PICTORIAL PERCEPTION AND CULTURE

Do people of one culture perceive a picture differently from people of another? Experiments in Africa show that such differences exist, and that the perception of pictures calls for some form of learning

by Jan B. Deregowski

A picture is a pattern of lines and shaded areas on a flat surface that depicts some aspect of the real world. The ability to recognize objects in pictures is so common in most cultures that it is often taken for granted that such recognition is universal in man. Although children do not learn to read until they are about six years old, they are able to recognize objects in pictures long before that; indeed, it has been shown that a 19-month-old child is capable of such recognition. If pictorial recognition is universal, do pictures offer us a lingua franca for intercultural communication? There is evidence that they do not: cross-cultural studies have shown that there are persistent differences in the way pictorial information is interpreted by people of various cultures. These differences merit investigation not only because improvement in communication may be achieved by a fuller understanding of them but also because they may provide us with a better insight into the nature of human perceptual mechanisms.

Reports of difficulty in pictorial perception by members of remote, illiterate tribes have periodically been made by missionaries, explorers and anthropologists. Robert Laws, a Scottish missionary active in Nyasaland (now Malawi) at the end of the 19th century, reported: "Take a picture in black and white and the natives cannot see it. You may tell the natives, 'This is a picture of an ox and a dog,' and the people will look at it and look at you and that look says that they consider you a liar. Perhaps you say again, 'Yes, this is a picture of an ox and a dog.' Well, perhaps they will tell you what they think this time. If there are a few boys about, you say: 'This is really a picture of an ox and a dog. Look at the horn of the ox, and there is his tail!' And the boy will say: 'Oh! yes and there is the dog's nose and eyes and ears!' Then the old people will look again and clap their hands and say, 'Oh! yes, it is a dog.' When a man has seen a picture for the first time, his book education has begun."

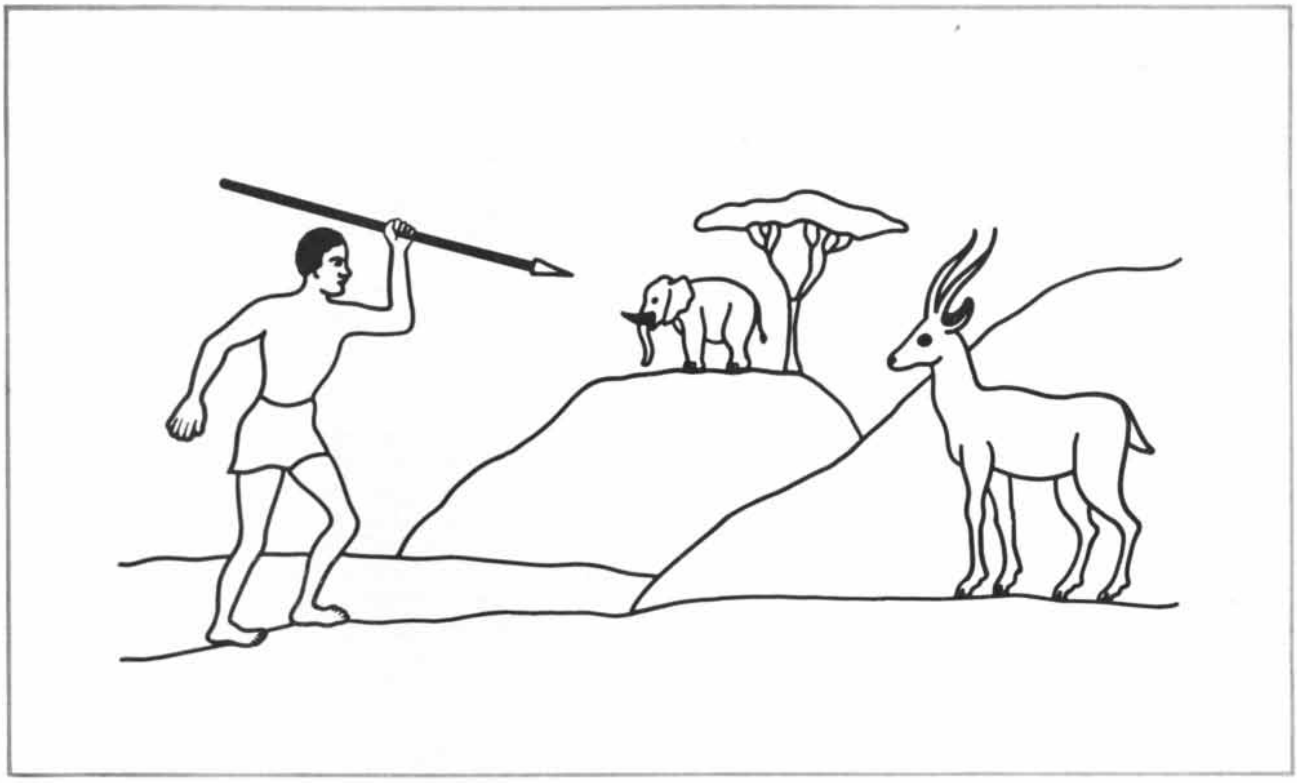
Mrs. Donald Fraser, who taught health care to Africans in the 1920's, had similar experiences. This is her description of an African woman slowly discovering that a picture she was looking at portrayed a human head in profile: "She discovered in turn the nose, the mouth, the eye, but where was the other eye? I tried by turning my profile to explain why she could only see one eye but she hopped round to my other side to point out that I possessed a second eye which the other lacked."

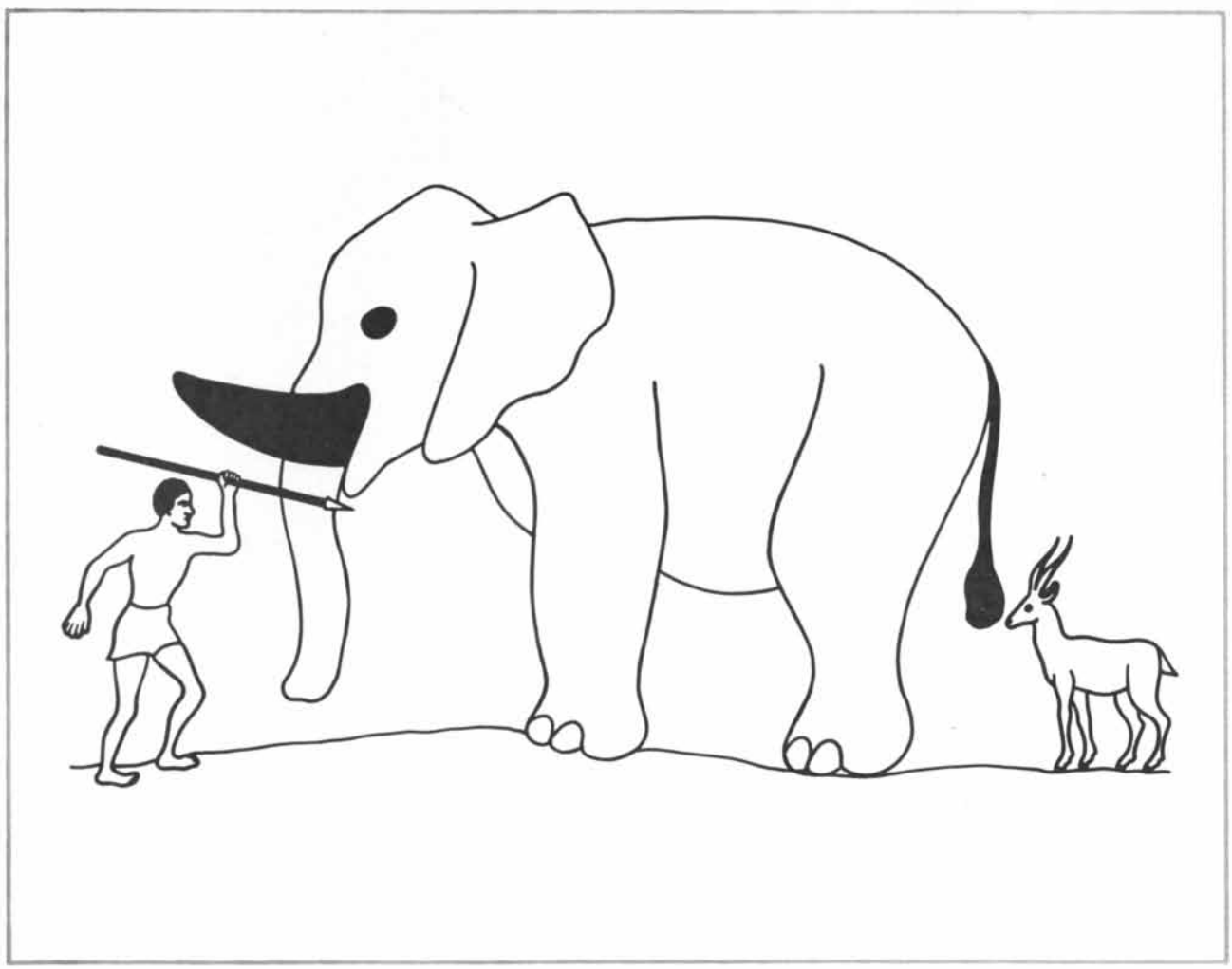
There were also, however, reports of vivid and instant responses to pictures: "When all the people were quickly seated, the first picture flashed on the sheet was that of an elephant. The wildest excitement immediately prevailed, many of the people jumping up and shouting, fearing the beast must be alive, while those nearest to the sheet sprang up and fled. The chief himself crept stealthily forward and peeped behind the sheet to see if the animal had a body, and when he discovered that the animal's body was only the thickness of the sheet, a great roar broke the stillness of the night."

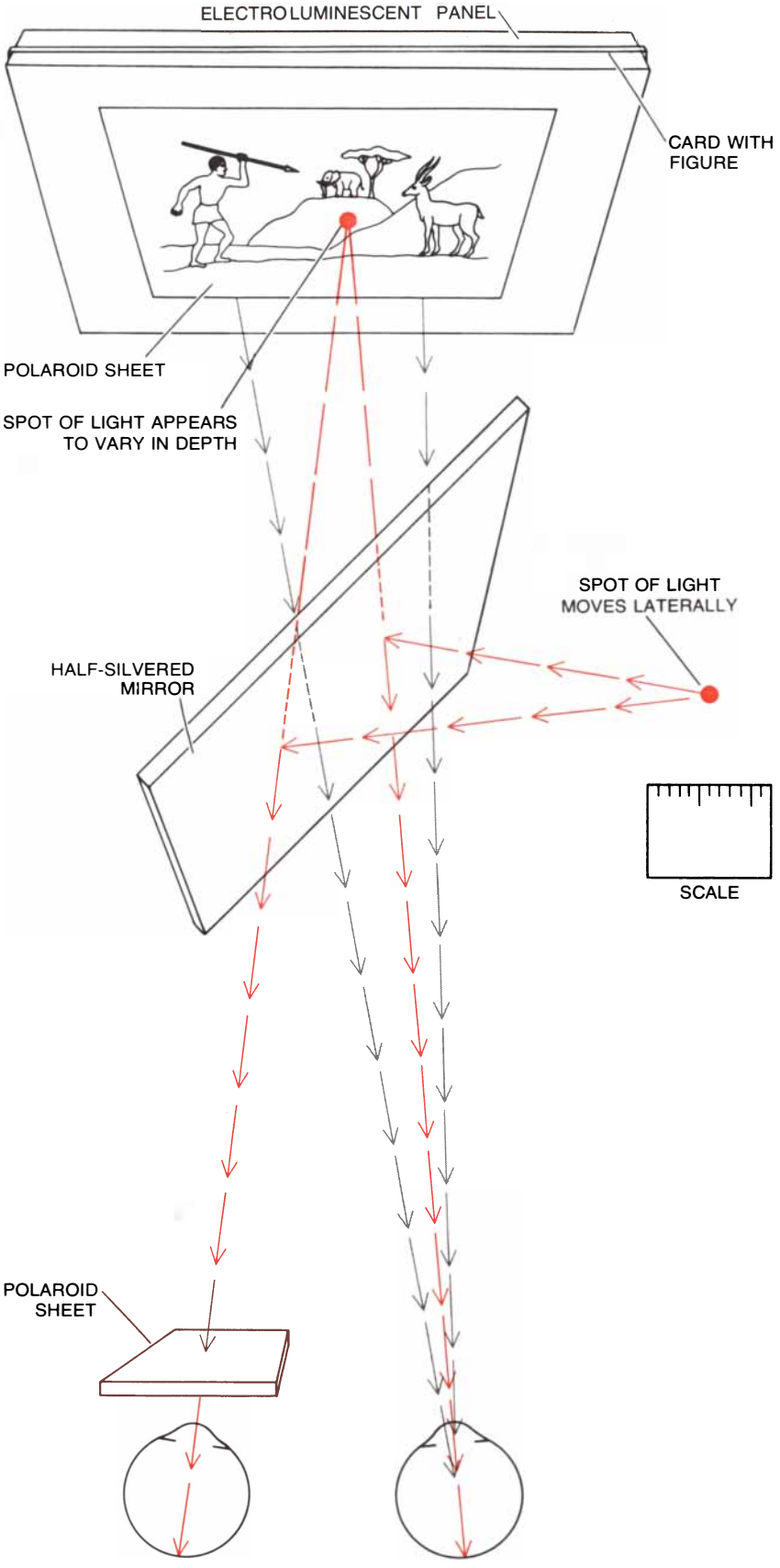
Thus the evidence gleaned from the insightful but unsystematic observations quoted is ambiguous. The laborious way some of these Africans pieced together a picture suggests that some form of learning is required to recognize pictures. Inability to perceive that a pattern of lines and shaded areas on a flat surface represents a real object would render all pictorial material incomprehensible. All drawings would be perceived as being meaningless, abstract patterns until the viewer had learned to interpret and organize the symbolic elements. On the other hand, one could also argue that pictorial recognition is largely independent of learning, and that even people from cultures where pictorial materials are uncommon will recognize items in pictures, provided that the pictures show familiar objects. It has been shown that an unsophisticated adult African from a remote village is unlikely to choose the wrong toy animal when asked to match the toy to a picture of, say, a lion. Given a photograph of a kangaroo, however, he is likely to choose at random from the array of toys. Yet one can argue that this sample was not as culturally remote as those described above. It is therefore probably safer to assume that utter incomprehension of pictorial material may be observed only in extremely isolated human populations.

Conventions for depicting the spatial arrangement of three-dimensional ob-

PICTORIAL DEPTH PERCEPTION is tested by showing subjects a picture such as the top illustration on the opposite page. A correct interpretation is that the hunter is trying to spear the antelope, which is nearer to him than the elephant. An incorrect interpretation is that the elephant is nearer and is about to be speared. The picture contains two depth cues: overlapping objects and known size of objects. The bottom illustration depicts the man, elephant and antelope in true size ratios when all are the same distance from the observer.







APPARATUS FOR STUDYING PERCEIVED DEPTH enables the subject to adjust a spot of light so that it appears to lie at the same depth as an object in the picture. The light is seen stereoscopically with both eyes but the picture is seen with only one eye. Africans unfamiliar with pictorial depth cues set the light at the same depth on all parts of the picture.

jects in a flat picture can also give rise to difficulties in perception. These conventions give the observer depth cues that tell him the objects are not all the same distance from him. Inability to interpret such cues is bound to lead to misunderstanding of the meaning of the picture as a whole. William Hudson, who was then working at the National Institute for Personnel Research in Johannesburg, stumbled on such a difficulty in testing South African Bantu workers. His discovery led him to construct a pictorial perception test and to carry out much of the pioneering work in cross-cultural studies of perception.

Hudson's test consists of a series of pictures in which there are various combinations of three pictorial depth cues. The first cue is familiar size, which calls for the larger of two known objects to be drawn considerably smaller to indicate that it is farther away. The second cue is overlap, in which portions of nearer objects overlap and obscure portions of objects that are farther away; a hill is partly obscured by another hill that is closer to the viewer. The third cue is perspective, the convergence of lines known to be parallel to suggest distance; lines representing the edges of a road converge in the distance. In all but one of his tests Hudson omitted an entire group of powerful depth cues: density gradients. Density gradients are provided by any elements of uniform size: bricks in a wall or pebbles on a beach. The elements are drawn larger or smaller depending on whether they are nearer to the viewer or farther away from him.

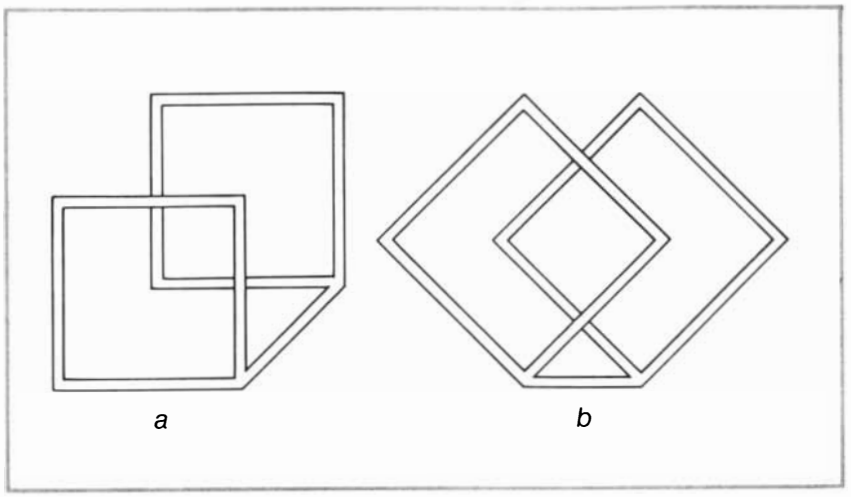
Hudson's test has been applied in many parts of Africa with subjects drawn from a variety of tribal and linguistic groups. The subjects were shown one picture at a time and asked to name all the objects in the picture in order to determine whether or not the elements were correctly recognized. Then they were asked about the relation between the objects. (What is the man doing? What is closer to the man?) If the subject takes note of the depth cues and makes the "correct" interpretations, he is classified as having three-dimensional perception. If the depth cues are not taken into account by the subject, he is said to have two-dimensional perception [*see illustration on preceding page*]. The results from African tribal subjects were unequivocal: both children and adults found it difficult to perceive depth in the pictorial material. The difficulty varied in extent but appeared to persist

through most educational and social levels.

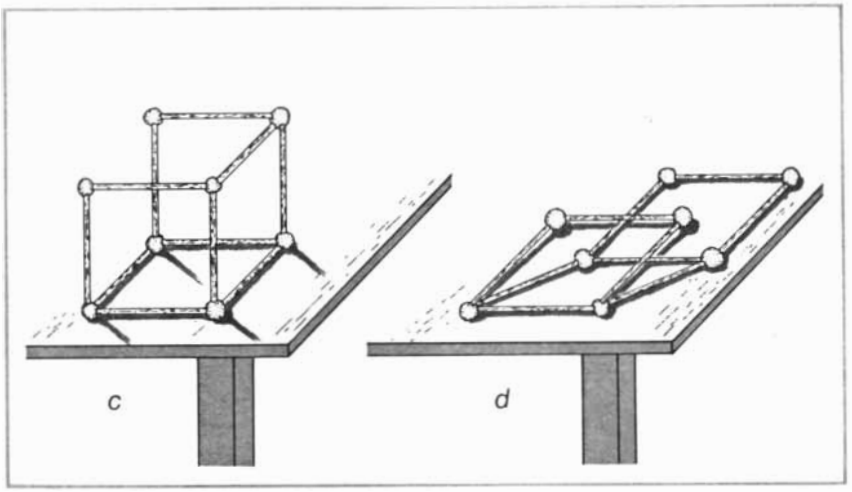
Further experimentation revealed that the phenomenon was not simply the result of the pictorial material used in the test. Subjects were shown a drawing of two squares, one behind the other and connected by a single rod [*see top illustration at right*]. They were also given sticks and modeling clay and asked to build a model of what they saw. If Hudson's test is valid, people designated as two-dimensional perceivers should build flat models when they are shown the drawing, whereas those designated as three-dimensional perceivers should build a cubelike object. When primary-school boys and unskilled workers in Zambia were given Hudson's test and then asked to build models, a few of the subjects who had been classified as three-dimensional responders by the test made flat models. A substantial number of the subjects classified as two-dimensional perceivers built three-dimensional models. Thus Hudson's test, although it is more severe than the construction task, appears to measure the same variable.

The finding was checked in another experiment. A group of Zambian primary-school children were classified into three-dimensional and two-dimensional perceivers on the basis of the model-building test. They were then asked to copy a "two-pronged trident," a tantalizing drawing that confuses many people. The confusion is a direct result of attempting to interpret the drawing as a three-dimensional object [*see top illustration on next page*]. One would expect that those who are confused by the trident would find it difficult to recall and draw. The students actually made copies of two tridents: the ambiguous one and a control figure that had three simple prongs. To view the figure the student had to lift a flap, which actuated a timer that measured how long the flap was held up. The student could view the figure for as long as he wanted to, but he could not copy it while the flap was open. After the flap was closed the student had to wait 10 seconds before he began to draw. The delay was introduced to increase the difficulty of copying the figure. The results confirmed that the students who were three-dimensional perceivers spent more time looking at the ambiguous trident than at the control trident, whereas the two-dimensional perceivers did not differ significantly in the time spent viewing each of the two tridents.

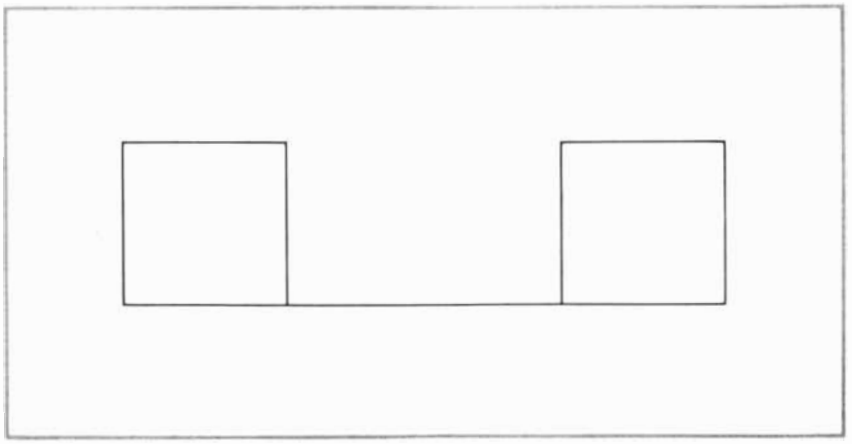
Do people who perceive pictorial



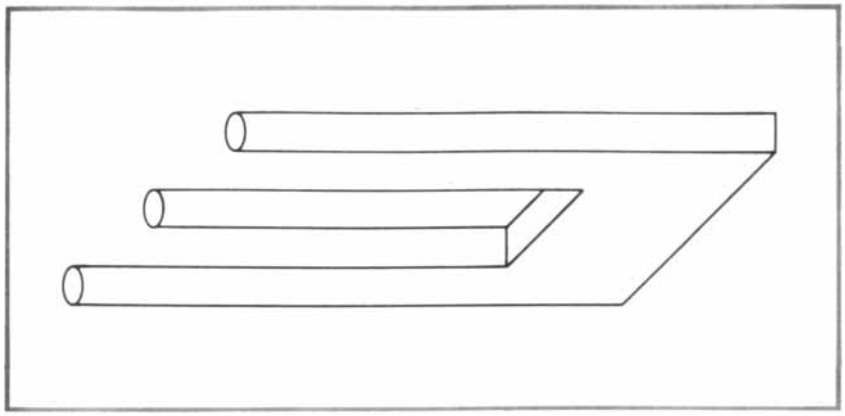
CONSTRUCTION-TASK FIGURES consist of two squares connected by a single rod. Most subjects from Western cultures see the figure *a* as a three-dimensional object, but when the figure is rotated 45 degrees (*right*), they see it as being flat. Africans from a variety of tribes almost always see both figures as being flat, with the two squares in the same plane.



STICK-AND-CLAY MODELS of the figure *a* in the top illustration were made by test subjects. Almost all the three-dimensional perceivers built a three-dimensional object (*left*). Subjects who did not readily perceive depth in pictures tended to build a flat model (*right*).



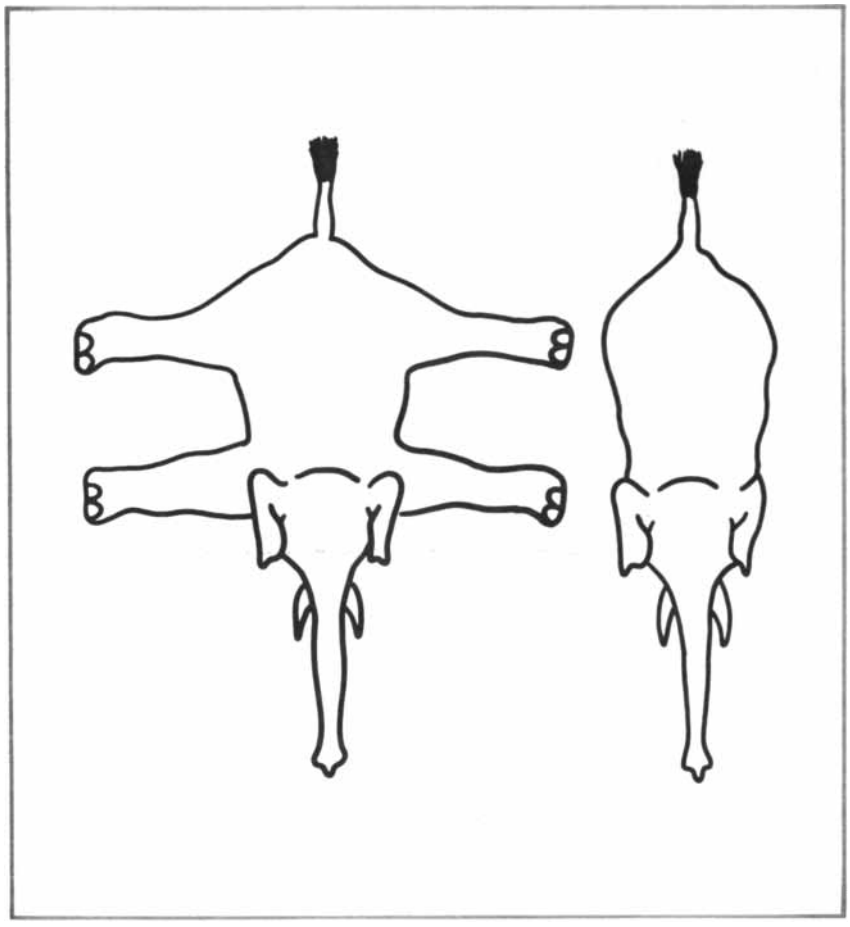
"SPLIT" DRAWING was preferred by two-dimensional perceivers when shown a model like figure *c* and given a choice between the split drawing and figure *a* in top illustration.



AMBIGUOUS TRIDENT is confusing to observers who attempt to see it as a three-dimensional object. Two-dimensional perceivers see the pattern as being flat and are not confused.

depth really see depth in the picture or are they merely interpreting symbolic depth cues in the same way that we learn to interpret the set of symbols in "horse" to mean a certain quadruped? An ingenious apparatus for studying perceived depth helped us to obtain an answer. This is how the apparatus is described by its designer, Richard L. Gregory of the University of Bristol:

"The figure is presented back-illuminated, to avoid texture, and it is viewed through a sheet of Polaroid. A second sheet of Polaroid is placed over one eye crossed with the first so that no light from the figure reaches this eye. Between the eyes and the figure is a half-silvered mirror through which the figure is seen but which also reflects one or more small light sources mounted on an optical bench. These appear to lie in the figure; indeed, optically they *do* lie in the figure provided the path length of the lights to the eyes is the same as that of the figure to the eyes. But the small light sources are seen with both eyes while the figure is seen with only *one* eye because of the crossed Polaroids. By moving the lights along their optical bench, they may be placed so as to lie at the same distance as any selected part of the figure."



SPLIT-ELEPHANT DRAWING (*left*) was generally preferred by African children and adults to the top-view perspective drawing (*right*). One person, however, did not like the split drawing because he thought the elephant was jumping around in a dangerous manner.

A Hudson-test picture that embodied both familiar-size and overlap depth cues was presented in the apparatus to a group of unskilled African workers, who for the most part do not show perception of pictorial depth in the Hudson test and in the construction test [*see illustration on page 84*]. The test picture showed a hunter and an antelope in the foreground and an elephant in the distance. The subjects set the movable light at the same apparent depth regardless of whether they were asked to place it above the hunter, the antelope or the elephant. In contrast, when three-dimensional perceivers were tested, they set the light farther away from themselves when placing it on the elephant than when setting it on the figures in the foreground. The result shows that they were not simply interpreting symbolic depth cues but were actually seeing depth in the picture.

When only familiar size was used as the depth cue, neither group of subjects placed the movable light farther back for the elephant. The result should not be surprising, since other studies have shown that familiar-size cues alone do not enable people even in Western cultures to see actual depth in a picture, even though they may interpret the picture three-dimensionally.

The fact that depth was seen in the picture only in the presence of overlap cues is of theoretical interest because it had been postulated that a perceptual mechanism for seeing depth cues where none are intended is responsible for certain geometric illusions, for example overestimating the length of the vertical limb of the letter *L*. If the mechanism is the same as the one for the perception of pictorial depth in Hudson's tests, then one would expect a decrease in the perception of geometric illusions in people who have low three-dimensional scores.

Do people who find pictures of the

perspective type difficult to interpret tend to prefer pictures that depict the essential characteristics of an object even if all those characteristics cannot be seen from a single viewpoint? Here again the first systematic cross-cultural observations were carried out by Hudson. He showed African children and adults pictures of an elephant. One view was like a photograph of an elephant seen from above; the other was a top view of an elephant with its legs unnaturally split to the sides. With only one exception all the subjects preferred the drawing of the split elephant [*see bottom illustration on opposite page*]. The one person who did not prefer the drawing said that it was because the elephant was jumping about dangerously.

Other studies have shown that preference for drawings of the split type is not confined to meaningful pictures but also applies to geometric representations. Unskilled Zambian workers were shown a wire model and were asked to make a drawing of it. Only an insignificant proportion of them drew a figure that had pictorial depth; most drew a flat figure of the split type [*see bottom illustration on page 85*]. They also preferred the split drawing when they were shown the model and were asked to choose between it and a perspective drawing. Then the process was reversed, and the subjects were asked to choose the appropriate wire model after looking at a drawing. Only a few chose the three-dimensional model after looking at the split drawing; instead they chose a flat wire model that resembled the drawing. Paradoxically the split drawing had proved to be less efficient than the less preferred perspective drawing when an actual object had to be identified.

Although preference for drawings of the split type has only recently been studied systematically, indications of such a preference have long been apparent in the artistic styles of certain cultures, for example the Indians of the northwestern coast of North America. Other instances of the split style in art are rock paintings in the caves of the Sahara and primitive art found in Siberia and New Zealand. What art historians often fail to note is that the style is universal. It can be found in the drawings of children in all cultures, even in those cultures where the style is considered manifestly wrong by adults.

Perspective drawings and drawings of the split type are not equally easy to interpret. Even industrial draftsmen with a great deal of experience in interpreting

engineering drawings, which are essentially of the split type, find it more difficult to assemble simple models from engineering drawings than from perspective drawings.

One theory of the origin of the split style was put forward by the anthropologist Franz Boas. His hypothesis postulated the following sequence of events. Solid sculpture was gradually adapted to the ornamentation of objects such as boxes or bracelets. In order to make a box or a bracelet the artist had to reduce the sculpture to a surface pattern and include an opening in the solid form, so that when the sculptured object was flattened out, it became a picture of the split type. It is possible that this development led to the beginnings of split drawings and that the natural preference of the style ensured its acceptance. There is no historical evidence that this evolution actually took place, however, and it does seem that the hypothesis is unnecessarily complicated.

The anthropologist Claude Lévi-Strauss has proposed a theory in which the split style has social origins. According to him, split representation can be explored as a function of a sociological theory of split personality. This trait is common in "mask cultures," where privileges, emblems and degrees of prestige are displayed by means of elaborate masks. The use of these mask symbols apparently generates a great deal of personality stress. Personalities are torn asunder, and this finds its reflection in split-style art.

Both Boas' and Lévi-Strauss's hypotheses ignore the universality of the phenomenon. If one accepts the existence of a fundamental identity of perceptual processes in all human beings and extrapolates from the data I have described, one is led to postulate the following. In all societies children have an aesthetic preference for drawings of the split type. In most societies this preference is suppressed because the drawings do not convey information about the depicted objects as accurately as perspective drawings do. Therefore aesthetic preference is sacrificed on the altar of efficiency in communication.

Some societies, however, have developed the split drawing to a high artistic level. This development occurs if the drawings are not regarded as a means of communication about objects or if the drawings incorporate cues that compensate for the loss of communication value due to the adoption of the split style. Both of these provisions are found in the art of the Indians of the Pacific Northwest. These pictures were intended to serve primarily as ornaments. They also incorporate symbolic elements that enable the viewer to interpret the artist's intention. Every such code, however, carries the penalty that communication is confined to people familiar with the code. Highly stylized art is not likely to be easily understood outside of its specific culture. Thus whereas the same psychological processes under the influence of different cultural forces may lead to widely different artistic styles, the styles arrived at are not equally efficient in conveying the correct description of objects and evoking the perception of pictorial depth.

STYLIZED BEAR rendered by the Tsimshian Indians on the Pacific coast of British Columbia is an example of split drawing developed to a high artistic level. According to anthropologist Franz Boas, the drawings are ornamental and not intended to convey what an object looks like. The symbolic elements represent specific characteristics of the object.

What are the forces responsible for the lack of perception of pictorial depth in pictures drawn in accordance with the efficacious conventions of the West? At present we can only speculate. Perhaps the basic difficulty lies in the observers' inability to integrate the pictorial elements. They see individual symbols and cues but are incapable of linking all the elements into a consolidated whole. To the purely pragmatic question "Do drawings offer us a universal lingua franca?" a more precise answer is available. The answer is no. There are significant differences in the way pictures can be interpreted. The task of mapping out these differences in various cultures is only beginning.

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