

# *Art and Technics*

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manities and the arts, has given rise to a special kind of aberration—the result of undue success in displacing emotions and sensitivities and feelings, in disregarding man's deepest sources of life and love, in cutting itself off from the values and purposes disclosed by religion and art. If we are to save ourselves from the threatening miscarriage of the technical functions, we must restore primacy to the human person; that is to say, we must nourish those parts of man's nature that have been either neglected or made over into the image of the machine. To overcome the distortions of technics, we must cultivate the inner and the subjective as our ancestors during the last three centuries cultivated the outer and the objective. But our proper goal is a balance between these essential aspects of the personality. In my succeeding lectures I shall try, by concrete illustrations, to show what is meant by such a reconciliation and balance.

### *From Handicraft to Machine Art*

IN ORDER to understand more fully the problems that modern man confronts, in his own person, through the divergent development of art and technics during the last few centuries, I have, so far, adopted the old pedagogic trick of examining them at their point of origin—in their purest form. So I have treated art as mainly an expression of the inner life without any reference to the physical media and processes and concrete operations through which even the most etherealized form of art must be expressed. Similarly, I have treated technics, so far as possible, in an equally pure state, emphasizing the impersonal conditions that enter, even in primitive cultures, into man's control of the forces of nature.

But in actual history, this separation does not hold. Art and technics go together, sometimes influencing each other, sometimes merely having a simultaneous effect upon the worker or the user. So, even on some of the earliest stone age tools or weapons, when the material



lent itself to the purposes of symbolic expression, we observe carvings, scratchings, or etchings of a character that does nothing to further the work in hand. Here the worker had something to say as well as something to do. Even while he was serving Prometheus he was listening, with an ear half-cocked, to the distant sound of Orpheus's lyre, or the wildest notes of Pan's pipes. Doubtless rhythm and form did in fact lighten the psychological load of hard physical labor, as Karl Buecher long ago suggested in his classic treatise on Work and Rhythm; and art, at that stage, may have both taken the curse off monotonous work and even increased the efficiency of the worker.

Over a large part of human history, then, the tool and the object, the symbol and the subject, were not in fact separated. All work was performed directly by human hand, and that hand was not a detached hand, a specialized hand, it was part and parcel of a human being who, no matter how faithfully he followed his craft, had many other interests than the performance of work. Not every part of craftsmanship, as I reminded you in the last lecture, is by nature creative and esthetically rewarding. But even the meanest slave, with a tool in his hand, would feel the impulse to give the object on which he was working something more than was required to make it work; he would linger over it, at the least, to heighten its finish, or he would modify the form in some degree to make it delight the eye as well as perform its function. In some cases, as in the fashioning of that beautiful tool the American ax, it is hard to say, when we consider the perfect shape of the handle, whether the practical or the

esthetic purpose was dominant, so completely are both requirements met.

In the earlier stages of culture, I must remind you again, the symbolic interest usually dominated the technical one. In pottery, for example, the breasts or the trunk of a woman might suggest the rondures of the jug or the vase; so, too, as Vitruvius tells us in his treatise on architecture, the column might be turned into the figure of a woman to form a caryatid, in order to symbolize the humiliation that had befallen the inhabitants of a certain conquered city—their women were condemned to serve as supports of the entablature. Sometimes, instead of resorting to these more obvious symbolisms, the craftsman, adhering strictly to functional needs in the development of his form, would finish it off by more playful modes of decoration. Having given good form to his oil jug or his bowl he would add to it some "leaf-fringed shape" of men and maidens, in Tempe or in Arcady, to remind the user, as one man speaking to another, that life was more than a matter of shaping utensils or storing food in them.

These forms of extraneous decoration belong to the system of handicraft and are usually absent from machines. From the very beginning real machines are startlingly matter of fact, objective, *sachlich* as the Germans say, whether we examine a bow-drill or a draw-loom. But even here the objectivity is not absolute; for by intimate use machines take on a certain personal, I-and-thou quality in relation to their operator, so that for long ships boasted a carved figurehead, and that somewhat capricious machine, the shotgun, likewise bore all sorts



of complicated ornament, though the more deadly and businesslike rifle quickly eliminated such fancies. What perhaps has caused decoration to disappear from sewing machines and typewriters during the last seventy-five years, as well as from so many other objects, like china and glass, is the fact that the so-called decorative art produced by the machine is as depersonalized as the functional object it decorates: in short, it is no more capable of stirring feeling than the machine itself, or rather less so, since it lacks the machine's own kind of integrity.

Now, however laborious many of the earlier processes of craftsmanship actually were, two things throughout the greater part of history served to redeem the whole process of technical development. One of them was that the operations were under the direct control of the craftsman himself. He took his own time about his work, he obeyed the rhythms of his own body, resting when he was tired, reflecting and planning as he went along, lingering over the parts that interested him most, so that, though his work proceeded slowly, the time that he spent on it was truly life time. The craftsman, like the artist, lived *in* his work, *for* his work, *by* his work; the rewards of labor were intrinsic to the activity itself, and the effect of art was merely to heighten and intensify these natural organic processes—not to serve as mere compensation or escape. Commercialized production for overseas trade may, even in ancient times, have introduced extraneous pressures into the work of the craftsman, making him hasten his pace, or lower his standards of sound workmanship, or scant his personal contribution, so that the work would no longer bear his inimitable

signature. But the fact that the handicraft worker is master of the process, so long as he respects the nature of his materials, was a great satisfaction and a support of personal dignity. The other reward of craftsmanship in many branches of art and technics was that the worker could pass, with further technical skill, from the operational to the expressive parts of his job. Through acquiring skill in technics, he became licensed, as it were, to practice art. At that stage, the machine itself makes a contribution to creative release. The potter's wheel, for example, increased the freedom of the potter, hampered as he had been by the primitive coil method of shaping pottery without the aid of a machine; and even the lathe permitted a certain leeway to the craftsman in his fashioning of beads and bulges. Up to a point, then, in all the industrial arts, technical development and symbolic expression go hand in hand. Who can say, indeed, whether the great string music of the eighteenth century would ever have been written had not violin-makers like Stradivarius placed in the hands of the composer such superb instruments as the violins they created?

As long as handicraft processes remained uppermost, say roughly until the middle of the nineteenth century in the more advanced Western countries, handicraft itself was the mediating factor between pure art and pure technics, between things of meaning that had no other use and things of use that had no other meaning. All the useful arts served in some degree as instruments of communication as well as agents of effective work. In pots and woven cloths, in houses and shrines and tombstones, in churches and palaces, the worker contrived not merely to do the job that must be done, but to identify himself,



to individualize himself, to express himself, to leave behind a message, sealed as it were in the bottle of art, for the pleasure and enlightenment of other men. There is one department of technics, however, where this happy relationship does not hold: the part governed from the beginning by a dehumanized pattern of life—mining and warfare. The overthrow of an integrated method of thinking and working and creating, governed by human interests and human norms, came into the Western World with the disproportionate development of mining and warfare. I have not time, in these lectures, to follow through that development and to point out what an unfortunate influence this had upon both the development of the machine and the whole course of modern civilization. It must suffice for me to remind you here of something I went into at some length in *Technics and Civilization*, that the destructive tendencies in modern technics—to deface and befoul the environment and to stamp out human life with ever increasing ruthlessness—stem from these two occupations. But here I want to concentrate on the more formative and beneficent aspects of technics; particularly with those parts that have encouraged man's higher life.

Now there is one other fact in connection with mechanization that has been insufficiently appreciated, I think, by most writers on the subject. I have already alluded to it in an earlier lecture and I shall go back to it now, since we are about to witness its effect upon the development of the art of printing. This is the fact that men become mechanized, they themselves are transformed into mechanical, uniform, replaceable parts, or they teach themselves how to perform, with accuracy, standardized

and repeatable acts, before they take the final step of inventing machines that take on these duties. The social division of labor precedes the mechanical division of labor, and the mechanical division of labor, in general, precedes the invention of complicated automatic machines. The first step is to reduce a whole human being into a magnified eye, a magnified hand, a magnified finger, subordinating every other function to that whose province is enlarged. This specialization takes place even under the handicraft system at a late stage in its development. By breaking the once unified process of work into a series of fractional operations, as in the famous pinmaking illustration of Adam Smith, the output can be increased at the simple cost of taking all the fun and interest and personal responsibility out of the operation for the worker. This may happen even without minute specialization and subdivision. So we have automatic bookkeepers, in the person of human beings, before we have mechanical calculating machines; we have photographic painting, too, at least three centuries before we have photography. This fairly general truth applies in full degree to the field I purpose to examine in the present lecture: the invention of printing from movable types.

I have chosen printing because this mechanical art is second only to the clock in its critical effect upon our civilization; and because in its own right it exemplifies the much broader passage, constantly going on in our own day, from the tool to the handworked machine, and from the machine to the completely automatic self-regulating device from which, at the end, almost every intervention of the human person is eliminated, except at the very beginning, in the arrangement of the works,



and at the very end, in the consumption of the product. Finally, and not least, I have chosen printing because it shows, in the course of its own development, how art and technics may be brought together, and how necessary it is, even for technical development, to have the person that presides over the process refresh himself constantly at those sources in life from which the symbol, in its purest forms, comes forth.

Probably many people in this audience know, at least in outline, the story of printing, so admirably put together by Thomas Carter, the veritable unraveling of a mystery from which only the very last link in the chain seems still to be absent. For one thing, though it is in the nature of mechanical inventions to spread widely from their original center, the spread of printing and the accessory arts upon which it depends, like that of paper-making, is one that wove into a single web the cultures of the East and West, with each part contributing its share to the final product. In a special sense, therefore, printing is a universal art, prophetic of that One World which our technical instruments make it possible for man now to achieve—though we do not yet know whether it will be one world blasted and ruined by atomic bombs or one world pushed to a higher plane of development through the abundant practice of mutual aid. At all events, printing swept across the world, from China and Korea, where movable types were first invented, into Europe, in the course of a century. We can trace its progress in a series of steps, by way of Persia and Turkey and Russia, till we find the first printed book in Holland and the first European book printed from movable types in Germany. This art had many begin-

nings in earlier civilizations, from signet rings to coins. It *might* have been applied to the printing of books at almost any moment for the last 2500 years. But before the method was applied to books a new social medium was necessary: a community that had abandoned slavery and was ready, indeed eager, to equalize cultural advantages once reserved for a ruling caste; so that the rise of free cities, of urban democracy, of an increasingly literate group of citizens gave an incentive to a method for manifold and cheapening the process of producing books.

And here again—you must forgive me if I drive this point home a little insistently, to compensate for the more dominant opposite view—here again the esthetic symbol preceded the practical use. For the first application of printing was in the domain of art, the printing of woodcuts: it was only at a later stage that the interest in the word led to that consummate invention, so advanced, so modern at every point—the invention of movable type. For note what was involved in the concept of setting up a line of type by using separate letters cast on a uniform pattern in a mold: the movable type is the original model of the standardized, replaceable part, which some forgetful historians are inclined to attribute to a much later inventor, Eli Whitney, in his perfection of the standardized gun. Finally, the printing press itself, first hand-operated, then, in the nineteenth century power-driven, became one of the earliest pieces of standardized, increasingly automatic, machinery. Within a century of the invention of printing, the calligrapher, the hand-copyist, had been driven out the field of book production over which he had long presided; and yet,



so far from this being a serious loss, it was in its initial stages a mighty gain, since all that was good in the handwork was preserved, while some part of what was bad, the inevitable monotony and tedium, was eliminated. Within a generation of Gutenberg's invention, the book in fact reached a perfection in type, impression, and general form that has not in fact been surpassed by any later efforts.

To understand what was involved in this change-over from writing to printing, we must compare the difference visible at an earlier stage between cursive handwriting, longhand, and the more highly formed hand-printed letter. Though there is a typical element in all handwriting—so that one can identify the clerical hand or the humanist hand, the civil service hand or the Palmer method hand or the boarding school hand—there is no form of art that tells one so much, at every stroke, about the individuality of the writer, about his tone and his temper and his general habits of life. So truly is handwriting a key to the human personality that when one wants to refer to the highest type of individuation in art, we refer to the artist's signature. As you know, Chinese calligraphy usually accompanies a picture, done in the same style—visually a part of it. But this very individuality of handwriting is itself a handicap to the widest kind of communication. Reading would be a most laborious art if, on every page, one had to struggle with a new personality and master his vagaries of written expression as well as his thought. For the sake of general legibility and universality it was important that the human being who copied a book should achieve a certain kind of neutrality and impersonality, that he should sacri-

fice expressiveness to order, subduing his idiosyncrasies, making each letter conform to a common type, rigorously standardizing the product. The typical and the repeatable—what is that but the province of the machine? After a copyist repeated the same letter a thousand times, his letters would achieve that impersonal quality. And by habit and repetition, by restraint and humility, he brought the manuscript to a point of mechanical perfection at which the letters themselves could readily be transferred into movable types.

But note how perverse art itself can be when divorced from other equally central human purposes. From the standpoint of effective communication, the handwrought manuscript tended by its very elaboration to lose sight of its essential reason for existence. In this respect, its development was very similar to that we often find in other arts, a tendency on the part of human fantasy, once it is emancipated from the restraint of practical needs, to run riot, to seek to prolong the esthetic moment beyond any reasonable duration. In medieval cathedrals this sometimes went so far that Ruskin even discovered carving in places where no human eye but his own—if we except the original worker—had probably ever beheld it. Quite evidently this desire to prolong a pleasurable occupation, while it makes for a good life, has its own kind of shortcoming; and in the case of the book, the very esthetic excellence of the illuminators and illustrators served also to retard the process of copying and so limit the circulation of books. Even if the hand labor had been rough and quick, it would have produced too few; but since it was actually measured and meticulous, it served as a further brake on the spread of learn-



ing. How unique and precious books were, how well respected they were as works of art, we know from the state they come down to us in: no scrawls in the margins! no dirty fingerprints! no dog ears! But as long as art held production in check, there were never enough books, even in an illiterate age, to go round. So eventually, in the development of the manuscript, there came a point where the two impulses, the technical and the esthetic, came to a parting of the ways. The esthetic and personal part of copying was getting in the way of the practical offices of the book; and for the sake of increasing the circulation of ideas, it was time for the two sides of the art to separate. At that point, the machine entered, to take over the repetitive part of the process. As a result, printing itself reached maturity almost overnight.

Unfortunately, it took a long time to discover that, to be an art in its own right, the machine need not, in fact *must not*, attempt to imitate the special graces of handicraft art. If viewed from the ideal standpoint of the illuminator, aiming at purely esthetic effects, printing was indeed a poor makeshift; and the early printers themselves must have felt the force of this traditional judgment, for very often, right down to the nineteenth century, they gave the printed page many of the illuminator's embellishments: a certain floridness, a certain ornateness of figure and arabesque on the title page and the initial letters, surrounded the serene austerity of the text itself. But printing, even before the steam press and the linotype machine completely mechanized it, was essentially a new art, with its own special canons of taste, its own standards of esthetic expression. The early printers hesitated to let the type speak for itself. They thought

machine ornaments were better than no ornaments, whereas they should have realized that a certain chastity of statement, a certain reserve and underemphasis, is characteristic of good machine art; it is the function itself that addresses us, and the esthetic appeal must always be within the compass of a rational judgment. If the essence of machine art is the expression of function—if beauty here, in Horatio Greenough's memorable words, is the "promise of function"—then the main effort of the printer must be to convey the meaning of the writer to the reader, with the least intrusion of his own personality.

Behind the appearance of printing from movable types, apparently so sudden, and on superficial analysis just a great mechanical feat, we find a thousand years of self-discipline and esthetic training, which went along with the effort to respect the gifts of the spirit and to deepen the inner life. Some of that training still is important for those who would design typography. You might think that, once printing was achieved, it would be possible to cut loose entirely from these earlier sources; but in fact the continued interdependence of art and technics could not be better illustrated than in this wholly mechanical art. The great fonts of type, the platonic forms from which all later types down to our own day have been derived, were almost all cast within a century of the invention of printing. Sometimes the early books printed in these fonts seem a little too compact and crowded for our modern taste in reading, as if the designer still felt that the paper was as precious as parchment, and if he was to have wide margins, the lines themselves must be crowded together. But in general, nothing



more perfect, as print, has been achieved than the work of the early type designers and printers like the great Nicholas Jenson: people who were still under the spell of the old manuscripts. As soon as the art of the calligrapher fell into decay, the art of type design became more difficult, for in aiming at mechanical accuracy and finish, the designer often lost the precious touch of the hand itself. Once utilitarian and rational interests predominated over esthetic ones, as they did in the nineteenth century, there followed a series of lapses both in type itself and in the layout of the printed page: the Bounderbys and the Gradgrinds of Victorian capitalism, confusing ugliness with efficiency, seem to have preferred ill-proportioned, illegible, or downright ugly types.

When the revival of printing as an art began in the final quarter of the nineteenth century, largely under the influence of William Morris, those who started it refreshed themselves at two sources: the manuscript and the earliest printed books. Moreover, they wisely practiced the old hand art of calligraphy in order to restore their sense of form. Two of the best typographers I know today are remarkable calligraphers; and to receive a letter written in their beautiful hands is to remind one of all that has been lost by our overreliance upon the machine, and by the general haste and pressure that makes ordinary handwriting so ill-formed and uncouth. Here is a matter that has a much wider application than use usually realizes; namely, that one must never let the development of the machine get so far away from its sources in art and handicraft that we could not reinvent the art all over again if its higher secrets were lost. To speak in biological terms, man's relation to the machine

must be symbiotic, not parasitic: and that means he must be ready to dissolve that partnership, even forgo temporarily its practical advantages, as soon as they threaten his autonomy or his further development.

But there is something else involved in the fact that such a typical machine art as printing reached its highest plateau of achievement within a century of its invention; and this is the truth that, by very reason of its impersonality and standardization, a machine art, once it has achieved a high level of form, is not subject to endless variations: the main problem is to keep it at its original high level. Though the subjective arts often fall into stereotypes and fashionable molds, the fact is that man's inner life, when awakened, is inexhaustible; and repetition without variation and re-creation is fatal to the existence of the humane arts. This is not so with the arts of the machine. Here the type is the supreme achievement; for the sake of functional economy, for the sake of order and common use, the fewer new demands that are made, the better. The capital danger in the arts of the machine is misplaced creativity, in other words trying to make the machine take over the functions of the person. The path of advance in printing, for example, was in the opposite direction: pruning away the excrescences in type, left over from the old illuminators, with their fancy initial letters and head pieces and tail pieces, so that the true subject matter of printing, the words themselves, would be more visible to the reader, and so that, by their very form and spacing and proportion, they would in the most subtle way possible underline the meaning of the text. A beautiful book is no substitute for a readable book; and a readable book should



bring one closer to the mind of the author, not make one a prey to the whimsies of the typographer.

All this should explain why there have been no radical changes in type faces from the very beginning, at least within the roman fonts; and it should also explain why no radical changes are immediately in prospect. Some keener analysis of the physiology of the human eye or the psychology of reading might produce certain fresh variations: indeed, the greater space we now allow between lines and between words is an indication of such an adaptation. So, too, if we undertook to create a world language and began the wide use of an international phonetic alphabet, with all its strange new characters beyond our usual abc's, the typographer would have a considerable leeway for experiment in inventing new shapes. But these changes would be due to the growth of scientific knowledge, or, like the more mechanical cutting of modern type faces, they would be due to the objective conditions imposed by linotype setting. But in type, as in the other machine arts, we give up a certain subjective freedom in order better to serve a common collective goal: in the case of printing, universality, legibility, facility of understanding, and with all these qualities the widest possible distribution.

While painting has been going through the radical succession of changes that has brought into existence cubism, futurism, expressionism, and surrealism, the wildest notion that the painter's colleagues in typography turned up with during the craziest period of the twenties was that capital letters should be abolished, presumably in the interests of democracy, or that a font without shading or serifs—called with absolute inappropriateness

Modern Gothic—should be preferred to the older fonts. Unfortunately the absence of serifs and shading, though it may make the letters look a little more mechanical, does not in the least make them more legible, and as for doing away with capitals and punctuation, that is so far from being modern that it only takes us back to the earliest roman forms from which modern printing started.

In short, the machine, and the machine arts, when taken on their own essential terms, are necessarily stable, like all type forms, and there is nothing more fatal to a good machine form than irrelevant subjectivity, misplaced creativeness, meretricious uniqueness, as if produced by hand. As soon as you find such suspicious features in any machine form—as in the constant restyling of the less essential parts of a motor car—you know that the canons of conspicuous waste, dear to the businessman, and the newly rich, have gotten the better of the canons of economy and function; and that somebody is picking your pocket of money you might use for better purposes, under the pretext that he is furnishing you with art. The current name for that particular perversion is industrial design.

The two great results of the invention of mechanical printing have been characteristic, in some degree, of similar advances in all the industrial arts: they have been to standardize in a more rigorous fashion a product that was already standardized, and to progressively eliminate the craftsman himself in the act of freeing him from the drudgery of hand labor patterned on a mechanical model. If there was a certain loss in that change-over, it nevertheless was, I submit, a reasonable price to pay



for the benefit that printing conferred on the word—and the world; for, if it suppressed the copyist, it released the writer and conferred on him the privilege of talking directly to a greater number of fellow men than he had ever addressed before. Printing broke the class monopoly of the written word, and it provided the common man with a means of gaining access to the culture of the world, at least, all of that culture as had been translated into words or other printable symbols; doing so, it increased every man's range in time and space, bringing together times past and times to come, near and distant, peoples long dead and peoples still unborn. Recent generations have perhaps overestimated the benefits of literacy, for these benefits do not come about automatically, and they may be accompanied, if unwisely used, by a loss of firsthand experiences and contacts, a loss of both sense and sensibility, with an increase of pride and prejudice. But it is hardly possible to overestimate the handicaps of illiteracy; for that chains one to the world of the here and now, a form of cultural solitary confinement, fatal to human development. Again, though print undoubtedly accentuated man's natural eye-mindedness, to the point of actually impairing his vision by overstraining the eye, it also freed the mind from the retarding effects of irrelevant concreteness. Only now that we are falling back into a state of vacuous illiteracy, through the overdevelopment of radio and television, can we realize on what a low level of abstraction we should live without the benefit of the printed word. The swiftness and economy of print, compared with the interminable prolixity of the spoken word, more than made up for the

other human qualities that were forfeited through the invention of the printing press.

What further innovations remain to be made in printing, other than the possibilities I have mentioned, are mainly on the technical side. They are similar to what has been happening in other departments of technics. One improvement that is surely coming, now that practically all manuscripts are in their final stages typewritten, is a completion of the automatic process with the aid of a scanner which will automatically set up type without the intervention of the typographer. When that final invention takes place in printing, this art will have achieved its theoretical limit of perfection, the limit long ago envisaged by Aristotle, when he observed, in words I am fond of quoting, that slavery would disappear when musical instruments would play by themselves and looms would weave by themselves: for then, he added, "chief workmen would not need helpers, nor masters slaves." The other possibility, also a technical one, would lead in the other direction, not toward automatism and large-scale mass production, but in the direction of making printing or its equivalent possible by a more simple and direct method, lending itself to small-scale production and therefore to a larger measure of personal expression. Many such processes, from mimeographic to photographic offset printing, are already available. William Blake was perhaps only a little ahead of his time in his personal method of reproducing his poems in small quantities. Thanks to my friendly Japanese translator, Professor Tsutomu Ikuta, I have in my possession a charming version of Edmund Blunden's poems, done in



Japan, hand-lettered and then photographed and reproduced by the offset process, a sort of modern version of the earliest method of wood-block printing; and the directness and simplicity and beauty of the product, its exquisite fitness to the work in hand, with its modest demands for material support, perhaps indicates a way in which we can overcome the banal effects of mass production, with its abject dependence upon a large market. This means of printing will perhaps be one of the answers to the modern publisher's barbarous reluctance to consider the publication of poetry, for example, as anything but a painful personal favor on his part.

From my point of view, the greatest developments to be expected of technics in future, if once the philosophy I have been advocating becomes generally accepted, will not be, as we are usually led to think, in the direction of universalizing even more strenuously the wasteful American system of mass production: no, on the contrary, it will consist in using machines on a human scale, directly under human control, to fulfill with more exquisite adaptation, with a higher refinement of skill, the human needs that are to be served. In this matter, I am wholly on the side of Peter Kropotkin; for the author of *Mutual Aid* and *Fields, Factories and Workshops* understood that advance of the machine, as an agent of a truly human life, meant the use of small-scale units, made possible by the further progress of technics itself. Much that is now in the realm of automatism and mass production will come back under directly personal control, not by abandoning the machine, but by using it to better purpose, not by quantifying but by qualifying its further use.

You perhaps understand now something that may, at an earlier moment, have puzzled you a little: why I chose to take modern printing, by the invention of movable type, as the key art in discussing not merely the passage of handicraft art into machine art, but in further elucidating the essential nature of technics itself. I chose type because the whole development of technics, so long as it is conforming to its proper canons, is in the direction of the typical—and what could be more typical than type? Like the scientific knowledge that contributes so much to this development, it is the repeatable, the standardizable, the uniform—which is to say, again, the typical—that is the essential field of technics. This concern for the type, if carried into all the operations of industry, should have the effect of enabling us, in one department after another, to establish a common background of order, a highly simplified order based on the utmost degree of functional efficiency and economy, an order that demands a minimum contribution from the rest of the human personality. But once established and perfected, type objects should have a long period of use. No essential improvement in the safety pin has been made since the bronze age. In weaving there has been no essential modification in the loom for over a century. And what is true for machines holds good in no small degree for their products. When the typical form has been achieved, the sooner the machine retreats into the background and becomes a discreetly silent fixture the better. This again flies in the face of most contemporary beliefs. At present, half our gains in technical efficiency are nullified by the annual custom of restyling. Extraordinary ingenuity is exercised by publicity directors and industrial designers



in making models that have undergone no essential change look as if they had. In order to hasten style obsolescence, they introduce fake variety in departments where it is irrelevant—not in the interest of order, efficiency, technical perfection, but in the interest of profit and prestige, two very secondary and usually sordid human motives. Instead of lengthening the life of the product and lowering the cost to the user, they raise the cost to the user by shortening the life of the product and causing him to be conscious of mere stylistic tricks that are without any kind of human significance or value. This perversion of technics in our time naturally saps the vitality of real art; first by destroying any sound basis for discrimination and then by taking energy and attention away from those aspects of human experience in which the unique and the personal are supremely important.

And now I come to a final point, which is essential to our understanding of the relations of art and technics in the world today. There is no extraneous way of humanizing the machine, or of turning it to the advantage of that part of the human personality which has heretofore expressed itself in what we may call the humane arts. You do not make a machine more human by painting it with flowers, as our ancestors used to paint typewriters and coffee grinders, or by spoiling its smooth surface with mechanical moldings and carvings, as our ancestors used to spoil the looks of steam radiators and cooking ranges. That is sentimental nonsense: the canons of machine art are precision, economy, slickness, severity, restriction to the essential, and whenever these canons are violated—either by the application of irrelevant ornament or by packaging the works in an irrelevant form,

streamlining pencil sharpeners or other stationery objects, for example, or making the radiator of an automobile look like the mechanical counterpart of a shark's mouth, or accentuating speed, as another motor car designer tries to, by turning what should be a protective molding into a chromium arrow—when this sort of thing is done the result is not the humanization of the machine but its debasement. It does not thereby acquire human values; it merely loses important mechanical values, values which, by their proper esthetic expression, do have at least a modicum of human relevance, to the extent that they express order or subserve power. The point is that the machine is not a substitute for the person; it is, when properly conceived, an extension of the rational and operative parts of the personality, and it must not wantonly trespass on areas that do not belong to it. If you fall in love with a machine there is something wrong with your love-life. If you worship a machine there is something wrong with your religion.

One of the effects of the machine arts is to restrict the area of choice, on the part of the designer, and to extend the area of influence, with respect to the product. In some sense, man must forgo his purely personal preference and submit to the machine before he can achieve good results in the limited province of choice that remains to him. This curtailment of freedom is not unknown even in the pure arts: the sonnet, or any other strict form in any of the arts, the fugue say in music, sets similar boundaries to personal expression, and the sculptor, too, must follow the grain of the wood or respect the quality of the stone if he is to get the best results from his work; material and process play this part everywhere.



What is peculiar to the machine is that choice, freedom, esthetic evaluation, are transferred from the process as a whole, where it might take place at every moment, to the initial stage of design. Once choice is made here, any further human interference, any effort to leave the human imprint, can only give impurity to the form and defeat the final result. So it is by a fine sense of formal relationships, by proportion, by rhythm, by delicate modulation of the utilitarian function that good form is achieved in the machine arts: this applies equally to a page of type or to a bridge, to a chair or a pitcher. In the case of photography, for example, there was for long a question as to whether it was or was not art. And the answer to that question is: Is there any leeway for choice and initiative on the part of the photographer? If there is such leeway, there is a possibility of art; that is, of success or failure in terms that would have significance to the beholder. Perhaps the best effect of machine art is to make us conscious of the play of the human personality in the small area where it remains free, a differentiation so delicate, so subtle, that a coarse eye would hardly take it in and an insensitive spirit would not know what it meant. The artists who have taught us most about the values of the machine in our day—I would single out particularly Alfred Stieglitz, Brancusi and Naum Gabo—have been remarkable for this exquisite touch, for this sense of a perfection in form achieved by leaving the minimum human imprint on a natural form or a purely geometrical shape; so it was by the slightest modulation of an ovoid piece of marble that Brancusi turned an egg into a human head. Henry James, in that wonderful story "The Great Good Place," dreamed of an architecture "all

beautified by omissions"; and that effort to rid itself of the superfluous, to return to the essential and the inevitable, is one of the truly esthetic qualities of machine art, one that indicates the maximum determination by human values. Once that delicacy of perception becomes common, we shall not have to worry so much about the problem of quantification: for within the machine itself we shall have some of the intense interest in qualities, and in the effect of qualities upon the human mind, that came so naturally with earlier forms of art and handicraft. That problem of quantification, however, is a specially serious one; and I shall need the whole of the next lecture to put it before you.

Once we have achieved the right form for a type-object, it should keep that form for the next generation, or for the next thousand years. Indeed, we should be ready to accept further variations only when some radical advance in scientific knowledge, or some radical change in the conditions of life has come about—changes that have nothing to do with the self-indulgent caprices of men or the pressures of the market. Then, and then only, does a modification of the type become imperative. Otherwise the ideal goal for machine production is that of a static perfection, a world of immobile platonic forms, as it were, a world of crystalline fixity, rather than of continued change and flux. The more automatic our processes become, and the more heavy the investment in automatic equipment, the more in fact does this tendency toward the static actually hold. Today, for example, the change-over from our present system of telephone dialing to a quicker one, now technically possible, which would use push buttons, is retarded by the staggering expense



of making this adaptation. Therein lies the paradox of technical progress.

This interpretation of the path of technics, as leading to a series of flat plateaus rather than as a steady climb upward, is, I know, a baffling contradiction to the popular one. Indeed it must seem another perilous heresy. The animus of the last three centuries has been toward improvement, innovation, invention without end; and the chief duty of man, according to the utilitarian catechism, is to adapt himself to such mechanical changes as rapidly as is necessary to make them profitable. But this stale view assumes that we are capable of learning nothing, that we are incapable of mastering the machine we have created and putting it in its place; that we shall not emancipate ourselves from the manias and compulsions that our preoccupation with the machine has brought into existence; that philosophy and religion and art will never again open up to man the vision of a whole human life. It assumes indeed that we shall never call our soul our own again. But once we arrive at a fuller degree of self-understanding, we shall render unto the machine only that which belongs to the machine; and we shall give back to life the things that belong to life: initiative, power of choice, self-government—in short, freedom and creativeness. Because man must grow, we shall be content that the machine, once it has achieved the power and economy of a good type, should stand still—at least until the creator again places himself above the level of his mechanical creature. If this is too much to expect, then the time has come to set the stage for Post-Historic Man: the man without memory or hope.

### *Standardization, Reproduction and Choice*

THE PROBLEM that I now propose to discuss is one that goes far beyond the realm of art itself; and I do not mean to let myself be unduly confined, in endeavoring to carry that problem to its conclusions. But the problem arose, perhaps earlier than anywhere else, in the domain of art, and I am grateful that the general scope of these lectures encourages me to draw most of my illustrations from the related fields of technics and the arts. As far as time allows, I shall follow the trail opened in the arts into the rest of life; and if I do not take you the full distance, you will at least have provisions of a modest kind for making the journey by yourselves. We have seen, so far, that the split between art and technics, which is such a vexing one in our life today, perhaps existed from the very beginning of their development: that Prometheus and Orpheus, if in a sense brothers, were also like Cain and