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DELIVERED AT THE NATIONAL GALLERY OF ART, WASHINGTON, D. C.

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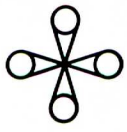


PRIMA PARS
t' Amsterdam.
by FREDERICK DE WIT.
in de Kalverſtraet by den Dam in de Witte Paskaert.
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E. H. Gombrich

ART AND ILLUSION

A Study in the Psychology of Pictorial Representation

THE A. W. MELLON LECTURES
IN THE FINE ARTS
1956
NATIONAL GALLERY OF ART
WASHINGTON

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To the Memory of My Teachers

EMANUEL LOEWY
[1857–1938]

JULIUS VON SCHLOSSER
[1866–1938]

ERNST KRIS
[1900–1957]

VIII

Ambiguities of the Third Dimension

> The sense of sight discerns the difference of shapes, wherever they are . . . without delay or interruption, employing careful calculations with almost incredible skill, yet acting unnoticed because of its speed. . . . When the sense cannot see the object through its own mode of action, it recognizes it through the manifestations of other differences, sometimes perceiving truly and sometimes imagining incorrectly. . . .
>
> PTOLEMY, *Optics*

I

IN PROBING the illusions of art from various sides, we have come, in the last chapter, to stress increasingly the power of suggestion. In the reading of images, as in the hearing of speech, it is always hard to distinguish what is given to us from what we supplement in the process of projection which is triggered off by recognition. "Recognition," though, is perhaps a misleading term in this connection. It was the "guess" of the radio monitor, it will be remembered, that turned the medley of speech sounds into speech; it is the guess of the beholder that tests the medley of forms and colors for coherent meaning, crystallizing it into shape when a consistent interpretation has been found.

But the comparison between the hearing of speech and the reading of pictures, however useful it may have proved as a starting point, is not without its pitfalls. The difficulties in identifying words, after all, are rather incidental. They become interesting only in abnormal conditions that blur those distinctive features that together make up the speech sign. In visual representation, signs stand for objects of the visible world, and these can never be "given" as such. Any picture, by its very nature,

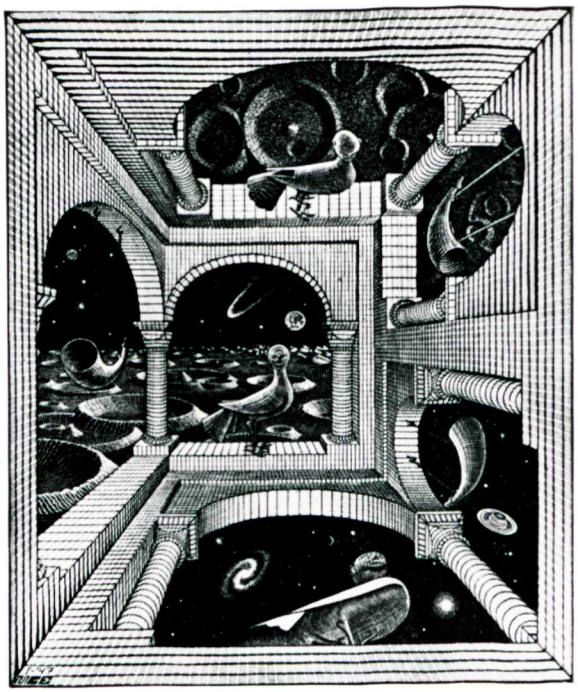
remains an appeal to the visual imagination; it must be supplemented in order to be understood. This is only another way of saying that no image can represent more than certain aspects of its prototype; if it did it would be a double, and not even Pygmalion could make one. Unless we know the conventions, we have no means of guessing which aspect is presented to us. Even the famous glass models of flowers in the Harvard University museum would not tell a visitor from Mars very much about plants if he had never touched any. Which brings us back to the wisdom of Philostratus who made his hero Apollonius say that no one can understand the painted horse or bull unless he knows what such creatures are like.

There is nothing paradoxical in this assertion. A picture of an unknown animal, or an unknown building, will tell us nothing of its size, for instance, unless some familiar object allows us to estimate the scale. Indeed, the point would hardly need elaboration were it not for the bearing it has on the most important trick in the armory of illusionist art, the trick of perspective.

II

IN RECENT YEARS a great deal has been written on perspective and the rendering of space in art, but the beholder's share in the illusion of space is still somewhat incompletely understood. It is best illustrated by an amusing print by William Hogarth that was destined to be a title page for a textbook on perspective [209]. The picture is full of the illogicalities which, singly, are often found in the art of children and amateurs and which are said to have been perpetrated by a dilettante nobleman whom Hogarth wished to ridicule. The man on the distant hill looks as large as the woman bending out of the window of the inn and can be seen to light his pipe at her candle. The trees on the hill appear to become larger the farther their distance from us, and yet some of them overlap the inn sign. Both ends of the church are clearly seen, and the bridge does not seem to span the river. The angler's lines interfere with each other, and the man in front must slide off the sloping pavement. Used as we are to the conventions of correct perspective, we interpret Hogarth's satire according to his intention. We see the print as an impossible picture. We rarely pause to think that it might also represent an impossible world, a world

209 HOGARTH: *False perspective. 1754, engraving*

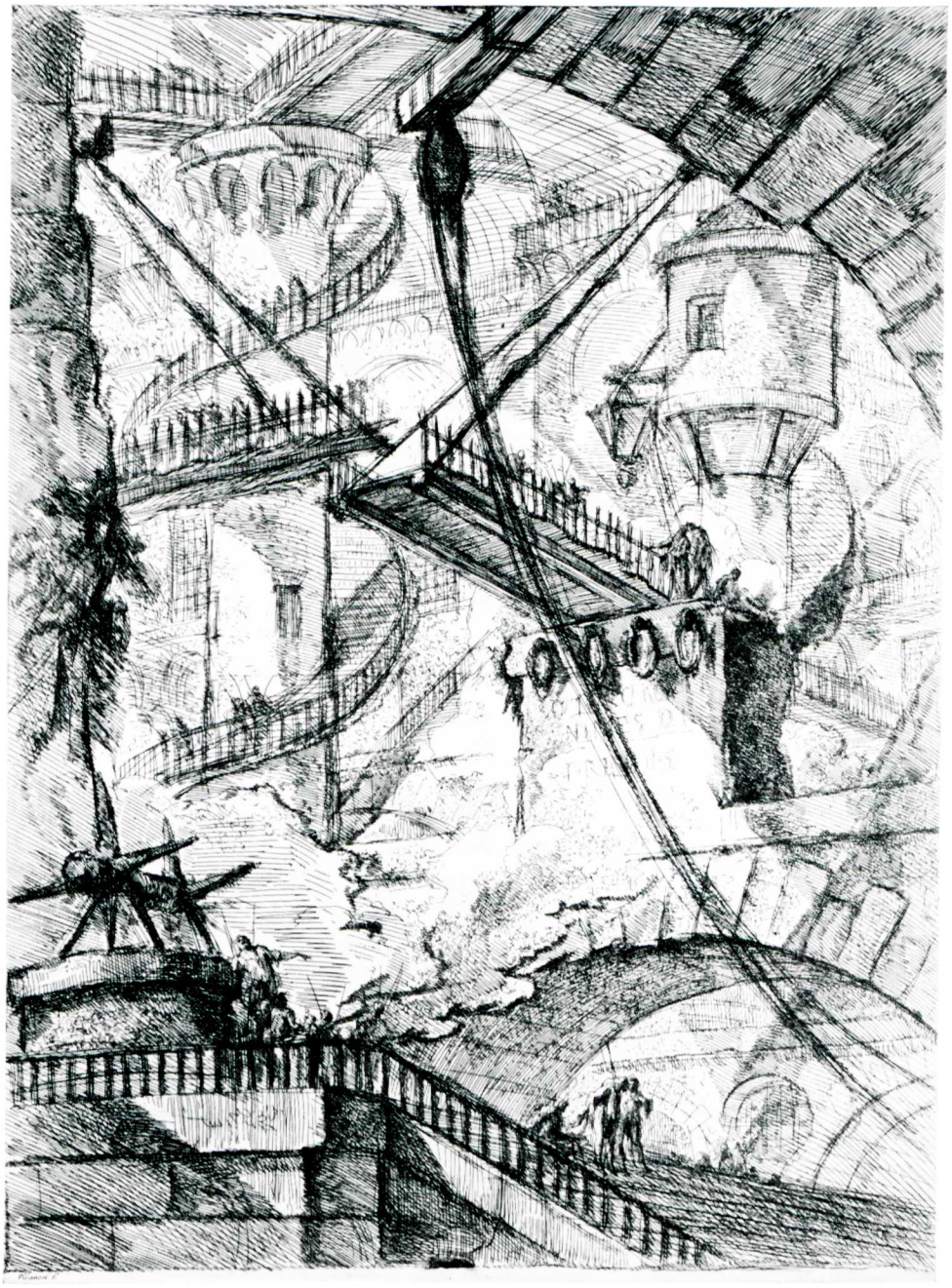


210 ESCHER: *Autre Monde. 1947, woodcut*

where the laws of gravity do not apply, where trees may grow to any height and arms to any length.

We are perhaps a little more aware of this possibility than Hogarth was, for our artists have accustomed us to the sight of impossible worlds. The print of the Dutch artist M. C. Escher [210] provides an instructive counterpart to Hogarth just because its perspective looks so correct. It is only when we come to look more closely that we see that such a structure cannot exist in our world and that the artist wants to transpose us into the giddy realms where terms such as "up" and "down" and "right" and "left" have lost their meaning. The print is an artist's meditation on space, but it is also a demonstration of the beholder's share; it is in trying to work out the intended relation of things and sights that we realize the paradoxes of his arrangement.

It is instructive to return from this extreme to a work of Hogarth's day that hovers on the fringe of the dream world. Piranesi, a master of perspective, used his skill in a series of prints of nightmare dungeons to conjure up an image of improbable and haunting scenery [211]. Is the perspective in Piranesi's print correct or false? As soon as we ask ourselves this question, we find that we must again set to work to sort out the things represented and to reconstruct the nightmare prison in our minds.

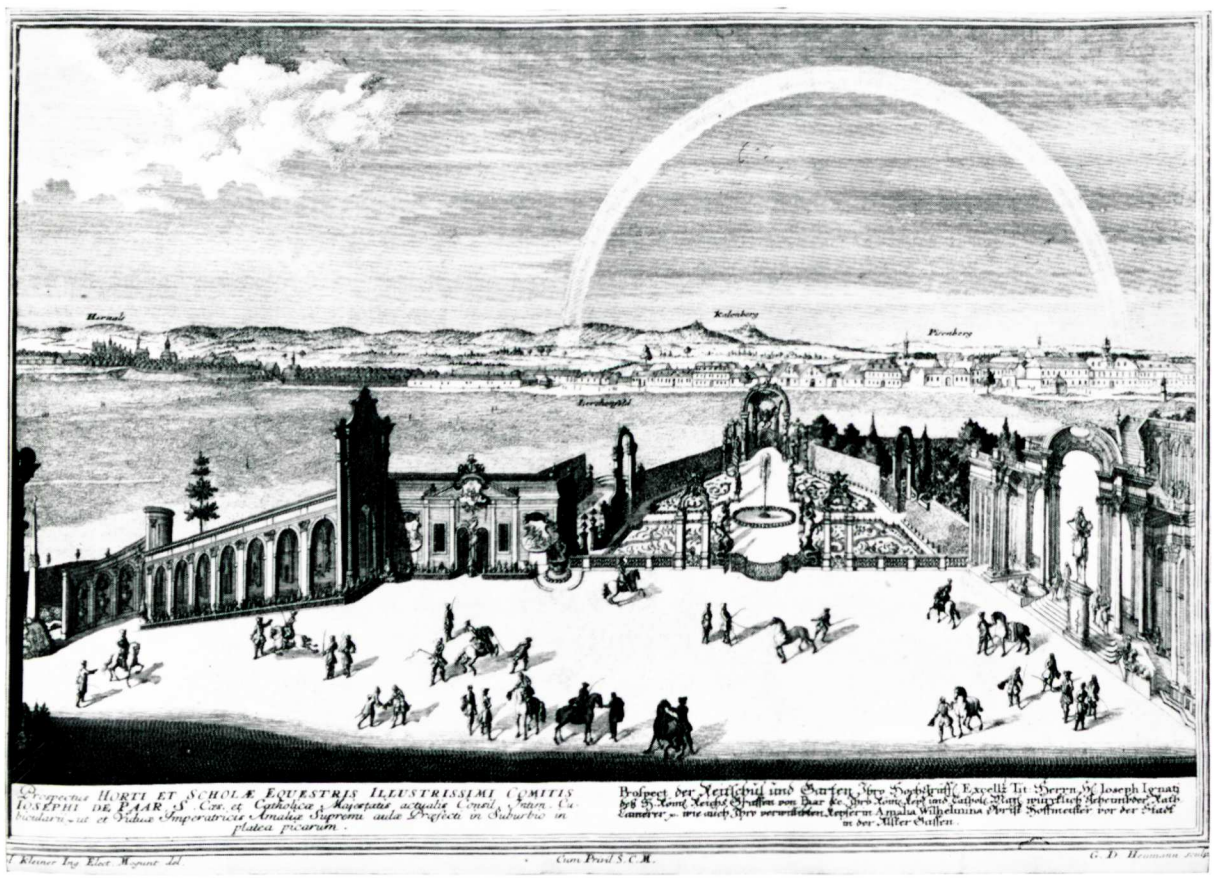


211 PIRANESI: *"Carceri," pl. VII. Before 1750, etching*

The rope hanging from the pulley—where does it lead? How is the drawbridge tied up? What is the angle of the banister near the lower edge? Watching ourselves trying to read the print in terms of a possible world, we gain some insight into the beholder's share in all reading of spatial arrangement. For it is always possible to stop the game and to baffle the search by a simple trick: transform the dungeon in your mind's eye into a stage design—for instance, the scenery for *Fidelio*, Act II—and your questions will have to sound very different. Where does the painted backdrop start, we would have to ask, and what shape should the stage props have to look like the design? Clearly there would be many answers possible to this question, indeed an infinite number of answers, and they all would depend on, among other things, the point of view from which the scene was to be looked at.

If this experiment in imagination may be a little hard to perform, this is due only to the fact that twentieth-century artists and stage designers have come to spurn the tricks of illusion. We rarely get into situations where the eye is actually deceived, unless we visit the churches and monasteries of Austria or Bavaria decorated by traveling specialists in

212 SALOMON KLEINER: *Riding school in Vienna. c. 1740*



illusionist effects, the *quadratisti*, who made it their job to transform any old interior into a fairy palace by painting vistas of colonnades on the walls or grandiose cupolas on the ceiling. Entering such a hall we may often be uncertain what is painted and what is "real," and it is interesting and amusing to watch the disappearance of the illusion when we trick the tricksters and view their work from an angle that was not intended.

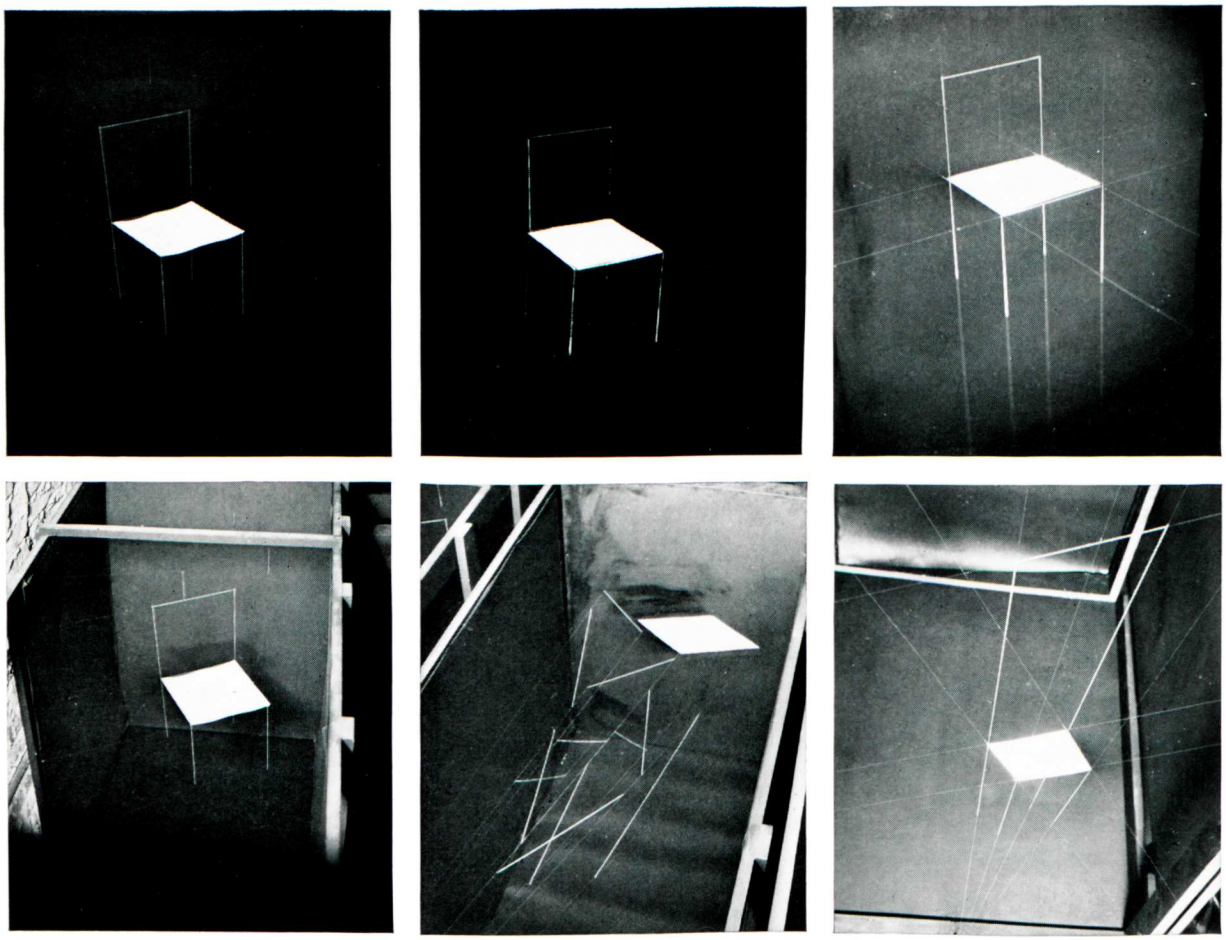
Let us look at an engraving that does precisely this [212]. It represents a riding school in eighteenth-century Vienna which was obviously designed to appear much larger and more sumptuous than it really was. Standing, presumably, at the wrought-iron gate inside the garden, the visitor would see on his left a triumphal arch with an equestrian monument in the center. On his right, he would see a colonnade seemingly extending far into the background and issuing into a rounded court with an obelisk in its center. Turning round, he would behold the formal garden itself, giving a prospect that appeared to lead a considerable distance toward the boschetto. The strange and unexpected convolutions which these stage settings made for those actually riding in the court are hard to imagine.

Our engraving deliberately takes the illusion to pieces, but illusionist effects of this kind survive the processes of reproduction altogether badly. Alas, we have all come to see art too much through the falsifying media of photographs and slides; thus the old insight that it is naïve to demand that a painting should look real is gradually giving way to the conviction that it is naïve to believe any painting can ever look real.

This conviction has been strengthened by certain muddles in the philosophy and psychology of perception that have led to a rumor of some mysterious flaw in perspective. "We do not always realize," writes Sir Herbert Read, "that the theory of perspective developed in the fifteenth century is a scientific convention; it is merely one way of describing space and has no absolute validity."

III

IT MAY BE LUCKY, therefore, that precisely at this juncture, when critics and art historians have somewhat lost their bearings in these matters, psychology has taken over the investigation of illusion with scientific



213 *The Ames chair demonstrations*

precision. It was Adalbert Ames, Jr., in particular who, starting as a practicing artist, invented a number of ingenious examples of trompe l'œil for the laboratory, which may help to explain why the theory of perspective is in fact perfectly valid though the perspective image demands our collaboration.

Most of these demonstrations are arranged in the form of peep shows. One of them which can be fairly successfully illustrated [213] makes use of three peepholes through which we can look with one eye at each of three objects displayed in the distance. Each time the object looks like a tubular chair. But when we go round and look at the three objects from another angle, we discover that only one of them is a chair of normal shape. The right-hand one is really a distorted, skewy object which only assumes the appearance of a chair from the one angle at which we first looked at it; the middle one presents an even greater surprise: it is not even one coherent object but a variety of wires extended in front of a backdrop

on which is painted what we took to be the seat of the chair. One of the three chairs we saw was real, the other two illusions. So much is easy to infer from the photograph. What is hard to imagine is the tenacity of the illusion, the hold it maintains on us even after we have been undeceived. We return to the three peepholes and, whether we want it or not, the illusion is there.

It is important to be quite clear at this point wherein the illusion consists. It consists, I believe, in the conviction that there is only one way of interpreting the visual pattern in front of us. We are blind to the other possible configurations because we literally "cannot imagine" these unlikely objects. They have no name and no habitation in the universe of our experience. Of chairs we know, of the crisscross tangle we do not. Perhaps a man from Mars whose furniture was of that unlikely kind would react differently. To him the chair would always present the illusion that he had the familiar crisscross in front of his eye.

One of the facts that Ames and his associates want to drive home with these demonstrations is, as they put it, that "perceptions are not disclosures." What we can see through the peephole does not directly and immediately reveal to us "what is there"; in fact, we cannot possibly tell "what is there"; we can only guess, and our guess will be influenced by our expectations. Since we know chairs but have no experience of those crisscross tangles which also "look like" chairs from one point, we cannot imagine, or see, the chair as a crisscross tangle but will always select from the various possible forms the one we know.

The example illustrates the inherent ambiguity of all images and also reminds us of the reasons why we are so rarely aware of them. Ambiguity, as we observed in the last chapter, can never be seen as such. We notice it only by learning to switch from one reading to another and by realizing that both interpretations fit the image equally well.

That is the reason why people are generally puzzled if they are told that any correct rendering of perspective may stand for an infinity of shapes in space: it strikes them as perverse to insist that, say, the houses in Canaletto's view of Venice [165] might be imagined as standing at any angle and distance from the beholder, provided we give up the idea they are houses of a familiar type. It is quite possible that only a stage designer, or at least a person accustomed to moving on an illusionist stage, would

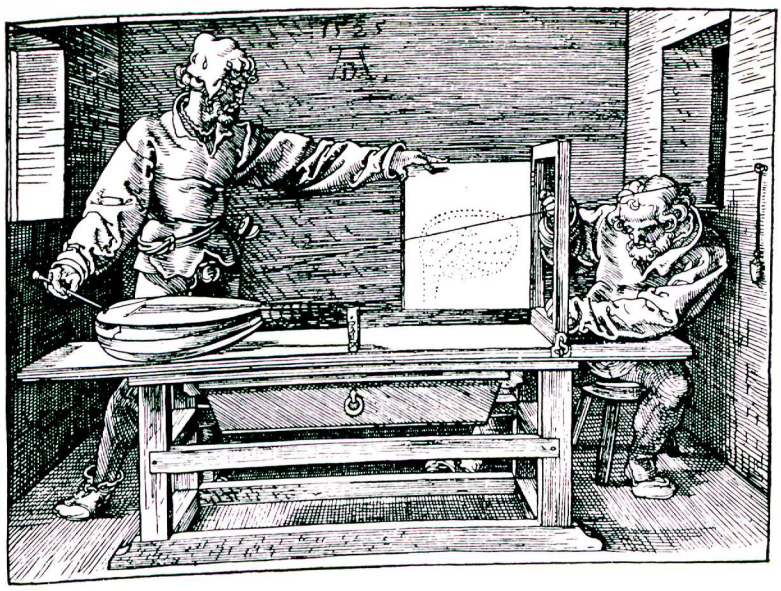
be able to perform the necessary switches and really "see" the ambiguity.

Let us remember that the need for the beholder's collaboration in the reading of perspective images, so dramatically confirmed in the Ames demonstrations, does not contradict the contention that perspective is in fact a valid method of constructing images designed to create illusion. On the contrary, Ames constructed his exhibits entirely on the basis of perspective theory and proved, if proof was ever needed, that this theory suffices to "deceive the eye."

IV

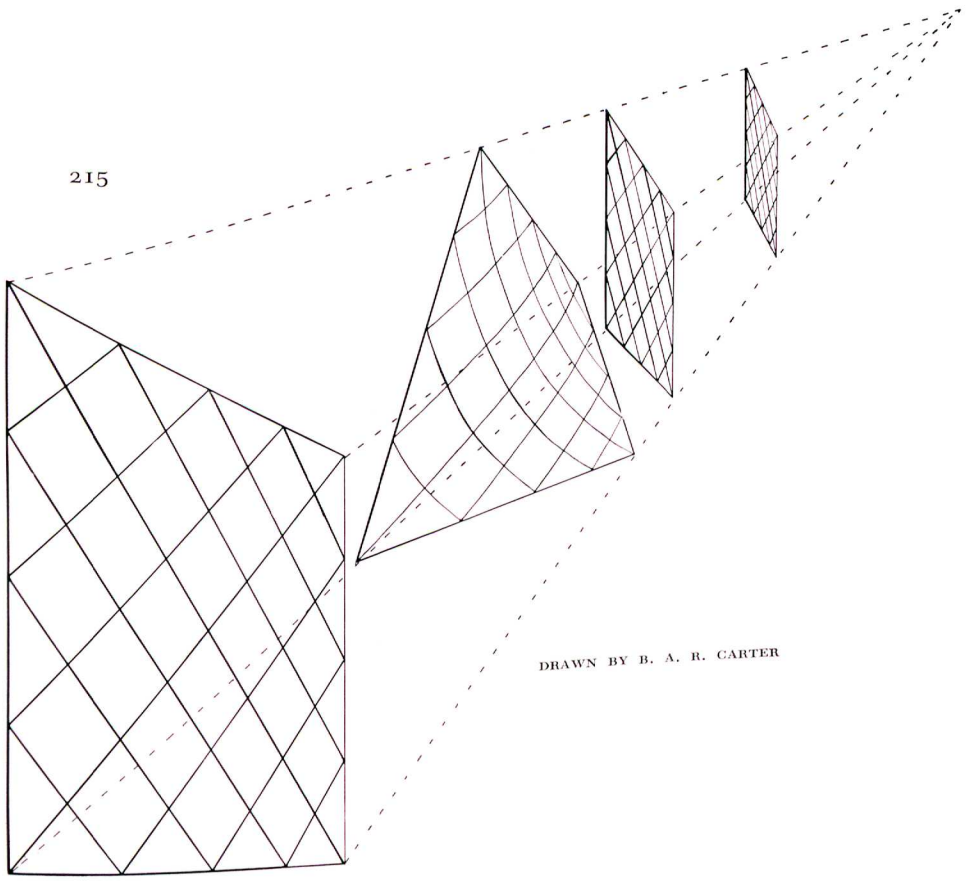
NOW perspective may be a difficult skill, but its basis, as has been said, rests on a simple and incontrovertible fact of experience, the fact that we cannot look round a corner. It is due to this unfortunate inability of ours that as long as we look with one stationary eye, we see objects only from one side and have to guess, or imagine, what lies behind. We see only one aspect of an object, and it is not very hard to work out exactly what this aspect will be from any given point. All you have to do is to draw straight lines to that point from any part of the object's surface. Those that will lie behind an opaque body will be hidden, those that have free passage will be seen. Moreover, the fact that we see only along straight lines is also sufficient to account for the diminution of the aspect at a distance. The whole rationale of the process is illustrated with masterly simplicity in Dürer's famous woodcut [214]. He represents the straight line of sight by a string and shows how the lute will appear in the frame from the point of the painter's eye, which must be imagined to be where the string is attached to the wall. It also follows from Dürer's demonstration that any number of objects can be constructed that will result in the identical aspect from the peephole.

Perhaps the easiest way to get that point clear is to imagine all these objects as constructions of wire (as some of Ames's indeed are), or as a sequence of wire-screen gates [215]. Our diagram shows that with the help of taut strings, real or imagined, radiating from one point, we can devise and arrange any number of such gates which will appear to be superimposed upon one another from that point so that all but the nearest



214 DÜRER: *From "Unterweisung der Messung." 1525*

will be hidden from sight. The geometry of similar triangles tells us that all the gates parallel to each other will differ in scale but not in proportion. If one has a series of identical squares, all the others will have, too. It will be well for the reader to keep this fact in mind, for much of our later argument will hinge on it. But our demonstration also makes it clear that such gates would not have to be parallel to each other or at right angles to the central line of sight. If we are free to change their proportions,



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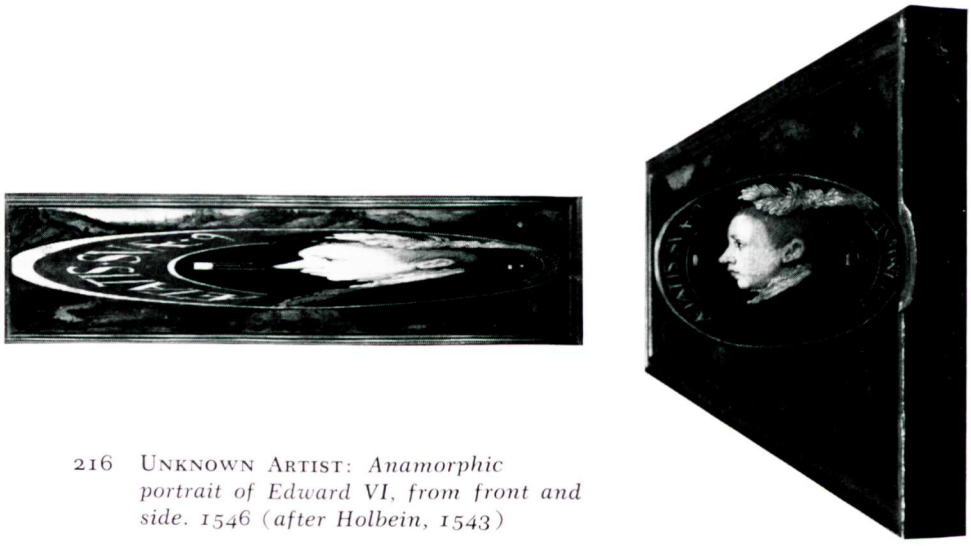
DRAWN BY B. A. R. CARTER



216 UNKNOWN ARTIST: *Anamorphic portrait of Edward VI, from front and side. 1546 (after Holbein, 1543)*

we can construct them for any oblique or curved arrangement while taking care that all their nodal points (where the wires cross) remain located on the same straight "strings." All these skewy configurations would still present from one point of view the same aspect as the straight ones. The geometry needed for our construction is called the "art of perspective," and the technical term for oblique or curved images that fulfill this condition is "anamorphosis."

The sixteenth-century portrait of Edward VI [216] is such an "anamorphosis." Seen from in front it presents a weird appearance, but seen from very close to the edge, the distortion is rectified, and we see the head transposed into the normal view. This display of the magic skill of perspective yields an unexpected bonus: in the original peep show, the head will look surprisingly plastic, as if protruding from the oblique panel. The reason is the same that makes us "see" the chair in the Ames demonstrations rather than a crisscross of wires. Having difficulty even in imagining the shape of the distorted profile that is equivalent to the normal view, we interpret what we see as a configuration parallel to our eyes, a kind of phantom arising from the picture. Ames, in fact, has employed this age-old device of anamorphosis, and his demonstrations prove that there is nothing wrong with the theory of perspective as illustrated by Dürer. From a fixed viewpoint, any distortion in perspective can be made indis-

tinguishable from the normal image. Why, then, do we call it a distortion? Clearly because it is not a relational model. We remember Plato's protest at the trickery of sculptors, who lengthened the proportions of statues destined to be seen from below, because they failed to represent things as they "really are." Like Plato, we are tempted to reserve this description for a correct relational model of three-dimensional objects.

We have all seen scale models of buildings such as the Parthenon, some with little toy mannikins dotted around. Now it is obvious that if we bend down to the point where these toy mannikins stand, the aspect of the building will appear the same as it would from the corresponding position on the Acropolis. Movie producers make use of this fact when they have to represent disasters such as earthquakes. A scale model of a burning house, or a collapsing bridge, can be made to look indistinguishable from the "real thing" if all standards of comparison are eliminated.

A picture on a flat surface, of course, can never be such a scale model. It can only represent identical relationships in two dimensions and not in three. Would it therefore be useless for the movie trick? Not necessarily. A flat picture of a façade, for instance, would serve its purpose. If it were drawn to scale, let us say 1 inch to a yard, it would clearly result in the same image from a distance of 100 inches as the real building from 100 yards. There is nothing "conventional" in this fact, which follows from elementary geometry. The belief that perspective rests on a convention arises from confusion between relational models and images. What is a convention, though a convenient one, is that we like to paint on flat surfaces and can therefore present only relational models of two dimensions. If we wanted to draw a relational model of a curved façade, say of a crescent in the city of Bath, it might indeed be convenient to abandon the convention of the flat drawing surface and select a curved one.

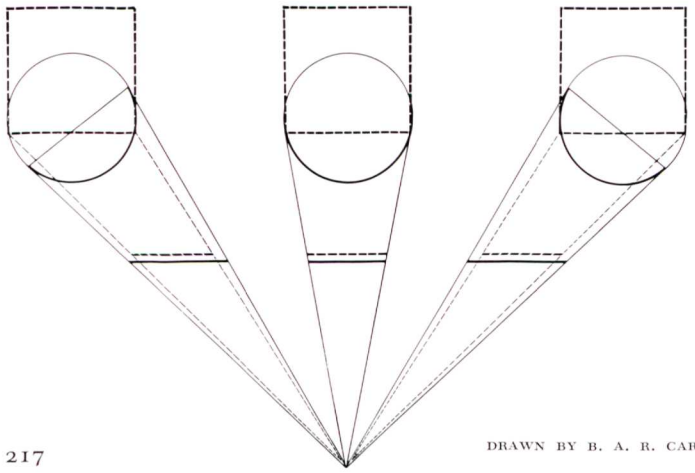
This convenience should not be confused with the power of a curved surface to create that illusion of reality we experience in the circular panorama painting beloved of the nineteenth century, or under the vaulted dome of the Zeiss Planetarium, beloved of the twentieth. Here there are two illusions interacting which must be carefully separated. The first is the illusion that the real sky is vaulted or even (though less obviously so) that a real panorama from a mountain top is circular. What is real in such life situations is our freedom to turn round and to assign imaginary equal

distances to all remote objects in our field of vision. Enjoying the same freedom of movement in the panorama or planetarium, we experience the second illusion that even to the arrested gaze the curved picture will be more truthful than the flat one. This is not so. In fact the method of the planetarium can be used to demonstrate the equal validity of perspective projection on a flat surface. The light points on its vaults are real "projections." They are thrown there by a powerful lamp in the center in which the stars are "represented" by so many searchlight beams. Now to the stationary eye close to that apparatus it can make no difference whether these beams strike a flat or a curved surface. Naturally the objective relationship of the lightpoints will change, but to the stationary beholder their pattern must look the same. He can no more tell in the dark what their real relationships are "up there" on the ceiling than he can tell this of the stars in outer space. Both are infinitely ambiguous. All he knows is that nothing prevents him from reading (and seeing) them in the same way as he reads (and therefore sees) the night sky.

This is all perspective can and does claim. Following as it does from our inability to look round corners, a perspective picture cannot exist in its own right, as a three-dimensional model can. Even our two eyes, since they view it from two different points, can in fact look round a corner and must therefore find fault with the panel designed for a peep show. To ask for it, finally, to be hung on a wall and viewed from any part of the room while still preserving the illusion is to ask for an absurdity. Perhaps the demand still hides the Pygmalion wish that a picture be more than a shadow, a little world independent of the beholder.

Here perhaps are the inarticulate roots of the idea that perspective is merely a convention and does not represent the world as it looks. Perhaps, also, a wish was father to the thought: the wish for a stick with which to beat the Philistine who wants to have his picture "correct." Moreover, certain facts could be cited to show that perspective theory leads occasionally to paradoxical results. One of these was discussed by Piero della Francesca and Leonardo, who showed that if we paint a picture of a row of columns, such as a temple façade, seen from the front, the columns on the side will come out wider in the construction than those directly in front [217]. The reason for this paradox, however, is not that the laws of perspective are inexact but that the ordinary results of geometrical pro-

jection sometimes take us by surprise. Columns, of course, extend both in width and in depth, and it is this extension away from the frontal plane of the elevation that causes the slight anomaly. That point becomes clearer if we imagine square pillars instead of columns and still clearer if we imagine those pillars painted red along the façade but green on the sides. Now perspective shows that in such a case the identical red fronts of the pillars will appear as identical red rectangles on the projective plane, but while the pillar in the center—right in front of us—will disclose no



217 DRAWN BY B. A. R. CARTER

green side, we will see an increasing amount of green as more and more of the sides of the pillars become visible. It is this addition of the sides, which project in ever greater width, that accounts for the apparent thickness of the pillars. If we replace the pillars by columns, we have to contend with additional consequences of projective geometry. With one eye, as the diagram shows, we never see the full width of a column, since the tangents formed by the straight lines of sight touch the circumference nearer to each other the nearer we stand. Conversely, we see slightly more of the surface of the column that is farther away from us. At very close range, this small unexpected increase in the area taken in by our eye when we step back partly compensates for the decrease in size due to the greater distance. All this is no doubt a little confusing; if it is a consolation to the reader, let me state my conviction that many writers on perspective have also become confused at this point, not excluding myself, of course. But I believe that basically the column paradox is very simple: it is caused

by the beholder's difficulty in interpreting the projection of a shape extending in depth that offers no clues as to its orientation. Columns or spheres look the same from any angle, and it is this special case of ambiguity that creates the painter's difficulty in coping with such undifferentiated shapes.

These facts, then, may for once really be described as the "exceptions which prove the rule," for the rule postulates that perspective is the theory of indistinguishable aspects from one point. There is another chain of arguments that presents greater difficulties. If it is true, the argument runs, that things of equal size will look smaller when farther away, it cannot also be true that a scale drawing of, say, a palace façade will represent its real appearance. After all, the windows of the wings will be farther away from us than those in the center. The height of the palace, too, must appear to shrink as the wings extend farther to the right and left. Does this not suggest that a correct picture should have slowly and slightly converging curves? This argument is usually countered by a reminder that what goes for the palace will go for its picture. If the one looks foreshortened and perhaps curved, the other, which we see from the same angle and which will therefore look identical, will also share this appearance. The peep-show arrangement could therefore look right while the world of our visual experience would still be subtly different, non-Euclidian, and curved (as has been claimed), like Einstein's universe.

But as a matter of fact this argument, too, is somewhat unrealistic. Sitting in front of that long-stretched façade and looking at its center, the painter would not see much of the wings, for the angle of vision which allows us to discriminate clearly is very small. He would therefore scan the view by moving his head, and as soon as he did that, the whole situation would change. Naturally, as he turns right, the façade will appear to converge in one way, and as he turns left, in another; but if he wanted to paint these aspects, he would quite instinctively shift his easel so as to stand obliquely to the façade, and in this changed situation ordinary perspective demands a converging image. While he turns, in other words, he is aware of a succession of aspects which swing round with him. What we call "appearance" is always composed of such a succession of aspects, a melody, as it were, which allows us to estimate distance and size; it is obvious that this melody can be imitated by the movie camera

but not by the painter with his easel. It is understandable if painters feel that the curve will suggest the movement of lines more convincingly than the straight projection, but this curve is a compromise that does not represent one aspect but many. Neither this nor any other system can claim that it represents the world "as it appears," but within the orthodox perspective arrangement, we deal with tangible, measurable relationships. Provided our wire-screen gates or grills [215] are parallel to one another, they will be identical in patterns and relationships and will be superimposed on one another from one point. Remembering the Ames demonstrations, it is really up to us in such a case to say which of these shapes, classified and arranged in a sequence of progressive diminution, we call the "real" gate and which "the image," though for obvious reasons we have become used to thinking of the outermost as the "motif" and of all the others as its "representations" from a given point of view.

One cannot insist enough that the art of perspective aims at a correct equation: it wants the image to appear like the object and the object like the image. Having achieved this aim, it makes its bow and retires. It does not claim to show how things appear to us, for it is hard to see what such a claim should mean. If two gates are indeed indistinguishable from one point, the same is true of all others which answer the same condition. If the lines of one are straight, so will all the others be. There is no room in this arrangement for some ultimate gate which gives us the shape in which all the others "appear to us."

It is tempting to identify this ultimate gate with what is called the "stimulus pattern," the actual relationships of the lines on the retina, and the fact that the retina is curved has indeed been brought into this discussion. But psychology warns us increasingly not to be too rash with this identification. We can never see our own retinas.

V

IT IS for this reason, I believe, that the psychology of vision and even phenomenological introspection have proved a will-o'-the-wisp for the student of art. It may well be, for instance, that a taut string held very close to our eyes "appears curved," but the only meaning we could attach to this statement, as to all descriptions of illusions, is the literal meaning

that it "looks like a curved string." With strings held very close to our eye, judgment becomes uncertain and we may make mistakes. But to say that all straight lines in our field of vision look curved seems to me a much more doubtful statement. It would imply that all straight strings look like curved strings, and that is manifestly not the case. It is perhaps significant that the prime argument for this claim of a curvilinear world is taken from architecture and not from painting. The Greeks allegedly introduced the so-called "refinements" of deviation from rectangularity in their temples to correct the distortions of vision. But if we can see the difference between a curved building and a straight one, the argument falls to the ground. In any case, it would not touch the painter, for if he painted the curves we would only see them more curved.

Leonardo called the mirror "the painter's master," and the mirror can indeed help us to clarify this much-debated issue. Take any rectangular pocket mirror and hold it so that the straight lines of a building, whether roof or wall, are reflected in it very close to the mirror's straight edge. It will be easy to make the two parallel, and the building will be seen to run true with the straight mirror side. Now it is certainly possible to say that this effect is due to our seeing both the mirror and the building curved. But we may now see why this is not a helpful description. Perceiving from the standpoint of experience, as has been said, "is synonymous with observing differences, relationships, organizations, and meanings." The idea that our world is really curved and should be so painted is little better than the old argument that we "really" see the world double and upside down.

VI

PERHAPS the reader will feel, by a sense of approaching giddiness, that we are here moving towards the unfathomed abyss that threatens to swallow up psychological and philosophical inquiries into the "really real." But if we hold fast to the railing of our subject—the beholder's share in the reading and interpretation of visual image—we may perhaps peer down for a moment.

It will be remembered that the digression on perspective aimed at sorting out various spurious problems from that of ambiguity. Ames

showed that perspective "works" but that it cannot explain why we select one of the possible configurations as the "real" one.

The nature of this problem is best demonstrated on the basis of the best-known visual ambiguity, the so-called "size-distance relationship." It is a fact that was known to the Greeks and the Arabs, and must have been observed by many a sailor and hunter, that where we lack other clues we cannot judge the size of an object unless we know its distance, and *vice versa*. This uncertainty was dramatically illustrated quite recently when a party of explorers diving in a bathyscaphe declared themselves unable to judge the size of the unknown creatures they had seen in the deep.

Ames has made use of this interdependence of knowledge and the estimation of distance by making his subjects look through a peephole at the enlarged or diminished images of familiar objects, such as wrist watches or playing cards. The expected reactions happened: the large wrist watch was judged to be of normal size but nearer; the diminutive one was estimated to be farther away than it really was. What is interesting in this experience is not that one is easily deceived, but that even an awareness of the ambiguity will not prevent one from making a guess. On the contrary, the habit, or compulsion, of jumping to a conclusion will always have the better of us when we look through the peephole. We will always see an object at a distance, never an appearance of uncertain meaning. The best we can achieve is a switch from one reading to another, a trying out of various interpretations, but the demonstration confirms the conclusion of our preceding chapter, that ambiguity as such cannot be perceived. The disciples of Ames refer to this fact as the "thereness-thatness" experience; to perceive means to guess at something somewhere, and this need will persist even when we are presented with some abstract configuration where we lack the guidance of previous experience. Presented with a circular disk, for instance, we are well aware of the fact that it might be fairly large and far away, or small and close by. We also may remember intellectually that it might be a tilted ellipse, or a number of other shapes, but we cannot possibly see these infinite possibilities; the disk will appear to us as an object out there, even though we may realize, as students of perception, that another person may guess differently.

One must have experienced these effects to realize how elusive they make the idea of "appearance" as distinct from the object itself. The stimulus school of psychology and the phenomenalists talked as if the "appearance" of the disk, the stimulus pattern, were the only thing really "experienced" while all the rest was inference, interpretation. It sounds like a plausible description of vision, but it is untrue to our actual experience. We do not observe the appearance of color patches and then proceed to interpret their meaning. Perception as such, as has been said, has a subject-predicate character. To see is to see "something out there." Even where the retina is really the only agent, in afterimages and the like, we still project the color patches into space.

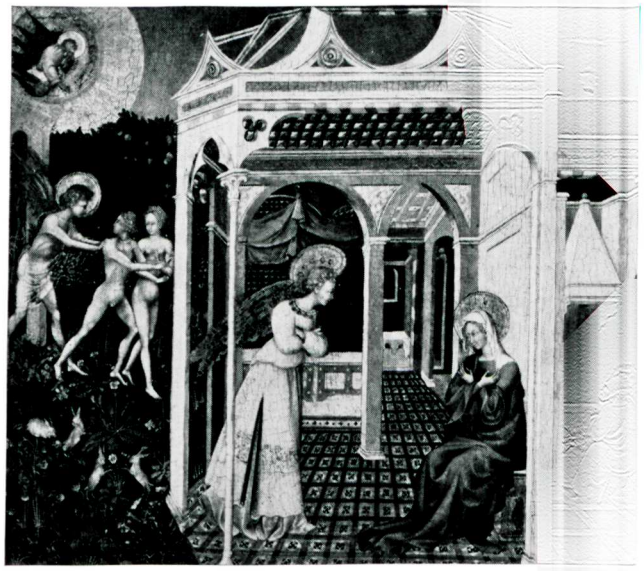
This fact, as we shall see, also helps to account for the difficulty in the demand for fixing "appearances" on to a canvas. Phrased in this general way, it is an impossible demand. What we can do is to set up an easel and submit to the concrete problem of making the image out there look like a given object in the distance, knowing full well (but not caring at all) that in doing so it must of necessity also look like any number of unreal objects. No wonder we need a starting point for this matching process, something man-made with which to compare the object and which can then be modified and approximated within the terms of the equation. The statement, "From where I stand this picture here looks like the castle there," is manageable and sometimes even testable. The general statement, "This picture represents reality as it appears to me," may undoubtedly be sincere, but strictly speaking, it makes no sense. It is about as profitable as the quarrel whether the moon looks like a dime or a silver dollar. The difficulty in answering this poser has never prevented a child from drawing the moon. As long as it is recognizable within the universe of its picture, no problem can arise. All I need to interpret the picture are those contextual aids that will make me think of the moon as the appropriate guess.

VII

WE HAVE come back, so it seems, to where we were at the end of the last chapter. The illusions of art presuppose recognition; to repeat the phrase from Philostratus, "No one can understand the painted horse or

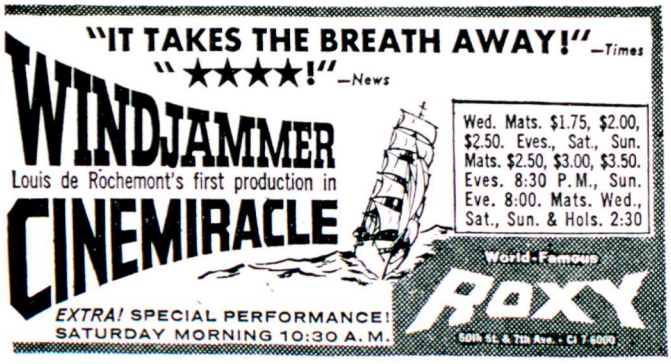
bull unless he knows what such creatures are like." The mistake which has led so much theorizing on art into the bog is in thinking that there must be means of representing "appearances" or even "space" as such.

It is our knowledge, or more precisely our guess, that makes us interpret the small horse or bull in many a picture as a distant horse or bull. It is not for nothing, therefore, that perspective creates its most compelling illusion where it can rely on certain ingrained expectations



218 GIOVANNI DI PAOLO: *The Annunciation. c.* 1440/1445

and assumptions on the part of the beholder. The Baroque decorator's illusion of painted ceilings or architecture works so well because these paintings represent what might, after all, be real. Every care is taken to blur the transition between the solidly built and the flatly painted, and we continue to interpret the one in terms of the other. It is for similar reasons that Renaissance painters liked to suggest depth through the rendering of tiled pavements [218]. Assuming as we must that the pavements are flat and the tiles identical units, we are compelled to read their progressive diminution as recession. But here, as always, the impression of depth is entirely due to our share, our assumption, of which we are rarely aware. In a similar way, modern poster artists often rely on our expectation of the normal letter form to give us the impression



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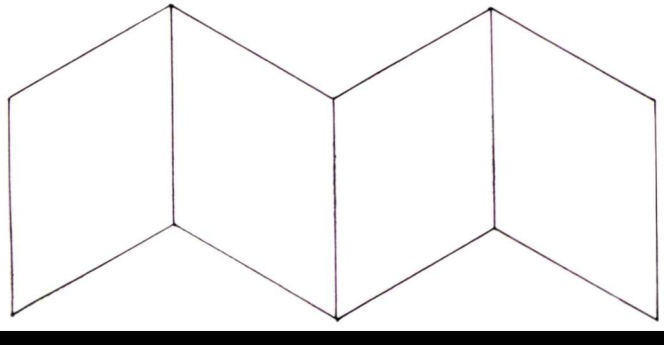
of letters or words arranged in depth or coming toward us with aggressive force [219]. It is an effect which would be lost on someone who did not know the conventions of lettering.

At this point the reader should be warned that the argument here developed would not be accepted by all schools of psychology. The Gestalt school would have none of it. The pioneers of this important movement want to minimize the role of learning and experience in perception. They think that our compulsion to see the tiled floor, or the letters, not as irregular units in the plane but as regular units arranged in depth is far too universal and too compelling to be attributed to learning. Instead they postulate an inborn tendency of our brain. Their theory centers on the electrical forces which come into play in the cortex during the process of vision. It is these forces, they claim, that tend toward simplicity and balance and make our perception always weighted, as it were, in favor of geometrical simplicity and cohesion. A flat, regularly tiled floor is simpler than the complex pattern of rhomboids in the plane, hence it is a flat, regularly tiled floor we actually see.

To support this view, the Gestalt psychologists are fond of demonstrating that we select the simple configuration even where there is no question of our knowing such shapes from experience. The most obvious example is a pattern of rhomboids [220]. Most of us will see it as a zigzagging band of regular rectangles rather than as a chain of rhomboids. Moreover, there are two possible readings of the regular band in space, and both are indeed adopted almost at random. We can see it starting from behind or from in front. We can even make it switch round from one position to the other with little effort. What we cannot do even with the greatest effort is to see or imagine the various irregular shapes



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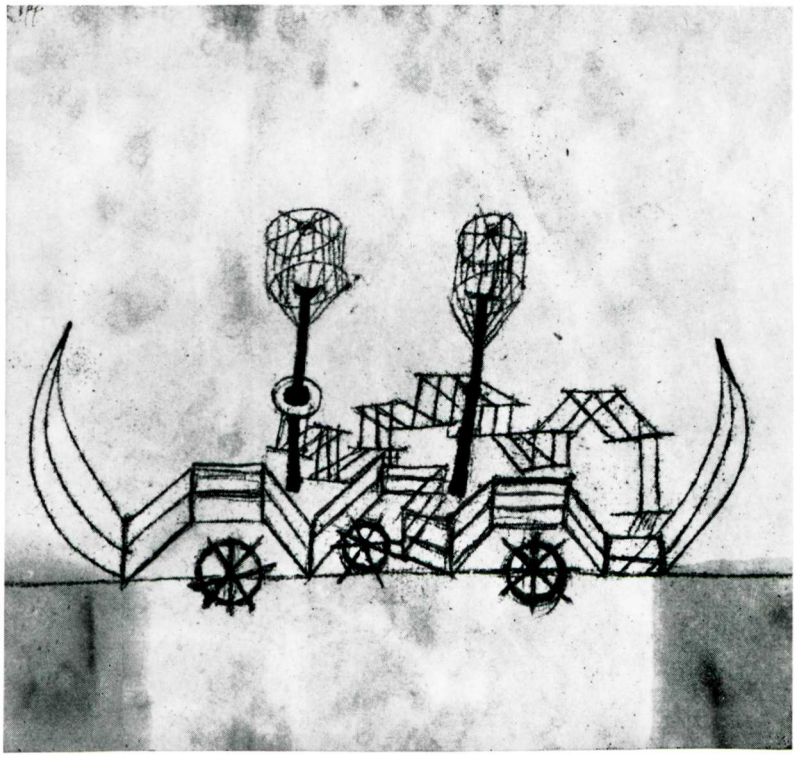
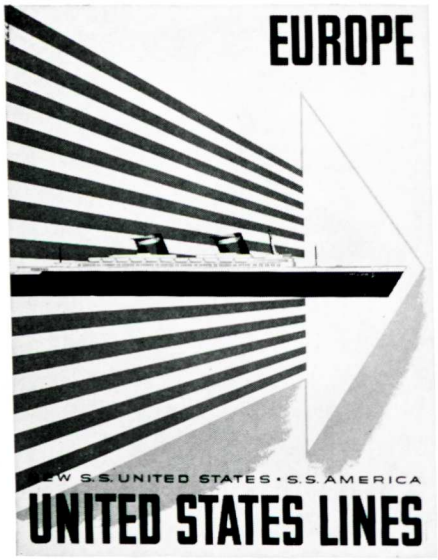


221 KLEE: *Old Steamer. 1922, water color*

the rhomboids would have to make to fit any in-between position, though reason and mathematics assure us that an infinite number of such irregular shapes must exist and can be construed.

At first glance, these findings would seem to apply remarkably well to the reading of pictures. Take one of Klee's fantasies, his *Old Steamer* [221]. We have never seen a craft of this kind and have no experience to guide us in the reading of such an image. Yet we will surely see it as a three-dimensional construction. It is only when we ask ourselves how we are to imagine the rickety vessel that we notice the possibility of several readings. The plank on top of the wheel may be imagined as going backward or upward, and it is this ambiguity that adds to the impression of rocking instability that Klee, the great explorer of forms, certainly aimed at.

The example shows, I hope, that the issue raised by the Gestalt psychologists is of much more than theoretical interest in relation to art. Since art has begun to cut itself loose from anchorage in the visible world, the question how to suggest one reading rather than another of any arrangement of forms has become of crucial importance. It is true that artists and critics are rarely aware of what is at stake. It is so easy to talk at cross-purposes about these matters. Our inability to see ambiguity often protects us from the knowledge that "pure" shapes allow of an infinity of spatial

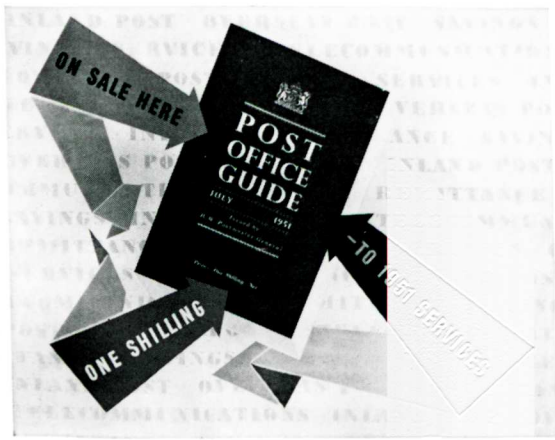


222 LESTER BEALE: *Poster.* 1952

readings. Even so, the dynamics of form and color as such have naturally aroused increasing interest, and it would be comforting to know that three-dimensional forms can still be suggested unambiguously in a non-representational context. But what is comforting is not necessarily true, and I feel that much more research is needed to confirm or refute the artist's subjective feeling that he has "represented" an abstract three-dimensional shape. For though the simplicity criterion certainly guides our reading in certain cases that happen to be simple, it is easy to show that its application is limited. We need not go to abstract art to make this demonstration. Any picture of a tree will demonstrate the dilemma more or less. Turn back to Hobbema's *Village with Watermill* [33]. How much can we tell about the spatial relations of its tree branches? And yet, I contend, we do not see the distant trees as a flat silhouette—rather we accept any one reading that would fit the image and rarely even notice its ambiguities. One would have to ask a number of observers to make a wire model of the trees concerned to bring out the different readings of the same image.

A series of simple posters may serve to bring these conflicting views into focus. Take the effective design for the United States Lines [222]. Though nobody has ever seen such a sight, most people, I find, confidently read it as an arrow pointing obliquely backward across the Atlantic. This reading conforms to the expectations of the Gestalt psychologists, for it tallies with the simplicity criterion. We take the stripes on the arrow to be parallel and therefore read their convergence as recession. We are told this reaction is so basic that it cannot be put down to assumptions and interpretations. And yet the explanation breaks down in another simple poster for the *Post Office Guide* [223]. The simplicity criterion would compel us to accept the lettering on the arrows as uniform and therefore to see the arrows as lying parallel to the book. I doubt if many readers will see the arrangement this way. The situation indicates too strongly that the arrows are meant

223 ALICK KNIGHT: *Poster.* 1952

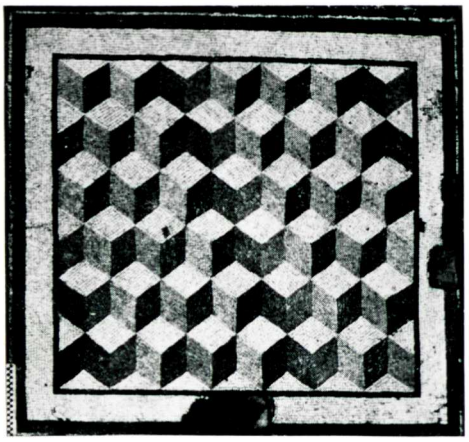


224 WALTER HOFMANN: *Poster*. 1951

to point toward the book, much as the arrow in the previous poster pointed across the ocean. But as soon as we adopt this reading, we have here no clue as to the exact angles in which the arrows are supposed to be pointing. They are obviously to be imagined as tapering off toward the arrowhead, and therefore the simplicity criterion lets us down. Yet here, as always, we will not leave the picture uninterpreted; rather we will adopt at random any reading that is not inconsistent with the situational clues and be satisfied with some image of cardboard arrows in a window display. Few of those who have seen the poster are likely ever to compare notes and discover that their illusions differed because each of them contributed a different share of "space" to the arrangement.

VIII

WHY IS IT DIFFERENT with the Graz trade fair poster [224], which also represents a tapering shape none of us has seen? Merely to ask this question is to remind the reader at last of the gigantic oversimplification that lies in discussing the rendering of space without reference to modeling, that is, the rendering of light and shade. In light and shade Western artists have discovered a means of vastly reducing the ambiguity of shapes as seen from one side. Hogarth, the great empiricist who so wittily worked out the effects of "false perspective," explained with admirable lucidity what he meant by "the retiring shade": "It is equally instrumental with converging lines, in shewing how much objects, or any parts of them, retire or recede from the eye; without which, a floor, or horizontal-plane, would often seem to stand upright like a wall. And notwithstanding all the other ways by which we learn to know at what distances things are from us, frequent deceptions happen to the eye on account of deficiencies in this shade: for if the light chances to be so disposed on objects as not to give this shade its true gradating appearance, not only spaces are confounded, but round things appear flat, and flat ones round."

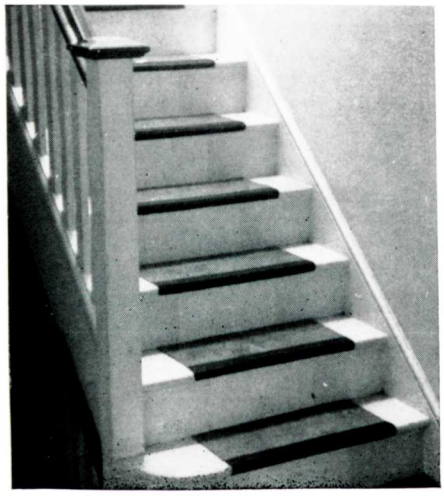


225 *Mosaic from Antioch*

Hogarth knew that shade had a defining character only where it is used to plot a foreshortening, "thus mutually compleating the idea of those recessions which neither of them alone could do." But he also knew that in given situations even these two clues together will not rule out ambiguity unless a third, "reflection," completes the definition: "As an instance that convex and concave would appear the same, if the former were to have no reflection thrown upon it, observe the ovolo and cavetto, or channel, in a cornice, placed near together, and seen by a front light, when they will each of them, by turns, appear either concave, or convex, as fancy shall direct."

It is possible that Plato referred to the same ambiguity when he said that "the same things appear bent and straight to those who view them in water and out, or concave and convex, owing to similar errors of vision about colors, and there is obviously every confusion of this sort in our souls." At any rate, the decorators of classical antiquity must have known of our ability to switch between various readings, even of shaded objects, "as fancy directs" for they used the most striking pattern of this kind, the reversible cubes, on walls and pavements [225]. We can read each of these units as a solid cube lighted from above or as a hollow cube lighted from below.

It is possible to imitate these conditions in a photograph of a staircase [226]. If the reader has sufficient patience, he will discover that the photograph can be read in three different ways. The one is the obvious (and correct) version which makes him imagine he is walking up the stairs to the attic, with his left hand on the railing and the light coming down from above onto the dark patches of linoleum which protect the steps in the center. But if he turns the book round and manages to forget his previous reading, he can see the stairs leading upward once more, with the light again falling in from the top and the linoleum ready to be stepped upon. But there is a third possibility: we see the linoleum as upright and the shadowed intervals as the steps onto which we look from high above with the light coming from below. Covering up the railings and looking only at a section of the pic-



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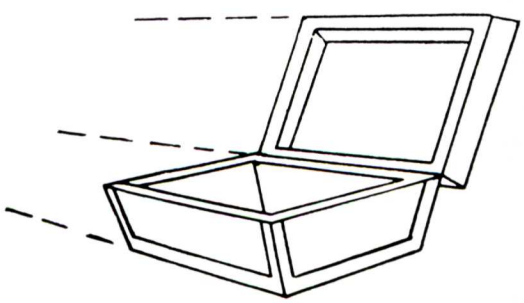
ture help greatly in the task of switching between various readings. It is clear why: the more that evidence of the spatial situation is taken in, the less possible will it be to accept the alternative reading. The consistency test will be put to increasing strain. We are reminded of our efforts to sort out the complex spatial arrangement of Piranesi's print and to judge our interpretation against our experience of "possible worlds." We begin to see a little more clearly that these tests rely on what Hogarth called the "mutual compleating of ideas," the consistent interaction of clues.

IX

IT IS IMPORTANT to recall these elementary facts from the psychology of perception if we, as historians, are to understand what is involved in the invention of illusionist art. Neither the invention of perspective nor the development of shading by itself would be enough to create an unambiguous, easily readable image of the visual world. Used as we are to the reading of naturalistic images, we are rarely aware of this need for interaction; we are well satisfied with outline drawings which we read correctly by means of the simplicity criterion alone. But reports of the difficulty encountered by beholders brought up in a different tradition may make us pause before we declare our reading as automatic.

Early in this century, a Japanese artist, Yoshio Markino, came to Europe. In his childhood reminiscences (which his publishers rather cruelly printed in the author's own idiom) he writes:

"About the perspective, I have some story of my own father. When I got a book of the drawing lessons at my grammar school there was a drawing of a square box in the correct perspective. My father saw it and said, 'What? This box is surely not square, it seems to me very much crooked.' About nine years later he was looking at the same book and he called me and said, 'How strange it is! You know I used to think this square box looked crooked, but now I see this is perfectly right.' . . . This example shows you that if one is ignorant of the law of nature, a quite correct thing looks to him quite wrong. That is why I say that you must have the scientific training, although it may make you feel disagree-



able, and you must not rely upon only your Human Sense, which is very dangerous." We have seen that actually "scientific training" says otherwise. The unshaded perspective drawing of a box which the artist's father probably saw in his son's drawing book was, no doubt, the correct projection of a rectangular shape [227]. It therefore can suggest such a shape, but it need not. For as we have seen in the discussion of Ames and of the theory of perspective, there are also an infinite number of skewy boxes which will result in the same aspect. And so Markino's father was right both times: when, as a Japanese, he judged the drawing to represent a crooked box, and later, when he had trained himself to exclude such an unlikely reading of a well-intentioned drawing book.

The correct interpretation of such traffic accidents on the way between artist and beholder is clearly of crucial importance for the whole issue of the changing conventions of art. In common with all nineteenth-century writers, Ruskin used these difficulties as evidence that "the truth of nature is not to be discerned by the uneducated senses."

"The Chinese, children in all things, suppose a good perspective drawing to be as false as we feel their plate patterns to be, or wonder at the strange buildings which come to a point at the end. And all the early works, whether of nations or of men, show, by their want of *shade*, how little the eye, without knowledge, is to be depended upon to discover truth. The eye of a Red Indian, keen enough to find the trace of his enemy or his prey, even in the unnatural turn of a trodden leaf, is yet so blunt to the impressions of shade, that Mr. Catlin mentions his once having been in great danger from having painted a portrait with the face in half light, which the untutored observers imagined and affirmed to be the painting of half a face."

Neither Catlin's own account nor the painting to which he refers and which still exists in the Smithsonian Institution [228] quite bear out Ruskin's words. It is true that a quarrel broke out among the Indians which ended badly for Catlin's sitter, "Little Bear," one of the Indians having remarked that the white man's painting showed "but half a man," but the remark was obviously intended as a provocation. Catlin's memoirs certainly confirm, as do many other stories of painters who worked among primitives, that his activities were regarded with much suspicion and little understanding. But we have come to see that there need be no contradiction between this failure to read naturalistic images as they are

228 CATLIN: *Little Bear. c. 1838*

meant to be read and that keenness of eye which Ruskin rightly admired. For not only is it perfectly true that a half-shaded face might represent but half a face, but such an interpretation might not even look improbable to a beholder who is used to the idea of a world peopled with spirits and monsters.

There is an old Chinese treatise about art which throws light on this difference: "Everyone is acquainted with dogs and horses since they are seen daily. To reproduce their likeness is very difficult. On the other hand, since demons and spiritual beings have no definite form and since no one has ever seen them they are easy to execute."

The passage of course refers to the painter who can indulge in all kinds of improbabilities where he represents things no human eye ever saw. In our context we are more interested in the corollary that what would make art easy for the painter would make it impossible for the beholder. If nothing were too improbable to make a picture, paintings could not be read. It is easy to show that we would all make the kind of mistakes which so surprised Ruskin if we lacked the relevant clues for a better hypothesis. A sufficiently small detail of any picture will be infinitely ambiguous. Isolate the hand of "Little Bear," and it might be mutilated. Take his neck alone, and the shadow might be a black smudge.

For shadow, as Hogarth knew, is only an indication of form as long as we know where the light comes from. If we do not know, we have to guess. Psychologists have found that in the absence of other clues, Western observers have settled for the probability that the light falls from high up and from the left-hand side. It is the position most convenient for drawing and writing with the right hand, and it therefore applies to most paintings. To most observers, therefore, the form in [229] will appear as part of a sphere. As a matter of fact, it is the conch from Crivelli's picture of the Virgin [230], isolated and turned upside down. When it is viewed in context, the ambiguity disappears from our awareness, because, seeing the throne, we understand the motif that the painter intended to represent, and everything falls into place.

229

The method of isolation and guessing is not merely a frivolous game. It reminds us of the tremendous gulf that separates the reading of pictures from the sight of the visible world. Simply to equate the one with the other, as Ruskin did, in common with so many nineteenth-century critics, is to bar one's way to the understanding of representation. But if we remain aware of the difference between the reading of pictures and the reading of situations, the game of isolation may yet prove of value for the understanding of both processes.

X

RUSKIN MARVELED that an eye keen enough to find a trace of an enemy or prey even in the unnatural turn of a trodden leaf should be so blunt as to misinterpret the isolated clues of Catlin's picture. But the true marvel of the eye is precisely the speed and assurance with which it interprets the interaction of an infinite number of clues. The psychologist in his laboratory has this in common with the artist, that he will test our reactions to isolated clues. We remember Ames's confirmation of the size-distance relationship in such isolation. Show the Red Indian a leaf of which he knows neither the size nor the distance in a peephole and his guess cannot, in the nature of things, be better or keener than anybody else's. It is the same with movement. We cannot tell whether what we see, in the absence of other clues, is a sphere approaching or a balloon being blown up.

230 CRIVELLI: *Madonna and Child Enthroned with Donor. c. 1470*

Nor will isolation allow us to perform that strange feat at which we have become so expert—separating the permanent color of things from the degree and hue of illumination. Taken in isolation, therefore, Ruskin's Red Indian might well interpret the upturned leaf swaying in the wind as a queer creature, changing shape and color in rhythmic succession. He will not do so, not because his eyesight is keen, but because he knows the type of world he lives in and has learned to make and test assumptions. It is particularly the assumption of the constancy of things which has proved its worth to animal and man. We look out into the world with the confidence that this thing out there will be more likely to change its place than its shape and that its illumination will vary more easily than its inherent color. This confidence in the stability of things in a changeable world is deeply ingrained in the structure of our language and has formed the basis of man's philosophy. The Aristotelian distinction between "substance" and "accident" is nothing but the codification of this faith in a stable world, modified by such accidents as the angle of vision, the reflection of light, or the change of distance.

It is easy to show that our reading of images and our reading of natural situations really proceed from substance to accident. We could not make sense of Constable's *Wivenhoe Park* [5] without the well-proven assumption that grass is as a rule sufficiently uniform in color for us to recognize the modifications due to light and shade, that Lilliputians rarely populate the English landscape and that therefore the small mannikins are far away, and that even fences are generally built fairly even in height so that the tapering off must indicate increasing distance—all these interpretations are found to dovetail and support one another so that a coherent picture emerges.

It might be said, therefore, that the very process of perception is based on the same rhythm that we found governing the process of representation: the rhythm of schema and correction. It is a rhythm which

presupposes constant activity on our part in making guesses and modifying them in the light of our experience. Wherever this test meets with an obstacle, we abandon the guess and try again, much in the way we proceeded in reading such complex pictures as Piranesi's *Carceri* [211].

In this emphasis on elimination of false guesses, on trial and error in all acquisition of knowledge "from the amoeba to Einstein," I am following K. R. Popper. It would be tempting to take up the problems of Gestalt psychology from this angle, for Popper emphasizes that the assumption of regularity is of the utmost biological value. A world in which all our expectations were constantly belied would be a lethal world. Now in looking for regularities, for a framework or *schema* on which we can at least provisionally rely (though we may have to modify it for ever), the only possible strategy is to proceed from simple assumptions. Popper has shown that paradoxically this is not due to the fact that a simple assumption is more probably right but because it is most easily refuted and modified. Take the history of man's grandiose attempt to find the regularities behind the bewildering movement of the planets in the sky. Ptolemy's complex system of cycles and epicycles could always be amended to "save the phenomena," but what appeared to be its strength was indeed its fatal flaw. Copernicus' inspired guess, according to which the planets moved in circles round the sun, was easily disproved by Kepler, but it was capable of an amendment which gave a coherent picture of the solar system and paved the way for Newton.

Without some initial system, without a first guess to which we can stick unless it is disproved, we could indeed make no "sense" of the milliards of ambiguous stimuli that reach us from our environment. In order to learn, we must make mistakes, and the most fruitful mistake which nature could have implanted in us would be the assumption of even greater simplicities than we are likely to meet with in this bewildering world of ours. Whatever the fate of the Gestalt school may be in the field of neurology, it may still prove logically right in insisting that the simplicity hypothesis cannot be learned. It is, indeed, the only condition under which we could learn at all. To probe a hole we first use a straight stick to see how far it takes us. To probe the visible world we use the assumption that things are simple until they prove to be otherwise.

In his perceptive book *Scenery and the Sense of Sight*, V. Cornish

231 FANTIN-LATOUR: *Still Life. 1866*

records his discovery that we "instinctively regard an object as extended in the plane at right angles to the line joining the object to the eye." He seeks the reason for this tendency in the shape of the retina, but it is more likely due to the need for some initial assumption, a lump of unarticulated hypothesis from which we start paring away till the image of our world emerges from it. The apparent vault of heaven must be a case in point.

It is hardly necessary to stress how immeasurably richer is the information we have at our disposal in this process of trial and error when we move around in the real world, compared with the interpretation of representations. The philosophers and psychologists from Berkeley's time onward were certainly right when they stressed the importance of touch for our confidence in a solid, permanent world. But we now know that touch is only one of a whole battery of cross checks at our disposal. Texture, for instance, as Gibson has recently shown, is a further important one. Assuming that the texture of individual substances will be constant, we can estimate the effect of recession by the same token that we use in perspective. Even in Escher's impossible world [210] this permanency of texture is not affected: as we see the hatching increase in density, we feel the effect of recession on one individual substance. The clue of texture, therefore, is basically also a clue of regularity and one which proves so reliable because the microstructure of things is least affected by accidents. Looking over a sandy plain, we have a right to start with the assumption that there will be no real, steady decrease in the size of the grains as they recede from our eye.

But all these clues, we may be sure, are subsidiary to the test of movement. Whenever we do not quite trust our eyes or want additional information, we shift our head slightly and watch the relative change of position. It is this test, of course, which is excluded by the peephole in the Ames demonstrations. With its aid, any false guess concerning the distance of a flat object seen against a background can be immediately eliminated, and the true shape of a three-dimensional configuration begins to emerge when we start "looking round a corner." Learning to "see" may have much to do with the acquisition of expectations of serial orders, the sequence of shapes a chair or a table will project onto our retina as we move our head. It is this Ames had in mind when he stressed that perceptions are not disclosures but are essentially prognostic

in character. The prognosis is of the shape that will appear if and when we move.

But granted the role of our expectations and anticipations in perception, which has even led one psychologist to talk of the unity between movement and perception, does not this insight militate against any comparison between the reading of paintings and the sight of the world in life situations? In a way it does. The world never presents a neutral picture to us; to become aware of it means to become aware of possible situations that we can try out and test for their validity. It is one of the miracles of art that it can compel us to apply this attitude, this test, to an imitation of nature, a stationary image. We have seen in the last chapter that such an imitation does indeed stimulate us to probe and anticipate, to project our expectations, and thus to build up an imaginary world of illusion.

The fact that this is possible suggests that in these discussions the resources of the stationary eye have sometimes been somewhat underrated. Like all good communication services, our senses rarely take chances with one signal alone. They make use of what engineers call "redundancies," the mutual confirmation of messages by repetition and cross reference. Though I have stressed in this chapter how ambiguous are the stimuli which, singly, have to be used by the stationary eye, their interaction even without the test of movement proved a very strong instrument to weed out false guesses.

In the course of time, artists have in fact succeeded in simulating one after the other of these clues on which we mainly rely in stationary one-eyed vision, and the result is that mastery of trompe l'œil illusion in which painting beat the mechanical means of photography by a few generations.

XI

WE MAY NOW BE in a somewhat better position to describe the character of that illusion. It implies, I think, that in certain circumstances we would be unable to *disprove* that a trompe l'œil is "real"—unless, that is, we could apply some movement test either by touching it or by shifting our position. Take a painting such as Fantin-Latour's *Still Life*

in Washington [231]. One could probably imagine an arrangement of two boxes with peepholes, one of which would show the painting, another a reconstruction of the motif. Under suitable lighting conditions, it might then become hard to decide which of the two peepholes opens on the painting, which on a real table with flowers and fruit. But remembering a similar experience in the laboratories set up by Ames and his pupils, we would have to add that these are not the only two alternatives between which we would have to decide. After all, there might be any number of combinations and permutations of real lemons and false flowers, flat or skewy oblique cardboard models of the cup or the book, all of which would result in the same stimulus pattern to the stationary eye. They would all be first and readily interpreted in terms of the real "possible" world of our experience, and there would be no jarring contradiction to prevent the illusion. From this point of view, the successful trompe l'œil might be described as the height of visual ambiguity. It is a multicolored canvas that we can interpret as a dining table.

That such illusions are rarely complete goes without saying. After all, we do not generally display pictures in peep shows, and as soon as we move, the illusion must disappear, since the objects in the still life will not shift in relation to each other. The painter of a real trompe l'œil, therefore, will have to be content with a shallow arrangement, such as a letter rack [168], or a flat relief where this failure of internal movement is less noticeable. The wonder is only that this handicap is not more serious than it is. It appears that once again we contribute some of the imagined movement from the store of our own expectations. I believe that some of this effect is even noticeable when we look at the Fantin-Latour from various sides, but the most instructive instances are those posters and pictures where a pointing finger or gun always seems to aim at us [83], or the portraits—already mentioned—which "follow us with their eyes." In a sense, I believe, all portraits do this when they do not clearly *look elsewhere*, as the reader may test by turning back to the portrait by Reynolds [26]. Here again we come up against the importance of the negative test. In our perceptions we are completely self-centered, and for good reason: we constantly scan the world for things which may concern us directly; we will assume that an eye looks at us, or a gun points at us, unless we have good evidence to the contrary. If the picture does

not supply this contrary evidence and our projective tests fail to find it, we will succumb to the illusion. There are geometrical reasons why the eye, or the muzzle of the gun, will fail to respond to our movement test. A real gun when seen at an increasing angle would show less and less of the muzzle. The painted round of the muzzle threateningly fails to do so—the imagination supplies the rest. The same is true of the eyes, particularly if we are subject to the verbal suggestions of a guide who appeals to our Pygmalion wishes.

These are extreme cases between illusion and suggestion, but they help to explain, I believe, why we still experience some kind of illusion when we see a picture on a wall or in a book—from a point, that is, where the perspective should go wrong. Here as always we first read the picture for consistency, and this consistency, the interaction of clues, is not wholly upset by our changing viewpoint. The painting may cease to be consistent with the world around it, but it remains closely knit within its own system of references. The frame sets off what Leonardo called a microcosm, and if this microcosm contains no jarring refutations of our attempted reading, we will read it *as if* we saw it from where the artist stood. We have had occasion before to recall the experience at the movies when we see the screen at an angle. We soon cease to notice the distortion, and when the actor speaks to the public, he also speaks to us. We can now perhaps explain this experience a little better: there is nothing in this one-way distortion which would contradict or eliminate a consistent reading.

Only in extreme cases, therefore, are the illusions of art illusions about our real environment. But they are illusions all the same, and as such they result in some unexpected and unintended consequences. We have seen in many instances that to interpret is to transform. We suspected, in the last chapter, that what is known as "mental set" is a state of readiness for certain tests. We have observed how these anticipated projections flicker round the image, completing the process that has been started off. The most famous description of this continued activity is Berenson's account of what he calls "ideated sensations" in front of paintings which stimulate his "tactile sense" and change the tonus of his muscles. He is set, we may say, to test the illusion of solidity. Earlier literature liked to dwell on other states of readiness. The one which has developed into a commonplace of

rhetorical description is the illusion that we seem to hear what is going on. "It only lacks the voice" is the standard form of praise for a portrait in eulogistic poetry. This form of praise deserves a moment's attention. It implies that the image looks so lifelike that we get ready for an additional test; having exhausted the resources of vision, we turn to touch or hearing. Here, as so often, Dante has revivified an ancient commonplace and restored it to its original immediacy when he describes the effect of the reliefs in Purgatory, reminding the expiating proud souls of such examples of humility as David dancing before the ark of the covenant:

> *In front there was a throng of seven choirs*
> *Depicted, causing strife between two senses,*
> *One saying "no," the other "yes," they sing,*
> *So with the clouds of incense, that were rendered*
> *So that my vision and my sense of smell*
> *Came into conflict over "yes" and "no."*

In Dante no less than in Berenson these ideated sensations are exalted as a triumph of art, and it is easy to see why. What is less often realized is the reason which makes them prove irksome to the artist. In a sense, Dante's description implies that reason. A conflict is set up which is far from pleasurable. What Dante could not know, because he had never seen really illusionist pictures, is that this conflict might extend into the sphere of vision itself. I believe we have here the reason why the perfection of illusion was also the hour of disillusionment.

XII

WE HAVE SEEN that we enjoy nothing more than the demand made on us to exercise our own "imitative faculty," our imagination, and thus to share in the creative adventure of the artist. But if this pleasure is to be felt, the transformation must not be so easy as to be automatic. The further illusionist skill advanced, the more frequently we therefore hear of the difference between a work of art and the mere trick of deception. In 1823 the great neoclassical critic, Quatremère de Quincy, devoted a whole book to this important distinction. Our pleasure in illusion, he insisted,

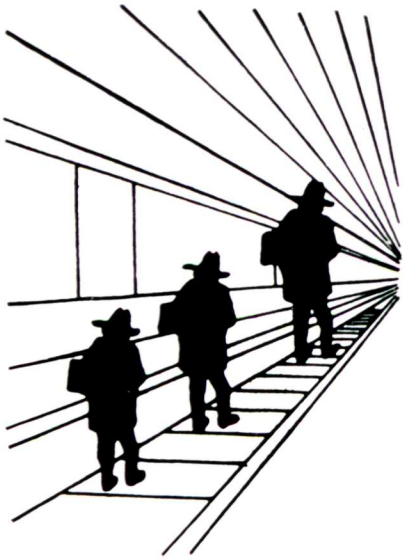
rests precisely in the mind's effort in bridging the difference between art and reality. This very pleasure is destroyed when the illusion is too complete. "When the painter packs a vast expanse into a narrow space, when he leads me across the depths of the infinite on a flat surface, and makes the air circulate . . . I love to abandon myself to his illusions, but I want the frame to be there, I want to know that what I see is actually nothing but a canvas or a simple plane."

These demands have been echoed ever since in French art criticism. They formed the basis of the aesthetics of Puvis de Chavannes and his Swiss follower Hodler and were given their most famous formulation in the injunction by Maurice Denis to the *Nabis:* "Remember that a picture, before being a battle horse, a nude woman, or some anecdote, is essentially a plane surface covered with paint in a certain arrangement."

It is a fact not very difficult to remember for those who are engaged in storing paintings or packing them into trunks. But is it possible to "see" both the plane surface and the battle horse at the same time? If we have been right so far, the demand is for the impossible. To understand the battle horse is for a moment to disregard the plane surface. We cannot have it both ways.

I am well aware that at this point many a reader will tend to disagree, or will at least suspect me of quibbling with very subtle and unreal distinctions. If he has this suspicion, I would like him to produce a real illusionist image to test my assertion: I would ask him to revert to that experiment I urged him to make in the Introduction and look at his image in the mirror. The fact that the area of the mirror that reflects the face is always exactly half the size of the face is so startling as to meet with skepticism on the part of most people who have looked into mirrors all their lives. Obviously, therefore, that is not what they see. They see the face in the distance behind the mirror surface, and thus they see it correspondingly larger. Now the mirror, because of the perfection of the illusion, may be a special case, an extreme, but one which it is useful to keep in mind, because it seems that the better the illusion, the more we see a picture as if it were a mirror. Psychologists have long recognized that our reaction to images also transforms what we "see" in a much more radical way than we usually notice.

There is an uncanny black man who stalks through the pages of our



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psychology books to remind us of this basic fact [232]. As he walks into the depth, he appears to increase in size. Our experience of the size-distance relationship suggests to us that a man farther off must be very tall to present the identical aspect of an ordinary man nearby. We are right in this conclusion, and if the picture contains no contrary clue, we will therefore see a larger man, regardless of the fact that as a pattern on the plane surface the three images take up the same size. Most of us must have recourse to actual measurement to fight down the movements of anticipation and conviction that transform the image before our very eyes. It is said that children—less trained in the interpretation of paintings in terms of an imagined reality—are less subject to this curious illusion. That may be so. But then they see the picture still as a flat surface covered with a pictogram. We can all achieve this with more or less effort; we may even train ourselves to oscillate between the two readings, but I doubt whether we can hold them both.

This unexpected effect of illusion must be disconcerting to any artist who wishes to remain in control of the architecture of his canvas. To create a harmonious pattern in the plane, he must be able to rely on identical shapes remaining identical and steps in hue remaining independent of the beholder's imagination. In illusionist painting, neither is the case. The ambiguity of the canvas destroys the artist's control over his elements. I believe this is the real explanation for the revulsion against illusionism that set in at the very time when its means were perfected. They were found to be inartistic, they militated against visual harmonies.

At the beginning of this century, at the time when these issues were still in the balance, the German critic Konrad Lange wrote a long book on the aesthetics of illusion. He saw, correctly I believe, that all reading of images demands what Coleridge calls a "willing suspension of disbelief." To him all aesthetic pleasure in art was rooted in our oscillation between two series of associations, those of reality and those of art. The terminology and the examples of the book sound curiously old-fashioned, and its aesthetic bias is no longer ours. But his psychological insights enabled Lange to diagnose the tendencies of his time pretty shrewdly:

"Following the overemphasis of the idea of nature for a time, we now have the stressing of the idea of art. Elements which impede illusion gain in interest. . . . A painting must not be natural but must aim at "decorative" effects. . . . If previously painting strove passionately . . . after the illusion of depth, artists now strive with equal passion to emphasize the plane. . . . If previously geometric schematization was rejected as inartistic, artists now wallow in canonic proportions, the golden section, the equilateral triangle. . . . If previously glazes were used to give luminosity to colors and to increase the sense of distance, colors are now spread in a dull mat medium that is seen mainly as pigment. . . . If previously technical skill was overrated, it is now held in contempt. . . ."

XIII

ALL THIS was written before the last desperate revolt against illusion and the peep-show picture, the rise of cubism. Cubism, I believe, is the most radical attempt to stamp out ambiguity and to enforce one reading of the picture—that of a man-made construction, a colored canvas. If illusion is due to the interaction of clues and the absence of contradictory evidence, the only way to fight its transforming influence is to make the clues contradict each other and to prevent a coherent image of reality from destroying the pattern in the plane. Unlike the Fantin-Latour, a still life by Braque [233] will marshal all the forces of perspective, texture, and shading, not to work in harmony, but to clash in virtual deadlock. Perhaps the most telling of these contradictions is Braque's treatment of light. There are black patches on the apples where Fantin-Latour painted highlights. In thus inverting the relationships, the painter drives home the message that this is an exercise in painting, not in illusion.

Cubism has sometimes been explained as an extreme attempt in compensation for the shortcomings of one-eyed vision. The picture embodies clues of which we could become aware only through movement or touch. We are made to see the outline of the table even under and behind the objects, and it can be claimed that this corresponds to our actual experience in life, where we always remain aware of the continued existence of objects half hidden by overlap. I am inclined to suspect that the problems

233 BRAQUE: *Still Life: The Table. 1928*

raised by Hildebrand, which so excited the world of art at the turn of the century, had their share in the creation of cubism and particularly in its success. The idea that the visible world of our experience is a construct made up of memories of movement, touch, and sight justified the experiment to do away with the peep-show convention and even to show various aspects of one object in the same painting.

But whatever the theories of the cubists may have been and whatever whiffs of conversations may have reached them from the discussions of the critics, they were, after all, artists and not psychologists. The main impulse behind cubism must have been an artistic one. It is hardly just to look at cubism mainly as a device to increase our awareness of space. If that was its aim, it should be pronounced a failure. Where it succeeds is in countering the transforming effects of an illusionist reading. It does so by the introduction of contrary clues which will resist all attempts to apply the test of consistency. Try as we may to see the

234 PICASSO: *Still Life. 1918*

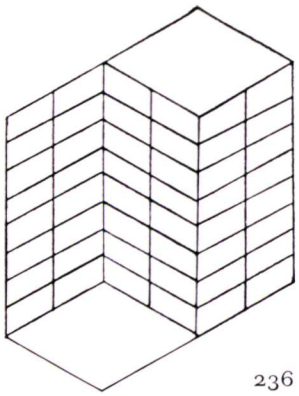
guitar or the jug suggested to us as a three-dimensional object and thereby to transform it [233, 234], we will always come across a contradiction somewhere which compels us to start afresh.

The result is exactly the opposite of the experience I described as the sorting out of clues in Piranesi's *Carceri.* There we tried out various interpretations until we found the one which fitted a possible world, how-

235 *Mosaic from Antioch*

ever fantastic. It is a point of cubism, I believe, that we are constantly teased and tempted into doing this but that each hypothesis we assume will be knocked out by a contradiction elsewhere, so that our interpretation can never come to rest and our "imitative faculty" will be kept busy as long as we join in the game.

Some of the effects exploited by the cubists were known to art for a long time, though they remained in comparative obscurity as decorative devices. The mosaicists of the ancient world were fond of the trompe l'œil [16], but they also knew how to tease the eye with ambiguities. We have seen that they knew ambiguous patterns of the type discussed by the Gestalt psychologists [225]. But the mosaicists of Antioch and Rome



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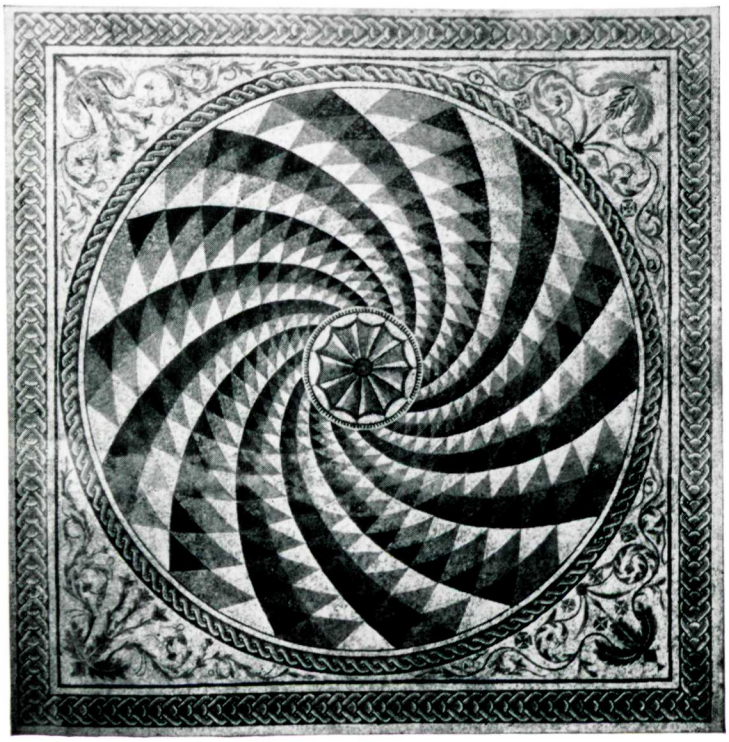
may have been as eager to counteract a purely spatial reading as were the cubists two thousand years later. The pattern of mosaic [235] will suggest a spatial reading in every detail but tends to resist the effort to complete it consistently so that we are driven round and round. Experimental psychology is familiar with this effect from the configuration called "Thiéry's figure" [236]. It is practically impossible to keep this figure fixed because it presents contradictory clues. The result is that the frequent reversals force our attention to the plane.

Thiéry's figure, I believe, presents the quintessence of cubism. But this device of artful contrariety is supplemented by other methods designed to prevent a consistent reading. Again we may go back to classical mosaics to find the first prototypes of these visual teasers. The whirling pattern from a floor in Rome [237] will set us searching for a point of rest from which to start interpreting. We cannot find it, and so we have no means of telling which of the overlapping arcs is supposed to lie on top and which below. An analysis of cubist painting would reveal a great number of such devices to baffle our perception by the scrambling of clues. To see them in isolation, we had better return to the methods of commercial artists who have profited from these experiments. The most familiar is the divergence between outline and silhouette that results in the feeling that two images have been superimposed on each other. But the word "superimposed" somehow begs the question. It is precisely the

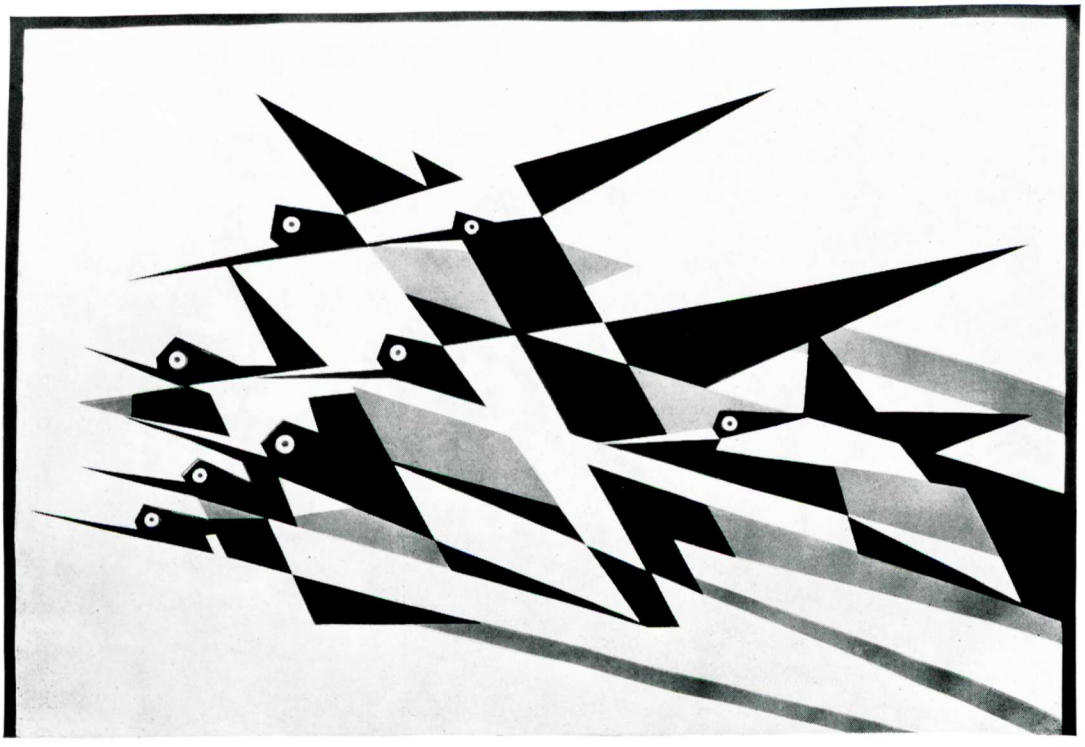


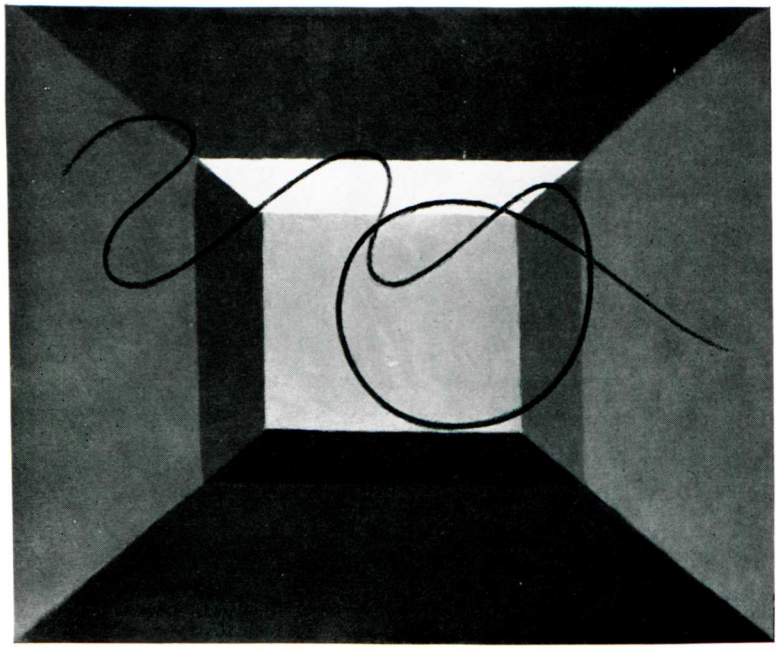
237 *Mosaic from Rome*

238 *London Transport sign*

point of these devices that it is often impossible to tell which of the shapes is meant to lie at the top and which below [234]. A more complex device results in the impression of transparent forms piled one upon the other but with the same ambiguity as to their sequence. The cubists discovered that we can read and interpret familiar shapes even across a complete change of color and outline. In earlier art the figure had to stand out unambiguously against the ground. In many contemporary posters, even letters or symbols are no longer formed of positive shapes. Relationships are reversed and still remain readable [238]. These simple methods give the artist one extra dimension for the arrangement of forms without at the same time committing him or us to any one special reading. This type of ambiguity is cleverly exploited in a poster by McKnight Kauffer [239]. We can read it in any number of ways for we cannot tell which of the "early birds" is actually leading, and though we may not be aware of it, his checkerboard shapes contribute to the impression of rapid flight, just as the Roman artist's whirl resulted in a feeling of movement. The device recalls Fraser's spiral [184], but the effect is the opposite. There our baffled perception finds refuge in an illusionary cohesion of forms. In cubism even coherent forms are made to play hide-and-seek in the elusive tangle of unresolved ambiguities.

239 E. McKnight Kauffer: *The Early Bird. Poster, detail. 1916*





240 VILLON: *Abstraction*. 1932

XIV

IT IS IMPORTANT to distinguish these contradictions from nonfigurative art. A painting such as Jacques Villon's *Abstraction*, from the Arensberg collection [240], can be read as a pyramid protruding toward us with a wavy line hovering in front, or as the interior of a box. There are various other readings, all of which fit, and still the picture lacks that tension which the cubists achieved by similar means. We now see why. There is no possible test by which we can decide which reading to adopt. The example reminds us of one of the intrinsic problems of abstract art that are too rarely discussed: its overt ambiguity. The function of representational clues in cubist paintings is not to inform us about guitars and apples, nor to stimulate our tactile sensations. It is to narrow down the range of possible interpretations till we are forced to accept the flat pattern with all its tensions.

Even nonobjective art derives some of its meaning and effects from the habits and mental sets we acquired in learning to read representations. Indeed, we have seen that any three-dimensional shape on the canvas would be illegible or, which is the same, infinitely ambiguous without some assumptions of probabilities that we must bring to it and test against it.

The painter who wants to wean us from these assumptions has perhaps

only one way open to him. He must try to prevent us from interpreting his marks on the canvas as representations of any kind by compelling us to switch over to that alternative which we have observed in the interpretation of drawings; he must make us read his brushmarks as traces of his gestures and actions [241]. This, I take it, is what the "action painter" aims at. He wants to achieve an identification of the beholder with his Platonic frenzy of creation, or rather with his creation of a Platonic frenzy. It is quite consistent that these painters must counteract all semblance of familiar objects or even of patterns in space. But few of them appear to realize that they can drive into the desired identification only those who know how to apply the various traditional consistency tests and thereby discover the absence of any meaning except the highly ambiguous meaning of traces. If this game has a function in our society, it may be that it helps us to "humanize" the intricate and ugly shapes with which industrial civilization surrounds us. We even learn to see twisted wires or complex machinery as the product of human action. We are trained in a new visual classification. The deserts of city and factory are turned into tanglewoods. Making results in matching.

241 JACKSON POLLOCK: *Number 12. 1952*