Figure and Ground

We see things because light from the surfaces of things reaches our eye. Surfaces structure light by various means, notably by being colored differently in different areas. Where two differently colored areas are adjacent to one another, the division between the two is called a contour.

Contours are considered very important to perception. They are often supposed to be the basis of the perception of shape, via a visual mechanism that results in the appearance of a clear figure against a vaguer background or ground. Figure and ground can also result from drawn lines—by a line I mean two contours close together, enclosing a narrow strip of pigment—which makes figure and ground a more general phenomenon, and also makes lines useful tools for exploring figure and ground.

The originator of the concepts of figure and ground was Edgar Rubin, a Dane. Despite the acclaim accorded his work, today
his research is widely misunderstood. I will try to establish what he actually said, and contrast his work with today's mistaken interpretations. Then I will try to show that though Rubin may have described figure and ground appropriately, he failed to interpret them correctly. I will also try to show that Rubin misunderstood his own research because he failed to understand picture perception.

Rubin and His Inheritors

Rubin's research was first presented at length in Danish, in a two-volume work, whose title Synsoplevede Figurer (1915) translated means visually experienced figures or visual figures. Since 1915 the research papers, theses, and texts that have made use of Rubin's work have probably grown into the thousands. Curiously, though, almost nowhere have Rubin's ideas been challenged. Rarely has any psychological concept met with more acclaim and less dispute.

In place of criticism, most authors make use of Rubin's work as a stepping-stone to other research problems, and Rubin's observations and conclusions go unquestioned. The direction taken by most of his inheritors is to suggest uses of, not problems with, Rubin's principles. It is suggested that a figure-ground concept is basic to perception, important to general psychology, fundamental to art, useful to architecture, and instructive to philosophy. For example, Wever (1927) wrote that "the greatest contribution to the theory of visual form perception is the Study by Edgar Rubin, in which the fundamental type of form experience was found to consist of a figure standing upon a ground" (p. 194). In a similar vein, Weintraub and Walker (1966) asserted that "probably the most basic organization imposed on the world by objects is that which leads to perception of objects as seeming to stand out against a background" (p. 9). Vernon (1939) in different words gave the same degree of emphasis: "Perception consists essentially in the emergence of the figure from the ground" (p. 91).

As the acclaim has grown, so too have the demonstrations of what are supposed to be the principles of figure and ground. Figure 15, which is adapted from Hochberg (1964, p. 59), is a version of a very interesting demonstration devised by Metzger (1936).
The black and white crosses can alternate, and the shape of a Maltese cross at first seems to be evident in the black areas, and then the white areas, then in the black areas again, and so on.

The shapes of letters could be missed when blocks were seen in Fig. 15. The shape of a face could be absent when an observer looks at Fig. 16. An area could be seen with the shape of a cross at one moment and be mere background the next in Fig. 17. The shape of an area on one side of a line or contour is sometimes noticed, and sometimes seems like background. The area appears to be different at different times. These differences in the appearance of the same area at different times we might think were due to differences in attention. But Rubin found that attention was not the explanation.

We might think that the direction of our attention would affect whether we see the letters in Fig. 15, or the appearances of the crosses in Fig. 17, but this is not so. Rubin pointed out we can look directly at the spaces between the blocks in Fig. 15 and still not observe the letters. And we can look at a "background" area in Fig. 17, and the other area can still be "the cross." Shape can be retained by an area we are not holding in the center of our attention. Shape can be absent in areas that we make the center of our attention. So it is not our attention that makes shape appear and disappear from our experiences. Attention tells us where to look, as it were, but it does not always tell us what we see when we look there.

Furthermore, differences in distance-like an area in Fig. 16 becoming background and looking more distant--are not normally related in any way to attention. If we were to come down some rickety stairs very carefully, when we reached the stable ground again and stopped paying attention to our feet, they would not suddenly seem to grow more distant. Differences in the distance of parts of Fig. 16 cannot be explained by attention.

What Rubin seemed to have shown was that contours and lines could be seen as "having shape on only one side" and that this one-sided shaping effect was not simply due to attention. The area with shape he called "figure" and the adjoining area he called "ground." "To characterize the fundamental difference between the two," Rubin said, "it is useful to consider the contour, which is defined as the common boundary of...two fields. One can then state as a fundamental principle: When two fields have a common border,
and one is seen as figure and the other as ground, the immediate perceptual experience is characterized by a shaping effect which emerges from the common border of the fields and which operates only on one field or operates more strongly on one than on the other" (1915, p. 35; 1958, p. 194).

At this point we have to begin to protect Rubin from his heirs. The claims Rubin made and the principle he described as fundamental were seen less clearly as time passed. As decades passed, psychology changed its moods and methods, and Rubin's phrases were refashioned to the needs of the moment. His ideas and his evidence became obscured behind inadvertently misleading re-interpretations.

At first, figure and ground seemed interesting and seemed to be useful for showing some relationships between contours, attention, and shape. Later, as the years went on, this important contribution to the study of perception became looked on, somewhat differently, as a study on an important part of perception. Later the emphasis shifted again, and figure and ground seemed more than important--the concept seemed basic to all of perception. Ultimately, writers stated flatly that figure and ground were necessary in perception.

To Rubin, figure and ground is interesting, a phenomenon that may have many implications. To Wever in 1927, Rubin had made a great contribution. By 1939, Vernon is saying that "perception consists essentially in the emergence of the figure from the ground" (p. 91). In 1949, Hebb first wrote, cautiously, "Simple figures do not always act as wholes innately. But it is undoubtedly true that they sometimes do so in one respect--in the figure-ground relationship" (p. 1). In continuing his discussion, the cautionary phrase "they sometimes do" seemed to vanish. He asserted, "The primitive unity [figure/ground] seems to be a direct product of the pattern of sensory excitation and the inherited characteristics of the nervous system" (p. 19). And, he continued, an area sensorily delimited "is seen as one, unified and distinct from its surroundings by any normal person, by the congenitally blind on the first occurrence of vision following operation for cataract (Senden, 1932), by the normal rat (Lashley, 1938), and apparently also at first vision by the rat that has been reared in darkness. The unity and distinctiveness of such figures from their background, then, is independent of experience, a "primitive" (pp. 19-20)...There is a primitive or innate figure-ground mechanism (p. 21). The rat, as well as man, finds some figure-ground relations obvious and inescapable (p. 22)." Hebb makes a number of subtle and important points about attention and visual organization and figure-ground relations. But nothing that he says throws doubt on his strongly expressed view that Rubin's figure-ground phenomenon is the inescapable experience of human observers, young and old.

Woodworth's was a solitary voice in 1931, when he said that a figure was sure to occur if a contour was present. Hebb's writings became very influential, and probably as a result of his analysis of figure and ground now there is a great chorus avowing that figure and ground is necessary for any shape perception and an inescapable result of looking at a line or contour. Hochberg was expressing the will of the crowd (for example, Geldard, 1962; Pastore, 1971, p. 274; E. J. Gibson, 1969, p. 345) when he said: "Although any contour divides the stimulation at the eye into two-regions, the shape of both regions cannot be simultaneously observed" (1964, p. 83).

The gradual drift from Rubin's description of figure and ground to flamboyant claims about the impossibility of seeing things any other way was not without good cause. First, the mood of researchers has changed from Rubin's gentle interest in describing a certain kind of experience people could have. Contemporary theorists want to describe causes for experience and have grown less concerned with contemplative attempts to analyze the details of individual experiences. Second, several demonstrations have seemed to show that past experience could not override a strong tendency to see "one-sided shaping effects."

Recall the FIGURE illustration (Fig. 15). Compare it to the WAX illustration and the FLY illustration of Figs. 18 and 19. It seems that despite our enormous familiarity with the shapes of common letters, something interferes and prevents us seeing the meaningful configuration (the words) in favor of oddly shaped blocks. The figure-ground tendency entirely sweeps aside the influence of familiarity and meaningfulness. At any rate, that was the lesson drawn from these illustrations. The fact that it was impossible
to see both faces at once in Fig. 16 has seemed further proof of the power of a figure-ground tendency.

Recall Fig. 17, a black cross on a white ground, or a white cross on a black ground, too. With figures such as these, Koffka (1935) claimed that it is difficult to see them as eight adjacent slices. The figure-ground tendency is too powerful for anything other than one-sided shaping effects to occur.

Two experiences made me suspicious of this interpretation of figure and ground laws. I showed the Maltese cross figure to a friend, who told me it looked like a beach ball. To her, the black and white wedges seemed like the eight adjacent panels on a ball.

Fig. 18

Fig. 19

FIGURE 18. The word wax is hidden here.

FIGURE 19. The word fly is hidden here.

There seems to be no difficulty in seeing the figure this way. Once the hint is given, subjects say the figure looks like a beach ball as readily as it can look like Maltese crosses.

I also showed a line figure--a circle--to a few children ages five to nine. A figure and ground tendency, Rubin once suggested, might be present, weakly, in young children. Over the years this idea became transformed, until now whole schools of psychologists are said to believe that "the first phenomena experienced by the infant are qualities, or figures, upon a ground" (Bond, 1972, p.226). I told the children to call the inner area of the circle "the island" and the outer area "the sea." I asked whether the island seemed to go under the sea, or the sea under the island, at the border or line. Sometimes, I called the inner area a lake and the outer area land, and asked the same questions. Adults who try this question report that the area which is figure seems closer, and the background extends behind the figure. The circular line only shapes the figure.

The children seemed to find my question meaningless. They would look at the drawing, but not answer. Any time they answered, it was after looking off to the side, seeming to think about the question, as though looking at the display was no help. Never did I find a child who could glance at the drawing and quickly reply. Figure and ground seemed not to be powerful in their experience.

I came to wonder whether there was not something wrong with analyses of the FIGURE, FLY, and WAX illustrations and the two-faced figure. The lesson to be drawn from the Maltese beach ball was that an appropriate hint would facilitate seeing borders as having shape on both sides. Would that work with the two-faced figure? Perhaps Fig. 20 provides the answer. Fig. 20 can be seen as a clam (or a thin-lipped hamburger!), with the dividing line shaping both top and bottom shells of the clam. Evidently, hints create and destroy the context for two-sided effects to occur. The "faces" hint prevented two-sided effects, perhaps, because seeing two faces fitting together is implausible, too difficult to imagine. The "clam" hint creates the correct context.

Hints about the letters reversed the FIGURE, WAX, and FLY figures, also. But why was it so difficult to see the letters in the first place? Is it true that figure-ground overwhelms the power of familiarity and meaningfulness? Perhaps the demonstration has been misanalyzed. Perhaps the rule that "contours are normally seen as one sided" has been incorrectly drawn from these figures. The fact is that the letters are not present in these illustrations. The letters are incomplete. Tops and bottoms are missing, and the shapes of the letters are oversimplified at times, so that important features are missing. And the terminations that are usually present at the tops and bottoms of letters are also absent. Fig. 21 restores some of these, and the result is blatantly obvious letters. These illustrations have been interpreted in ways that confuse the normal functions of contours in perception with the results of making shapes incomplete.

The modern version of Rubin's figure-ground principles was
that figure-ground is inevitable if a line or contour is present. The popular demonstrations of figure-ground inevitability are readily reversed by hints and by supplying missing parts to misanalyzed illustrations. Was there any basis for the misguided modern version of Rubin's principles in his original research? Unfortunately not. With Elizabeth Kennedy I have examined Rubin's work in the original Danish version, and reviewed many of his research papers, published and unpublished, in the Danish Archives. Nowhere does he seem to find or suggest that contours necessarily give rise to figure and ground. Positive support for the idea is conspicuously absent. Instead, there are frequent reports that the occasional subject would see his displays with figure on both sides of a contour.

There is no difficulty in creating figures where lines shape both adjoining areas. Consider Fig. 22. Even without any hints, subjects see this as containing a line shaping two adjoining regions. The figure seems like two six-sided crystals. Each crystal is bounded or shaped by the middle line.

Consider a very clear case, in which lines give impressions of many different kinds of boundaries. Some of the impressions are figure-ground in type, some have shape on both sides of the line, and there are other shaping functions, too. Figure 23 is a line drawing that looks like a fence, with wires and cracks. Notice that lines that separate boards in the fence are seen as having figure on both sides; the lines mark the edges of surfaces of both adjoining boards. This is an important case: Rubin and others have suggested that if the ground does have shape, and if shape is perceived on both sides of a border, the ground would be shaped by borders it does not have in common with the figure. In fact, in the above example adjoining boards in the fence are shaped by borders they share in common. Other lines shape the top of the posts, giving the figure-ground appearance of a nearby board and a distant background. Others shape the interior of boards, showing where the front meets the slanting top.

The lines that seem like wires are cases where neither region adjoining the wire is figure, only the line itself. (Kaplan, 1969, with animated movies of moving textures, often found boundaries between regions of texture seemed to "stand out" from either adjoining region, looking appreciably closer to the observers than either of the
Much of Rubin's work was descriptive. He was a phenomenologist; that is, he tried to establish the characteristics of a certain kind of visual experience. It is these characteristics and their significance that have least been questioned by later authors. I will suggest, following some leads by Gibson (1951), that their customary interpretation as basic in normal perception is in need of a complete revision.

The fundamental difference between figure and ground Rubin characterized as one area having shape belonging to the common contour and the other area having no shape from the common contour. The area shaped by the common contour he called figure; the other area he called ground. The contour limited the figure, and not the ground. The ground even seems to extend behind the figure (1915, pp. 36-37).

The figure was said to have the character of "a thing." A thing he considered to be a material with shape. The ground seemed more like a "substance." He compared "things" and "substances" to an aspect of language as follows. We can take a material-word, add it to a shape-word, and get a thing-word! *Water* plus *drop* becomes *waterdrop*; *gold* plus *bar* becomes *gold-bar* (p. 44)—these were two examples he gave. To Rubin, then, a thing is a unified whole, a bounded lasting shape (p. 45) made of some substance—a substance with definite shape.

The ground looks like a substance, not a thing, in the way that expanses of sand or flour seem like substances. But the substance of the ground is *not* the same as the substance of the paper or screen used for making the display (p. 44). The texture of the surface of the display can be quite distinct from the apparent substance of the ground. Why the material of the display should be irrelevant is a question I will try to answer later.

By having shape, the figure was more ornate and distinct than the ground; its features were more likely to be noticed (leading Rubin's predecessors to conclude erroneously that paying attention created the impression of shape in the figure). The figure was
prominent both in the sense of being more likely to be examined by his subjects, and also it "stood out." Its localization was somewhat indefinite; observers found they did not have a clear impression of its distance. All they could say was that it stood out in front of the ground. Its indefinite localization is a puzzle. Why is there anything indefinite at all about the distance of a contour on a piece of paper? I will also tackle this question later.

When an area is seen as figure and later as ground, its color seems to change, too. As a figure, Rubin found the color would appear more compact, and look as though it were on a surface. Katz (1935) previously had noticed this appearance and he called it surface color. As a ground, a color would seem filmy or airy like the sky, less compact. In Katz's terms, these are film or volume colors.

Rubin said that subjects were more likely to "put something into" the figure than "into" the ground (p. 69). One striking example may help make part of his meaning clear. One subject "put something into" adjoining areas of a display. The display was "seen as" a green mushroom on which a black worm was crawling. Rubin said that the subject would "put into" a display things with similar shapes to the figure. Hence the ground, having no perceived shape, would not have "things put into it" (pp. 71, 79, and Chap. 9). The subject may also recall some event that happened to occur when he first saw one of Rubin's displays. Recalling the extraneous event when the display is shown again Rubin describes as "putting it into the experience of the display." Subjects can put form and motion or events into their experience of the display.

Besides describing the characteristics of figure and ground, Rubin investigated the role played by figure and ground in essential skills such as recognition and also investigated some factors influencing which areas would more likely be seen as figure. I will not reinterpret some of these investigations, but will note them in passing.

If an area of a display was seen as figure on the first presentation of the display, that area would be figure again on the second presentation, Rubin found. With some displays, different subjects could be instructed to see different areas of the displays as figure on the first showing of the display. On a second showing, the same area would be figure.

With the same kinds of displays, Rubin could instruct subjects to see different areas as figure at different times. He found that if subjects saw a different figure the second time a display was shown (that is, if figure and ground were reversed), the display was not recognizable. Zusne (1970, p. 121) notes that debate over this finding has concluded in favor of Rubin.

Among the factors determining which area would be seen as figure were these six: (1) The enclosing area was more likely to be figure. (2) The instructions or attitudes given to the subject were important. (3) The lower area would more likely be figure. (4) Vertical and horizontal figures were preferred over diagonal figures where vertical and horizontal were taken in relation to a framework like the sides of the page or screen used for the display. (5) If one area contained distinctive marks of a well-known thing or had the shape of a familiar object, it was likely to be figure. (6) Some colors were preferred over others.

One can attend to the ground and describe its characteristics. The ground is therefore not merely an unattended part. The differences between figure and ground are qualitative, not merely differences in vagueness or clarity. The change between figure and ground, with a given area, is usually surprising to subjects and unlike the effect of seeing something in the periphery and turning to examine it. So Rubin concluded the differences between figure and ground cannot be explained by differences in the direction of attention.

Rubin leaves us a list of differences between figure and ground, some evidence on the role of figure and ground in recognition and the observation that differences in the direction of attention do not explain figure and ground.

Earlier we noted the way hints influence the perception of figure and ground, and Rubin too noticed how instructions can change figure and ground and vice versa. He also noticed that some characteristics of a display such as its texture, may have no role in figure and ground. It may be that Rubin played down the role of attention a little too much. It may be that there is more to attending
than a change in the direction of attention. It may be that hints and
instructions can control markedly different ways of looking.

**Gibson's Pictorial Perception and Figure-Ground**

In the early 1950's, J. J. Gibson distinguished between dif-
ferent ways of looking. Consider some of his points that may have a
bearing on figure and ground. In a 1951 paper entitled "what is a
form?" Gibson argued that often the marks we make on surfaces can
be taken as depictions of the edges of surfaces. The perception
afforded by these marks is a special kind. "The paper surface is
scarcey seen and a different surface seems to emerge within the
outline. The paper surface appears to become 'background.'... Most
observers perceive an object and do not see tracings on a surface at
all" (pp. 405-406).

Gibson is perhaps not the phenomenologist Rubin was. The
paper surface is, of course, clearly visible-to say it is not seen is too
strong. The notion of a surface emerging within the outline is per-
haps misleading; it sounds like slow condensation, quite unlike the
immediate impressions of shape given by many displays. The paper
surface may well look like a foreground or a framework instead of
background. I doubt if observers fail to see that what they look at is
tracings on a surface.

Happily, the key to Gibson's insight lies not in these mislead-
ning observations but in a fact that Gibson noticed and Rubin over-
looked. Gibson noticed that with these kinds of displays, "when you
press the question, [subjects] tell you that they do not literally see a
physical object, but a picture of it" (p.406).

Rubin never pressed Gibson's question onto his subjects. In
fact, Rubin gave his subjects very curious instructions: He told them
to report what they saw, not what they knew. Let us closely con-
sider the relationship between the perceiver and the displays. Rubin's
instructions probably biased his subjects toward leaving out of their
reports many things that were obviously true about the displays. The
instructions indicate that Rubin, too, was biased, that he probably
took far more interest in reports about the displays that were
obviously not true, things that because they were not true he could
ascribe to perception and not to cognition. In other words, Rubin
asked about "experiences" but was never blunt enough to say "list the
physical characteristics of my displays that you can see to be true," a
request that might have allowed him to distinguish between
perception of the display and perception of the display as a
depiction.

Rubin never pushed his subjects for accurate descriptions of
the displays. Perhaps when subjects said things like "The figure
seems to be on top of the ground," they could actually have told
Rubin that it was obvious, too, all the while that the figure area was
actually no nearer than the ground area, that all of the color patches
were on the same plane. Consider the illustrations on the preceding
pages; they were accompanied by words like "beach ball," "boards,"
"wires," and "cracks" (and these were appropriate captions). But if
anyone had been asked to list the physical characteristics of the
display, there is no doubt what he would have said. He would have
mentioned black and white patches, lines and contours, and that is
all. Someone might say the boards in the fence are thick, or the
beach ball round, or the figure in front of the ground. But, if pressed,
he would have said, too, that he was seeing black and white areas,
flat, all in the same plane.

Rubin noticed similarities between perception of real phy-
sical surfaces with edges and perception of line or contour figures.
Gibson noticed there were differences as well (though, as I pointed
out, some of the differences he describes are questionable). Rubin
was not blind to the fact that subjects could say that a display could
look like something other than what it was or reminded subjects of
extraneous events or extraneous scenes like a worm crawling on a
mushroom. In fact, Rubin promised a third section to his thesis
(which was hurried because of the duties of war) on the fact that
sometimes subjects "put things into" a display, as he phrased it. This
third section was written, in rough draft, and perhaps incompletely.
We may never know his final position, because as a result of yet
another war the notes and drafts were lost, and not all his papers
have been recovered. (Elizaboth Kennedy was given much-ap-
preciated help by Danish archivists, psychologists, and Rubin's
family in searching through Rubin's papers, but without recovering
that vital third section.)

In Rubin's phrase, "putting into a display," one can see his
cautious approach to the possibility of the displays being depictions.
But his approach always remains superficial in the 1915 work. Notice that he claimed that an area containing features of a well-known object would be likely to be figure. And he went on to claim that subjects can "put into figures" things like well-known objects or movements. But he never discusses the bases for "putting something into a figure." He does not offer criteria for distinguishing what is "put into" a figure from what is seen there. Nor does he distinguish what is "put in" because the display is a picture from what is "put in" on entirely fortuitous grounds. The subject may remember some chance event—a cough, a door slamming—that occurred when a display was shown. Recalling the chance event when the display occurs again is called, by Rubin, "putting it into the experience of the display."

On the one hand, Rubin fails to distinguish pictorial properties of the display from chance associations with the display. On the other hand, his descriptions of the experiences resulting from his displays are distinguished from "things put into the display" on purely intuitive, completely unstated grounds. Gibson's request that the subjects separate what is truly there from what they see the display is depicting (and from what the display happens to remind them of) could be the beginning of an effort to make Rubin's intuitive distinctions explicit. The cost of the effort will be that figure and ground will be considered part of a very complex kind of perception (no longer the simple basis of perception). Consider that displays unmistakably made solely of lines can be seen as beach balls, boards in a fence, cracks, or wires. The display is seen as made of lines and also, at the same time, as objects that the observer can see are not present. The observer can tell that the difference in depth between figure and ground is apparent, not real. Is figure and ground a pictorial phenomenon? If so, the differences between figure and ground should be more than a list of unrelated items. They should follow from the nature of depiction.

**Figure-Ground as Pictorial Perception**

So, can most of the figure-ground experience be explained as perception of the displays as pictures?

Perhaps a contour or line on a display can be seen as depicting the edge of a surface—the silhouette of an irregular object, iso-
Rubin also noticed that the figure and the ground seemed "indefinitely" located. Their distance from the observer was unspecific, though the ground seemed further than the figure. Rubin did not explain these experiences of location. But if the contour or line represents an edge of a surface against a background, the nearness of the figure is understandable. And the indefiniteness of the location of both figure and ground can be understood, too. The indefiniteness is puzzling only if we try to think of figure and ground as typical of some basic process in normal perception. Because subjects can, of course, tell exactly how far the surface of the display is, with its lines and contours. The distance is not further than the screen or book or page the subject is being shown. That distance is not at all imprecise to subjects. Then why should the figure and ground emerging from the lines and contours in the display be indefinitely located? How can it be that the lines and contours are clearly located and that the figure and ground are not? The answer could be that figure and ground are inherently pictorial, and the display as a picture does not provide information about the location of the figure and ground. The lines or contours are precisely located, but what they depict is not, without additional information.

Many of Rubin's proposals for factors influencing which area would be seen as figure make sense if the displays are considered as pictures. If one is to take the lines and contours as depicting the edges of surfaces, then the particular area adjacent to an irregular line or contour that will represent a surface is equivocal in the absence of further information. So it makes sense to find that subjects can adopt a set to perceive either one side or another as representing a surface. That the lower area is typically taken as representing a surface might follow from the fact that most surfaces in the world are on the terrain in the world, not up in the sky. That the area containing distinctive marks of a known object is seen as figure follows directly from a pictorial hypothesis about figure and ground. If one area has the outline shape of a well-known object and the other does not, it follows, too, that the well-known object would more likely be seen.

The factors of color or reflectance (Botha, 1963) and enclosure or size (Oyama, 1960), or the preference for vertical figures rather than diagonal figures, can perhaps be less readily subsumed under a pictorial hypothesis, but these very factors are not more than "tendencies"--they are not particularly powerful in their effect, and they are readily reversed by hints. Nor do they explain the characteristics of the figure-ground experience, and it is these characteristics and their significance that are at issue.

Shape on one side of a border at one time, shape on both sides of a border at other times, unreal (to the subject) differences in depth, the irrelevance of the consistency of a display, the mixture of precise location of contours or lines and indefiniteness of the location of figure and ground--these and other reports from Rubin's subjects all make sense only if subjects can see simple irregular lines and contours as depictions of the edges of surfaces. Investigators have generally thought that simple line and contour displays should be used to investigate the basic laws of perception. It may be that typically subjects see these displays as pictures as well as simple forms, as Gibson (1951) suggested. The simplicity of the forms allowed ambiguity: it was deceptive and allowed subjects to take a pictorial attitude.

One can still learn a great deal from Rubin's subjects. They did not behave erratically. There are common threads to their reports. What they tell us, though, is not about a mysterious figure-ground tendency that is necessary to all forms of perception. They tell us about a special way of looking, in which a line or contour depicts the edge of a surface. Rubin's subjects provide the first systematic evidence ever gathered on the puzzle of line and contour representation. What remains to be done is to explore the possibilities of line and contour representation yet further. The next step is to ask what lines or contours can represent.

This chapter was on the legacy left by a very impressive set of studies by Edgar Rubin. Rubin was very angry with the ways in which his work was abused by his readers (MacLeod, 1968). This chapter tried to show how the times have indeed mistreated his work and tried to clarify his original intentions. But his work has to be reunderstood, for it is actually a beginning study on picture perception. The next chapter will go beyond Rubin's research and try to answer the question his work seems to point to--namely, what can a line depict?