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## II

# An Appraisal of Lewis Mumford's "Technics and Civilization" (1934)

LEWIS MUMFORD

WHEN the book *Technics and Civilization* appeared, just twenty-five years ago, it possessed a distinction that had nothing to do with its intrinsic merits: it stood alone in its field. Stuart Chase had published a modest book on *Men and Machines* dealing mainly with American examples; while Oswald Spengler's happy awareness of technics in *The Decline of the West* was vitiated, as Mumford pointed out in a bibliographic note, by his unreliable data and erratic generalizations. These faults were magnified rather than decreased by his *Man and Technics* (1932). So perhaps the only modern book that could be regarded as the precursor of Mumford's was Ulrich Wendt's *Die Technik als Kulturmacht* (1906).

Looking back a quarter of a century, one does not know which fact should cause most surprise, the failure of anyone else to make such an historical and critical study, or the hardihood of a single scholar in venturing into a field where so little preparatory work had been done. Fortunately for Mumford, he had gone to a technical and scientific high school where he had a first-hand experience with most of the elemental tools and machine processes; and as a young amateur radio experimenter, making his own instruments, writing little articles for *Modern Electrics*, he knew some of the passionate preoccupations of the inventor and the engineer. Even more fortunately, he had come under the influence of three teachers each deeply concerned with the cultural impact of technics: Patrick Geddes, Thorstein Veblen, and Edwin E. Slosson. The latter's course on "The Modern World" at Columbia was deeply influenced by Ostwald's *Die Energetische Grundlagen der Kulturwissenschaften*, but that work only confirmed the brilliant interpretation Geddes had made almost a generation earlier in a paper entitled "The Classification of Statistics."

The immediate prelude to *Technics and Civilization* was a sketchy

essay, called "The Drama of the Machines," which appeared in *Scribner's Magazine* in 1930. This had resulted in an invitation from R. M. MacIver to give a course on "The Machine Age in America" at Columbia; and in the development of that course the focus changed from America and the modern world to Western civilization and the technical changes that began in the twelfth century of our era. But it needed a trip to Europe in 1932, in particular to the Deutsches Museum in München, to open up a growing literature on the historical development and cultural transformations of technics, a literature as remarkable in Germany then as in France and Italy today. Once Mumford discovered these sources, he realized that the current interpretation of the industrial revolution of the eighteenth century was a British provincialism, for the changes that seemed then to spring forth so suddenly, in fact had been under way from the twelfth century on, and were part of a larger movement that had transformed Western culture.

As late as twenty-five years ago, this was a challenging if not an entirely original view; though economic historians had been discovering that the coal and iron industries had not suddenly sprung to life with the invention of the steam engine, the emphasis still lay on the contributions of Watt and Arkwright and their colleagues. This foreshortened historic perspective had become chronic ever since Arnold J. Toynbee had coined the term "the industrial revolution" to describe what had happened in the eighteenth century. As a result, the role of earlier technical innovations was not so much misinterpreted as blandly ignored.

Mumford's first purpose, announced early in the introduction, was to set modern technics in a larger historic framework and to correlate the changes that had been taking place in our physical environment with changes that were taking place in the mind. He rejected the notion of the economic determinists, Marxian or otherwise, that technics had undergone a development in isolation, influencing all other institutions, but uninfluenced by human desires and decisions other than those directly connected with invention and organization. "Technics and civilization as a whole," he noted, "are the result of human choices and aptitudes and strivings, often irrational when apparently most objective and scientific: but even when they are uncontrollable they are not external." Perhaps the full weight of this sentence would be lost to a young scholar today. But in 1934 the notion that man internalizes his external "world" and externalizes his

internal “world” was not yet a commonplace of anthropology, still less of economics and history—and perhaps even now it is not such a commonplace as it should be. In the same vein he continued: “To understand the machine is not merely a first step toward re-orienting our civilization: it is also a means toward understanding society and toward knowing ourselves.” For these two sentences the somewhat turbid rhetoric of the introduction perhaps deserves to be forgiven.

The best way to gauge Mumford’s achievement and to point out where *Technics and Civilization* fell short may be to recapitulate the argument *seriatim*. The first chapter treats of the cultural preparation for the machine, giving weight to the influence of monastic regularity on the development of the clock and on capitalism, as an institution that turned people to quantitative calculations, favorable to physical science as well as to commerce. In this Mumford saw the beginnings of a depersonalized, mechanical system, barren of human fantasies and feelings, widely open to every kind of regimentation. The chief oversight of this chapter was the failure to relate the advance of mechanical invention to the severe labor shortage that followed the Black Plague of the fourteenth century, an event that, after the first shock, likewise turned people toward concentration on immediate and tangible goods.

But a greater omission was Mumford’s failure to follow through the implications of his original distinction between tools and utensils, machines and utilities. In general, historians of technics have overestimated the role of tools and machines, the dynamic, mobile, masculine components of technics, artificial extensions of arms, limbs, hands, teeth, fists. By the same token, they have overlooked the more passive, static, feminine aspects, so conspicuous in neolithic culture: the role of the container and the internal transformer, corresponding to the breast, stomach, womb, and circulatory system. Cellars, bins, cisterns, vats, vases, jugs, irrigation canals, reservoirs, barns, houses, granaries, libraries, cities—all these are containers and they perform essential functions of storing potential energy and furthering chemical, biological, and social reactions.

Most of the great technical achievements of early cultures occurred without any machines but the simplest: their great inventive resources came forth in the art of building containers. The fact that this insight was not followed further in *Technics and Civilization* shows that Mumford himself was not able to shake off the preoccupations of his period.

Chapter two, "The Agents of Mechanization," widened the historic perspective further, by summarizing the original sources of technology. Here Mumford used an ideal, non-historic scheme worked out by his master Patrick Geddes, correlating the primitive occupational types, the miner, hunter, woodman, herdsman, peasant, and fisherman, with their ideal location in the descending course of a river valley, from mountain top to sea. This presentation not merely throws some light upon occupational origins, but also upon the intermixtures and transferences that take place when these types meet and mingle in the city, and finally produce the specialized craftsmen, technicians, and engineers one finds there from the late neolithic period on. In contrast to the Victorian notion, held equally by Comte and Spencer, that the industrial arts tend to produce a peaceful economy, Mumford, following Sombart's clue, pointed out the active role of war in stimulating mechanical invention.

Unfortunately, Geddes' valley-section diagram, though a useful device, was governed by the nineteenth-century usage that gave priority to the external environment and to tangible, observable agents. Such a mode of explanation, attributing war and weaponry to a mere extension of hunting techniques obscured almost as much as it revealed. If Mumford were writing on this topic today, he would have not so much to recast what he had written, as to go into a whole aspect he had passed over: the religious origins of war itself; and that in turn would lead to an appraisal of the role of the cosmic religions in imposing a sense of regularity, fixed succession, inexorable order, favorable to every kind of regimentation. Without this theological background, it is doubtful if the Pyramids would have been built with such exquisite accuracy, or whether collective human machines could have been effectively organized and brought into play. Yet all this throws an important light upon the existence of complex machines in early cultures, whose significance Mumford did not grasp till twenty years later. By any of the standard definitions of the machine, such instruments were not lacking in the Bronze Age. What made them so long invisible was that their component parts, which formed the work-army or the Sumerian phalanx, were composed of perishable materials—human beings. The great achievement of modern technics was to transform blood and sinew into iron, steel, and Babbitt metal.

Apart from assembling old facts in new relationships, the main value of these early chapters was a shift in the whole point of view,

which made technics an integral part of higher civilization. This was quite different from the earlier evaluation that made man's development dependent almost solely on his being a "tool-using" animal—as if he could have transcended the limitations of his immediate environment without his greatest invention, language and formal symbolism.

With the next three chapters, dealing with successive phases of technical developments in and around 1000 A.D., we come to the most original and yet in some ways the most dubious part of the whole book. Following the lead of Geddes and anthropological precedent, Mumford defined the dawn age of modern technics, the eotechnic phase, as one based on wind and water power, with wood and glass as the favored materials. His sections on the role of wood and glass, along with the early one on the monastery and the clock, count as perhaps the most distinguished passages in the book. But beyond this Mumford had made another contribution, still largely neglected. He had defined the nature of a technical phase as consisting of a particular mode of power, particular modes of transportation and communication, and a particular set of metals and other material resources.

Mumford was not unaware even then of the difficulties of any scheme of periodization. He referred to these three phases as successive, but overlapping and interpenetrating; and he successfully resisted the temptation to treat them as definite periods in time. Though the conception of phase avoids this patent difficulty, it opens up other problems, almost as serious. If the neotechnic phase is that of the light metals, copper, aluminum, magnesium, where does our nuclear complex belong, with its dependence upon the rare heavy elements? And is there not a parallel between the breaking down and re-synthesis of coal tar products in the paleotechnic regime, and the breaking up of the atom and the synthesis of new molecules today? Is there not an even more uncomfortable resemblance between the wholesale but temporary pollution of atmosphere, water, and soil that went on in the iron and coal technology, and the more sinister permanent pollution threatened by nuclear technics?

If the division into phases becomes vexatious with the data immediately in hand, the whole scheme breaks down as soon as one steps outside the arbitrary thousand-year period and tries to work out a more universal succession of technological phases. J. Meursinge's grammatic scheme is the only one I know that has attempted to do this



in detail over the entire course of history, but it is quite as unsatisfactory in its definitions and delineations as the worst kind of empiricism. The author of *Technics and Civilization* may in fact congratulate himself over the fact that the division he used never effectively caught on; and it broke down in his own mind before it could do any serious damage.

Looking back over these historic chapters, one is conscious of much new material that might now be added, but little that should be taken away. Yet there is one lapse that the author should regard with shame, even though he sinned in good scientific company. Following Geddes, he anticipated and identified some of the elements in an emerging biotechnic economy, as in the invention of the telephone and the airplane, but he mentioned the possibilities of atomic energy (page 380) only to dismiss them. In a purely historic account, this oversight might have been pardonable. But the essence of Mumford's method, what in fact distinguishes it from more traditional procedures of scholarship, is that it embraces the potential and the possible, as a necessary part of any adequate description of a human institution.

Nor could Mumford plead ignorance of the approaching possibility of using this new form of energy for destruction, even more effectively than for work. Not merely had he read Frederick Soddy's *Matter and Energy* almost as soon as it came out, but he had also followed H. G. Wells' vivid and amazingly accurate description of an atomic war, in the novel *The World Set Free*, published serially in 1913. Furthermore, Mumford was a sufficiently close student of Henry Adams to know how deeply concerned that prescient historian had been to prepare his colleagues in science and scholarship to assume active intellectual guidance in the drastic — indeed catastrophic — social changes that atomic energy would bring about.

Unfortunately, a certain intellectual disdain for the crudity of Adams' attempt to equate social transformations with Willard Gibbs' Phase Rule led him to undervalue Adams' profound intuitions, which were the latter's total response to far more complex data, much of it still unsymbolized and unformulated, on which he had drawn. In failing to do justice to Adams' insight, Mumford did equal injustice to himself. What justified the generalist's existence, if not the power to see clearly possibilities that specialized competence rejected? His unwillingness to face the prospects of atomic power rested, it is true, on the sound notion, stated immediately after, that solar energy

would be entirely adequate to man's industrial needs once we had invented an efficient electric accumulator. But I suspect that his unwillingness to deal with the explosive possibilities of atomic energy was largely due to sheer cowardly apprehension. Wells had too graphically demonstrated the way in which this triumph would actually be perverted.

The second half of *Technics and Civilization* was an attempt to provide a fresh point of view, or, in broader terms, a philosophy capable of assimilating the goods of technics and coping with the evils that accidentally or integrally had accompanied Western civilization's growing absorption in the industrial process, treated almost as an end in itself, that is, as a religion, rather than as a means of satisfying human wants.

Chapter VI, "Compensations and Reversions," attempts a critical examination of the weaknesses of the so-called machine age, weaknesses that were all the more obvious during the 'thirties because the maldistribution of the products of the machine had brought the whole mechanism to a jarring standstill. Mumford attempted to show how the human deficiencies of this machine-dominated civilization had been historically overcome by various compensatory devices and shock-absorbers, from the romantic "return to nature" to a stultifying relapse into savagery and violence. Here Mumford was on a trail he would now be prepared to carry much farther back, into the very origins of civilization itself. At all events, the sections "Mass Sport" and "The Cult of Death," it seems to the reviewer, have lost nothing through the passage of time. Unfortunately, they now need an additional section, "The World as Extermination Camp," as the ultimate destination of unqualified power released from all organic disciplines and humane inhibitions. In re-thinking these passages recently, Mumford found that they failed to give sufficient weight either to the irrational compulsions and fixations that stepped up technological change, or to the irrational goals its most ardent disciples have taken for granted.

But the chapter that was perhaps the most ingratiating to Mumford's contemporaries in the 1930's was "The Assimilation of the Machine." This dealt with the various ways the machine had enriched, even while altering, the whole domain of esthetic and even ethical expression. Most of what Mumford said here has become a commonplace by now: who does not appreciate the esthetic values of the inorganic and the depersonalized, the abstract and the



mechanical, of simultaneous images and visual experiences below the surface of everyday events, as popularly revealed in the photograph, the stroboscopic image, and the motion picture? Mumford's first essay in this direction, *Machinery and the Modern Style* (1921), had in fact antedated Le Corbusier's vivid paeans; and he himself has recently amplified this chapter by his observations on mass production and reproduction in *Art and Technics*. But the point of view had long been developing, among the leaders of the Deutscher Werkbund in Germany and the Cubists in France.

Yet precisely because this chapter is superficially so up-to-date, it now wears a curiously old-fashioned air. It attributed to the machine itself positive qualities that were in fact due to human intentions—qualities that often disappeared (as the good lines of the motor car have so largely disappeared in America) at the very moment the technical processes themselves were being simplified and perfected. No one could write an honest chapter today without going far more exhaustively into the perversions that have crept into the whole process.

In the final chapter, "Orientation," the whole outlook and tone of the book, as well as the underlying philosophy, seem even more definitely dated. It is not so much in its philosophy as in its cheerful expectations and confident hopes that it now seems something of a museum piece: even in those plans that have been carried through, the realization has retrospectively disfigured the anticipation. Mumford assumed, quite mistakenly, that there was evidence for a weakening of faith in the religion of the machine, coupled with a shift in interest to the biological and human aspects of technics. This was an erroneous assumption; and by now most people have forgotten the grounds for it—that after four years of economic depression many Americans had so completely lost their faith in technology that they were prepared to settle for a subsistence economy. Mumford did not accept such defeatism: but he plainly did not anticipate that the American economy would be salvaged, in all its radical lopsidedness, by war and preparations for war, aided by a rising birthrate.

The crux of this final chapter is the section called "Basic Communism," in which Mumford wrestled with the problem of normalizing consumption in order to distribute the advantages of mass production without establishing a totalitarian dictatorship or a war economy, and without destroying surplus goods for the sake of maintaining a price level, as had been done in the early days of the New Deal.

In a few years, this argument would become suspect and, because of its accurate terminology, would be falsely identified with the very Marxian totalitarian assumptions it explicitly rejected. What was said under the rubric of "basic communism" might today be easily passed off without comment as "social security."

I have passed lightly over the major weaknesses of this book, with the charity an older man owes a younger rival. But I feel that the book is now seriously inadequate at both ends. The development of technics before 1000 A.D. would surely deserve at least as many chapters as were given to its advances since that time, though this might demand even greater gifts of condensation and generalization. By the same token, it would probably need more than a single new chapter to make even a brief summation of the advances of the last quarter century—and it is doubtful if we have enough perspective yet to evaluate them. This explains why Mumford has so easily resisted the very obvious duty of bringing the book up to date.

So much for what the book attempted, and where, palpably, it failed. But what *Technics and Civilization* said by its very being was probably more important than any special contribution: for what text and illustrations joined in saying was that technics was not merely the product of engineers, inventors, workmen, capitalists, scientists, but the expression of a whole society, to be enjoyed and assimilated, not alone because of its immense material productivity, but because of the values and forms and meanings it brought into existence—and still more for those it may still bring, once technics escapes the pressures toward regimentation and exploitation that have so long, from the days of the pyramid builders onward, undermined its human applications.

About those qualities that seem to me to constitute the peculiar strength of *Technics and Civilization*, I have said nothing—the interweaving of factual presentations and human evaluations, of causal and purposeful interpretation, the continuous penetration of the subject at many levels. In Mumford that silence would be due less to modesty than to a sense of failure, for the demonstration he gave has not greatly popularized the method behind it, nor has it lessened the academic suspicion that this very comprehensiveness betrays a certain want of rigor, of the kind familiar to specialized scholarship. But to the reviewer, absolved by his commitment from either disappointment or modesty, this failure suggests another interpretation. Whatever the original defects of *Technics and Civilization*, whatever

further shortcomings time has disclosed, it still unfortunately possesses its original distinction: it stands alone, an ironic monument if not an active influence.