. Those who are adaptable will be so rigorously adapted that no play in the complex will be possible. The complete joining of man and machine will have the advantage, however, of making the adaptation painless. And it will assure the technical efficiency of the individuals who survive it.

Up to the present, adaptation has been the product of material interaction, with all this implies in laxness, misfitting, and excess. But future adaptation will be calculated according to a strict system, the so-called "biocracy." It will be impossible to escape this system of adaptation because it will be articulated with so much scientific understanding of the human being. The individual will have no more need of conscience and virtue; his moral and mental furnishings will be a matter of the biocrat's decisions.

At present we have little conception of what this new man will be like. The technician by his existence gives us an inkling, but an imperfect one; the technician still retains elements of spontaneity. We are, however, able to divine what the new man will gain and what he will lose in comparison with the average modern man.

The Dissociation of Man. A second element, which is of great importance (and is, in a way, the inverse of the last), is the human dissociation produced by techniques. The purpose of our human techniques is ostensibly to reintegrate and restore the lost unity of

the human being. But the unity produced is the abstract unity of the ideal Man; in reality, the concrete application of techniques dissociates man into fragments. We have already considered the dissociation of human intelligence and action characteristic of modern methods of work. The same tendency is found in "shift" work. It is understood, of course, that in modern work the human being accomplishes nothing; at best he performs a neutral function during the "dead time" of the working day. He must exercise his own personality, if he exercises it at all, during the eight hours of leisure.

This tendency gives "good results" in the form of contented workers. But in another sense it is exceedingly dangerous. It is impossible to make industrial labor interesting by allowing the worker to introduce his own personality into it. He must be rendered completely unconscious and mechanized in such a way that he cannot even dream of asserting himself. The technical problem is to make his gestures so automatic that they have no personal quality at all.

What we usually say is: "The worker must be freed from continual preoccupation with the tasks of his vocation." I can easily see the good results of this liberation. But to call good the fact that the worker thinks and dreams about matters unrelated to his work while his body carries out certain mechanical activities is to sanction the psychological dissociation between intelligence and action which our technical society tends to produce and which is possibly the greatest of human scourges. We thereby admit that, when all is said and done, the ideal state, higher than consciousness, is a dreaming sleep.

To acquiesce in the thesis that work is "neutral" is to acquiesce in this profound rupture. Indeed, the individual cannot be "absent" from his work without great injury to himself. Work is an expression of life. To assert that the individual expresses his personality and cultivates himself in the course of his leisure (we have already considered what may be expected of man's leisure) is to accept the suppression of half the human personality. History compels the judgment that it is in work that human beings develop and affirm their personality. Those who set an inordinately high value on sports and gambling are without substance. Only see what leisure has made of the bourgeois classes of society!

It is possible that the modern organization of industrial society

has made people "happy." The dissociation of mental activity from physical actions probably results in a lessening of fatigue since there is no longer any need to participate or to make decisions. It is nonetheless undesirable to sanction this situation or to establish it as the norm. To do so is inevitably to weaken the human personality; it is impossible so to fragment man's personality without weakening it. A certain disequilibration may be avoided by these means. But the loss of creative power has disastrous psychological consequences. When the human being is no longer responsible for his work and no longer figures in it, he feels spiritually outraged. The technical organization of the technical society may obviate certain tendencies to aggression and frustration (in a non-Freudian sense). But the annihilation of work and its compensation with leisure resolves the conflicts by referring them to a subhuman plane.

It is difficult to understand the hope many modern men repose in leisure. Yet this hope is prevalent. It is, for example, the point of departure of Christian employers [1] who hold that in his leisure time the worker can lead a personal life, escape the constraints put upon him by society, and regain his psychic equilibrium. This is also the attitude of the socialists, who advocate the greatest possible reduction of working hours in order that the individual be afforded certain possibilities of life and self-development. It is the attitude of the technicians of labor, as reported by Friedmann. In commenting on certain essays of Leon Walther, Friedmann writes: "We must conjure up the prospect of a society in which labor will be of restricted duration, industrial operations automatized, and piecework, requiring no attention, made pleasant by music and lectures . . . a society, in short, in which culture will be identified completely with leisure. In a leisure more and more full of potentialities, and more and more active, will be found the justification of the humanistic experiment."

Friedmann is asserting here that it is impossible to make industrial labor positive. But if we agree to Friedmann's proposition that the human being can develop his personality only in the cultivation of leisure, we are denying that work is an element of

[1] See *Rapport sur le travail au Conseil Œcuménique* (1948).

personality fulfillment, or of satisfaction, or of happiness. This is bad enough; but the situation is even more serious when we consider that putting our hopes in leisure is really taking refuge in idealism. If leisure were a real vacuum, a break with the forces of the environment, and if, moreover, it were spontaneously utilized for the education of the personality, the thesis of the value of leisure might hold. But neither of these conditions is true.

We see first of all that leisure, instead of being a vacuum representing a break with society, is literally stuffed with technical mechanisms of compensation and integration. It is not a vacuous interval. It is not a human kind of emptiness in which decisions might be matured. Leisure time is a mechanized time and is exploited by techniques which, although different from those of man's ordinary work, are as invasive, exacting, and leave man no more free than labor itself. As to the second condition, it is simply not the case that the individual, left on his own, will devote himself to the education of his personality or to a spiritual and cultural life. We are perpetually falling into this idealism. In fact, modern man himself seeks to give a technical form to his leisure time and rebels against entering the sphere of human creativity. Since his youth, and in his vocational activity, he has been unrelentingly "adapted." If the individual must be regimented into intelligent use of his free time, if he is obliged to spend this time learning how to be "human," of what value are vacations and leisure? Where in this new framework of propaganda is there room for the transcendingly important elements of personality formation, choice, personal experience, and spontaneous participation in creative activity? Who or what is to be his guide in the collective, educative employment of leisure? The employer? the administration? the labor unions? To put the question at all is to recognize its fatuity. What if man's leisure allowed him to judge his own work? What if, in becoming "cultivated" or, even better, "a real person," he should rebel against his stupid, mechanized job? Or find his four hours of obligatory servitude an intolerable abasement? It is unimaginable.

We conclude that the education of the human personality cannot but conform to the postulates of technical civilization. Man's leisure must reinforce the other elements of this culture so there will be no risk of producing poorly adjusted persons. This is the

direction the techniques of amusement have taken. To gamble that leisure will enable man to live is to sanction the dissociation I have been describing and to cut him off completely from a part of life.

Historically it has always been possible for men to realize themselves in their free time. The individual has always found self-expression both in work and in leisure; the two exist in a mutual relationship and express two consubstantial aspects of the human being. It is idealistic to expect leisure to replace the functions of both work and leisure or to epitomize and take upon itself the whole of life. A minimum condition would be that automatic work, the *travail néant*, be of very limited duration, perhaps three or four hours daily. But such a reduction of working hours is still a long way off. And even if we could be certain that this would come to pass in two or three generations, might not the human being have been so transformed by that time that his spontaneous creative power would have been irreparably destroyed? It would be utterly idealistic to reply in the negative. And it would be twice-compounded idealism to believe that the individual with fourteen hours of leisure free of technique and of necessity, would spontaneously produce works expressing his personality.

There are people who have hobbies such as gardening or puttering about the house. But what is the proportion of such people to those who do nothing? The melancholy fact is that the human personality has been almost wholly disassociated and dissolved through mechanization.

All this shows once again how illusory it is to pin to one sector of technique the hopes which serious analysis denies all of them. We must conclude that the organizers of work, who have clearly recognized the nature of modern labor, have failed to recognize the nature of leisure. If it is asked whether leisure could be otherwise, the answer is that it could. So could the conditions of work. And the state and human nature. But if we are going in for all these conditionals, paradise could also find a place on earth.

The Triumph of the Unconscious. Flight is always possible. It is, indeed, the spontaneously chosen solution (moreover, it represents still another aspect of the technical encirclement of the person). If there cannot be any real salvation, the individual escapes into illusion and unconsciousness. Modern man (I do not speak of the theoreticians) represses his fear of the technical world and intoxi-

cates himself with action, or, better, with the illusion of action. One of the most genuine men of our time, Georges Navel, is a living witness to the possibility of true freedom even in a technical world. But Navel has had to pay a fearful price for this freedom in effort, asceticism, and refusal to compromise. And even Navel is not completely free of the illusion of action, as shown by his recommendation of "political participation" as one means of curing the world's malaise.

The individual who engages in party politics, with its program of activities, meetings, and fellowship, may well discover in it an answer to the problems of disequilibration. Indeed, the more demanding the party, the more efficacious the remedy. Communism long ago denounced the political activity of the democracies as an intolerable hoax and a "flight into unreality." For them, democratic political "action" is completely useless. I will not go into Marx's analysis of democracy, which I hold to be true. But everything Marx has to say about democratic political action seems to me to hold, feature for feature, for Communist politics as well. The individual who throws himself into political activity of any coloration has the gratifying impression that he is accomplishing something, and justification and satisfaction. But the sad truth is that he is resolutely by-passing the real problem and repressing it. This kind of compensation, which is natural and easily understandable, can nonetheless only result in human disintegration and a new technical alienation. A detailed consideration of political activity would bring us back once more to the same point. Political activity allows the human being to exist in the technical milieu, but it is regression nonetheless, and a corollary to the general flight into unconsciousness.

But this is true of work and, in fact, of all elements of human life. All of them, to the extent that they are encircled and repressed by technique, tend to pass over the lower threshold of consciousness. The unconscious tends, therefore, to play an ever more important role in the conduct of human life.

Every technique, and above all every human technique, makes a fundamental appeal to the unconscious. At the same time the sphere of action of the unconscious is enlarged by means of the repressions I have mentioned. It is highly significant that technical elements begin to appear in what the psychoanalysts call the

"great dreams." The traditional figures of certain typical dreams, figures which go back to the remotest human times, are beginning to be displaced by technical instruments. Bastide notes the appearance of the automobile in the dreams of certain Indian tribes. The important point here is that a technical contrivance has replaced traditional symbols; the breakdown of an automobile, it would seem, is symbolic of sexual derangement. This mechanical penetration of the unconscious indicates that nothing human is exempt from the influence of technique.

In art, technical influence has been marked. Indeed, modern art expresses the subconscious precisely to the degree that the subconscious has been influenced by the machine. The artist is in fact a seismograph that records the fluctuations of man and society. The cubist and abstract schools of art (as, in poetry, dadaism and oneirism) are aspects of this deep reality. With very different forms, Chirico, Léger, and Marcel Duchamp, sometimes consciously and sometimes unconsciously, show us the coupling of machine and person. They show too the absurdity of the mechanical world, however rational it may be, and the impossibility of an aesthetic based on the technical movement unless it is an aesthetic of madness. A major section of modern art and poetry unconsciously guides us in the direction of madness; and, indeed, for the modern man there is no other way. Only madness is inaccessible to the machine. Every other "art" form can be reduced to technique; note the utilitarian art of the Soviets. The artists of our time are the most impressive witnesses to the fact that a true aesthetics is an impossibility for men whose only alternatives are madness or pure technique; and this in spite of the existence of powers of artistic invention such as past civilizations have seldom seen.

As long as modern art was concerned with an aesthetic of movement (as opposed to the older aesthetic of form), with the integration of duration into graphic representation, with the "simultaneity" of Miro, Picasso, and Klee, an artistic world capable of development was still possible. But although the artist of the present can still master and represent the impulse of the machine, he is completely overwhelmed and impotent in a world that has a place only for a human being who has been stripped of his real self. Contemporary art forms bear witness to this impotence.

We must pay due respect to the honorable struggle being waged by those who wish to deliver men from the clutches of technique and restore certain possibilities of living to man. If I have criticized their research on work and leisure, I did so not because I object to their aims but because I distrust their illusions and idealism.

If we take note of the penetration of technique into the unconscious, we must also consider the inverse, the exploitation of this penetration by other techniques with the purpose of reinforcing it and making it more complete. I have indicated that propaganda is based on the manipulation of the subconscious by technical means. So are those hypermodern police methods which have as their end the establishment of a "neurotic complex" based on feelings of insecurity. Our technical world not only creates these feelings spontaneously, it develops them with malice aforethought for technical reasons and by technical means which, in their action on the human being, reinforce the structures of that technical world. "The only person who still remains a private individual is he who is asleep," declared Robert Ley in a noteworthy phrase. The words might be taken to refer exclusively to the Nazi regime. But they are not limited. They pertain to the integration of all men into a brutally technicized environment.

Ley's aphorism, however, is not altogether exact, for we have observed the intrusion of technique even into dreams. This phenomenon has been given a Freudian interpretation in terms of the "superego," which lays hold of the thoughts and feelings of every individual. This concept of the superego, which is composed of the collective imperative and mass assimilation, brings us to a new series of observations centering about the "mass man."

Mass Man. Modern society is moving toward a mass society, but the human being is still not fully adapted to this new form.

The purpose of human techniques is to defend man, and the first line of defense is that he be able to live. If these techniques strengthen him in his nineteenth-century individualism (itself no ideal state of affairs), they only aggravate the split between the material structures of society, the social institutions, and the forces of production, on the one hand, and man's personal tendencies, on the other. This presupposes that technique can in fact defend man's individuality. But such a disruption is technically impossible because it would entail insupportable disorders for man. Human

techniques must therefore act to adapt man to the mass. Moreover, these techniques remain at variance with the other material techniques on which they depend. They must contribute to making man a mass man and help put an end to what has hitherto been considered the normal type of humanity. The type that will emerge and the type that will disappear will be the subjects of a forthcoming work. For the moment, it suffices to establish concretely the tendencies of our human techniques to create the mass man.

Material techniques usually result in a collective social form by means of a process which is largely involuntary. But it is sometimes voluntary; the technician, in agreement with the technical data, may consider a collectivity a higher social form. Involuntary and voluntary action are both to be observed, for example, in the sphere of psychological collectivization. I have indicated (for example, in my treatment of leisure) the means by which this involuntary and, in a way, automatic adaptation appears. I shall refer to one other striking phenomenon of involuntary psychological collectivization: advertising.

The primary purpose of advertising technique is the creation of a certain way of life. And here it is much less important to convince the individual rationally than to implant in him a certain conception of life. The object offered for sale by the advertiser is naturally indispensable to the realization of this way of life. Now, objects advertised are all the result of the same technical progress and are all of identical type from a cultural point of view. Therefore, advertisements seeking to prove that these objects are indispensable refer to the same conception of the world, man, progress, ideals—in short, life. Once again we are confronted by a technical phenomenon completely indifferent to all local and accidental differences. Indeed, American, Soviet, and Nazi advertisements are in inspiration closely akin; they express the same conception of life, despite all superficial differences of doctrine. The Soviet Union, after having for a period violently rejected the technical system of advertising publicity, has more recently found it indispensable.

Advertising, which is founded on massive psychological research that must be effective, can "put across" the technical way of life. Any man who buys a given object participates in this way of life and, by falling prey to the compulsive power of advertising, enters

involuntarily and unconsciously into its psychological framework.

One of the great designs of advertising is to create needs; but this is possible only if these needs correspond to an ideal of life that man accepts. The way of life offered by advertising is all the more compelling in that it corresponds to certain easy and simple tendencies of man and refers to a world in which there are no spiritual values to form and inform life. When men feel and respond to the needs advertising creates, they are adhering to its ideal of life. This explains the extremely rapid development, for example, of hygiene and cocktails. No one, before the advent of advertising, felt the need to be clean for cleanliness' sake. It is clear that the models used in advertising (Elsie the Cow, for instance) represent an ideal type, and they are convincing in proportion to their ideality. The human tendencies upon which advertising like this is based may be strikingly simple-minded, but they nonetheless represent pretty much the level of our modern life. Advertising offers us the ideal we have always wanted (and that ideal is certainly not a heroic way of life).

Advertising goes about its task of creating a psychological collectivism by mobilizing certain human tendencies in order to introduce the individual into the world of technique. Advertising also carries these tendencies to the ideal, absolute limit. It accomplishes this by playing down all other human tendencies. Every man is concerned, for example, about his bodily health—but show him Superman and it becomes his destiny to be Superman. In addition, advertising offers man the means for realizing material desires which hitherto had the tiresome propensity of not being realized. In these three ways, psychological collectivism is brought into being.

Advertising must affect all people; or at least an overwhelming majority. Its goal is to persuade the masses to buy. It is therefore necessary to base advertising on general psychological laws, which must then be unilaterally developed by it. The inevitable consequence is the creation of the mass man. As advertising of the most varied products is concentrated, a new type of human being, precise and generalized, emerges. We can get a general impression of this new human type by studying America, where human beings tend clearly to become identified with the ideal of advertising. In

America advertising enjoys universal popular adherence, and the American way of life is fashioned by it.

In addition to the involuntary, psychological activity which leads to the creation of the mass man, there are certain conscious means which can be used to attain the same end. We must not misunderstand the qualification *conscious* in this connection. The degree of choice is very small; the process is effectively conditioned by material techniques and the beliefs they engender. However, this consciously concerted action is geared to psychological collectivization and, unlike advertising techniques, exerts a direct effect. It has a twofold basis and a twofold orientation, and centers about the notions of group integration and unanimity, which I shall discuss in the following section.

Up to now, in discussing human techniques we have considered only man's need for adaptation with a view to his happiness or, at least, his equilibrium. This plays a role here too. For example, it can be shown that in our society the individual experiences tranquility only in a consciously gregarious state. This involves not only the indeniable "strength in unity" and "forgetfulness of one's lot in the crowd," but also the conscious recognition of the need to apply adequate remedies to social dangers. In our culture, the person who is not consciously adapted to his group cannot put up adequate resistance. Lewin's studies of anti-Semitism, for example, indicate that the Zionist groups with their collective psychology were able to withstand persecution much more readily than were the unorganized Jews who had retained an individualistic mentality.

It cannot be denied that this kind of conscious psychological adaptation, which gives the individual a chance to survive and even be happy, can produce beneficial effects. Though he loses much personal responsibility, he gains as compensation a spirit of co-operation and a certain self-respect in his relations with other members of the group. These are eminently collectivist virtues, but they are not negligible, and they assure the individual a certain human dignity in the collectivity of mass men.

While I have insisted on the "humanistic" tendencies of human techniques and, starting from the premise that man must be adapted to be happy, have tried to demonstrate the necessity of

these techniques and their interrelation with all other techniques, my attitude has been resolutely optimistic. I have presupposed that technical practices and the intentions of the technicians were subordinated to a concern with human good. And when I traced the background of the human techniques, I proceeded from the most favorable position, that of integral humanism, which, it is claimed, is their foundation.

But there are more compelling realities. The tendency toward psychological collectivization does not have man's welfare as its end. It is designed just as well for his exploitation. In today's world, psychological collectivization is the *sine qua non* of technical action. Munson says: "By building the morale of the troops, we are trying to increase their yield, to substitute enthusiastic self-discipline for forced obedience, to stimulate their will and their attention —in short, we are pursuing success." There he gives us the key to this kind of psychological action: the yield is greater when man acts from consent, rather than constraint. The problem then is to get the individual's consent artificially through depth psychology, since he will not give it of his own free will. But the decision to give consent must appear to be spontaneous. Anyone who prates about furnishing man an ideal or a faith to live by is helping to bring about technique's ascendency, however much he talks about "good will." The "ideal" becomes so through the agency of purely technical means whose purpose is to enable men to support an insupportable situation created within the framework of technical culture. This attitude is not the antithesis of the humanistic attitude; the two are interwoven and it is completely artificial to try to separate them.

Human activity in the technical milieu must correspond to this milieu and also must be collective. It must belong to the order of the conditioned reflex. Complete human discipline must respond to technical necessity. And as the technical milieu concerns all men, no mere handful of them but the totality of society is to be conditioned in this way. The reflex must be a collective one. As Munson says: "In peacetime, morale building aims at creating among the troops that state of mental *receptivity* which makes them susceptible to *every psychological excitation* of wartime." And this "receptivity" must also be instilled in every other human group in the technical culture, and especially in the masses of the workers.

Psychological conditioning presupposes collectivity, for masses of men are more receptive to suggestion than individuals, and, as we have seen, suggestion is one of the most important weapons in the psychological arsenal. At the same time, the masses are intolerant and think everything must be black or white. This results from the moral categories imposed by technique and is possible only if the masses are of a single mind and if countercurrents are not permitted to form.

The conditions for psychological efficiency are, first, group integration and, second, group unanimity. (This should not be taken to mean that on a larger scale there may not be a certain diversity.) I am speaking of a determinate group (for example, a political party, the army, an industrial plant) which has a definite technical function to fulfill. The purpose of psychological methods is to neutralize or eliminate aberrant individuals and tendencies to fractionation. Simultaneously, the tendency to collectivization is reinforced in order to "immunize" the environment against any possible virus of disagreement.

When psychological techniques, in close co-operation with material techniques, have at last succeeded in creating unity, all possible diversity will have disappeared and the human race will have become a bloc of complete and irrational solidarity.

Total Integration

Until recently, we were obliged to think of man as divided in his relation to the technical world. One part of him was given over completely to the monster and subjected to the interior and exterior rules; but the other part he could keep for himself: his inner life, his family life, his psychic life. He suffered from this division, but nonetheless he retained a very considerable measure of freedom. (When he insisted on retaining too much, he was said to be suffering from a proportionate lack of social adaptation.) Many more aspects of the human personality have been exposed to the technical society, and today very nearly the entire human race is experiencing this progressive cleavage of personality. The average man, with his sentimental and intellectual attachments to the past,

suffers acutely. Rare are the men who have so completely renounced the inner life as to hurl themselves gladly and without regret into a completely technicized mode of being. Such persons may exist, but it is probable that the "joyous robot" has not yet been born.

I have repeated time and again that this tension, this dichotomy, is harder and harder to bear and begins to appear more and more baneful in its influence even to the psychologists, sociologists, and teachers, that is, to the psychotechnicians in general. They want to restore man's lost unity, and patch together that which technical advances have separated. But only one way to accomplish this ever occurs to them, and that is to use technical means. Since the human sciences are applications of technical means, this entails rounding up those elements of the human personality that are still free and forcing ("reintegrating") them into the expanding technical order of things. What yet remains of private life must be forced into line by invisible techniques, which are also implacable because they are derived from personal conviction. Reintegration involves man's covert spiritual activities as well as his overt actions. Amusements, friendship, art—*all* must be compelled toward the new integration, thanks to which there is to be no more social maladjustment or neurosis. Man is to be smoothed out, like a pair of pants under a steam iron.

There is no other way to regroup the elements of the human personality: the human being must be completely subjected to an omnipotent technique, and all his acts and thoughts must be the object of the human techniques. Those men, undoubtedly "men of good will," who are so preoccupied with the technical restoration of man's lost unity certainly have not willed things as they have turned out. Their error lies much more in not having clearly seen genuine alternatives. The conscientious psychologist, sympathetic though he may be to human suffering, does not even consider alternative solutions to the problem. For him, technique imposes a technical solution. And this solution indeed restores unity to the human being, but only by virtue of the total integration of man into the process which originally produced his dismemberment. The psychologist sees this dismemberment (and civilization's neuroses, too) as symptomatic of the incompleteness of the absorptive process. To achieve unity, then, means to complete the process.

Technical Anesthesia. It seems odd that the application of a technique designed to liberate men from the machine should end in subjecting them the more harshly to it. But given the technological state of mind, the paradox is easily explained. Consider a worker who is subject to a machine and its caprices. He must follow the machine's tempo and breathe its waste products. At the same time, he must fight off fatigue and boredom. In short, he must perform the work of two men. The efficiency expert comes and institutes procedures to automate actions and save energy by transforming everything into mechanical reflexes. But the psychologist is dead set against this; he finds insupportable the total subjection of the worker to the machine which the efficiency expert has elaborated, and he proposes to liberate him. To accomplish this laudable end, the psychologist in turn elaborates a science of human behavior with its own laws of human psychology; for example, laws concerning worker fatigue, and so on. He draws up a program not merely of the worker's actions in the factory, but of his whole life. The human being ends by being encased in an even broader technical framework. It will doubtless make life easier and enable him to work with a minimum of effort, but only on condition that he follow its rules to the letter. The example is a simple one, but it can be found in every sphere of human activity, wherever the psychotechnician has felt himself called upon to "liberate" mankind. Progress must obviously be paid for by even harsher subjection to the instrument of salvation. The worker is in the same situation as the invalid racked by pain who receives an anodyne narcotic which makes him an addict—the addiction persists even after he has been "cured." In much the same way, a nation that has been subjected to a totalitarian propaganda barrage is unable to get its bearings in a direct and natural way after the barrage has ceased; the psychic trauma was too profound. The sole means of liberating people from "ideas" so inculcated is through another propaganda campaign at least as intense as the first. But the new propaganda only subjects them to a psychic pressure that kills a little more of their freedom.

Consider an inquisitorial and brutal police force that operates as it pleases and carries out arrests arbitrarily. No citizen has any peace of mind. Yet the only remedy so far devised for the disease is the establishment of the hypermodern system of dossiers. Every

citizen is kept track of throughout his life, geographically, biologically, and economically; the police know precisely what he is up to at every moment. This police system no longer needs to be brutal, openly inquisitorial, or omnipresent to the public consciousness. But it permeates all of life, in a way the average citizen finds it impossible to understand. Just what has been gained? Admittedly, man need no longer be apprehensive at work, or live perpetually under suspicion, or be afraid of being subjected to the "third degree." The terror which until now has been an integral part of the police methods of totalitarian states is, or soon will be, a thing of the past. The "terror over the city," perfectly described by Cerrado Alvaro, is only a transitory stage. A diffuse terror usually follows open police raids and public executions. At this stage the police may be invisible, but they lurk in the shadows. One hears tales of secret executions in the soundproof cellars of vast, mysterious buildings. At a still more advanced stage of police technique, even this diffuse terror gradually dissipates. The police exist only to protect "good citizens." They no longer carry out raids and there is nothing mysterious about them; therefore they are not felt to be oppressive. Police work has become "scientific." Their files contain dossiers of every citizen. The police are in a position to lay hands on anyone "wanted" at any moment, and this obviates to a great degree the necessity of doing so. No one can evade the police or disappear. But, then, no one wants to. An electronic dossier is not particularly fearsome.

Here we have the essence of the techniques of "humanization": to render unnoticeable the disadvantages that other techniques have created. The task of the technician is to develop machine techniques and human techniques to such a pitch of perfection that even the man face to face with the perfectly functioning machine no longer has human initiative or the desire to escape. In a simple machine, a sticking gear or an overheated rod calls the existence of the machine to the notice of its vexed user. A lubricating technique is needed which will make the machine function so smoothly that its presence is not felt. The ability to forget the machine is the ideal of technical perfection. In the "man-machine" complex, friction results from the collision between the human being and the organization. This friction can take a number of forms. Individual initiative may become irritated by some obvious

mechanical failure; the individual may insist on operating the machine in a manner not provided for in the rules of automatism. The problem then is twofold: to perfect mechanical techniques, on the one hand, and to invent and impose certain human techniques, on the other, so as to obviate the human sources of friction. As Latil has pointed out, self-guiding techniques that operate without any external interference are possible. This has been demonstrated by machines that are autonomous, have a memory, and anticipate future events. Skeptics of the kind who denied a priori the possibility of heavier-than-air machines will deride this as mere imagination. It is true that such machines have not yet been perfected, but even an approximation in this direction would suffice for our argument.

The technical society must perfect the "man-machine" complex or risk total collapse. Is there any other way out? I am convinced that there is. Unfortunately, I am also compelled to note that neither the scientists nor the technicians want any part of any other solution. And since I work with realities and not with abstractions, I recognize the inevitability of the fact that technical difficulties demand technical solutions. All the troubles provoked by the encounter between man and technique are of a technical order, and therefore no one dreams of applying nontechnical remedies. Men distrust them. A. Sargent well expresses the common opinion:

> Humanity is still captive of a metaphysical and dogmatic mentality at a time when experimental science (technique) could beyond any doubt allow them to solve their principal difficulties. We are still half buried in scholasticism at a time when biology is in a position to be our salvation . . . Our dogmatisms have well shown their mischievousness . . . It is therefore indispensable henceforth to resist the seductions of systems based on metaphysics and to face up to the one reality which we can understand and which concerns us . . . The life-sciences bring together certain means of knowledge and action. All doctrines which draw their inspiration from abstract conceptions have already betrayed their fundamental incapacity to organize the human world. Biocracy, that is, organization in accordance with the basic laws of life, represents our only chance of salvation at a moment of our development in which the various metaphysics and systems left over from archaic cultures still corrupt human life.

Sargent's position is clear. What is catastrophic in our situation is the survival of philosophies, political doctrines, and religion. (I am unable, incidentally, to believe them so powerful!) As to technique, it is completely innocent of the imminent catastrophes. Despite exaggerations, the text is clear: no other solution is possible, no other hope, than that represented by the improvement of human techniques. Every other solution is either inefficient or mischievous.

Sargent's attitude is representative of that of the majority of technicians. We have already examined the kind of future it holds in store for us.

Integration of the Instincts and of the Spiritual. We shall now take up perhaps the most difficult technical phenomena to grasp, inasmuch as they do not concern human techniques directly, but rather certain of their results.

It is often objected that skeptics fail to understand the nature of technical society because they are unwilling or unable to accept the extraordinary power of spiritual resistance to technical invasion of which human beings are capable. Everywhere, it is said, human liberty affirms itself in a world that the skeptics have declared closed to it. In proof of this, literary and musical forms are invoked like magical incantations. Abstract painting, surrealism, jazz; ethical forms such as "eroticism" and the "politics of engagement" are said to be manifestations of the supremacy of human freedom and will in the technical society. No one, of course, seeks to deny that these phenomena are immediately related to the technicity of the present; the question is how they are to be interpreted. It is true that man has psychic power, the strength of which is not yet known. Man is capable of outbursts of passion and violence. It does not seem that those sources of vital energy which might be summarized as sexuality, spirituality, and capacity for feeling have been impaired.

But every time these forces attempt to assert themselves, they are flung against a ring of iron with which technique surrounds and localizes them. Moreover, technique attacks man, impairs the sources of his vitality, and takes away his mystery. We have seen that one of the objectives of certain human techniques is to rob him of this mystery. And men must and do react instinctively and spiritually to the aggression of technique. When Henry Miller ut-

ters his anguished wail against the modern world, he is appealing through his fundamental eroticism to man's most primitive instincts. When the American Negro was still a slave, jazz meant release from despair and chains. But it is questionable that eroticism and jazz really represent a purposive reaction to technical aggression. We cannot settle these problems by appealing to a purely verbal idealism.

Jazz is one of today's most authentically human protests. Let us trace it back to its origin. The Negroes were hopelessly enslaved. The story of their toil, punishments, hate, and crushed rebellions has been often told. The terrible black emperor of Santo Domingo was now no more than a dream. In their extremity the Negroes discovered song, which likewise answered the needs of faith. Music expressed for them at once the despair of the present and the hope for salvation in Christ. Its culmination in delirium brought deliverance, but only as opium and alcohol did for others. Marx's celebrated remark that nineteenth-century religion was the opiate of the European masses is equally applicable to the jazz of the Negro slaves. In jazz they created a true art form. But with it they also shut every door to freedom. Jazz imprisoned the Negroes more and more in their slavery; from then on, they drew a morose relish from it. It is highly significant that this slave music has become the music of the modern world.

All instincts seem more unbridled today than ever before—sex; passion for nature, the mountains, and the sea; passion for social and political action. There cannot have been many historical periods in which these forces were so evident or so authoritative. Again, I have no wish to deny whatever validity they possess. It is good for city dwellers to go to the country. It is good that a marked eroticism is wrecking the sclerotic traditional morality. It is well that poetry, thanks to such movements as surrealism, has become really expressive once more. But these phenomena, which express the deepest instinctive human passions, have also become totally innocuous. They question nothing, menace nobody. Behemoth[1] can rest easy; neither Henry Miller's eroticism nor André Breton's surrealism will prevent him from consuming mankind. Such move-

[1] Behemoth (Hebrew; plural of *majesty*) designates matter organized, glorified, and set in motion.

ments are pure formalisms, pure verbalisms. No one has ever carried out the famous "pure surrealist act." And as for the self-styled revolution in ethics of Miller and the "black novels" of Boris Vian and others, all they amount to for the normal man is an invitation to a brothel (something which has never passed for revolutionary or as an affirmation of freedom). It is harmless to attack a crumbling middle-class morality. True, persecutions, seizures, and lawsuits have been directed against the "black" authors. But I would like to point to the tidy profits that such minor scandals have brought them. I am somehow unable to believe in the revolutionary value of an act which makes the cash register jingle so merrily.

For a like reason, the "politics of engagement" are vitiated. The monolithic political parties consist of the fossilized rank and file (who can scarcely be thought to be manifesting any particular activity or to be striking a blow for freedom merely because the hearse which is transporting them is rolling along at a clip) and of party intellectuals and directors who are out after votes and money. It is as though a winner of the National Lottery could pass for a martyr.

Then there is the modern passion for nature. When it is not stockbrokers out after moose, it is a crowd of brainless conformists camping out on order and as they are told. Nowhere is there any initiative or eccentricity.

In sum, the supreme forces of human nature are set into motion for the sake of amusement. The great bell in the cathedral tower, formerly rung to call the city's warriors to arms, is sounded to amuse foreign tourists. At this point I shall not make a lengthy analysis of the social forces we have been speaking of.[3] It is enough to indicate the contrast between the powers aroused and the ghastly mediocrity of the end products; between the pretensions of André Breton, for example, and the results. What has happened to the deepest human passions stems from many different causes. The only one of concern to us here is the fact that these spiritual movements are totally confined within a technical world. Here is yet another example of the phenomenon described at length in the second chapter, that technique encompasses the

[3] I have studied these central problems in a series of articles entitled "Conformism de notre temps," *Réforme*, 1949.

totality of present-day society. Man is caught like a fly in a bottle. His attempts at culture, freedom, and creative endeavor have become mere entries in technique's filing cabinet.

The Final Resolution. A precise question is posed: Into what has technique transformed man's efforts toward the spiritual?

One answer to this question is that technique possesses monopoly of action. No human activity is possible except as it is mediated and censored by the technical medium. This is the great law of the technical society. Thought or will can only be realized by borrowing from technique its modes of expression. Not even the simplest initiative can have an original, independent existence.

Suppose one were to write a revolutionary book. If it is to be published, it must enter into the framework of the technical organization of book publishing. In a predominantly capitalistic technical culture, the book can be published only if it can return a profit. Thus, it must appeal to some public and hence must refrain from attacking the real taboos of the public for which it is destined. The bourgeois publishing house will not publish Lenin; the "revolutionary" publishing house will not publish Paul Bourget; and no one will publish a book attacking the real religion of our times, by which I mean the dominant social forces of the technological society. Any author who seeks to have his manuscript published must make it conform to certain lines laid down by the potential publishers. A manuscript which in subject matter and format does not conform has no chance. This is the situation at the most elementary level of the technical publishing organization. One step further and we encounter the notorious system of the "rewrite."

If the publishing system is state-owned, the publication of revolutionary literature cannot even be considered. All this amounts to saying that technical forces, which were put into operation ostensibly for the diffusion of thought, lead in practice to its emasculation. The same holds true for broadcasting under private capitalism or under state ownership. It is impossible to agree with the ideologues who assert that capitalism is synonymous with freedom of broadcasting[4] or with those who assert that state ownership means humanization.

[4] M. Veillé's analysis of this point is convincing. See his *La Radio et les hommes* (Paris: Editions de Minuit; 1951).

Of course, we can write or teach anything, including pornography, inflammatory revolutionary manifestoes, and new economic and political doctrines. But as soon as any of these appear to have any real effect in subverting the universal social order (which is establishing itself in every country of the world with the support of the overwhelming majority of the respective populations), they are forthwith excluded from the technical channels of communication. As Crozier justly remarks: "The intellectual has a difficult life. He can only live by communicating, but he has been deprived of the means without which he cannot communicate." The intellectual has become a mere mouthpiece subject to the demands of the various techniques. According to Wiener, this is the cause of the progressive sterilization of intellectual life in the modern world. As Wiener puts it, present-day methods of communication exclude all intellectual activity except what is so conventional that it has no decisive value.

In the same way technique controls the nascent love of nature. The lone city dweller on a camping trip escapes his technical fate momentarily. But suppose that the solitary camper swells to a throng, overflows the countryside, sets the woods on fire, and commits other nuisances? Suppose he disturbs the "paying" guests? or trespasses on private property and hunting preserves? The public interest is then involved and technique intervenes, as it invariably does where large numbers of men are concerned. (Inversely, technique is creating a culture in which if large numbers are not involved, there is nothing at all.) Intervention then takes the form of an administrative police technique. Obligatory camp sites are established, complete with regulations. The camper is forced to carry a license, and the erstwhile act of free individual decision becomes a purely technical matter.

When an individual engages in political action a corresponding technical mechanism is set in motion. Political action is no longer possible except as a mass phenomenon, and "engagement" presupposes participation in a collectivity. Only a collectivity is wealthy enough to have at its disposal the means to "play politics." Only a collectivity can make itself felt in a world in which technique has given primacy to the quantitative rather than the qualitative. Since an inorganic mass would be inefficient, the collectivity must be optimally organized, with all that this implies in the way

of unity, discipline, and tactical flexibility. These are the exclusive province of technical organization, a fact which straightway leads to the formation of monolithic political parties, which alone can hope for success. Once again technique imposes its iron law on the generous strivings of the individual heart.

These brief examples, taken from as diverse spheres as possible, make it evident that today every human initiative must use technical means to express itself. These technical means *ipso facto* "censor" initiative. First, they screen out whatever does not lend itself to technical expression; initiative remains a purely private matter, with no importance to the technical society. Second, they compel a rigid conformism; initiative is reduced to the lowest common denominator and is, in effect, emasculated. The interplay of the technical censorship with the pretended "anarchic" spiritual initiatives of the individual automatically produces the situation desired by Dr. Goebbels in his formulation of the great law of the technical society: "You are at liberty to seek your salvation as you understand it, provided you do nothing to change the social order." All technicians without exception are agreed on this dictum. It is understood, of course, that the social order is everywhere essentially identical: the variation from democracy to Communism to Fascism represents a merely superficial phenomenon.

A second answer to our question of how technique has transformed man's quest for the spiritual involves an examination of the fate of the ecstatic [5] impulses and phenomena of the human spirit.

It is not difficult to observe that ecstatic phenomena proliferate in proportion to the technicization of society. They play an important role in modern society, but not the role usually assigned them. They function not as causes but as effects. It is childish to believe that Communism and Fascism, for example, created a mystique out of whole cloth, which they then imposed on their peoples; that they have blown up a vast bag of wind with which they "seduce" or "delude" the world. On the other hand, it is too easy to say that the Russian soul and the German soul were naturally "predisposed" to these systems. We would then have to hold that the Italian (and

[5] In what follows, the word *ecstasy* is used in its original Greek sense to denote a mental state transported out of its usual condition. The word denotes anarchic and antisocial tendencies as well as the more pleasant transports we usually associate with it. It is the ground of war as well as of religion. (Trans.)

now the Yugoslav and Chinese) souls are similarly predisposed. The myth presupposes a psychological basis—that people adhere to systems because these systems respond to something "true" in them. But this truth is certainly not very specific since very different sorts of people adhere to it. Further, mystic systems are not arbitrary creations of dictatorial regimes. No more are they the result of the demented will to power of the mighty. No "popular movement" can produce them; the requirements far exceed the spontaneous mystic capabilities of man. The real reason for the emergence of society as we know it is not mystic or psychic but technical.

It is nevertheless true that ecstatic phenomena are found today in the societies that have as their avowed aim the maximal exploitation of technique. Ecstasy occurs here, however, not as a cause but as a result of the technical society. More specifically, it is a function of the acceleration of the tempo of the technical society,[6] rather than of the technical level of the society.

For a long time it was believed that technique would yield a harmonious society, a society in equilibrium, happy and without special problems. This society would resign itself to an easy life of production and consumption based on an untroubled commercial ideology. This model of bourgeois tranquillity seemed to correspond exactly to the preoccupations of technology. The *summum bonum* was comfort, and the ideal type was capitalist Switzerland or socialist Sweden. The sudden plunge of the technically most advanced societies into war and mutual destruction was a rude awakening for the *bourgeoisie.* An aberration? Scarcely. It had been forgotten that technique means not comfort but power. The bourgeois countries had developed their technical systems at a comfortable pace, until these systems had fully exploited their possibilities of orderly growth. Then technology, with its accelerated tempo, took over. The smaller nations were unable to keep up. And the great technical countries had willy-nilly to abandon their

[6] Ellul anticipates here a recent preoccupation of so-called "general system theory," according to which social and psychological phenomena depend for their specific results on the acceleration of linear systems and not upon their position or velocities. The latter is usually a condition of equilibrium; the former seldom is. Thus, to give a trivial example, it is not the absolute value of the world's population at any moment which threatens social dissolution, but the rate at which it is increasing, especially if the rate of increase is itself increasing. (Trans.)

languid pace and accommodate themselves to the real tempo of the technical society. The result was that disproportion between the leisurely bourgeois mentality and the explosive tempo of technique to which we give the name *war*. A by-product of this ecstasy was a certain mystique. The American myth was born, presenting exactly the same religious traits as the Nazi or Communist myth. But it is different, as we have often noted, in that it still is in a spontaneous phase; it is not yet organized, utilized, and developed technically.

Whatever the actual technical level of the country, as soon as technical acceleration appears, the mystique appears too. Even technically backward societies experience it as soon as they decide to adopt modern techniques. So do such societies as the Nazi or the Communist when they take up and adapt to their system whatever is new. The more languid social groups, such as Switzerland or France, which cannot or will not submit to technical acceleration, do not manifest these phenomena.[1]

A nation which has reached a pitch of perfection in its technical organization sometimes feels this perfection to be intolerable. Such a factor was probably the cause of the astonishing ecstasy of "combativity without object" which erupted in Sweden in December 1956. In a too-perfect universe the human being has no adequate way of releasing the deepest impulses of human nature. These obscure forces are always there, and tend to emerge to the degree that perfect technical constraint has not yet been fully achieved.

These observations confirm Roger Caillois's statement that the more restrictive the social mechanism, the more exaggerated are the associated ecstatic phenomena. The restrictions imposed by technique on a society reduce the number of ways in which religious energy can be released. In a nontechnical society there are a plurality of ways in which psychic energy can be channeled; but in a technical society there is only one. Technical restrictions eliminate all secondary objects. Human psychic energies concentrate, and there are no "leaks." The result is ecstatic phenomena of unparalleled intensity and duration.

In today's technical society, magical and mystical tendencies which traditionally were in opposition are all mutually satisfied by

[1] Since 1958 France has experienced both rebirth of technical progress and a nationalistic mystique.

technique and hence made one. Technique fully satisfies the mystic will to possess and dominate. It is unnecessary to evoke spiritual powers when machines give much better results. But technique also encourages and develops mystical phenomena. It promotes the indispensable alienation from the self necessary, for example, for the identification of the individual with an ideology. Whether man identifies with a father figure or with an abstraction, this identification is incited by the recognition of an exceptional charismatic quality. This quality, integrated into the technical society, takes from it a compelling intensity it did not have before. It also takes on a mechanical character. The ecstatic phenomenon, organized, centralized, and diffused by technique, can only relate to a mechanized charism which is capable of this relation. This charismatic endowment has traditionally been an attribute of heroes, but today it is the "heroes of labor" who are so endowed.

We must conclude that it is far from accidental that ecstatic phenomena have developed to the greatest degree in the most technicized societies. And it is to be expected that these phenomena will continue to increase. This indicates nothing less than the subjection of mankind's new religious life to technique. It was formerly believed that technique and religion were in opposition and represented two totally different dispensations. It was held that, with the development of a purely materialistic society, a struggle was inevitable between the machine and the economy, on the one side, and the ideal realm of religion, art, and culture, on the other. But we can no longer hold such a boundlessly simplistic view. Ecstasy is subject to the world of technique and is its servant. Technique, on the most significant level, integrates the anarchic and antisocial impulses of the human being into society. These impulses take their influence and receive their diffusion strictly by virtue of the technical means brought into play. The ecstatic phenomena of the human psyche, which without technical means would have remained completely without effect, are deployed throughout the world.

Technical means, acting on the ecstatic phenomena, encourage certain daring innovations of expression. Consider, for example, the extraordinary artistic novelty of the cinema. But it must be remembered that the technical fact *ipso facto* entails the total inclusion of art and thought (however revolutionary they seem) within the social framework. Human impulses are confined within

well-defined limits, and become the objects of propaganda, profit-seeking, contractual obligations, and the like. The vast extent of the technical apparatus makes the "payoff" inevitably the primary consideration, in money in the capitalist world, in power and authority in the Communist world. Technique as a means, however, encourages and enables the individual to express his ecstatic reactions in a way never before possible. He can express criticism of his culture, and even loathing. He is permitted to propose the maddest solutions. The great law here is that all things are necessary to make a society and that even revolt is necessary to make a technical society. I believe that this is no exaggeration. Revolt is consciously organized in the Soviet Union, for example, in *Krokodil*, the journal officially devoted to criticism of Soviet polity and administration. The expression of criticism is permitted because its repression would be even more catastrophic. But it is permitted only on condition that it entail no serious consequences, or, better put, so that no serious consequences to the power of the state can result. The technical apparatus, in fact, assures this by confining the most violent explosions of human ecstasy within itself and by satisfying without danger and at small cost to itself certain spiritual needs of the citizen reader. It must not be supposed that there is any danger of the reader becoming a partisan of an author. Sartre complains that he has readers but no public. He gives certain complex reasons for this, and some of them may even be true. But he does not see (or perhaps refuses to see) that the technical conditions of publishing necessarily entail such a result. Sartre, of course, is not alone. What he complains of represents a long tradition. Technique, which transforms culture into luxury, puts so many cultural modalities at the reader's disposal that none of them has any more importance than any other; the customer becomes a butterfly dipping into whatever flower he chooses. Sartre represents one ten-thousandth of French authorship, and he reaches twenty thousand readers. Not bad. But in the circumstances it is difficult to have a genuine community of readers. (I take it that the cellars of the Left Bank do not constitute the public Sartre dreams of.) Technique erects a screen between the author and his readers. Miniature fireworks issue from the magic bottle, but not revolt. A few printed pages out of the deluge of printed matter will never make the butterfly a revolutionary.

The complete separation of thought and action effected by technique produces in a new guise a phenomenon which we have already discussed as it appears in other areas: the lack of spiritual efficacy of even the best ideas. The very assimilation of ideas into the technical framework which renders them materially effective makes them spiritually worthless. This does not mean that ideas have no worthwhile effect on the public at all. They have a great effect, but not the effect their creators intended. Henry Miller's erotic petard, launched onto society like a plastic bomb, finds a reader whose sexual life is thwarted, who is upset by the conditions of his work, his lodgings, his political life. This has created in him a thirst for revolt. And he finds his thirst powerfully and well expressed by Miller. The pornographic element unfetters his imagination and plunges him into an erotic delirium that can satisfy his contracted needs. But Miller's book, far from pushing a man to revolt, vicariously satisfies the potential revolutionary, just as the sexual act itself stills sexual desire, or jazz soothes the Negroes' bitter longing for freedom. We have noted that jazz has become universal. The reason is now clear: it is the music of men who are satisfied with the illusion of freedom provoked by its sounds, while the chains of iron wind round them ever tighter. The same mechanism is at work on the reader of *Krokodil*. Seeing his discontent expressed far better than he could express it himself, he is satisfied vicariously with an official revolt and ceases to criticize . . . at least for a while—but by then he will have received the next issue.

As a result of technique, these vicarious remedies are not local but universal phenomena. Technique diffuses the revolt of the few and thus appeases the need of the millions for revolt. The same could be said of all the "movements" started since the turn of the century in response to the frustration of the most elementary human impulses. But can it be maintained, therefore, that social movements such as surrealism, youth hostels, revolutionary political parties, anarchism, and so on, have failed? They have failed in that they have not achieved their own goals of re-creating the conditions of freedom and justice or of allowing man to rediscover a genuine sex life or intellectual life. But they have been completely successful from another point of view. They have performed the sociological function of integration. Technical means are so important, so difficult to achieve and to manage, that it is

easier to have them if there is a group, a movement, an association. Such movements are based on authentic impulses and valid feelings, and do allow a few individuals access to modes of expression which otherwise would have been closed to them. But their essential function is to act as vicarious intermediaries to integrate into the technical society these same impulses and feelings which are possessed by millions of other men. Herein lies their sociological character. Certain deep ecstatic instincts and impulses would otherwise escape the jurisdiction of the technical society and become a threat to it. Movements such as today's existentialism, or eroticism in the form of a renovated Marquis de Sade or of the little pornographic reviews, are a sociological necessity to a technical *milieu*. The basic human impulses are unpredictable in their complex social consequences. But thanks to "movements" which integrate and control them, they are powerless to harm the technical society, of which henceforth they form an integral part. These movements perform a well-defined but completely involuntary function. Their operations are effected independently of will or desire. And no one has calculated their effects in advance. André Breton and Henry Miller are innocent of the sociological function they have assumed. One can reproach them only for a fearful lack of clarity as to their position and function in the technical society.

All revolutionary movements are burlesques of the real thing, but this must not be imputed to the activities of Machiavellian wire-pullers. The phenomenon appears naturally in the interaction of human techniques with social movements that seek to express basic human instincts. Our analysis could be repeated for pacifism, Communism, and all the multifarious movements designed to secure peace or social justice. They all fall into the same pattern and fulfill the same function. Some are indeed more authentic and "truer" than others because they better express human revolt; they are more successful in pulling the teeth of aggressive instincts and in integrating them into the technical society. (If I have not mentioned religions, it is because they no longer express revolt; they have long since, in their intellectual and sociological forms, undergone integration.)

With the final integration of the instinctive and the spiritual by means of these human techniques, the edifice of the technical so-

ciety will be completed. It will not be a universal concentration camp, for it will be guilty of no atrocity. It will not seem insane, for everything will be ordered, and the stains of human passion will be lost amid the chromium gleam. We shall have nothing more to lose, and nothing to win. Our deepest instincts and our most secret passions will be analyzed, published, and exploited. We shall be rewarded with everything our hearts ever desired. And the supreme luxury of the society of technical necessity will be to grant the bonus of useless revolt and of an acquiescent smile.

CHAPTER

[6]

A LOOK AT THE FUTURE

We have completed our examination of the monolithic technical world that is coming to be. It is vanity to pretend it can be checked or guided. Indeed, the human race is beginning confusedly to understand at last that it is living in a new and unfamiliar universe. The new order was meant to be a buffer between man and nature. Unfortunately, it has evolved autonomously in such a way that man has lost all contact with his natural framework and has to do only with the organized technical intermediary which sustains relations both with the world of life and with the world of brute matter. Enclosed within his artificial creation, man finds that there is "no exit"; that he cannot pierce the shell of technology to find again the ancient milieu to which he was adapted for hundreds of thousands of years.

The new milieu has its own specific laws which are not the laws of organic or inorganic matter. Man is still ignorant of these laws. It nevertheless begins to appear with crushing finality that a new necessity is taking over from the old. It is easy to boast of victory over ancient oppression, but what if victory has been gained at

the price of an even greater subjection to the forces of the artificial necessity of the technical society which has come to dominate our lives?

In our cities there is no more day or night or heat or cold. But there is overpopulation, thraldom to press and television, total absence of purpose. All men are constrained by means external to them to ends equally external. The further the technical mechanism develops which allows us to escape natural necessity, the more we are subjected to artificial technical necessities. (I have analyzed human victory over hunger in this vein.) The artificial necessity of technique is not less harsh and implacable for being much less obviously menacing than natural necessity. When the Communists claim that they place the development of the technical society in a historical framework that automatically leads to freedom through the medium of the dialectical process; when Humanists such as Bergson, or Catholics such as Mounier, assert that man must regain control over the technical "means" by an additional quantity of soul, all of them alike show both their ignorance of the technical phenomenon and an impenitent idealism that unfortunately bears no relation to truth or reality.

Alongside these parades of mere verbalisms, there has been a real effort, on the part of the technicians themselves, to control the future of technical evolution. The principle here is the old one we have so often encountered: "A technical problem demands a technical solution." At present, there are two kinds of new techniques which the technicians propose as solutions.

The first solution hinges on the creation of new technical instruments able to mediate between man and his new technical milieu. Robert Jungk, for example, in connection with the fact that man is not completely adaptable to the demands of the technical age, writes that "it is impossible to create interstellar man out of the existing prime matter; auxiliary technical instruments and apparatus must compensate for his insufficiencies." The best and most striking example of such subsidiary instruments is furnished by the complex of so-called "thinking machines," which certainly belong to a very different category of techniques than those that have been applied up to now. But the whole ensemble of means designed to permit human mastery of what were means and have now become milieu are techniques of the second degree, and nothing

more. Pierre de Latil, in his *La Pensée artificielle*, gives an excellent characterization of some of these machines of the second degree:

"In the machine, the notion of finality makes its appearance, a notion sometimes attributed in living beings to some intelligence inherent in the species, innate to life itself. Finality is artificially built into the machine and regulates it, an effect requiring that some factor be modified or reinforced so that the effect itself does not disturb the equilibrium . . . Errors are corrected without human analysis, or knowledge, without even being suspected. The error itself corrects the error. A deviation from the prescribed track itself enables the automatic pilot to rectify the deviation . . . For the machine, as for animals, error is fruitful; it conditions the correct path."

The second solution revolves about the effort to discover (or rediscover) a new end for human society in the technical age. The aims of technology, which were clear enough a century and a half ago, have gradually disappeared from view. Humanity seems to have forgotten the wherefore of all its travail, as though its goals had been translated into an abstraction or had become implicit; or as though its ends rested in an unforeseeable future of undetermined date, as in the case of Communist society. Everything today seems to happen as though ends disappear, as a result of the magnitude of the very means at our disposal.

Comprehending that the proliferation of means brings about the disappearance of the ends, we have become preoccupied with rediscovering a purpose or a goal. Some optimists of good will assert that they have rediscovered a Humanism to which the technical movement is subordinated. The orientation of this Humanism may be Communist or non-Communist, but it hardly makes any difference. In both cases it is merely a pious hope with no chance whatsoever of influencing technical evolution. The further we advance, the more the purpose of our techniques fades out of sight. Even things which not long ago seemed to be immediate objectives —rising living standards, hygiene, comfort—no longer seem to have that character, possibly because man finds the endless adaptation to new circumstances disagreeable. In many cases, indeed, a higher technique obliges him to sacrifice comfort and hygienic amenities to the evolving technology which possesses a monopoly

of the instruments necessary to satisfy them. Extreme examples are furnished by the scientists isolated at Los Alamos in the middle of the desert because of the danger of their experiments; or by the would-be astronauts who are forced to live in the discomfort of experimental camps in the manner so graphically described by Jungk.

But the optimistic technician is not a man to lose heart. If ends and goals are required, he will find them in a finality which can be imposed on technical evolution precisely because this finality can be technically established and calculated. It seems clear that there must be some common measure between the means and the ends subordinated to it. The required solution, then, must be a technical inquiry into ends, and this alone can bring about a systematization of ends and means. The problem becomes that of analyzing individual and social requirements technically, of establishing, numerically and mechanistically, the constancy of human needs. It follows that a complete knowledge of ends is requisite for mastery of means. But, as Jacques Aventur has demonstrated, such knowledge can only be technical knowledge. Alas, the panacea of merely theoretical humanism is as vain as any other.[1]

"Man, in his biological reality, must remain the sole possible reference point for classifying needs," writes Aventur. Aventur's dictum must be extended to include man's psychology and sociology, since these have also been reduced to mathematical calculation. Technology cannot put up with intuitions and "literature." It must necessarily don mathematical vestments. Everything in human life that does not lend itself to mathematical treatment must be excluded—because it is not a possible end for technique—and left to the sphere of dreams.

Who is too blind to see that a profound mutation is being advocated here? A new dismembering and a complete reconstitution of the human being so that he can at last become the objective (and also the total object) of techniques. Excluding all but the mathematical element, he is indeed a fit end for the means he has

[1] It must be clear that the ends sought cannot be determined by moral science. The dubiousness of ethical judgments, and the differences between systems, make moral science unfit for establishing these ends. But, above all, its subjectivity is a fatal blemish. It depends essentially on the refinement of the individual moral conscience. An average morality is ceaselessly confronted with excessive demands with which it cannot comply. Technical modalities cannot tolerate subjectivity.

constructed. He is also completely despoiled of everything that traditionally constituted his essence. Man becomes a pure appearance, a kaleidoscope of external shapes, an abstraction in a milieu that is frighteningly concrete—an abstraction armed with all the sovereign signs of Jupiter the Thunderer.

A Look at the Year 2000. In 1960 the weekly *l'Express* of Paris published a series of extracts from texts by American and Russian scientists concerning society in the year 2000. As long as such visions were purely a literary concern of science-fiction writers and sensational journalists, it was possible to smile at them.[1] Now we have like works from Nobel Prize winners, members of the Academy of Sciences of Moscow, and other scientific notables whose qualifications are beyond dispute. The visions of these gentlemen put science fiction in the shade. By the year 2000, voyages to the moon will be commonplace; so will inhabited artificial satellites. All food will be completely synthetic. The world's population will have increased fourfold but will have been stabilized. Sea water and ordinary rocks will yield all the necessary metals. Disease, as well as famine, will have been eliminated; and there will be universal hygienic inspection and control. The problems of energy production will have been completely resolved. Serious scientists, it must be repeated, are the source of these predictions, which hitherto were found only in philosophic utopias.

The most remarkable predictions concern the transformation of educational methods and the problem of human reproduction. Knowledge will be accumulated in "electronic banks" and transmitted directly to the human nervous system by means of coded electronic messages. There will no longer be any need of reading or learning mountains of useless information; everything will be received and registered according to the needs of the moment. There will be no need of attention or effort. What is needed will pass directly from the machine to the brain without going through consciousness.

In the domain of genetics, natural reproduction will be forbidden. A stable population will be necessary, and it will consist of the highest human types. Artificial insemination will be employed. This, according to Muller, will "permit the introduction into a car-

[1] Some excellent works, such as Robert Jungk's *Le Futur a déjà commencé*, were included in this classification.

rier uterus of an ovum fertilized *in vitro*, ovum and sperm . . . having been taken from persons representing the masculine ideal and the feminine ideal, respectively. The reproductive cells in question will preferably be those of persons dead long enough that a true perspective of their lives and works, free of all personal prejudice, can be seen. Such cells will be taken from cell banks and will represent the most precious genetic heritage of humanity . . . The method will have to be applied universally. If the people of a single country were to apply it intelligently and intensively . . . they would quickly attain a practically invincible level of superiority . . ." Here is a future Huxley never dreamed of.

Perhaps, instead of marveling or being shocked, we ought to reflect a little. A question no one ever asks when confronted with the scientific wonders of the future concerns the interim period. Consider, for example, the problems of automation, which will become acute in a very short time. How, socially, politically, morally, and humanly, shall we contrive to get there? How are the prodigious economic problems, for example, of unemployment, to be solved? And, in Muller's more distant utopia, how shall we force humanity to refrain from begetting children naturally? How shall we force them to submit to constant and rigorous hygienic controls? How shall man be persuaded to accept a radical transformation of his traditional modes of nutrition? How and where shall we relocate a billion and a half persons who today make their livings from agriculture and who, in the promised ultrarapid conversion of the next forty years, will become completely useless as cultivators of the soil? How shall we distribute such numbers of people equably over the surface of the earth, particularly if the promised fourfold increase in population materializes? How will we handle the control and occupation of outer space in order to provide a stable *modus vivendi*? How shall national boundaries be made to disappear? (One of the last two would be a necessity.) There are many other "hows," but they are conveniently left unformulated. When we reflect on the serious although relatively minor problems that were provoked by the industrial exploitation of coal and electricity, when we reflect that after a hundred and fifty years these problems are still not satisfactorily resolved, we are entitled to ask whether there are any solutions to the infinitely more complex "hows" of the next forty years. In fact, there is one and only

one means to their solution, a world-wide totalitarian dictatorship which will allow technique its full scope and at the same time resolve the concomitant difficulties. It is not difficult to understand why the scientists and worshippers of technology prefer not to dwell on this solution, but rather to leap nimbly across the dull and uninteresting intermediary period and land squarely in the golden age. We might indeed ask ourselves if we will succeed in getting through the transition period at all, or if the blood and the suffering required are not perhaps too high a price to pay for this golden age.

If we take a hard, unromantic look at the golden age itself, we are struck with the incredible naïveté of these scientists. They say, for example, that they will be able to shape and reshape at will human emotions, desires, and thoughts and arrive scientifically at certain efficient, pre-established collective decisions. They claim they will be in a position to develop certain collective desires, to constitute certain homogeneous social units out of aggregates of individuals, to forbid men to raise their children, and even to persuade them to renounce having any. At the same time, they speak of assuring the triumph of freedom and of the necessity of avoiding dictatorship at any price.[8] They seem incapable of grasping the contradiction involved, or of understanding that what they are proposing, even after the intermediary period, is in fact the harshest of dictatorships. In comparison, Hitler's was a trifling affair. That it is to be a dictatorship of test tubes rather than of hobnailed boots will not make it any less a dictatorship.

When our savants characterize their golden age in any but scientific terms, they emit a quantity of down-at-the-heel platitudes that would gladden the heart of the pettiest politician. Let's take a few samples. "To render human nature nobler, more beautiful, and more harmonious." What on earth can this mean? What criteria, what content, do they propose? Not many, I fear, would be able to reply. "To assure the triumph of peace, liberty, and reason." Fine words with no substance behind them. "To eliminate cultural lag." What culture? And would the culture they have in mind be able to subsist in this harsh social organization? "To conquer outer

[8] The material here and below is cited from actual texts.

space." For what purpose? The conquest of space seems to be an end in itself, which dispenses with any need for reflection.

We are forced to conclude that our scientists are incapable of any but the emptiest platitudes when they stray from their specialties. It makes one think back on the collection of mediocrities accumulated by Einstein when he spoke of God, the state, peace, and the meaning of life. It is clear that Einstein, extraordinary mathematical genius that he was, was no Pascal; he knew nothing of political or human reality, or, in fact, anything at all outside his mathematical reach. The banality of Einstein's remarks in matters outside his specialty is as astonishing as his genius within it. It seems as though the specialized application of all one's faculties in a particular area inhibits the consideration of things in general. Even J. Robert Oppenheimer, who seems receptive to a general culture, is not outside this judgment. His political and social declarations, for example, scarcely go beyond the level of those of the man in the street. And the opinions of the scientists quoted by *l'Express* are not even on the level of Einstein or Oppenheimer. Their pomposities, in fact, do not rise to the level of the average. They are vague generalities inherited from the nineteenth century, and the fact that they represent the furthest limits of thought of our scientific worthies must be symptomatic of arrested development or of a mental block. Particularly disquieting is the gap between the enormous power they wield and their critical ability, which must be estimated as null. To wield power well entails a certain faculty of criticism, discrimination, judgment, and option. It is impossible to have confidence in men who apparently lack these faculties. Yet it is apparently our fate to be facing a "golden age" in the power of sorcerers who are totally blind to the meaning of the human adventure. When they speak of preserving the seed of outstanding men, whom, pray, do they mean to be the judges. It is clear, alas, that they propose to sit in judgment themselves. It is hardly likely that they will deem a Rimbaud or a Nietszche worthy of posterity. When they announce that they will conserve the genetic mutations which appear to them most favorable, and that they propose to modify the very germ cells in order to produce such and such traits; and when we consider the mediocrity of the scientists themselves outside the confines of their specialties, we

can only shudder at the thought of what they will esteem most "favorable."

None of our wise men ever pose the question of the end of all their marvels. The "wherefore" is resolutely passed by. The response which would occur to our contemporaries is: for the sake of happiness. Unfortunately, there is no longer any question of that. One of our best-known specialists in diseases of the nervous system writes: "We will be able to modify man's emotions, desires and thoughts, as we have already done in a rudimentary way with tranquillizers." It will be possible, says our specialist to produce a conviction or an impression of happiness without any real basis for it. Our man of the golden age, therefore, will be capable of "happiness" amid the worst privations. Why, then, promise us extraordinary comforts, hygiene, knowledge, and nourishment if, by simply manipulating our nervous systems, we can be happy without them? The last meager motive we could possibly ascribe to the technical adventure thus vanishes into thin air through the very existence of technique itself.

But what good is it to pose questions of motives? of Why? All that must be the work of some miserable intellectual who balks at technical progress. The attitude of the scientists, at any rate, is clear. Technique exists because it is technique. The golden age will be because it will be. Any other answer is superfluous.

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In connection with this bibliography, the following points should be noted:

1) It makes no pretense to be exhaustive. I have listed only the works I have actually used and cited in the text. And since books are made to be read and not consulted, I have rejected the scholarly tradition of specifying pages in footnotes.

2) I have omitted systematically most works predating 1940. They are readily available elsewhere.

3) I have also omitted literary works on technique, such as those of Duhamel, Huxley, Ernst Jünger, Orwell, Gheorgiu, and others.

4) I have not inserted references relating to propaganda and psychological techniques, since these will be found in my forthcoming work on propaganda.

To these remarks of the author the translator wishes to add that it was impossible to check quotations cited in the text, since page references are lacking. In some cases, therefore, English has been translated into French and then back into English, a procedure which can conceivably lead to novel effects. But as M. Ellul has remarked, the books cited are to be read and not consulted.

Publisher's Note. This bibliography is somewhat less extensive than the bibliography in the original French edition since it includes only those works which are readily available in American libraries.

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ABOUT THE AUTHOR

JACQUES ELLUL was born on January 6, 1912, in Bordeaux, France. He studied at the University of Bordeaux and at the University of Paris, and holds degrees in Sociology, Law, and the History of Law. Since 1938 he has been associated with the University of Bordeaux as professor of History and Contemporary Sociology.

During the Second World War, Professor Ellul was a leader in the French resistance movement, and since then he has been active in politics in his native city. He is prominent in the worldwide Ecumenical movement.

Among his works are *Propaganda* (1965), and *The Political Illusion* (1967).

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