VIII

RECAPITULATION

THE time has come to attempt a summary of the story and the argument that have so rapidly been indicated in the previous chapters.

While the number of printed pictures and designs that have been made as works of art is very large, the number made to convey visual information is many times greater. Thus the story of prints is not, as many people seem to think, that of a minor art form but that of a most powerful method of communication between men and of its effects upon western European thought and civilization.

We cannot understand this unless we bear in mind some of the basic factors in communication between human beings.

Whatever may be the psychological and physiological processes which we call knowing and thinking, we are only able to communicate the results of that knowing and thinking to other men by using one or another kind of symbolism. Of the various methods of making such symbolic communication there can be little doubt that the two most useful and important are provided by words and pictures. Both words and pictures have been known to man since the most remote times. In fact, it may be said that until the animal had used them he had not become man.

While both words and pictures are symbols, they are different

in many ways of the greatest importance. So little are they equivalent to each other that if communication were confined to either alone, it would become very limited in its scope. All words need definitions, in the sense that to talk about things we have to have names for them. Verbal definition is a regress from word to word, until finally it becomes necessary to point to something which we say is what the last word in the verbal chain of definition means. Frequently the most convenient way of pointing is to make a picture. The word then receives definition, or, if one likes, the thing receives a name, by the association of a sensuous awareness with an oral or visual symbol.

Any legible written word, whether it be drawn painfully by an illiterate or written in flowing calligraphy by a writing master, remains the same word no matter how it may look. The same thing is true of the sound of the spoken word, with all its personal peculiarities and local accents. The reason for this is that any particular specimen, whether spoken, written or printed, is merely a representative member of a class of arbitrary forms of sounds and visual signs, which we have learned or agreed to regard as having the same meanings. In every instance it is the class of arbitrary forms that has the definition as a word and not any particular oral or visual specimen. Thanks to this it is possible for a word to be exactly repeated, for what is given in repetition is not the same unique specimen but another equally representative member of the same class of arbitrary forms.

Hand-made pictures, to the contrary, we are aware of as unique things; we all see the differences between them and know the impossibility of repeating any of them exactly by mere muscular action. Thus so long as the only way there was of describing objects was by the use of repeatable words and unrepeatable hand-made pictures, it was never possible from an oral or visual description to identify any object as being a particular object and not merely a member of some class. In thinking about this we have to remember that identification of the location, the function, or some particular marking of an object, is not a description of the object.

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Except for the words which are proper names or syntactical devices, a word is merely a name for a class of relations, qualities, or actions. The consequence of this is that what we call verbal description is very often no more than the accumulation of a series of class names. It is much like the game we play on board ship when we toss loose rings of rope about a peg. No one of the rings closely fits the peg. If it did we could not toss it over the peg. As it is each ring can go over a great many very different pegs. But by tossing a great many very loose verbal rings over an object we think that we describe the object. Thus when we endeavour to make a full and accurate verbal description of even the simplest things, such for instance as an ordinary kitchen can-opener, we accumulate such an enormous and complicated heap of verbal rings that it becomes practically impossible for anyone but a highly trained specialist to understand what we have said. This is the reason the tool-maker wants not a verbal description of the thing he is asked to make but a careful picture of it. It is doubtful if any much more intricate intellectual process can be imagined than the translation of a linear series of verbal symbols, arranged in an analytical, syntactical time order, into an organization of concrete materials, and shapes, and colours, all existing simultaneously in a three-dimensional space. If this is true of such simple abstract forms as those of can-openers, it takes little thought to realize what the situation is in regard to the infinitely complex and accidental shapes that occur in nature and in art. It brings home to us the utter necessity of properly made pictures if we wish to convey our ideas in exact and meaningful ways. Certainly, without pictures most of our modern highly developed technologies could not exist. Without them we could have neither the tools we require nor the data about which we think.

Furthermore, science and technology, for their full fruition, need more than just a picture; they need a picture that, like the words of verbal description, can be exactly repeated. A word or a sentence that could not be exactly repeated would have no meaning. Exact repetition is of the essence for words, for without it they

would be merely meaningless signs or sounds. Without exact repetition of the verbal symbols there would be no verbal communication, no law, no science, no literature. There would be only animal expression, like that of the barn yard. Over the years a good many people can see a picture, and many pictures can be sent travelling about the world. But, even so, a unique picture can make its communication to very few people, and it can only make it in one place at a time. There is a distinct limit to the number of persons who can seriously see and study and work from any single unique picture. As we have seen, the Greek botanists were fully aware of the limitation upon the use of hand-made pictures as a means of communicating exact ideas of shapes and colours. The reason for this limitation was that the Greeks, like their predecessors and, for many generations, their successors, had no way of making exactly repeatable pictures. They could only make copies of pictures, and when hand-made copies are made from hand-made copies it takes only a small number of copies for the final copy to bear no practically useful resemblance to the original. The meaning of this should be obvious so far as concerns the dissemination of accurate information about forms and shapes. In short, prior to the Renaissance, there was no way of publishing a picture as there was of a text.

While this is never mentioned by the historians of thought and art, of science and technology, it undoubtedly had much to do with the slowness of the development of science and technology and the thought based on them. Communication is absolutely necessary for scientific and especially technological development, and to be effective it must be accurate and exactly repeatable. Science in actual practice is not a dead body of acquired information but an actively growing accumulation of hypotheses put forth to be tried and tested by many people. This trying and testing cannot be done without exact repeatability of communication. What one or two men have thought and done does not become science until it has been adequately communicated to other men.

The conventional exact repeatability of the verbal class symbols gave words a position in the thought of the past that they no longer hold. The only important things the ancients could exactly repeat were verbal formulae. Exact repeatability and permanence are so closely alike that the exactly repeatable things easily become thought of as the permanent or real things, and all the rest are apt to be thought of as transient and thus as mere reflections of the seemingly permanent things. This may seem a matter of minor moment, but I have little doubt that it had much to do with the origin and development of the Platonic doctrine of Ideas and the various modifications of it that have tangled thought until the present day. The analytical syntax of sentences composed of words certainly had much to do with the origin of the notions of substance and attributable qualities, which has not only played a formative role in the history of philosophy but for long presented one of the most formidable hurdles in the path of developing scientific knowledge. At any rate, until comparatively recent times nominalism, with its emphasis on facts, its distrust of words, and its interest in how things act rather than in what they essentially are, has had little chance, and its great development has coincided remarkably with the ever-broadening development of modern pictorial methods of record and communication.

Some time at the end of the fourteenth or beginning of the fifteenth centuries men in western Europe began to make pictorial woodcuts, but no one knows when or where. For all we know it may have started simultaneously in many different places. By the middle of the fifteenth century men were engraving, and before its end they were etching. Printing from movable types began presumably in the 1440's; by the middle of the 1450's the Gutenberg Bible had been printed; and about 1461 the *Edelstein* came from the press. The *Edelstein* was merely a book of popular tales, but its pages were decorated with woodcuts. At the time they had no informational value or purpose. In 1467 the *Torquemada* was printed. It was a book of devotion, but illustrated with rough woodcuts representing definite particular things,—the pictures

with which a named and located church had been decorated. In 1472 the *Valturius* appeared. It was full of woodcuts of machinery, which were specifically intended to convey information. Shortly after 1480 the first illustrated botany book appeared. Its woodcuts were the last of a long series of copies of copies that started far back of the ninth century, and in consequence bore no relation to the things they were supposed to represent. In 1485 came the first printed botany book with illustrations drawn at first hand from the plants described in the text. In 1486 Rewich illustrated and printed the first illustrated travel book, the famous *Breydenbach.* Rewich had accompanied the author on his travels and drew the things they saw. In that same year three colours were first used in the printing of illustrations. In 1493 several illustrated catalogues of precious objects in the possession of some of the German cathedrals were printed. These appear to be the first printed illustrated catalogues of any kind of collections. By the middle of the fifteen-hundreds illustrated books about every conceivable kind of subject were coming from the presses of Europe in an ever increasing flood. Conspicuous among them were books about architecture, botany, machinery, anatomy, zoology, costumes, archaeology, numismatics, and, specially, some of the technologies and crafts. The single sheet print in the various mediums then available had begun its task of carrying across Europe in all directions information about buildings and works of art that themselves never travelled. The rapid pervasion of the Italian Renaissance and Baroque styles was accomplished by the single sheet print and the illustration.

Nothing like this had ever been known before. The same identical pictorial statements were made in each example of the edition, whether of a single sheet print or of an illustrated book. While for at least several thousand years men had been accustomed to having texts that repeated the same statements—Pliny the Younger, shortly after A.D. 100, referred casually to an edition of a thousand copies—now for the first time men were getting accustomed to pictures that repeated the same statements. It began to

be possible to convey invariant visual information about things that words were incompetent to describe or define.

With few exceptions, these illustrations prior to the middle of the fifteen-hundreds were what used to be called 'facsimile woodcuts', i.e. woodcuts made by cutting away the surface of a wooden block between the lines drawn on it by a draughtsman. This was not a translation of the draughtsman's lines but a saving of them, as many of the woodcutters were so skilful that the 'hands' of the draughtsmen can be recognized in the prints from the blocks. This skill made it possible for first-hand pictorial statements to appear in books, not only in some volume or volumes but in every copy of the entire edition of a book.

The first-hand pictorial statement by a competent draughtsman has much the same value as the testimony of a first-hand witness. If he is sharp-sighted and observant he can tell us much about an object or an action, but nevertheless his training and habit of seeing and drawing lead him to select certain things for statements and to omit others from them. Each school of art had its scheme for laying lines, and these schemes in time became neither more nor less than grammars and syntaxes which, while making handmade pictorial statements possible, also greatly restricted and influenced their power of statement. Much as he might want to, a German in the fifteenth or sixteenth century could not draw like an Italian, or *vice versa.* This meant that neither could say the same things in his drawings that the other could. We get sharp evidence of this in the copies that each made from the other—the Germans copying Italian engravings and the Italians copying German engravings. Although the specific lines of the original were there before him, the copyist never actually followed them closely in his copy, and rarely made any attempt to do so. Except in the most generalized of ways no two drawings, even one copied from the other, gave the same particularities. Especially was this true when the copy was not only a copy but a translation into another medium. The results of this are perhaps most easily to be seen in the prints after works of art, for in none of them are we

able to find the kind of qualitative statement that is necessary for connoisseurship of the work of art itself. As represented in the prints it was impossible to tell the most arrant fake from the original.

However, no matter what its defects might be, the first hand visual statement in a print had the great advantage that it was exactly repeatable and invariant. This meant that in things like the descriptive sciences, such for instance as botany and anatomy, it was possible to produce what we may think of as representations that were standardized to the extent of the size of the edition. So long as the subject of the print was not a particularity but a generalized statement of the generic traits of some kind of object the situation was good enough. In fact, even today when we want to give a statement not of personal characteristics but of abstracted generic forms we still use drawings for our illustrations.

In the middle of the fifteen-hundreds several very important things happened in print making that were to have unsuspected results. The woodcut broke down under the constant demand for more and more information in the available spaces. To pack more pictorial information in a given space, the lines have to be made finer and closer together. This led to the making of wood-blocks with such minutely reticulated surfaces that for practical purposes the printers were unable to get good impressions from the blocks with the paper and the techniques of printing that were then available. Whereas it is easy to find copies of the earlier books containing good impressions of their coarser blocks, it is sometimes exceedingly difficult to find copies of later books that contain good impressions from their finely worked blocks. It is probable that many of the most important picture books of the mid fifteen-hundreds never contained good impressions from their blocks.

The engraving, however, did not suffer from this technical difficulty. Its lines could be very fine and very close together, as compared to those on any wood-block, and still yield a sufficient quantity of clear impressions on the papers then available. I think

it can be said that this fact had much to do with the general increase in the use of engraving for illustrations that took place after the middle of the fifteen-hundreds. In any event, by the end of the century the engraving had taken the place of the woodcut in all but very few of the books made for the educated classes. This was not, as has been said, a mere superficial change in fashion, it was a basic change in modes and techniques made in response to an insistent demand for fuller visual information. In so far as there was a fashion as distinct from any need, I believe the fashion merely followed the norm set by the informational demand.

It thus becomes necessary to think about engraving and etching, which, from our present point of view, are to be regarded as varieties of the same technique. In the first years of engraving the engravers had been gold- and silversmiths. Then trained draughtsmen began to make engravings and, naturally, they used the linear schemes and syntaxes to which they were accustomed in their pen drawings and those of their schools. The German syntactical scheme was very different from the Italian. In the early years of the sixteenth century Marc Antonio and others after him began to make engravings after drawings, paintings, and sculpture by other men. These prints were made and sold not so much as works of art but rather as informational documents about works of art. Thus Dürer, in his Netherlands diary, refers to prints after Raphael as 'Raphaels Ding,' which he knew they were not. Marc Antonio evolved a novel scheme for the translation of sculpture into engraved reproductions. Instead of reporting about the surfaces of objects, their textures, their colour values, and the play of light across them, he devised a linear net which enabled him schematically to indicate their bosses and hollows. The most particular personal characteristics of the original works of art, their brush strokes and chisel marks, were thus omitted, and what was transmitted in the print was little more than an indication of iconography combined with generalized shapes and masses. At the end Marc Antonio used the same linear scheme in engraving Raphael's drawings and paintings that he had worked

out for ancient sculpture—the characterless 'Roman copies' of Greek statues. It is important to remember this, for it had momentous consequences.

It is to be noticed that while the early engravers on occasion made prints of late mediaeval objects, such as Schongauer's 'Censer', it is difficult to find a reproductive print of such an object by any of the engravers who grew up in the linear syntaxes that came after Marc Antonio. For practical purposes it is impossible to find a reproductive print by one of the masters of engraving that represents an early painting or a piece of mediaeval sculpture. Such mediaeval statues as were reproduced were reproduced not carefully for their own sakes but merely as hastily indicated details in architectural ensembles. The vast number of these mediaeval things still in existence shows that they have always been held precious by somebody, if not as works of art at least as examples of skill, as antiquities, or as relics. Thus the lack of engraved reproductions of them cannot be explained simply on the ground of a change in taste or fashion. A much more likely explanation is to be found in the fact that they did not yield themselves to the kind of rendering which was implicitly required by the dominant and highly schematized linear practice of engraving. When you have no vocabulary with which to discuss a subject, you do not talk very much about that subject.

Marc Antonio's method was rapidly adopted and developed by engravers everywhere, for it had the great business advantages that it was easily learned and could be used, no matter how libellously, for many different kinds of subject matter. The very limited average instrument of a very limited average purpose, it became the dominant style of engraving in spite of the fact that it made it impossible for the engraver who used it to catch and hold the particular characteristics that gave the originals their unique qualities. Everything that went through the procrustean engraving shops came out of them in a form that had been schematized and made reasonable—and reasonability meant conformity to the generalized abstract conventional webbing of lines that was an

incident of manufacture. As every great work of art is as by definition unconventional in its most important aspects, a representation of it in terms of a convention that leaves out those aspects is by definition a misrepresentation.

Shortly after Marc Antonio began his grammatical or syntactical investigations, the print publisher and dealer began to make his appearance. He was a manufacturer-merchant, and often was not himself an engraver. He employed others to make prints, not of subjects that interested them, but of subjects that he thought he might be able to sell. Very often that could have been the only interest that he himself took in them. Some of the publishers had the engravers work for them in their shops, just as though they had been mechanics. As ideas of business efficiency came in, the engraver gradually ceased to make the drawings after the originals he 'reproduced'. The publishers procured drawings of the objects they wanted to make reproductions of. These were then handed to the engravers, who copied and translated them on to their copper plates, generally without ever having seen the objects their work was supposed to represent. The consequence was that the prints which came out of these efficient shops were at best second or third hand accounts of their distant originals, and, not only that, translations of translations as well as copies of copies. The scheme of operation made it impossible to give any pictorial report of such things as the brush work, the chisel strokes, or the surfaces, of the originals—which, in fact, were the originals. Moreover, the prints became filled with clichés of representation based on the requirements of the linear syntax that had been adopted by the engraving craft, which interposed a flat veto on the representation of the most personal of all the traits of the original work of art. The linear network varied but little in its general scale, although the objects that were engraved, be they large or small, were all reduced or enlarged to a few typical scales which had no relation to the sizes of the originals. This had important effects on the vision of the people who used the engravings.

Naturally this schematic network of lines became the medium for the exhibition of a great deal of virtuosity, not of keen reporting but of the handling of the lines in the network. The extravagances of the virtuosi had their immediate effect on the day's work of the more humble artisans of the copper plate. The textures of the network became ends in themselves and not merely aids to statement. Form and content were separated, and both got lost.

When engraving became a capitalist enterprise it became important to get as many impressions from the engraved or etched copper plate as possible with as little difference as might be between them. Towards the end of the sixteenth and the beginning of the seventeenth century this problem was worked at with great business acumen by a number of men in different places. Among these men there may be mentioned Rubens, the painter, Callot, the etcher, and Abraham Bosse, who wrote the standard technical treatise on the craft. These men invented and rationalized ways of laying and sinking lines on plates in such a way that the plates would yield very large editions before they wore out. This not only affected the weave of the linear net, but increased its independence from accuracy in reporting.

Rubens, if not actually the first important artist to have a financial interest in the reproduction of his work, was the first to create about himself a school of engravers who specialized in the reproduction of his pictures, and often was himself either the publisher or a partner in the publishing firms. Anthony van Dyck, his famous painter pupil, used the services of a group of these engravers of the Rubens school to produce a set of over a hundred portraits, the first few of which he himself had etched. The set ran through many editions, and its coppers were still being printed from in the present century. The influence of the set can be traced in many engraved portraits until the second half of the nineteenth century. In a way it may be regarded as having provided the norm for much of subsequent portrait-engraving and etching.

In France, the only country that had a single artistic capital, engraving had a popularity perhaps greater than it enjoyed any-

where else. The French engravers of the seventeenth century embarked on a search for linear methods that would be economically efficient and at the same time afford opportunity to show off their skill and agility in the choreography of their self-assumed goose-steps. Their skill in these goose-steps soon became of more importance than the fidelity with which they reproduced their originals. Some of them engraved in parallel lines, others evolved elaborate schemes of highly artificial cross-hatchings, some became experts in the sheen of satins and metal and the barbering of hair. The subjects to be engraved were undoubtedly chosen to enable them to shine in their specialties. Few of the masterpieces of art did this.

In the eighteenth century the French fashion for framed drawings in interior decoration led to the attempt to give closer reproduction of the superficial qualities of the drawings that the engravers worked from. Up to this time engravings had looked like engravings and nothing else, but now, thanks to the discovery of new techniques, the test of their success began to be the extent to which they looked like something else. Among the new techniques used for this purpose were aquatint and stipple, and soft ground etching, the crayon manner, and others still. Some of the plates began to be printed in colour the more closely to imitate the drawings and water-colours. In the seventeenth century mezzotinting, a blurry medium devoid of sharp accents, had been invented as a way of reproducing oil paintings in tones instead of in lines. Except in England, where painting was lower in key than in France, it was not much used. One of the curious things about all these new techniques of making prints is that so little original work was ever done in them. Goya was the only great artist ever to produce more than a sporadic essay in aquatint. The best artists to make more than an odd soft ground etching were Girtin and Cotman. Turner made a few reproductive mezzotints after his own drawings. But I doubt if any great artist has ever regularly used any of the other methods for his first-hand expression. I think it can be said that as a rule the great artist has habitually used only such graphic pro-

cesses as are comparatively direct, and that the desire for expression is incompatible with the indirections, the technical complexities, and the linear routine that mark most of the reproductive techniques. Direct a process as engraving was in the hands of the primitive masters, and notably in those of such men as Pollaiuolo and Mantegna, it is to be noted that from the point of view of the artist the 'facsimile woodcut' was still easier, for all that he had to do was to make a stylized drawing on the block which was then cut by a skilled mechanic. Even such a complete master of the technique of engraving as Dürer actually designed many more woodcuts than he made engravings, and, if we omit six or eight of his most popular engravings from the count, his most interesting work was done on the block. A further reflection of this easiness of the woodcut is to be seen in the fact that Holbein and Burgkmair made no engravings, and that Baldung and Cranach made but a very few. The wide spread of etching among original artists in the seventeenth century and again in the nineteenth century can probably be accounted for by the fact that it was the most direct and simplest method of making printing surfaces that was known prior to the invention of lithography.

However there is no getting away from the other fact that the easiest way for the original artist was to have his work copied by the professional reproductive engravers. The result was that by the end of the eighteenth century single sheet prints and book illustrations had, with few exceptions, become mere second- and third-hand statements, in which everything had been reduced to the average common-sense level of craftsman's shop work. By the end of the eighteenth century the first-hand visual statement had practically ceased to exist in the illustration of books, and in the single-sheet print it had become the rare exception. In France, at least, the manufacturing situation in the engraving shops had become even more complicated than it had been in the past, for the printing surfaces were often made by several men, beginning with an etcher, who laid in the outlines of the print from the drawing, and winding up with a finisher-engraver, who went over the etched

lines and filled in between and reduced everything to the neat, tidy, characterless, and fashionable, net of rationality of engraving. Sometimes some equivalent of the quality of the drawings for the engraver made a ghostly flicker in the first etched states, but by the time that the finishers had done their work of degradation all qualitative equivalence to the originals and to the drawings for the engraver had completely vanished. The things that counted in public estimation were the brilliant moiré of the damask of the engraved lines and the sentimentality of the general situations represented.

I personally have no doubt that the growth of pictorial reasonability in the eighteenth century was based on the economics and shop practices of the business of print manufacture. Neither have I any doubt that this business had a great effect on the public as well as on the artists, for it was through the engraved picture that the world received its visual notions about most of the things it had not seen and studied with its own eyes—which is to say about most of the things in the world. One might think, if one had not waded through the contents of some of the great historic collections of old prints and illustrated books, that any visual report of a work of art would always tell much the same story about it, no matter where or when it was made, but the fact is that the reproductive prints and illustrations contained far more of the linear syntaxes and shop practices of their places and times of production than they did of the detail or character of the originals they purported to represent. Actually the buyers had come to appreciate prints and illustrations far more for the skill of their makers in the artificial dance steps of the engraver's tool than for any representational fidelity.

Then the poor and the uneducated did not have reproductions. But the rich and the educated did, and their reproductions had a great effect upon their vision, which, as today, was based not so much on acquaintance with originals as on acquaintance with reproductions. I have spoken of the net of engraved lines and all that it omitted, but there was another equally important factor for vision in the old engraved reproductions. The sizes of the printed

reproductions bore no necessary relation to the sizes of the originals. In the printed picture the great mural might easily be smaller than a little portrait, a jewel greater in size than a façade. Further, in the hand-made reproduction all trace of the handling of his tools by the maker of the original had vanished. There was no difference in the engravings between the texture of a painting by a young Raphael and that by an aged Titian, or between the surfaces of a 'Roman copy', a Greek original, and a Gothic sculpture. The wilful theatrical stroke of Rubens's brush in one of his sketches, like the dominant expressive gouge of Michael Angelo's chisel, was smoothed out and obliterated. If the original artist had resorted to shorthand in his statement of any form, the engravers spelled it out at length in terms of the most commonplace vision and cliché of rendering. Had the engravers worked from the originals more than they did, and less from poor sketches by poor draughtsmen, this might not have happened to the same extent. But, whoever might have tried it would still have faced the problem of the longevity of his plates, and that absolutely required the artificial net work of line. Steel facing was not discovered until photography was in use.

As it was, a blighting common sense descended on the vision of the educated world. This showed itself not only in the terms in which that world talked about art but in the contemporary art the world relished. Its principal interest had been diverted by the means of reproduction away from the actual qualities of the originals and works of art and directed to generalized notions about their subject matters. Thus the century failed to take account in art, just as so much of it did in writing, of the thing that Pascal, in the seventeenth century, had pointed out about writing—that the quality of a statement consists more in the choice and arrangement of the particular symbols used in making it than in its general sense (*Les sens recoivent des paroles leur dignité, au lieu de la leur donner*). The eighteenth century talked about harmony, proportion, dignity, nobility, grandeur, sublimity, and many other common-sense abstract verbal notions based upon the

gross generalities of the subject matter that came through into the engraved reproductions. The sharp particularities of which works of art are necessarily constructed and which give them their character and value were unknown and unmentioned, for they escaped verbal description and were never reproduced in the reproductions. Thus, in spite of Winckelmann's remarks about engravings and the necessity of knowing the originals, the aesthetic doctrine of his *History of Ancient Art* of 1764 may be regarded as the rationalization of a set of values based on the catch of the engraver's net. The same thing can be said of most of the critical discussion in such a standard book as Bosanquet's *History of Aesthetic* which was published in 1892, i.e. at a time when the photomechanical processes were still in a very unsatisfactory state of development. It is amusing to think how few of the great weavers of aesthetic theory had any familiar first-hand acquaintance with works of art and how many of them either, like Lessing, knew the art they talked about only through engravings, or else sieved their ideas out of the empty air. Had it not been for this it is doubtful whether the Milords who made the grand tours would have been so happy and complaisant about all the poor copies of High Renaissance pictures and all the bad 'Roman' imitations of classical sculpture which they brought back to the North.

We can catch a glimpse of what was going on in still another way. Very few of us ever think to what an extent the painters of the fancy subjects and historical compositions, which were so generally admired during much of the eighteenth century and the first part of the nineteenth century, produced their canvasses to be engraved rather than to be seen in their paint. The sale of the painting was often of less importance than the sale of the prints after it. Hogarth knew this very well. The patronage of Mr. Alderman Boydell, the great print publisher, meant more to many an English painter than did that of His Majesty and a dozen dukes. Today in America we have a curious analogue in the novelists who write for the sale of their 'movie rights' rather than for the sale of their books.

At the end of the eighteenth century a number of things happened which were to have remarkable consequences. Men discovered that, by using the engraver's tool on the end of the grain of the wood instead of a knife on its side, it was possible to produce wood-blocks from which the finest of lines and tints could be printed in great quantities. Paper, smooth paper, began to be made by machinery run by power in a continuous process. Iron printing presses came into being, and in 1815 one was invented that was run by power and not by the strength of men's backs. The number of impressions that could be run off in an hour was greatly multiplied. Stereotyping was remembered and put to practical use. In 1797 Senefelder discovered how to make lithographs; Wedgwood in 1802 announced the first practical step towards Talbot's later discovery of photography. By early in the 1830's the book publishers had discovered that there was a great market for cheap illustrated books, magazines, and cyclopaedias, directed at the man in the street and not at the classically educated gentleman in his elegant library. Among these publications were many that dealt with techniques and the processes of making and doing things, and it was not long before the ordinary man, the uneducated man who used his hands and who knew how to read and to look intelligently at explanatory pictures, was finding out much from which he had been effectually debarred. The crafts instead of being the 'arts and mysteries' of highly restricted trades and guilds were thrown open to anyone who had the ability to teach himself from a book. Out of all this came such a rush of inventions and new processes as had never before been known. The same thing happened in many of the sciences and for much the same reasons. At least in England, which took the lead in all this invention and investigation, the outstanding engineers and scientists for a long time were not the graduates of the classicizing 'public schools' and the universities, but the ingeniously self educated. It had great moral and ethical results, as well as economic and social ones.

In art, the lithograph made it possible for such artists as Goya

and Delacroix to send out into the world their own drawings, not in unique specimens but in editions. Each impression had all their personality and all their daring, unhampered and unspoiled by the intermediary engravers. Things like Goya's 'Bull Fights of Bordeaux' and Delacroix's illustrations for *Faust* blew a great hurricane through the dead air of the single-sheet print and the book illustration in France. It shortly produced Daumier.

In the 1830's Talbot and Daguerre worked out photography and the daguerreotype, and in a little while it became possible for the first time to have reproductions of works of art that had not been distorted and vulgarized by the middle-man draughtsman and engraver—to have reports of works of art that had not been reduced to the syntax and the blurring technical necessities of a manufacturing trade and craft. For the first time it became possible to have a reproduction of a drawing or a painting or a piece of sculpture that told enough about the surface of its original for anyone who studied it to tell something about the qualities of the original. By the third quarter of the century many experiments had been made towards getting the photograph translated into printer's ink without the intervention of either the draughtsman or the engraver. About 1860, Bolton, an English wood-engraver, thought of having a photograph made on his block of wood so that he could engrave a piece of sculpture without having to get a draughtsman to draw it on the block for him. This eliminated one of the two chief obstacles to getting truthful reproductions into the pages of books. Bolton's method remained the principal way of making book illustrations until the end of the century. In the seventies attempts were made to produce what we now call half-tones. This came to fruition in the eighties and nineties with the invention of the ruled cross-line half-tone screen, a device which made it possible to make a printing surface for a pictorial report in which neither the draughtsman nor the engraver had had a hand. Its great importance lay in the fact that the lines of the process as distinct from the lines of the visual report could be below the threshold of normal human vision. In the old hand-

made processes the lines of the process and the lines of the report were the same lines, and the process counted for more than the report in the character of the lines and the statements they made. Until after the two sets of lines and dots, those of the process and those of the report, had been differentiated and separated and the lines and dots of the process had been lost to ordinary vision, as they are in the photograph and the fine half-tone, there had been no chance of getting an accurate report. Man had at last achieved a way of making visual reports that had no interfering symbolic linear syntax of their own. In the whole history of human communication it is doubtful if any more extraordinary step had ever been taken than this.

Within a very few years the new method had overrun the world. Not only did it revolutionize printing, but it gave such accuracy of reporting as had never previously been dreamed of. It was prerequisite to the existence of all our popular magazines and of our illustrated newspapers. It has brought about a very complete restudy and rewriting of the accepted history of the arts of the past, and more than that it has made all the exotic arts known of the ordinary man. It is interesting to notice how few of the books of connoisseurship published prior to 1880 are still either authoritative or on the shelves for ready reference. The very vocabulary of art criticism has been changed, as have the qualities for which men look in works of art. Whatever else 'aesthetics' may now be, it is no longer a scholastic quasi-philosophizing whose task is to justify a tradition of forms based in equal measure on obstinate ignorance and sacro-sanct revelation.

The flood of photographic images has brought about a realization of the difference between visual reporting and visual expression. So long as the two things were not differentiated in the mind of the world, the world's greater practical and necessary interest in reporting had borne down artistic expression under the burden of a demand that it be verisimilar, and that a picture should be valued not so much for what it might be in itself as for the titular subject matter which might be reported in it.

RECAPITULATION

The photograph and photographic process having taken over the business of visual reporting from the hands of the pictorial reporters and the engravers, the artists suddenly found themselves absolved from any need of verisimilitude in their expression and design. A great many of them, knowing nothing whatever about either expression or design, were lost, for they too had been members of the public and had regarded verisimilitude as the purpose and the justification of their work. Except in the work of the very greatest artists, creation and verisimilitude are incompatible, contradictory aims, and it is only at the hands of these greatest artists that creation has won out in the conflict between the two. With the photograph the magic dance of the creator's hand became for the first time visible in the reports of his work. Thus photographic reproduction of works of art and of what used to be called 'curios' has raised basic questions about the validity of many of the most hard-shelled and firmly entrenched doctrines about both art and beauty. It has changed Asiatic and African, Polynesian and Amerindian curiosities into works of art. It has revealed to the public for the first time something of the actual qualities of the Greek and later European arts of the past. It has brought about not only a reconsideration of the curious and ambiguous notion of the masterpiece—which often was no more than the object or picture which particularly lent itself to the linear net of the engraving—but it has caused many famous and adulated things to fall from grace and bestowed grace upon many unknown ones. It has made the western European world see that 'beauty', as it had known it, so far from being something universal and eternal was only an accidental and transient phase of the art of a limited Mediterranean area. Beauty is no longer the absolute that the pontiffs for so long proclaimed it to be. The photograph has made it obvious that what for four centuries the European world had acclaimed as purpose and beauty in art was no more than a peculiarly local prejudice about subject matter and mode of presentation. I think it is clear that this prejudice was to a great extent based on the methods of reproduction through which

artistic and factual report alike had reached the public. For generations that public had been circumscribed and made provincial by the limitations imposed by the syntaxes of its graphic techniques. It is significant, for example, that many line engravings of nudes are 'good', and that very few in any of the other techniques are. The nude was the particular fish for which the net of engraving had originally been devised. In the photograph the nude is more than apt to become either a 'naked' or a vulgarity. The nude has ceased to be the great preoccupation of the artists that it was before the pervasion of photography.

For centuries the European world had been unable to distinguish between factual reporting, with its necessary requirement of verisimilitude (of which perspective was an essential part), and that expression of values, of personality, and of attitude towards life, with which verisimilitude is always at war. As the elder Haldane once remarked, 'it is only through the constant negation of mere appearance that personality realizes itself'.[1] At last, thanks to the photograph, visual dream and expression were no longer required to conform to the informational reportorial demands of the ordinary businesses of life.

In addition to all this, the exactly repeatable pictorial statement in its photographic forms has played an operational role of the greatest importance in the development of modern science and technology of every kind. It has become an essential to most of our industries and to all of our engineering. The modern knowledge of light, like that of the atom, would have been impossible without the photograph. The complete revolution that has taken place in the basic assumptions of physics during the last fifty years could never have been accomplished without the data provided by the photographic emulsion.

The total effect of all these things upon technical philosophy has been remarkable. Many of the old problems, the 'perennial problems of thought', now seem in a way to be resolved by the

[1] Quoted from J. S. Haldane's *Life, Mechanism and Personality*, by permission of Mr. John Murray.

discovery that at least some of them are little more than accidents of unrecognized, unanalysed syntaxes of symbolization.

The seriousness of the role of the exactly repeatable pictorial statement in all the long development since about 1450 has escaped attention very largely because that statement has been so familiar that it has never been subjected to adequate analysis. Having been taken for granted it has been overlooked. The photograph, as of today, is the final form of that exactly repeatable pictorial statement or report. Although it has very great limitations, it has no linear syntax of its own and thus has enabled men to discover that many things of the greatest interest and importance have been distorted, obscured, and even hidden, by verbal and pictorial, i.e. symbolic, syntaxes that were too habitual to be recognized. It is unfortunate that most of the world is still unaware of this fact.

In a way, my whole argument about the role of the exactly repeatable pictorial statement and its syntaxes resolves itself into what, once stated, is the truism that at any given moment the accepted report of an event is of greater importance than the event, for what we think about and act upon is the symbolic report and not the concrete event itself.

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