Psychology

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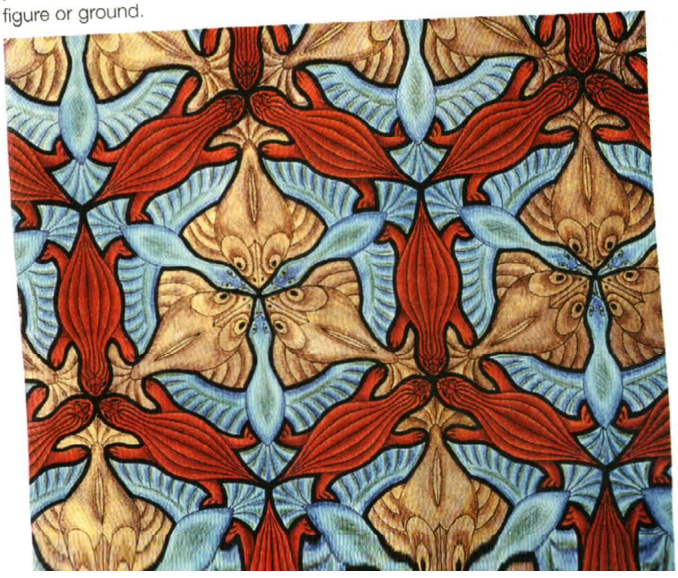
Constructing the Visual World

We do not actually see a retinal image; the mind must actively interpret the image and construct the world from the often-fragmentary data of the senses. In the brain, sensory signals that give rise to vision, hearing, taste, smell, and touch are combined from moment to moment to produce a unified model of the world. This is the process of *perception*.

Form Perception. To make sense of the world, we must know where one thing ends and another begins. In vision, we must separate the teacher from the lectern; in hearing, we must separate the piano solo from the orchestral accompaniment; in taste, we must separate the marshmallow from the hot chocolate. This process of dividing up the world occurs so rapidly and effortlessly that we take it completely for granted, until we must make out objects in a heavy fog or words in the rapid-fire conversation of someone speaking a language we don't know.

The *Gestalt psychologists*, who belonged to a movement that began in Germany and was influential in the 1920s and 1930s, were among the first to study how people organize the world visually into meaningful units and patterns. In German, *Gestalt* means "form" or "configuration." The Gestalt psychologists' motto was "The whole is more than the sum of its parts." They observed that when we perceive something, properties emerge from the configuration as a whole that are not found in any particular component. A modern example of the Gestalt effect occurs when you watch a movie. The motion you see is nowhere in the film, which consists of separate frames projected at (usually) 24 frames per second.

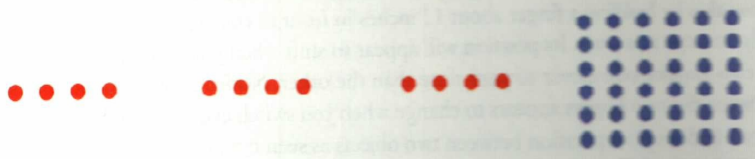
FIGURE 6.5 Figure and Ground
Which do you notice first in this drawing by M. C. Escher—the fish, geese, or salamanders? It will depend on whether you see the blue, red, or gold sections as figure or ground.



The Gestalt psychologists also noted that people organize the visual field into *figure* and *ground*. The figure stands out from the rest of the environment (see Figure 6.5). Some things stand out as figure by virtue of their intensity or size; it is hard to ignore the bright light of a flashlight at night or a tidal wave approaching your piece of beach. Unique objects also stand out, such as a banana in a bowl of oranges, and so do moving objects in an otherwise still environment, such as a shooting star. Indeed, it is hard to ignore a sudden change of any kind in the environment, because our brains are geared to respond to change and contrast. However, selective attention—the ability to concentrate on some stimuli and to filter out others—gives us some control over what we perceive as figure and ground, and sometimes it blinds us to things we would otherwise interpret as figure, as we

Other **Gestalt principles** describe strategies used by the visual system to group sensory building blocks into perceptual units (Köhler, 1929; Wertheimer, 1923/1958). The Gestalt psychologists believed that these strategies were present from birth or emerged early in infancy as a result of maturation. Modern research, however, suggests that at least some of them depend on experience (Quinn & Bhatt, 2005). Here are a few well-known Gestalt principles:

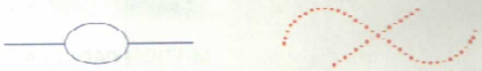
1 **Proximity.** Things that are near each other tend to be grouped together. Thus you perceive the dots on the left as three groups of dots, not as twelve separate, unrelated ones. Similarly, you perceive the pattern on the right as vertical columns of dots, not as horizontal rows:



2 **Closure.** The brain tends to fill in gaps to perceive complete forms. This is fortunate because we often need to decipher less-than-perfect images. The following figures are easily perceived as a triangle, a face, and the letter *e*, even though none of the figures is complete:

3 **Similarity.** Things that are alike in some way (such as in color, shape, or size) tend to be perceived as belonging together. In the figure on the left, you see the circles as forming an *X*. In the one on the right, you see horizontal bars rather than vertical columns because the horizontally aligned stars are either all red or all outlined in red:

4 **Continuity.** Lines and patterns tend to be perceived as continuing in time or space. You perceive the figure on the left as a single line partially covered by an oval rather than as two separate lines touching an oval. In the figure on the right, you see two lines, one curved and one straight, instead of two curved and two straight lines, touching at one focal point:



Unfortunately, consumer products are sometimes designed with little thought for Gestalt principles, which is why it can be a major challenge to, say, operate the correct dials on a new stovetop (Bjork, 2000; Norman, 1988). Good design requires, among other things, that crucial distinctions be visually obvious.

Gestalt principles Principles that describe the brain's organization of sensory information into meaningful units and patterns.