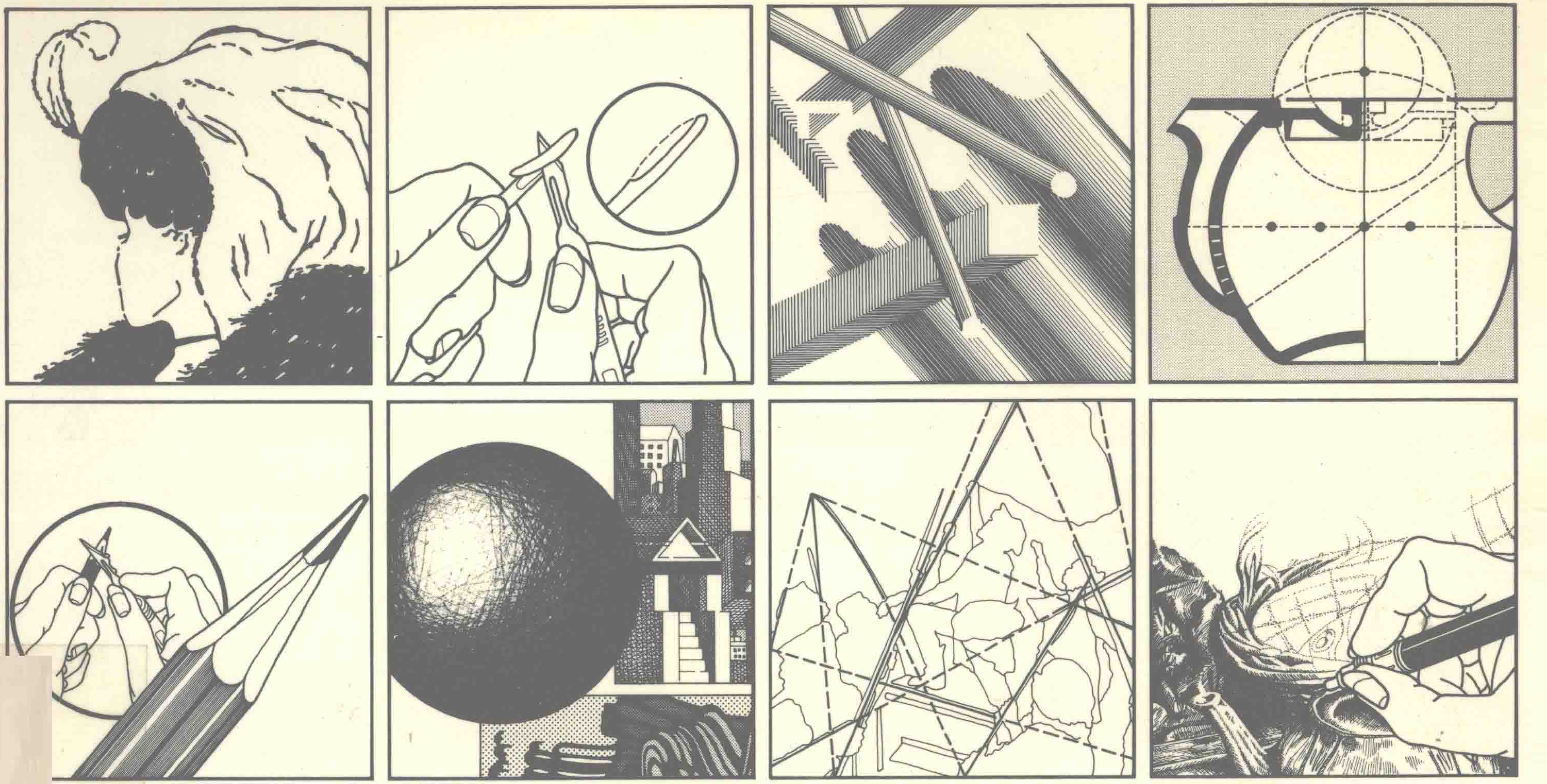
DESIGNER PRIMER

FOR ARCHITECTS, GRAPHIC DESIGNERS, & ARTISTS



TOM PORTER AND SUE GOODMAN

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Charles Scribner's Sons · New York

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Introduction

In the wake of a rapidly advancing computer-graphics technology, drawing by hand remains undisturbed as the central activity in the process of design. Design ideas, it seems, are still conceived of using pencil or pen on paper. Indeed, this is confirmed by a recent survey of design practices. The survey found that, compared with a computer literacy, management and modelmaking skills, etc., an employee's ability to draw both in freehand and with drafting instruments--in that order--was of paramount importance.

Therefore, the central theme of Designer Primer is its commonsense approach to objective drawing and design drafting for beginners. Chapter 1 examines the act of drawing as an extension of our visual perception, i.e., as the creation of spatial illusion on a flat surface. The understanding of the difference between what we see and what we think we see is then developed in Chapter 2. Here, pictorial images are dismantled and analyzed in terms of their constituent working parts.

Drawing mediums are discussed in Chapter 3 and evaluated for their sketching capabilities. This section serves as a prelude to a matter-of-fact approach to objective drawing techniques in Chapter 4--a section that also includes a variety of useful methods for achieving accuracy in the drawing process.

The functions, spatial prowess, and drafting techniques specific to each orthographic and design drawing type, as well as to composite versions, are reviewed in Chapter 5; alongside these are projects intended to harness design concepts to graphics and develop design drawing techniques. Finally, Chapter 6 focuses on the creation of professional-looking and visually compelling graphics, and on the all-important issues of their individual production time.

The word "artist" rarely appears within the text. Drawing in all its forms is explained step-by-step in the conviction that an understanding of how and what we see--with both the eye and the mind's eye--is the foundation of an honest and convincing drawing technique.

1 VISUAL PERCEPTION

Sensations of Space

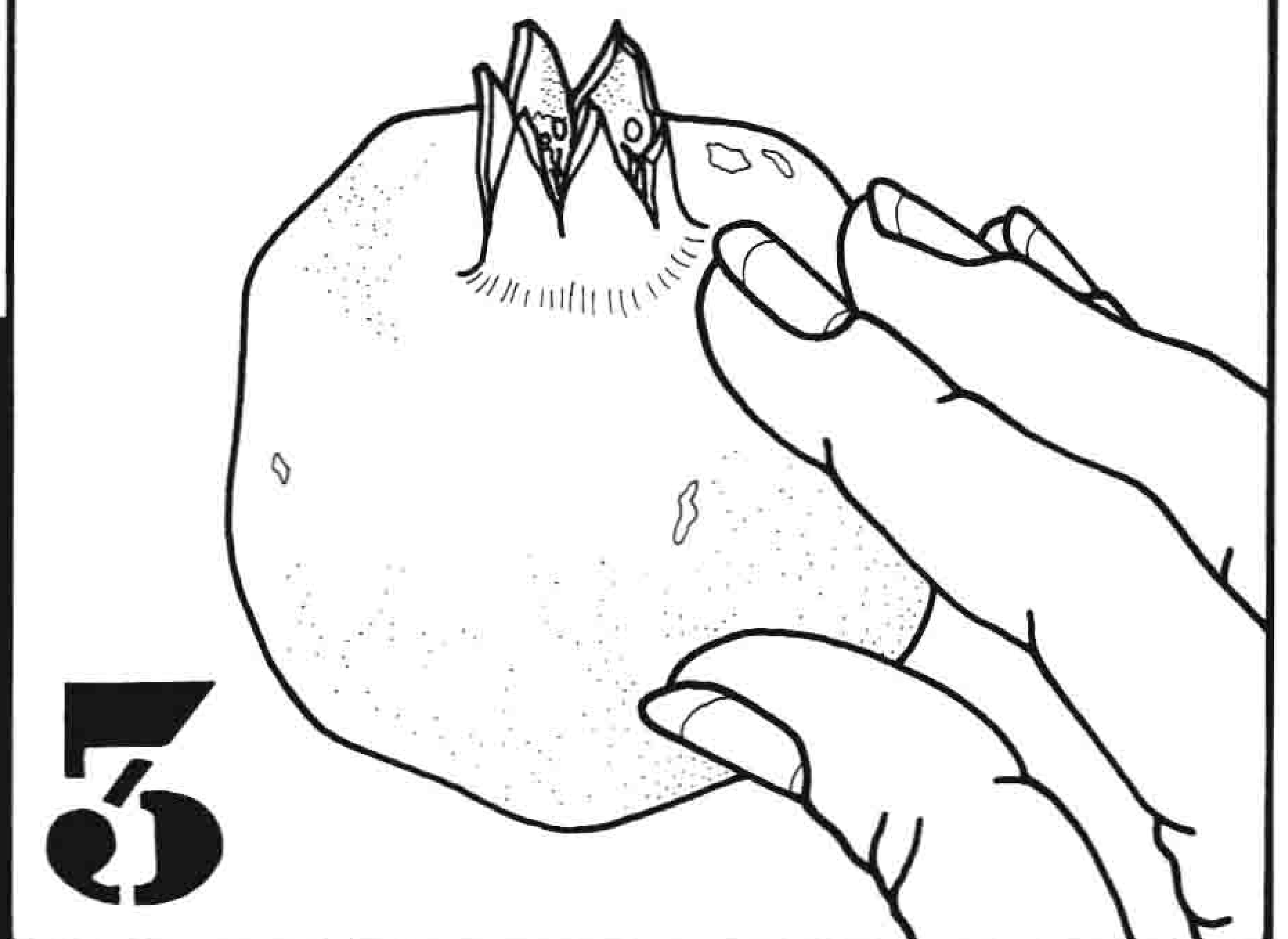
1

Our perceived experience of environmental space is primarily a sensuous event involving movement, for to pass through an environment is to cause a kaleidoscope of changing impressions, of transitions between one spatial sensation and another. Each experience affects the orchestrated functioning of our senses in a variety of ways--our eyes, ears, nose, and skin registering changing stimuli that trigger a flood of brain responses on all levels.

2

As we move through space, each body, neck, and eye movement sets the visual environment in motion. Of all the sense organs, the eyes receive by far the most spatial information. The physiology of the brain indicates that the visual scanning process is capable of monitoring up to eighteen separate images every second.

However, touch is an important aspect of our understanding of space. The psychologist Sven Hesselgren has outlined three tactile dimensions. The first is the actual sensation of physical contact with the surface of an object.



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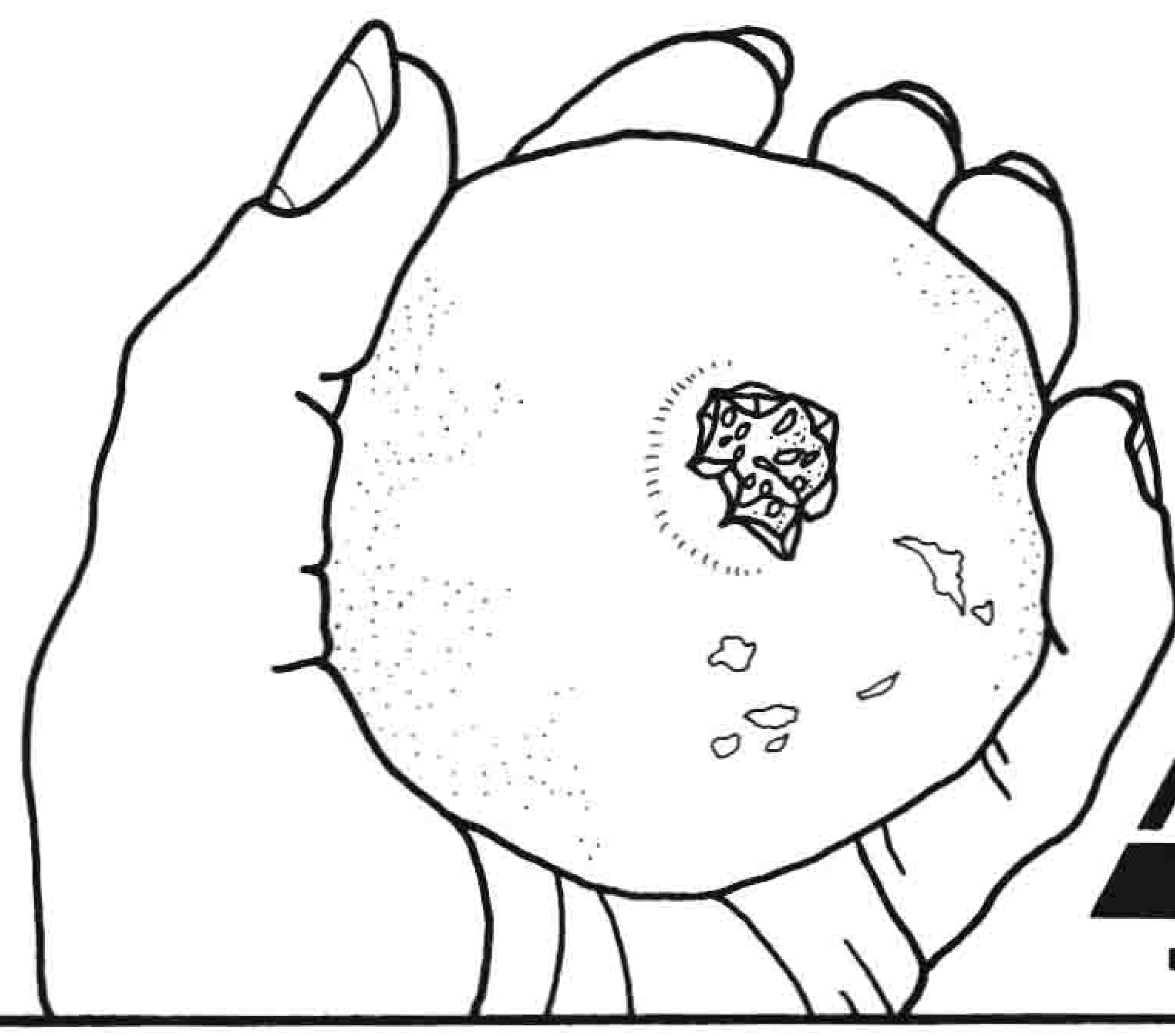
The second tactile dimension is experienced when we pick up an object. In holding it we gain an immediate impression of its weight--this sensation being recorded by the kinesthetic activity of our muscles, which make infinitesimal adjustments to the balance of our body.



4

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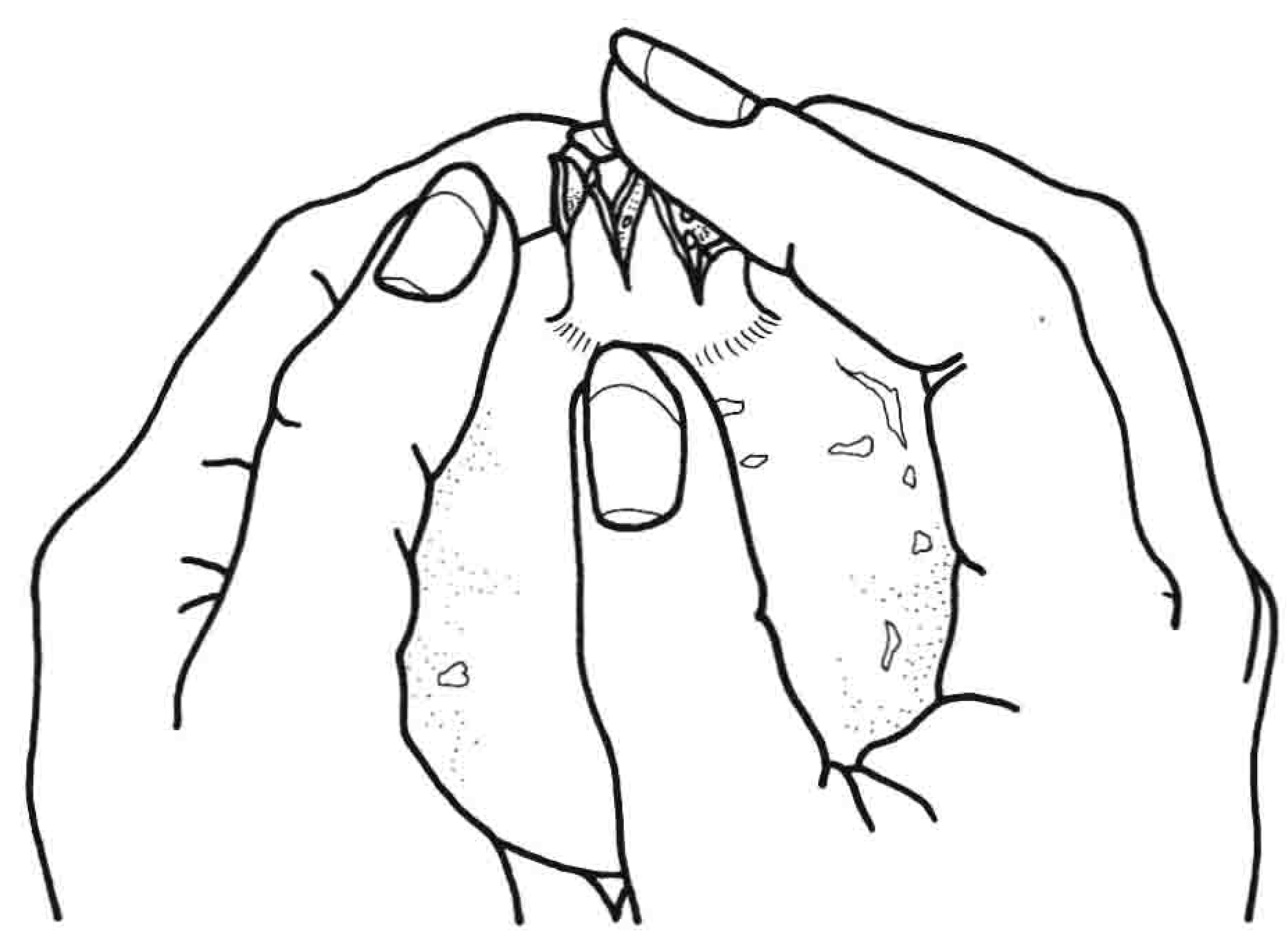
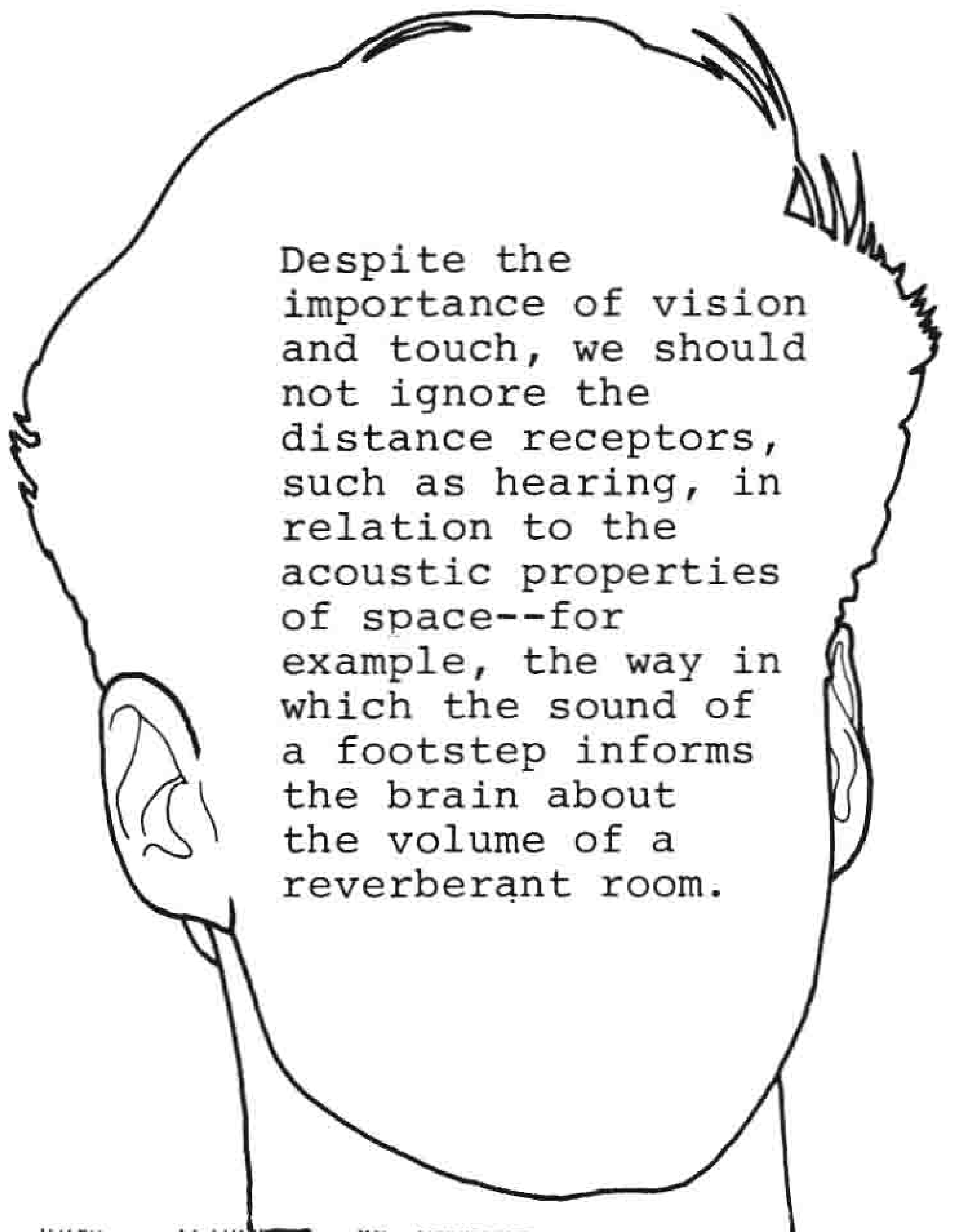
If we close our eyes, using our hands to explore the entire surface of an object, we experience the third dimension of touch--a haptic perception of its form. This sensation is the most reliable of our sense organs in acquiring knowledge of the existence of physical form.



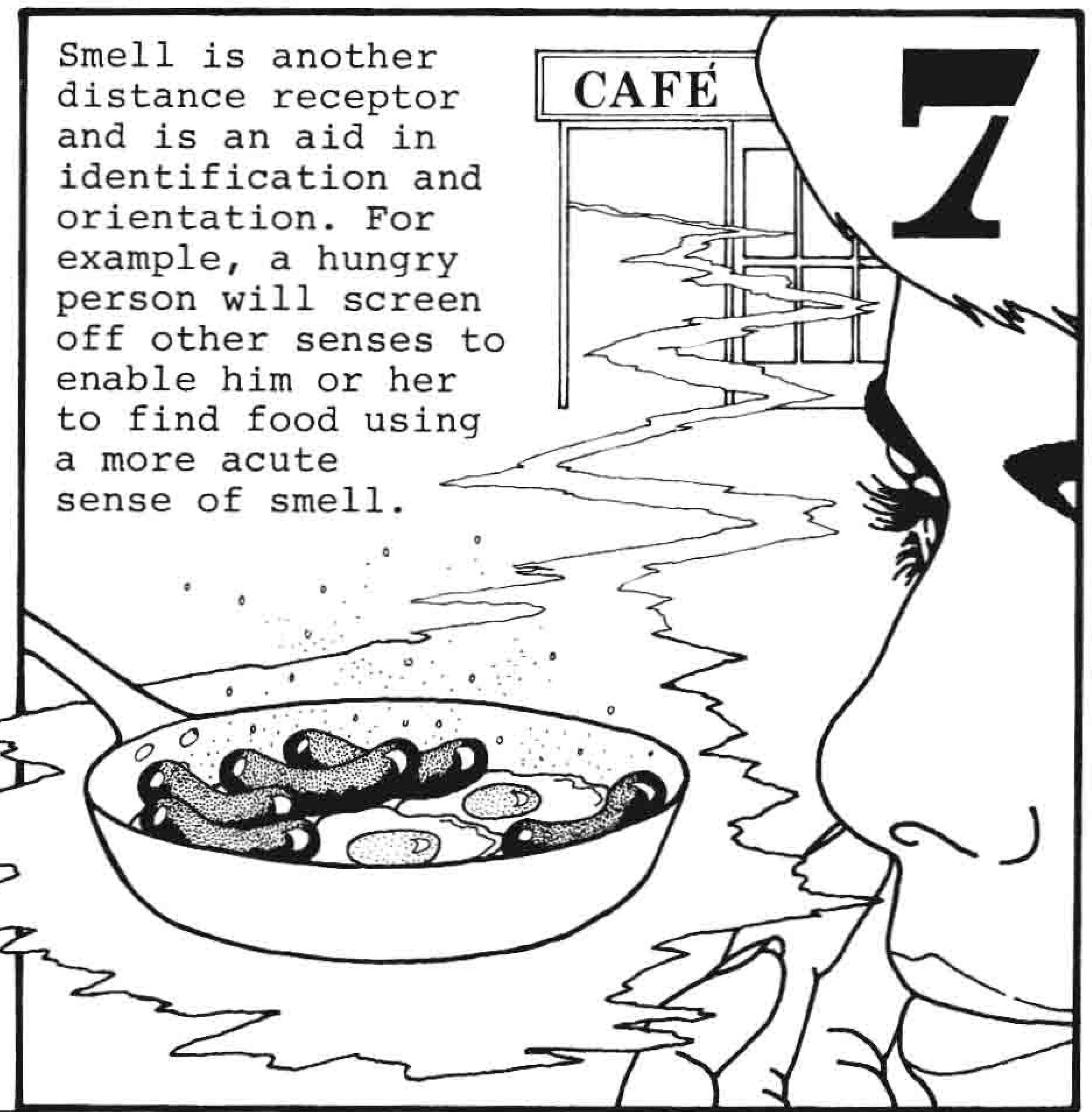
Sensations of Space

6



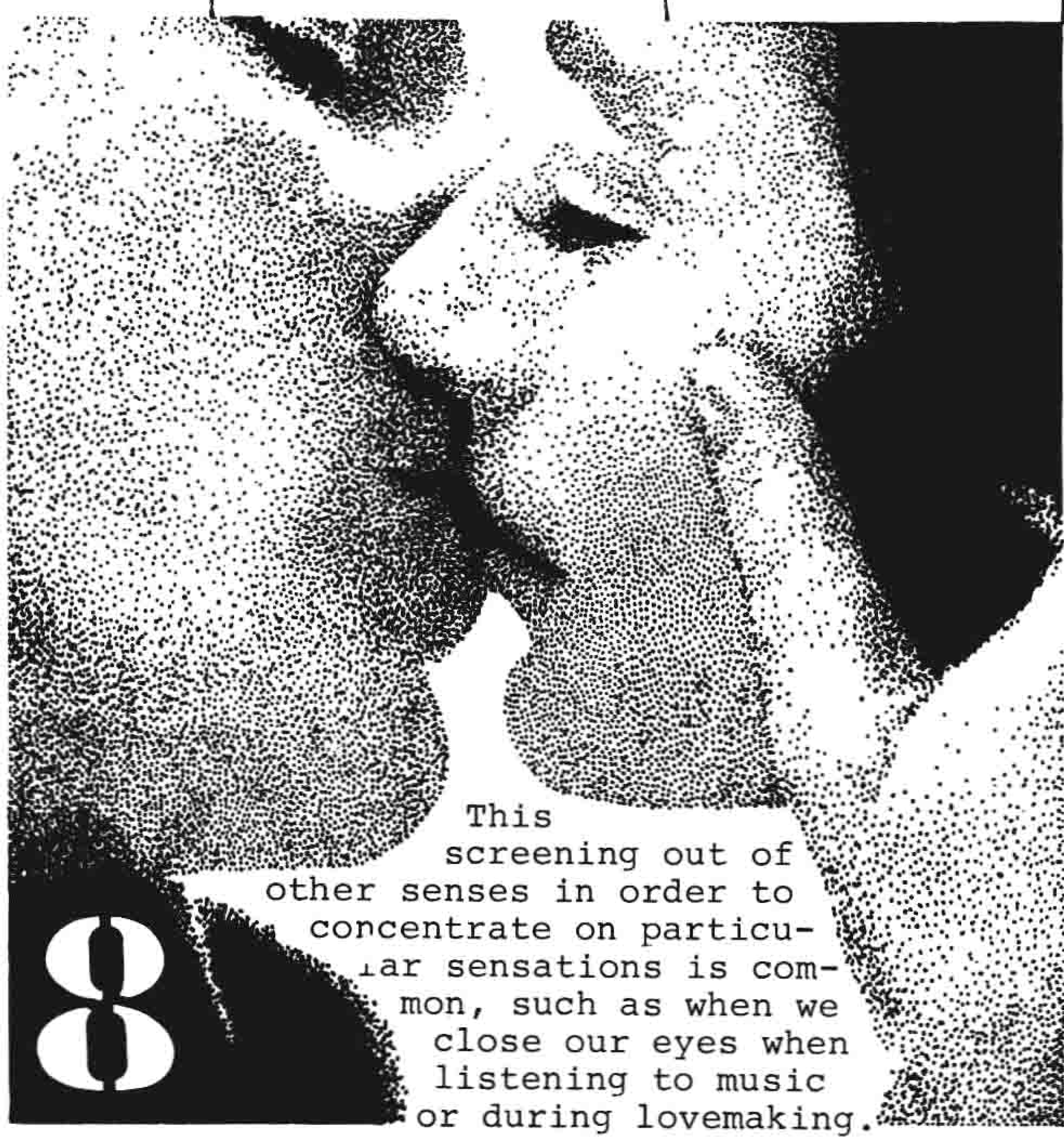
Despite the importance of vision and touch, we should not ignore the distance receptors, such as hearing, in relation to the acoustic properties of space--for example, the way in which the sound of a footstep informs the brain about the volume of a reverberant room.

7



Smell is another distance receptor and is an aid in identification and orientation. For example, a hungry person will screen off other senses to enable him or her to find food using a more acute sense of smell.

8

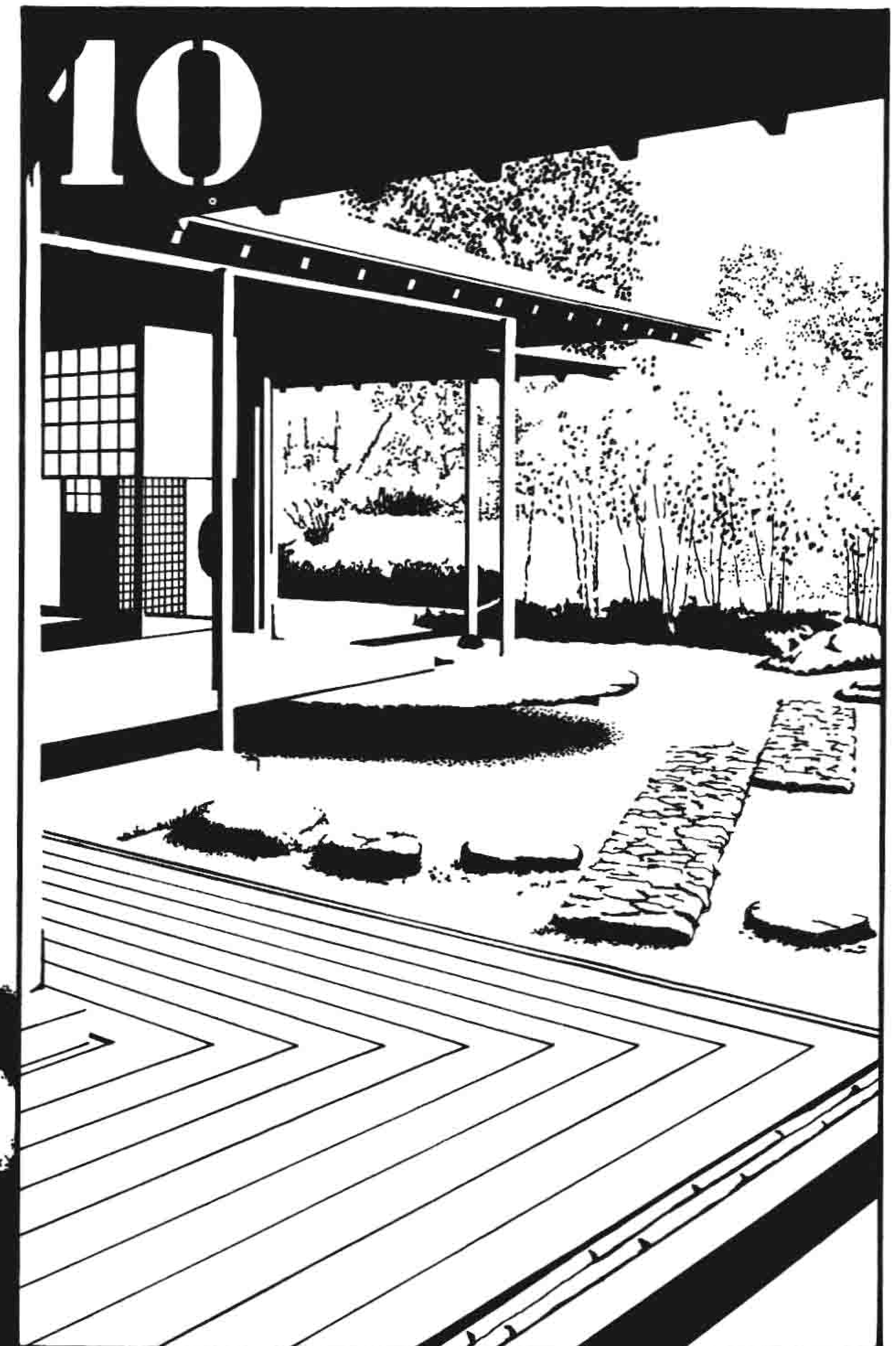


This screening out of other senses in order to concentrate on particular sensations is common, such as when we close our eyes when listening to music or during lovemaking.

9

The use of perfumes and colognes and the Colgate toothpaste "ring of confidence" is a further example of screening in a society embarrassed by body odors and bad breath.

10



Being more subtle in their sensitivity to temperature, humidity, texture, and shape, the immediate receptors (skin, membranes, and muscles) are sensitive to movement.

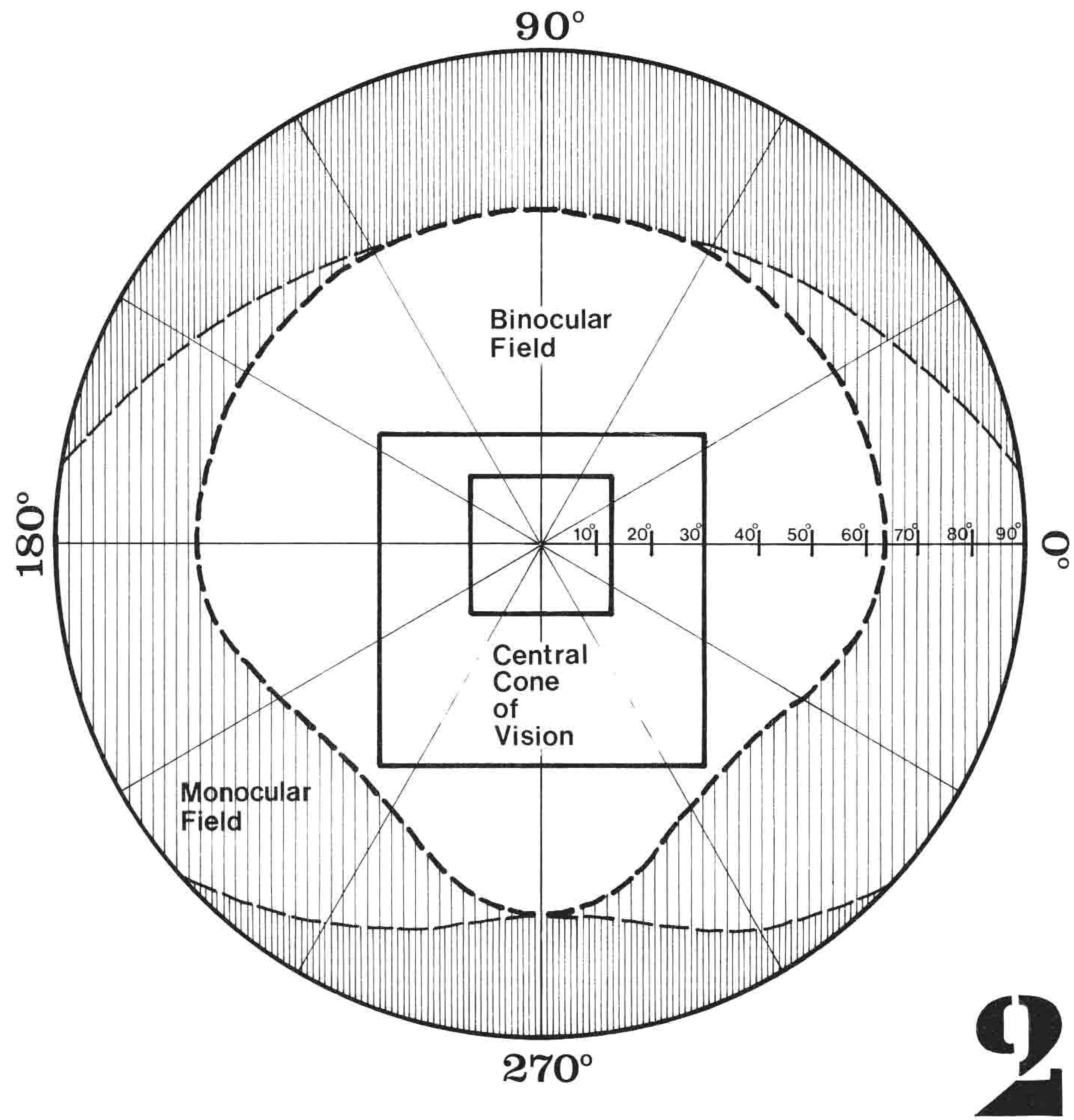
Oriental designers accentuate this kinesthetic aspect of our tactile appreciation of space by a manipulation of irregularly positioned objects, such as in paving. Walking through such a space necessitates an increased and correspondingly irregular number of muscular sensations.

The Visual Field

The world around us is seen by our eyes within a circular-shaped format called the field of vision. The range of this visual field is extensive. For example, if you hold your arm fully outstretched to one side and at right angles to your line of sight, it is possible to detect your hand at the outer reaches of your vision--especially if you wriggle your fingers. Located at the very center of the visual field is the very clearest viewing zone. This occurs immediately around the point at which our two eyes converge to focus on a point or object in space. Situated around, and especially to each side of, this clearly focused area is the progressively unfocused ring of peripheral vision. This monocular zone is perceived by each eye independently, and as we approach its outer limits, the detection of movement, such as that of your moving fingers, becomes more effective than the perception of an object, such as the shape of your hand.

The limits of the inner, binocular (or two-eyed) visual field is horizontally more than 180 degrees and vertically more than 130 degrees. However, within this area lies the sharpest and most accurate zone of the entire visual field. This is the central cone of vision, which ranges from 30 degrees to 60 degrees both horizontally and vertically. Within this central cone of vision the range for accurate shape and symbol discrimination is 30 degrees, and depending upon the quality of the viewing condition, colors can be discriminated accurately in a field extending out to 60 degrees.

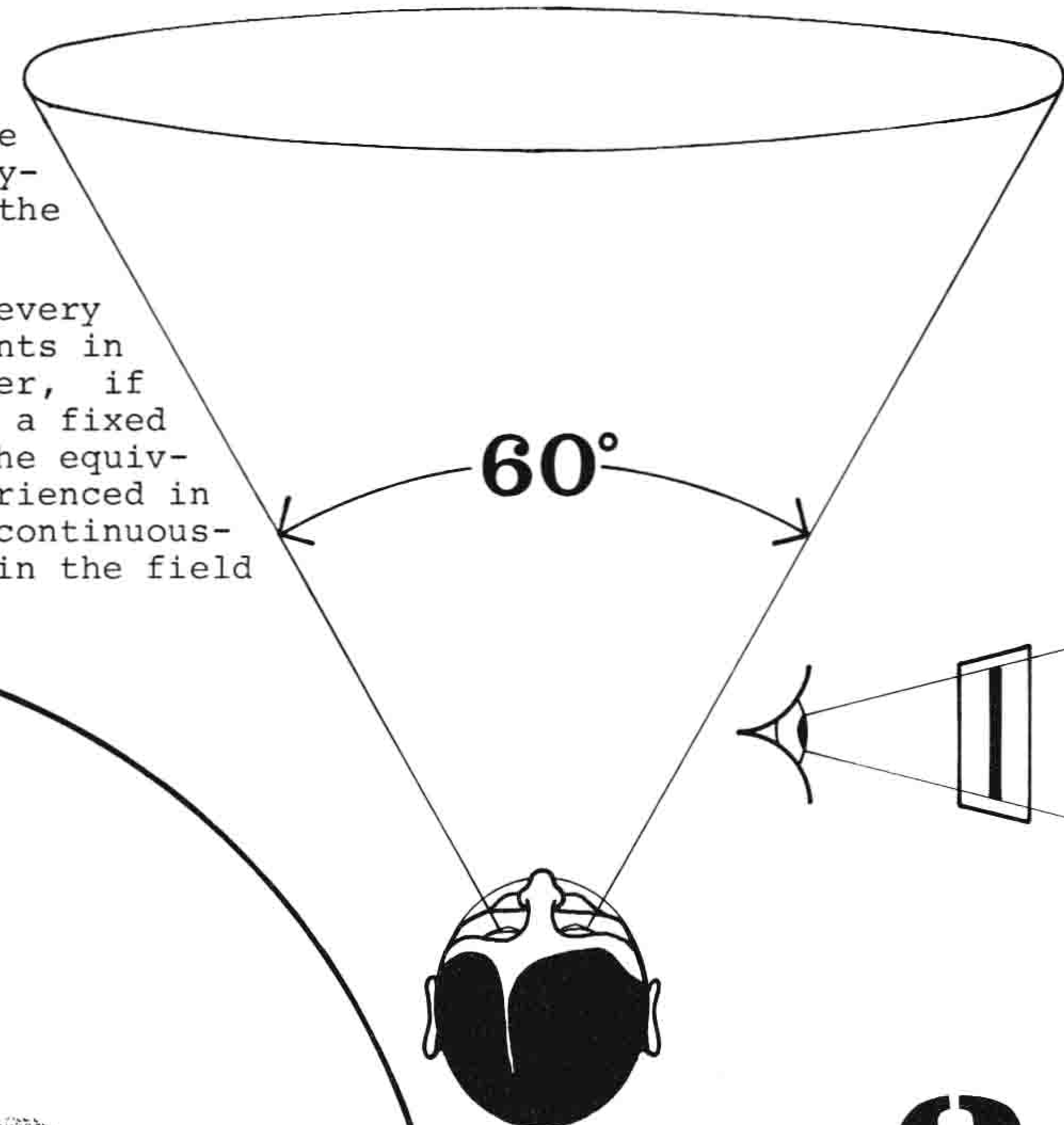
N.B.: The shaded regions at the top and bottom of this diagram represent the almost unnoticed intrusion of the eyebrows and the nose on the hazier outer limits of our peripheral vision.



The Cone of Vision and Sight Size

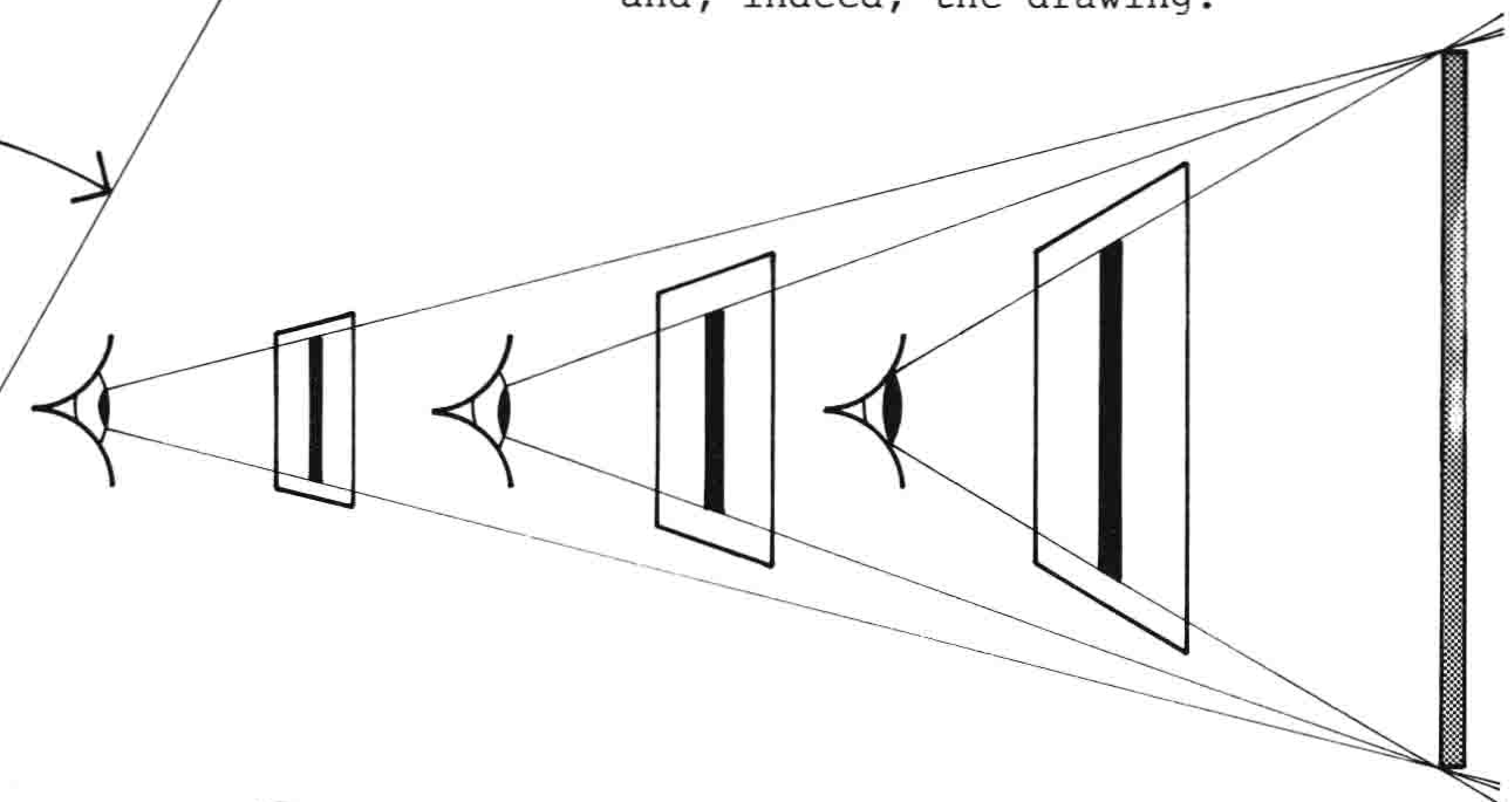
If we project the most accurate and distortion-free segment at the center of the field of vision, we form the cone of vision, i.e., a beam of sight that has its apex in the eye and whose conical projection registers everything clearly within a 60-degree angle on the horizontal and vertical planes.

The cone of vision shifts and adjusts with every movement of the eyes as they fixate on points in the distance and points close at hand. However, if we draw events that lie outside the range of a fixed cone of vision, we encounter distortion. The equivalent of this graphic distortion is not experienced in the dynamics of normal vision because we are continuously refocusing to accommodate new information in the field of view.



3

As the size of objects is conditioned by the proximity of the viewer, so, too, is the size of the drawing. For instance, the nearer the viewing position, the larger the object will appear and, consequently, the larger the resultant drawing. Conversely, the more distant the view, the smaller the resultant perception and, indeed, the drawing.



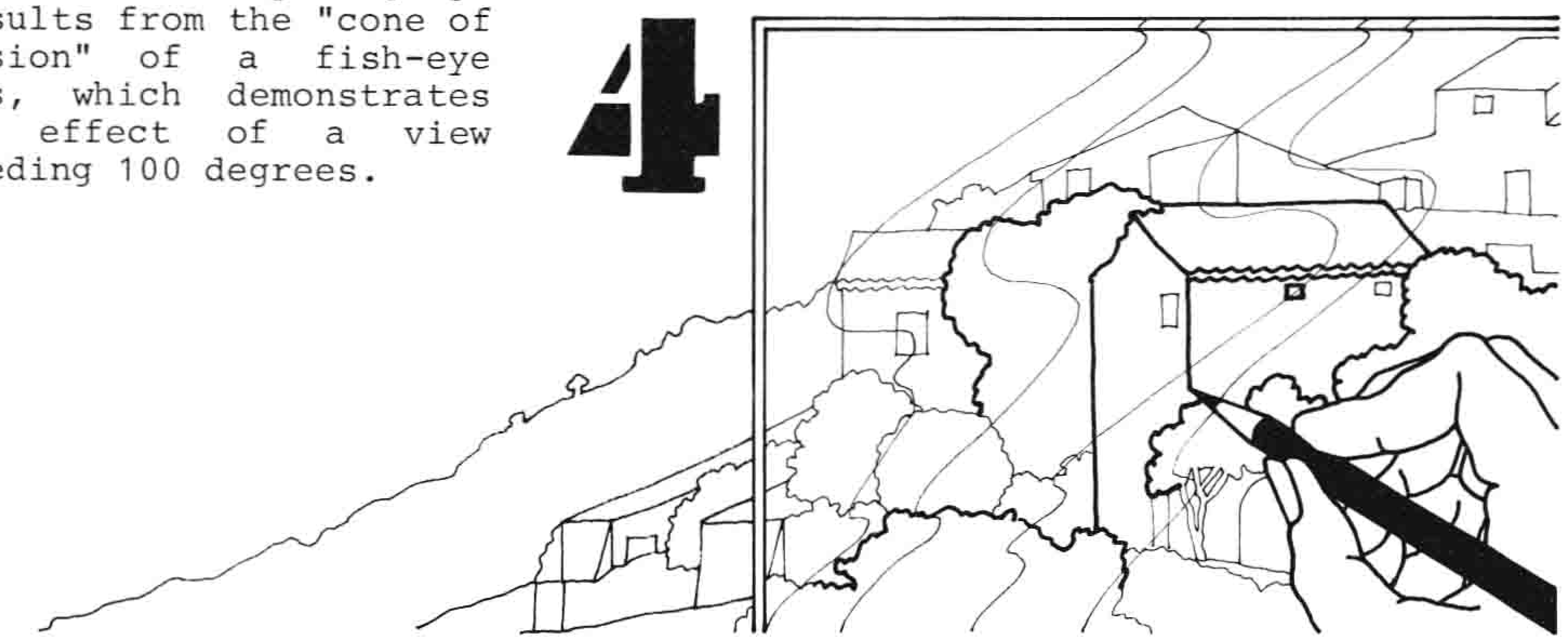
1

2

In photography, the telephoto lens comes closest to human vision. However, the distortion seen in this photograph results from the "cone of vision" of a fish-eye lens, which demonstrates the effect of a view exceeding 100 degrees.

In order to avoid problems of on-the-spot rescaling, it is important to begin drawing at the size at which the subject is seen, i.e., at sight size. Sight size is easily understood if we imagine the size the subject matter would assume if seen on paper as though through a sheet of glass. Drawing at sight size allows for measurements to be taken directly within the scope of the field of vision.

4



Binocular and Monocular Vision

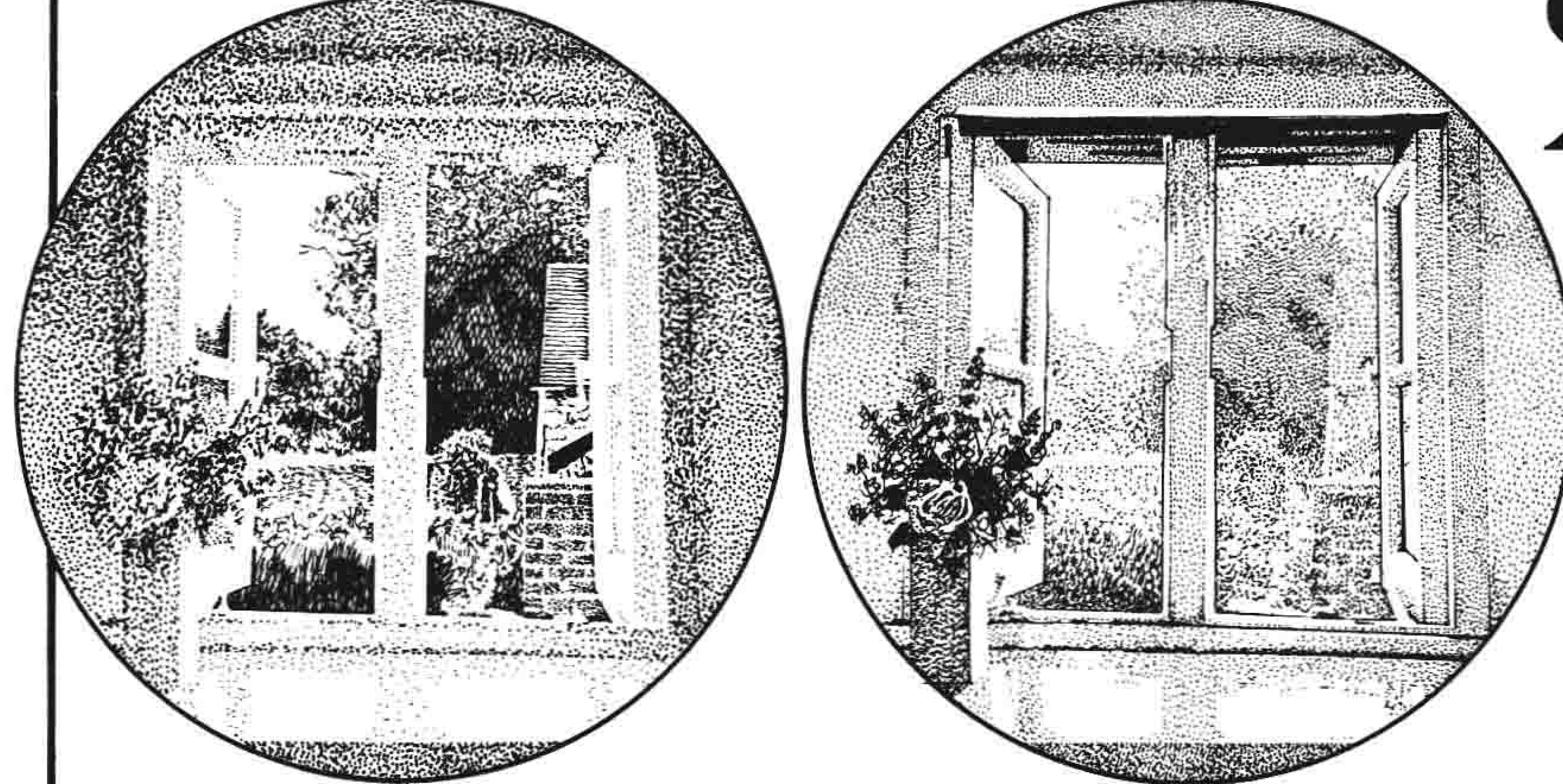
The primary visual signals or cues that aid our perception of objects in space are binocular vision and motion parallax. Binocular vision, i.e., two-eyed vision, can be divided into three component but related parts: disparity, accommodation, and convergence.

Disparity describes the fact that each eye receives a slightly different image from a stimulus. For example, we experience disparity if we line up a distant object with a vertical line, such as a window glazing bar, that is just a few feet away. Then, as we close and open each eye in turn, the vertical line will appear either to the left or to the right of the distant object.

LEFT RIGHT

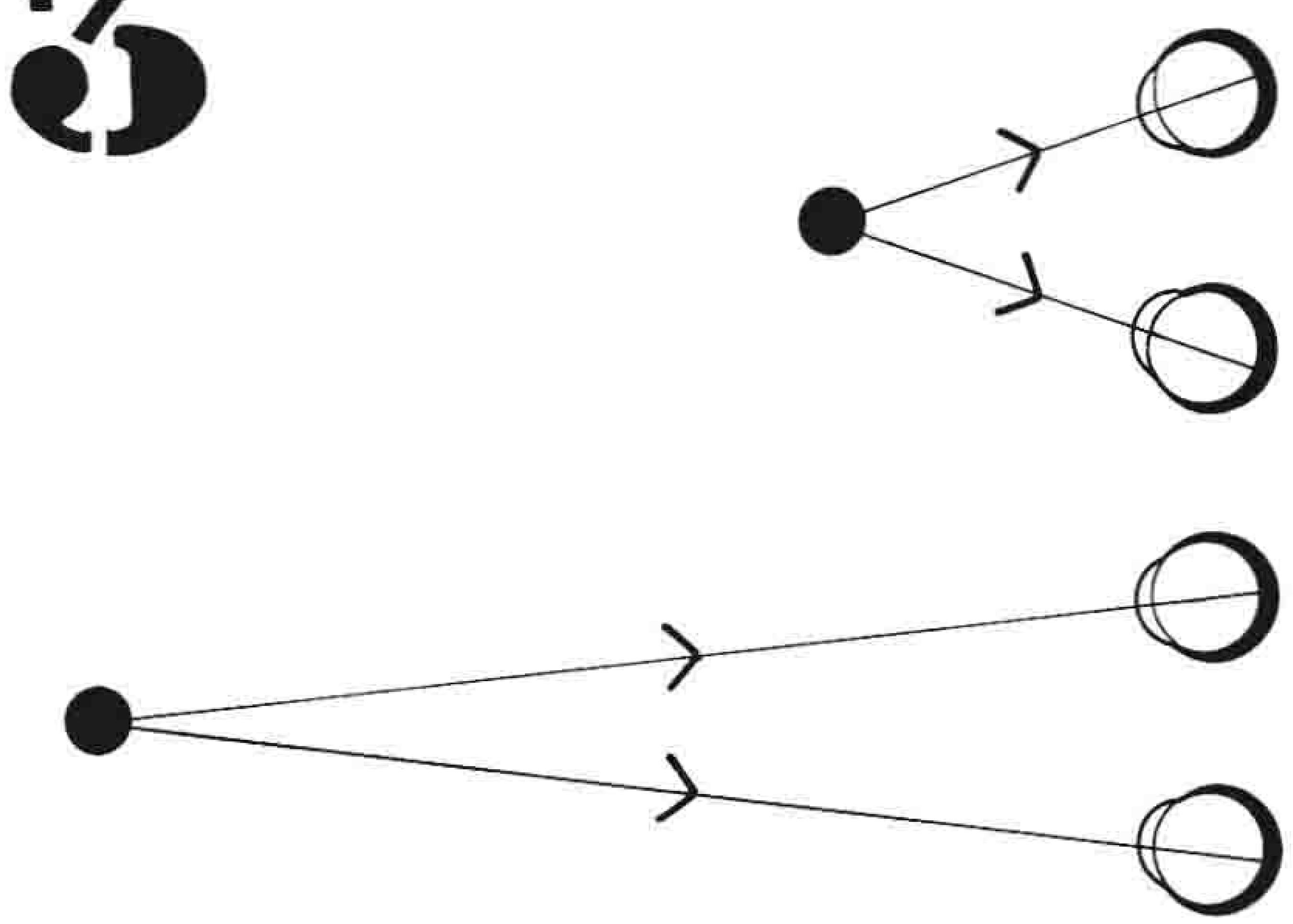
1

2



Accommodation is the ability to focus our eyes on only one point at a time. For instance, when we concentrate on the distant object, our impression of the glazing bar dissolves. Conversely, when we focus on the glazing bar, the distant object loses focus.

3



Convergence is the angle subtended by the two eyes on the object in focus--a nearer object subtending a larger angle, a more distant object a smaller angle.

4

Our eyes give overlapping fields of view and stereoscopic depth vision; motion of the head and eyes gives motion parallax, in which farther objects move less, such as the relative movements of nearer trees and distant hills when seen from a speeding train.

5

Apart from holograms, stereoscopic images, and moving pictures, all forms of graphic display are monocular. However, we always look at images with both eyes and often walk about in front of them. This experience of motion parallax works against the illusion of depth, as we are immediately aware of their flatness.

How the Eye Scans Images

1

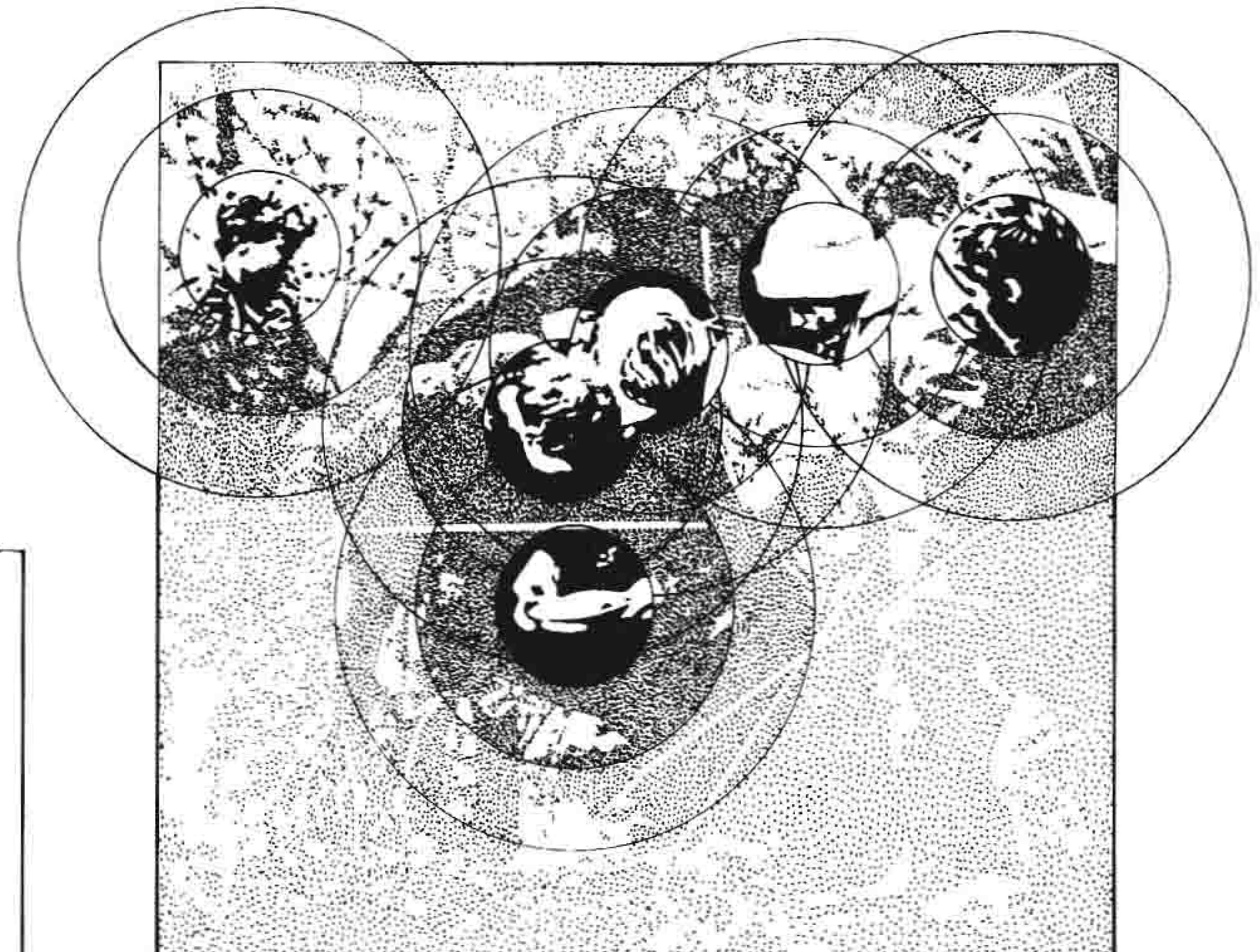
When we look at a scene, the eye cannot focus on more than one very small point at any one time. This tiny point of acuity exists at the center of the much wider field of vision. Visual data received outside the focused center of vision become progressively less determinate as they range out to the blurred outer reaches of our peripheral vision.

4

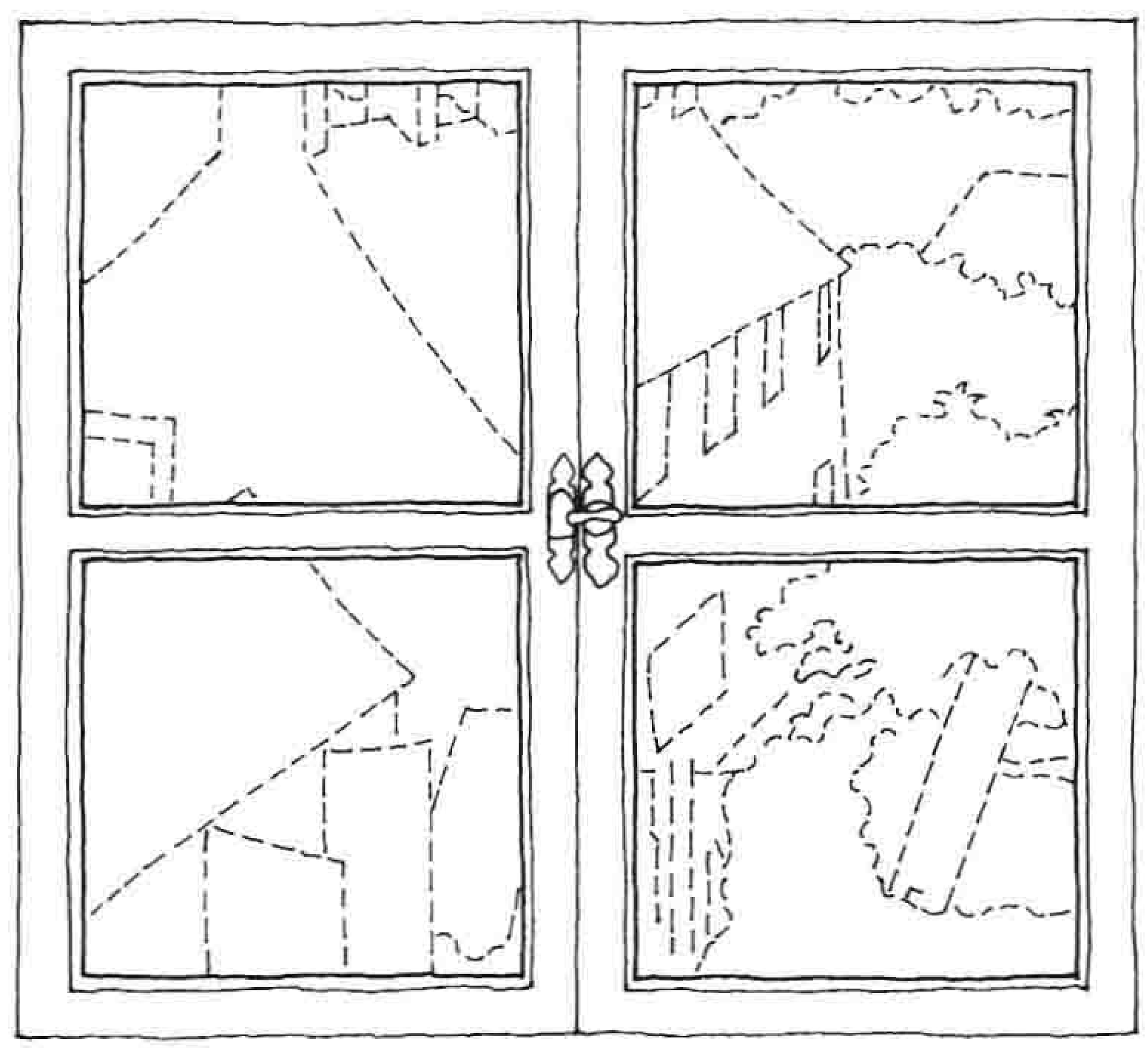
Studies confirm that people in the Western world tend to scan bland arrays of pictorial information in much the same way as they read text, working downward and scanning from left to right. In this initial scanning review, images take precedence over written material, and large images tend to attract the eye before smaller images.

2

Therefore, a scene is never viewed "at a glance"; rather, it is reconstructed via a scanning sequence in which the eye flits continuously from point to point to complete an almost instantaneous visual reconnaissance of the situation.



Similarly, when we scan familiar objects, places, and scenes, such as the view through a window, we take in little detailed information. As contrast and change induce perceptual arousal, familiarity with the stimulus breeds a jaded and casual appraisal.



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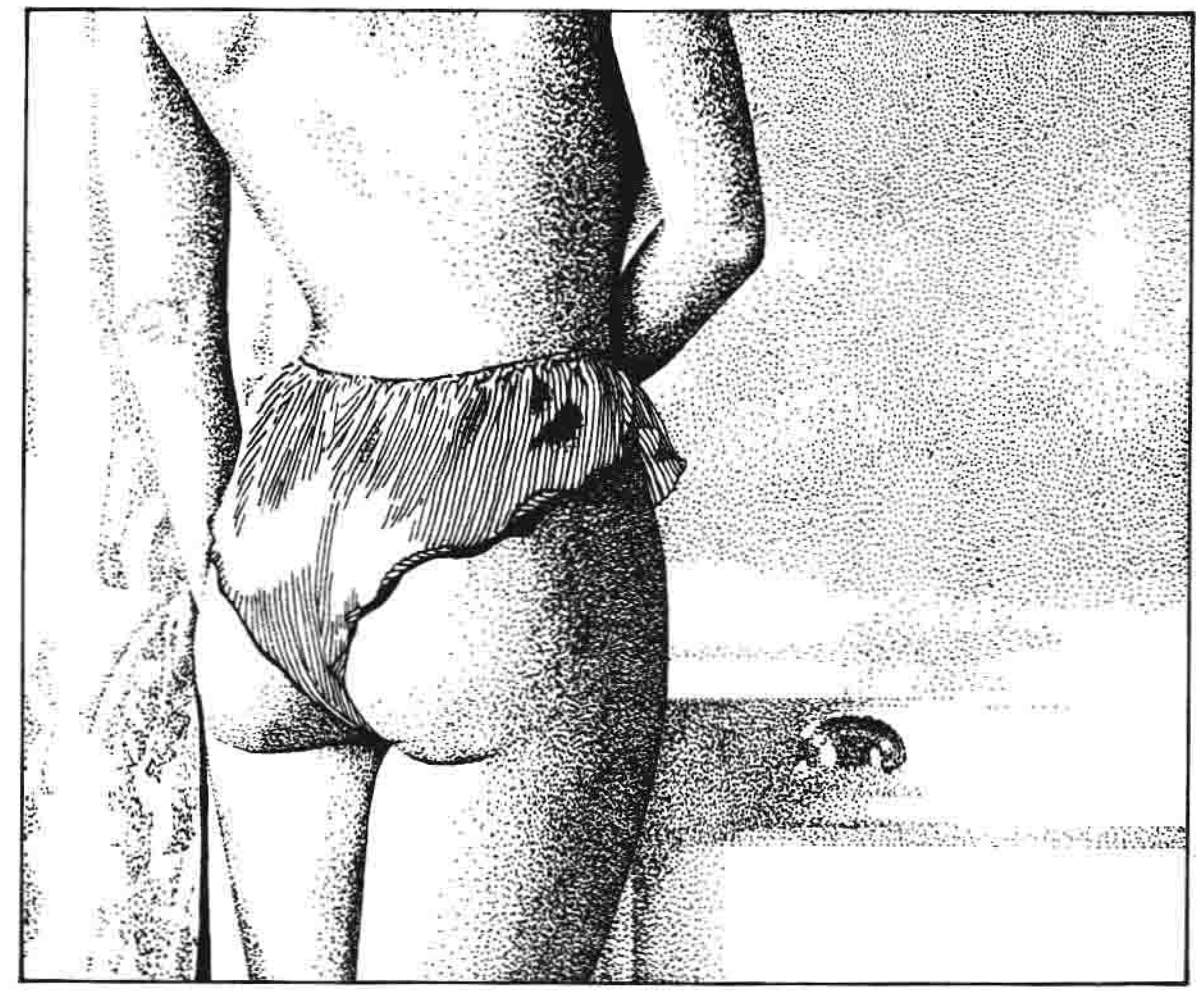

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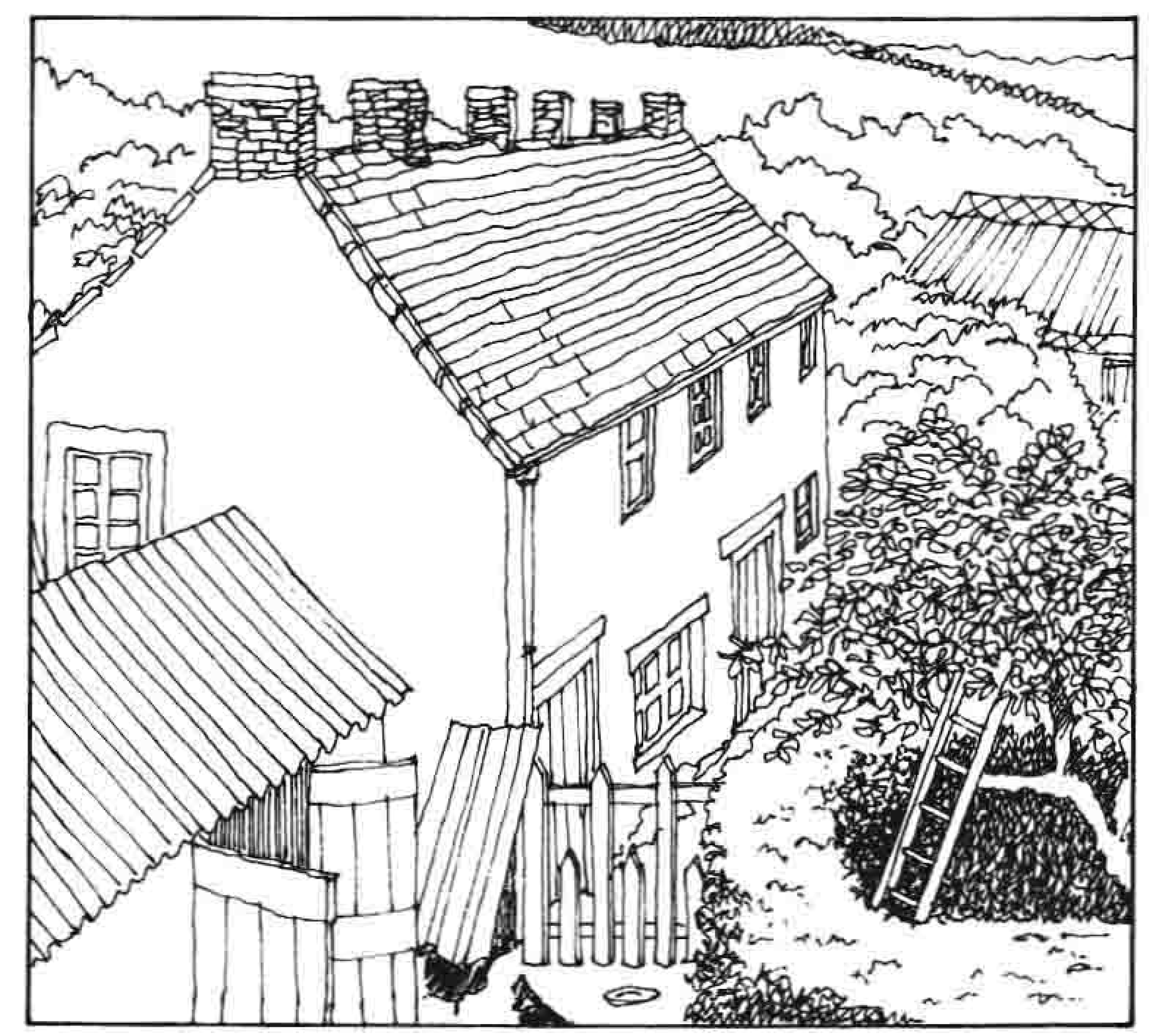
Visual scanning is an issue-oriented operation, i.e., people with quite different motives and interests will view the same scene in quite different ways.

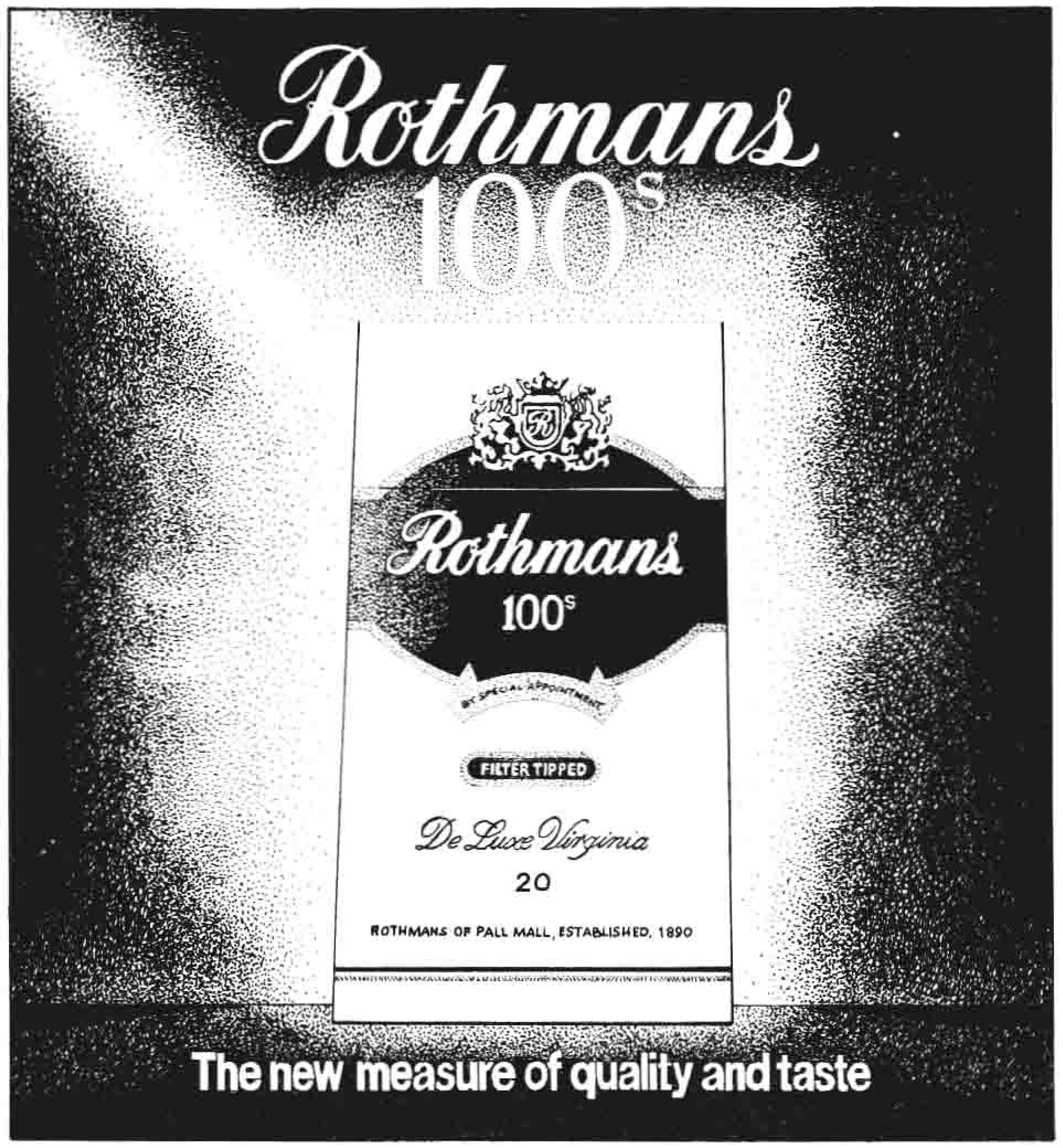
6



Conversely, observation drawing--and, indeed, foreign travel--heighten our level of sensory perception. For instance, if we were to make a detailed drawing of the same familiar window view, this demanding experience would induce a sharpened seeing process--a superimposed succession of slow-motion and searching scans of the view's details.

Single-Glance and Switched-Foci Graphics

1



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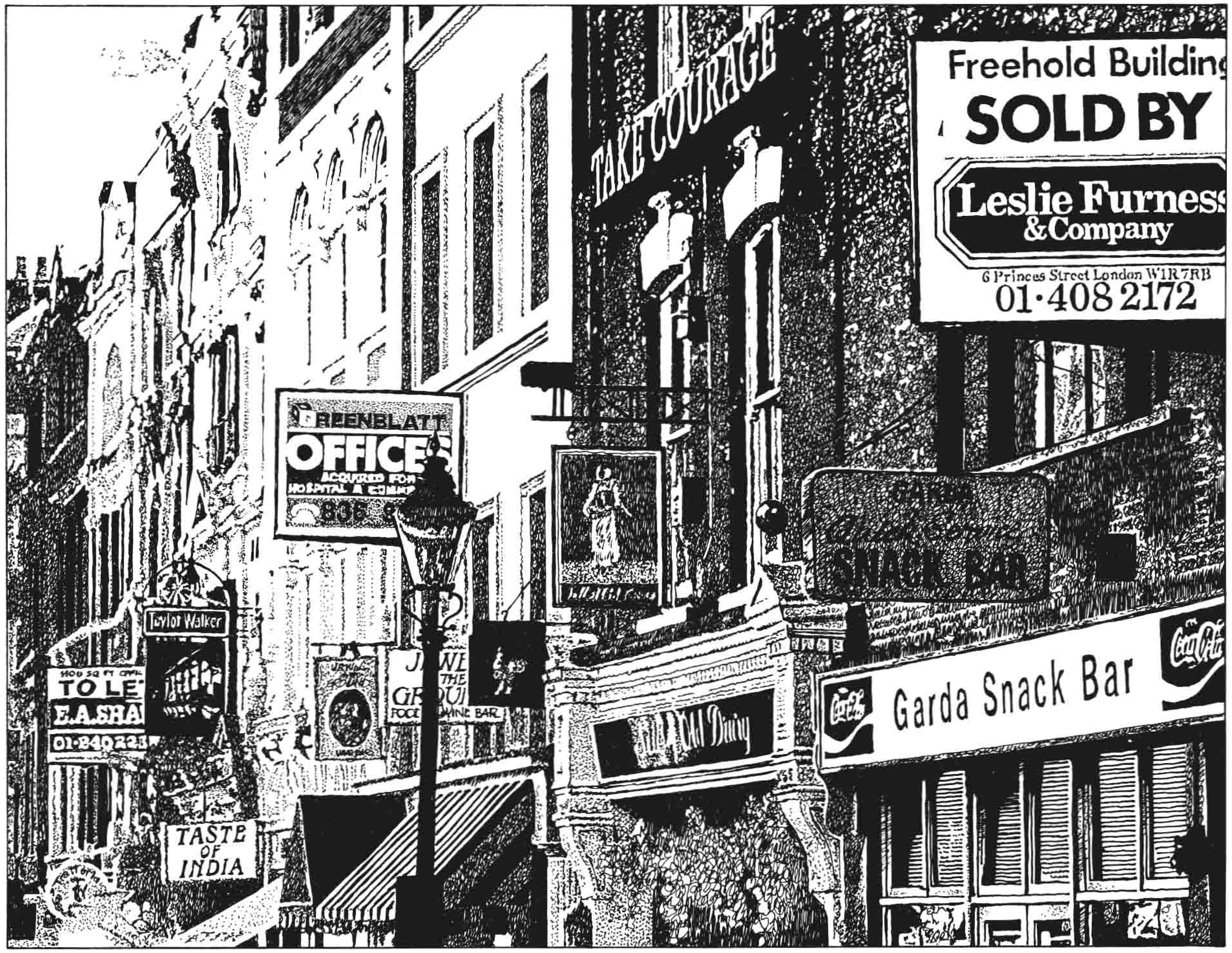


Pictorial displays seem to respond to the nature of our field of vision in two basic ways. One is the single-glance graphic, which usually contains a single point of focus. It presents information apparently seen--and intended for rapid visual consumption--in a single fleeting moment. Such graphics range from quick sketches to ads (often absorbed from the "corner" of the eye) to French Impressionist paintings, the last portraying a diffuse impression of the behavior of light on objects with one central point of focus.

Single-glance graphics simulate a fixed, momentary view of our field of vision in which the area of sharp focus--representing a stationary point of convergence of our two eyes--is surrounded by a blurred outer edge that reflects the gradual diffusion of information into the region of peripheral vision.

By contrast, in switched-foci graphics, the total area of the pictorial display is evenly in sharp focus. Rich arrays of detail invite a close encounter with all regions of the format and, in stimulating eye movement, provide the wandering eye with high degrees of information. Perhaps the best example of this type is Pre-Raphaelite art, which filled large canvasses with meticulously painted detail, such as landscapes in which every blade of grass is "seen." Although structured within a fixed cone of vision, such drawings and paintings respond to the voraciousness of our eye and induce it to make a searching journey around their formats.

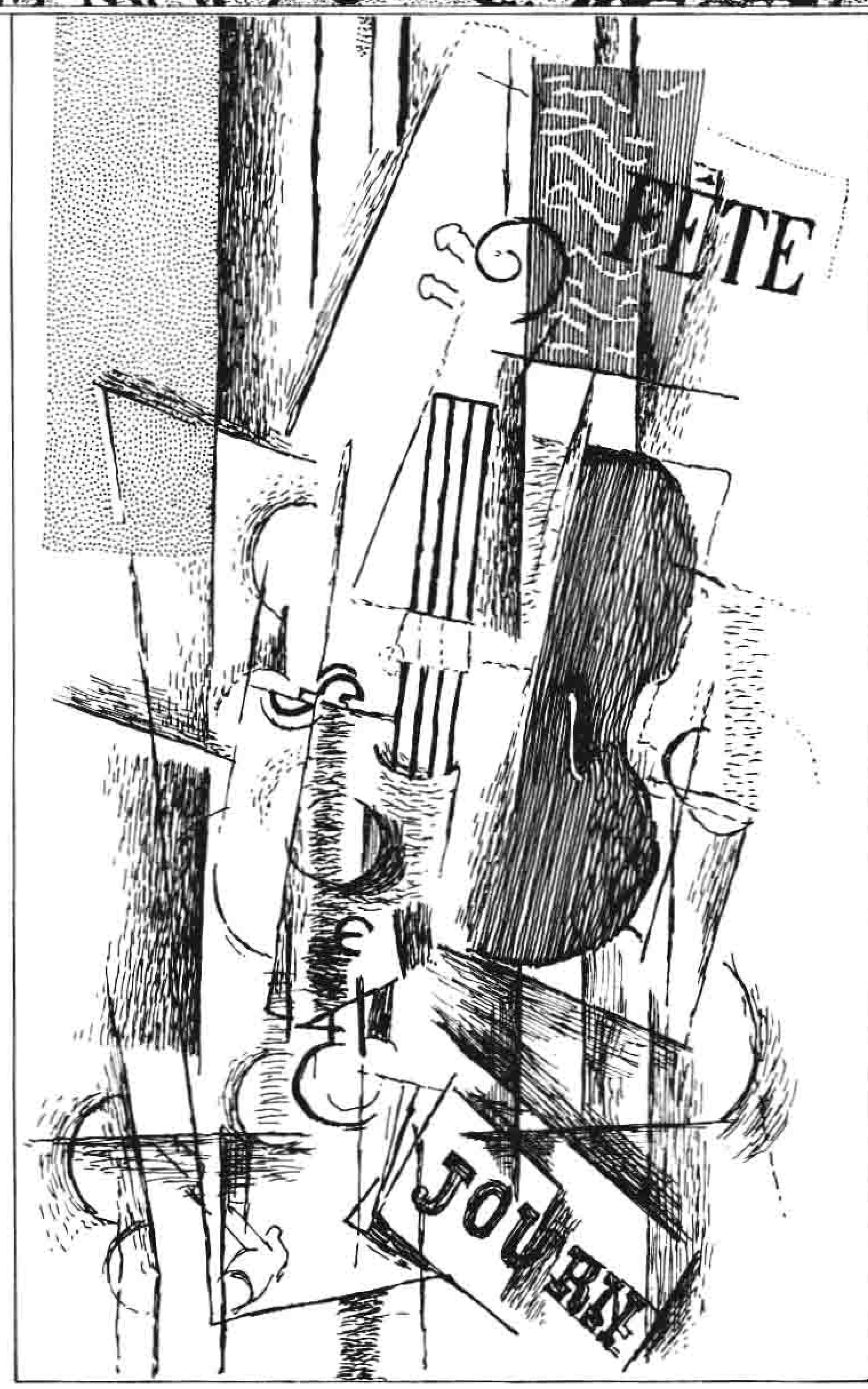
Multiglance and Motion Simulation

Both examples of pictorial images on the facing page respond to a fixed cone of vision and its corresponding field of view. However, there is another, rarer form of graphic that, in using a dynamic cone of vision, takes in the wider information of a multiple viewpoint. The resulting fusion of vision causes distortion. An example of multiple-viewpoint imagery can be found in the work of artist John Bratby, whose changing field of vision often encompasses not only the subject matter at his center of vision but also views of parts of his own body in relation to it.

This drawing is taken from John Bratby's painting "Window, Self-Portrait, Jean, and Hands."

1

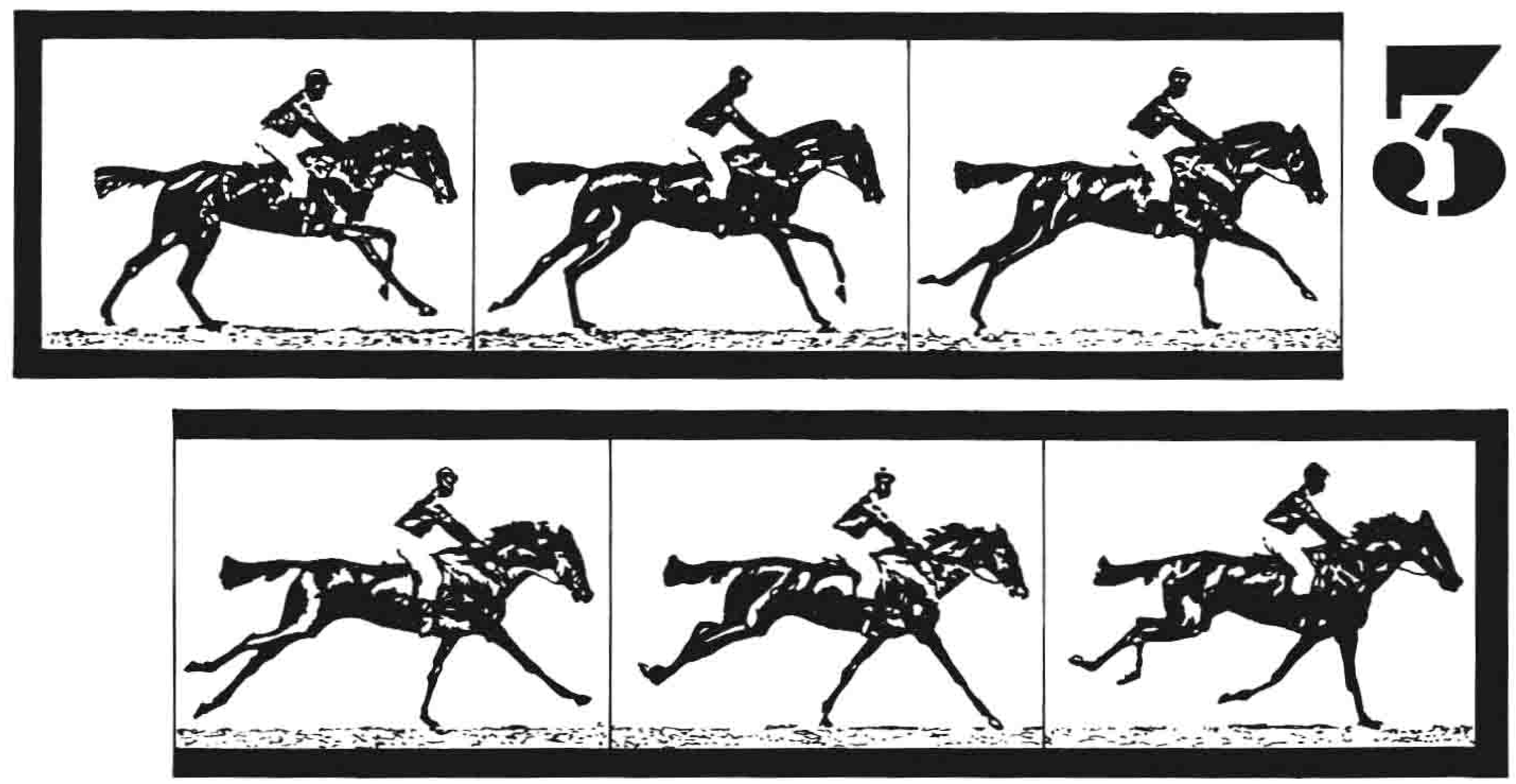
2



Yet another form of distortion results from attempts to simultaneously record a variety of angles of view of the same object. Pioneered by the Cubist painters, such graphics stem from the movement of the viewer about the three dimensions of an object in order to communicate its total understanding. This approach necessitates the fragmentation of glimpses for their graphic reassembly into a single image.

The illustration is based on a painting by Georges Braque, "Musical Forms 1913."

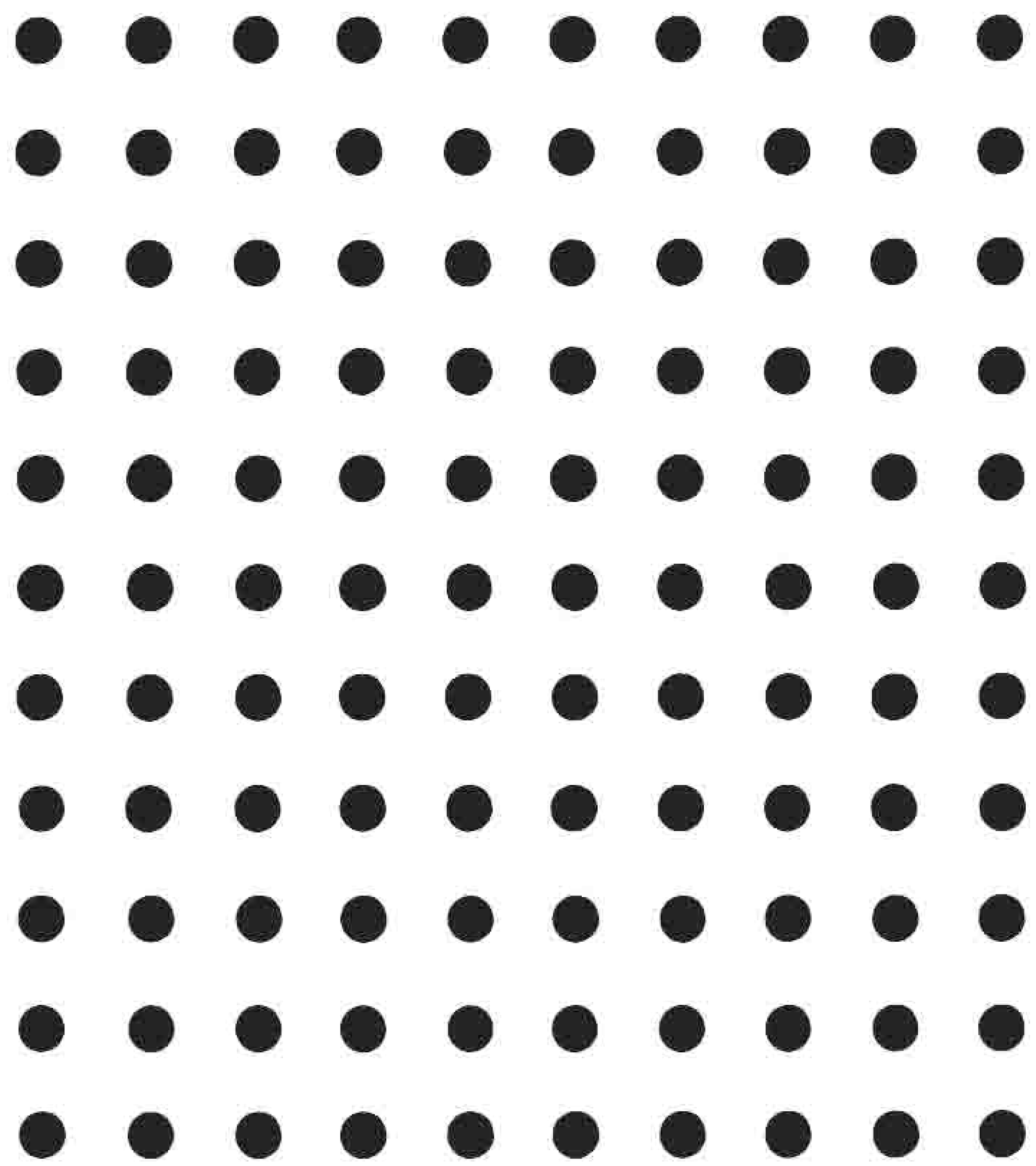
3



However, beyond graphics that are created from fixed or moving cones of vision, there are those that--despite being denied motion parallax --attempt to simulate the motion of objects across the field of view. These range from reducing the moving object to a blur, or indicating "echo" lines behind its trajectory, to dismembering the object into serialized views of its movement through space. However, movement can also be simulated in gesture drawing (see page 53).

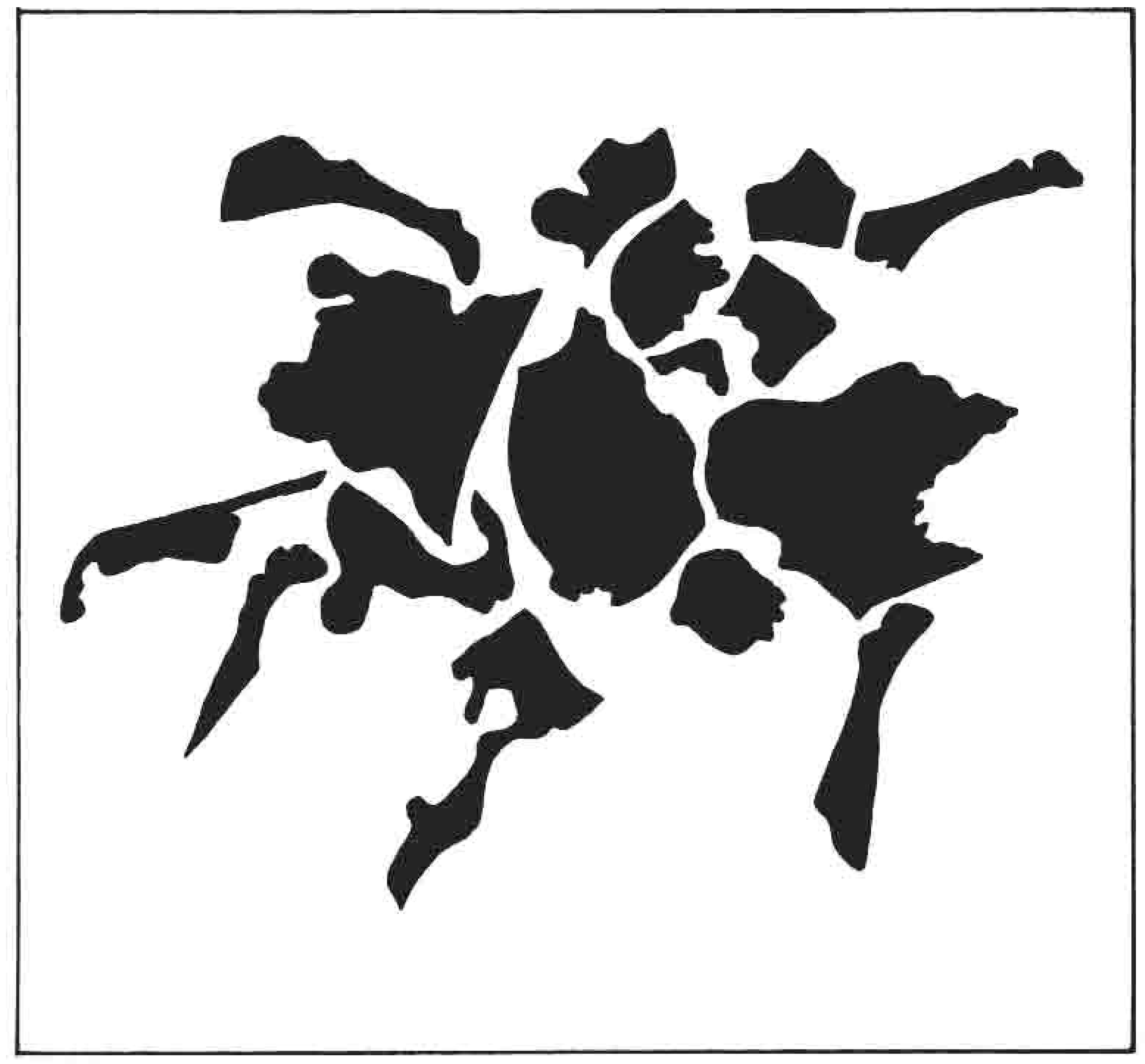
Gestalt: Similarity and Proximity Grouping

1



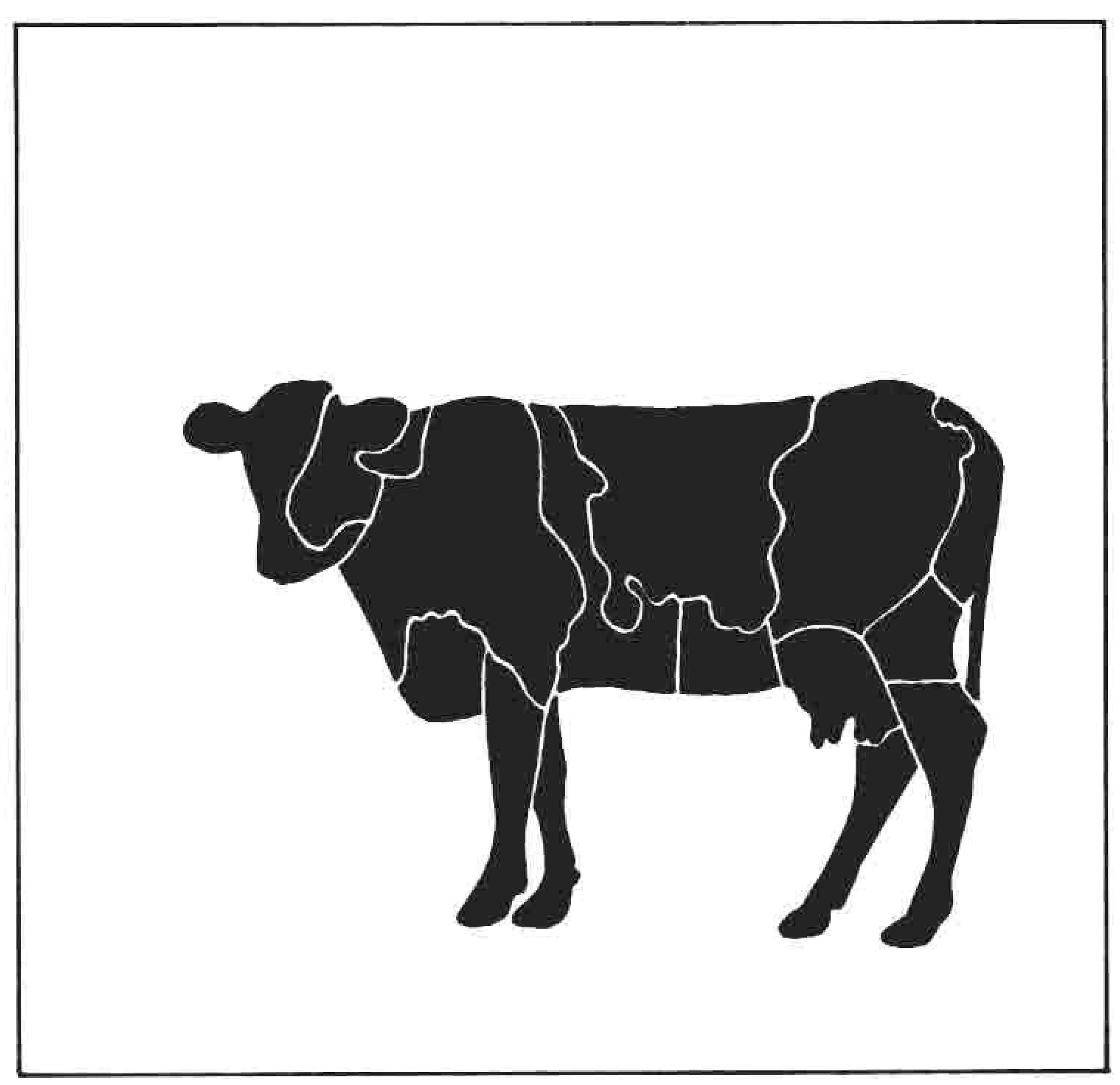
At this point it is worth touching on the work of the Gestalt psychologists, who studied the act of seeing as a dynamic and creative process involving both the viewer and the viewed. Their theories have stressed that--in seeking harmony and unity in visual information--our perceptual system first sees a "gestalt" (image) as a unified whole before identifying its constituent parts; furthermore, that our tendency to initially group things into simple units is governed by unit relationships, such as proximity (the relative nearness of elements to one another) and similarity (the relative sameness of elements). For example, the regularity of the dot configuration in this classic perception demonstration causes the eye to search continuously for a stabilized and unified resolution. In so doing, the eye scans the ordered arrangement of identical elements, constructing and reconstructing a changing but unresolved sequence of rows and squares.

The Gestalt theory also proposes that the eye has a facility to absorb only a limited number of unrelated elements. For instance, when confronted by too many dissonant elements, the eye, in failing to construct a unified image, tends to reject its impression as disorganized and chaotic.



2

Again, when the same units are rearranged into a new configuration, the familiar shape of a cow is recognized before we become aware of both its constituent elements and their regrouped arrangement.

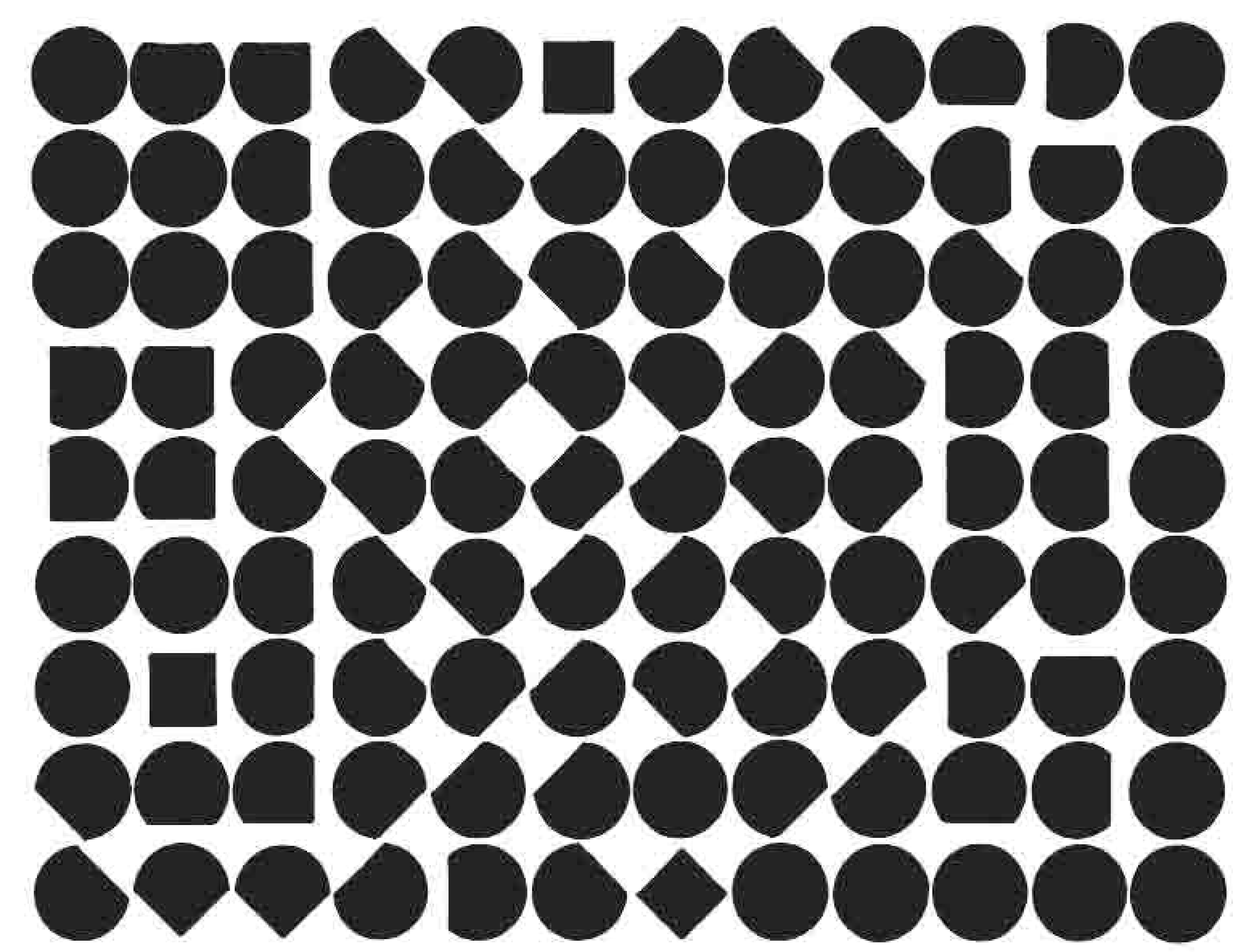


4

3

However, when these same elements are reassembled into related family groups of shape, their newfound qualities of "sameness" and "nearness" appear less disorganized.

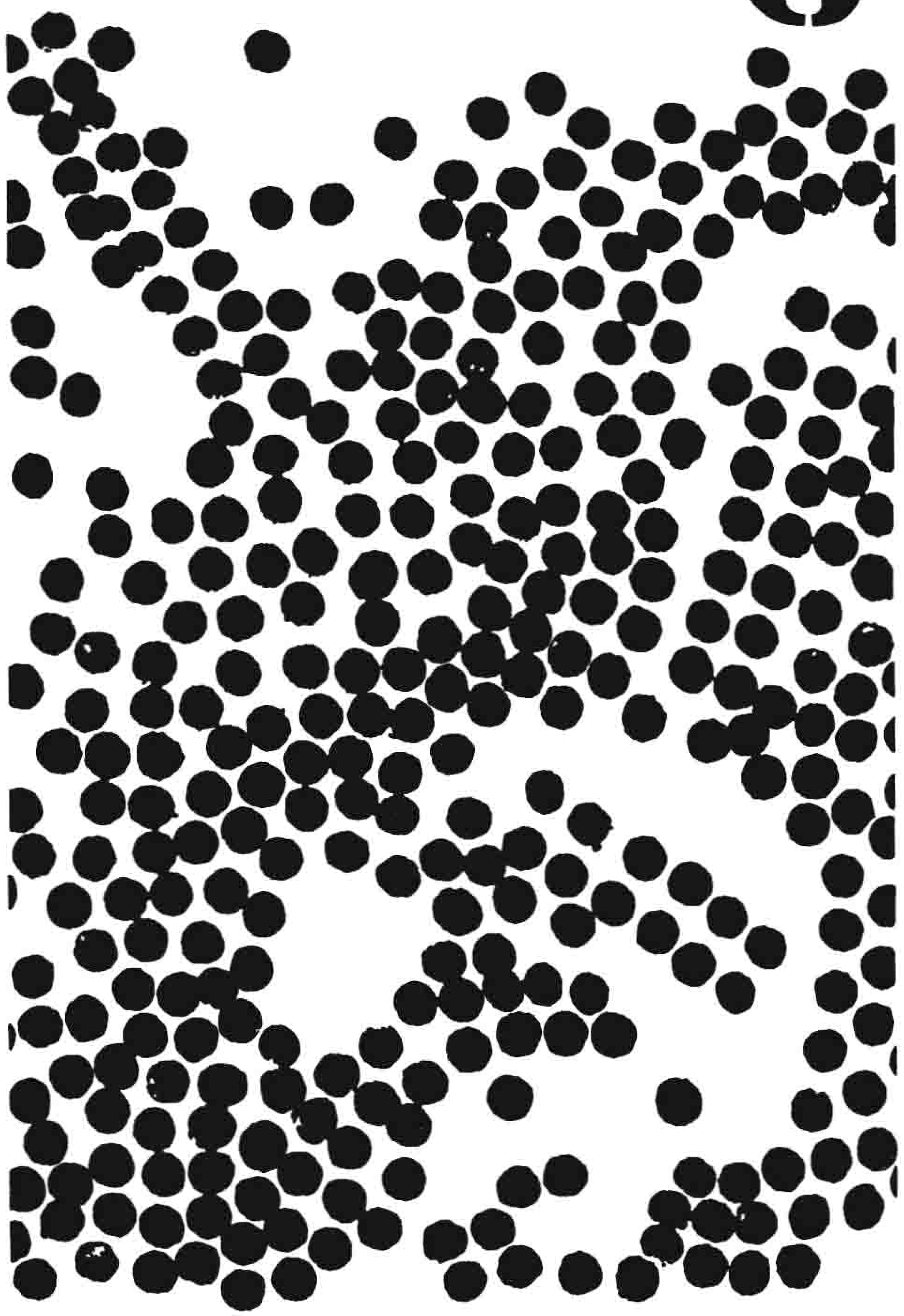
5



Being based on our past experience of images, the phenomenon of visual grouping is demonstrated by the way we continuously search for pictures--even with minimal data. We can reconstruct faces in a fire and in the marks of wood grain. Visual image-building stems from the mental grouping of elements with like characteristics, such as size and shape. For example, the sliced edges of circles in this detail from a Vasarely painting are quickly grouped to form a connected line.

Gestalt: Similarity and Proximity Grouping

6



However, when elements are of the same size and shape, the character of the grouping process will rely upon proximity between the elements--a quality conveyed by the amount and type of interval between them. This is one of the late Maurice de Sausmarez's student projects in which each dot symbolizes a person in a crowd of soldiers and rioters. Discrimination between soldier and rioter in this abstraction is quickly made by a visual assessment of their spatial relationship to each other.

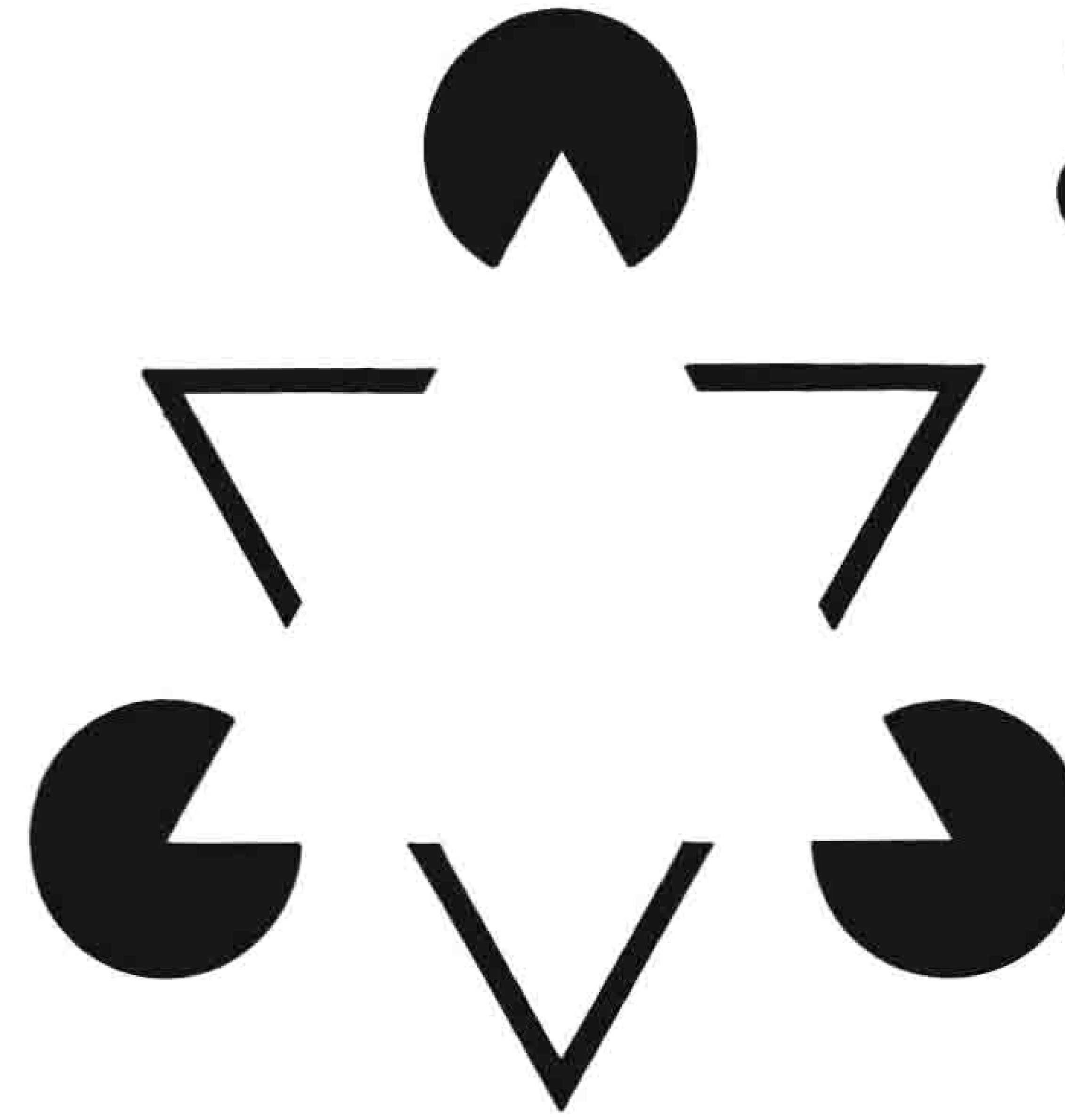
7

The visual bonding of elements due to proximity takes place at particular points in their juxtaposition. Providing the units are close enough, even dissimilar elements will be grouped.

Although the eye and brain can construct images from limited data, the resolution of the perception will remain incomplete if too many bits of information are missing from the stimulus.

9

8



Another interesting aspect of visual grouping is our perceptual facility for closing, or "painting in," incomplete information. In this image, the eye prefers to reconstruct the ghost of a white triangle rather than accept the two families of shape.

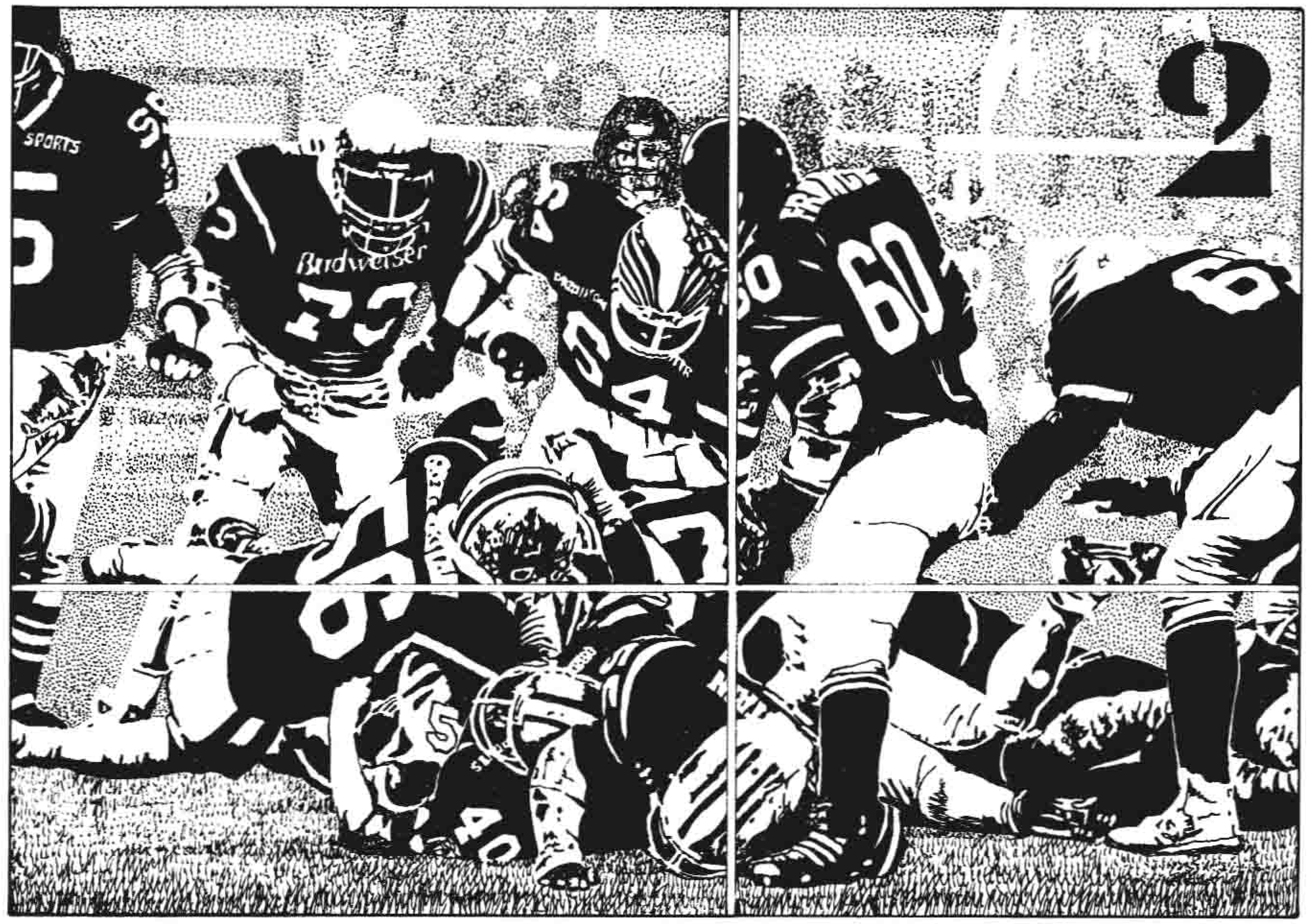
Therefore, in order to reassemble a comprehensible graphic, a resolved "gestalt" relies upon an adequate number of visible clues being present in the stimulus.

10

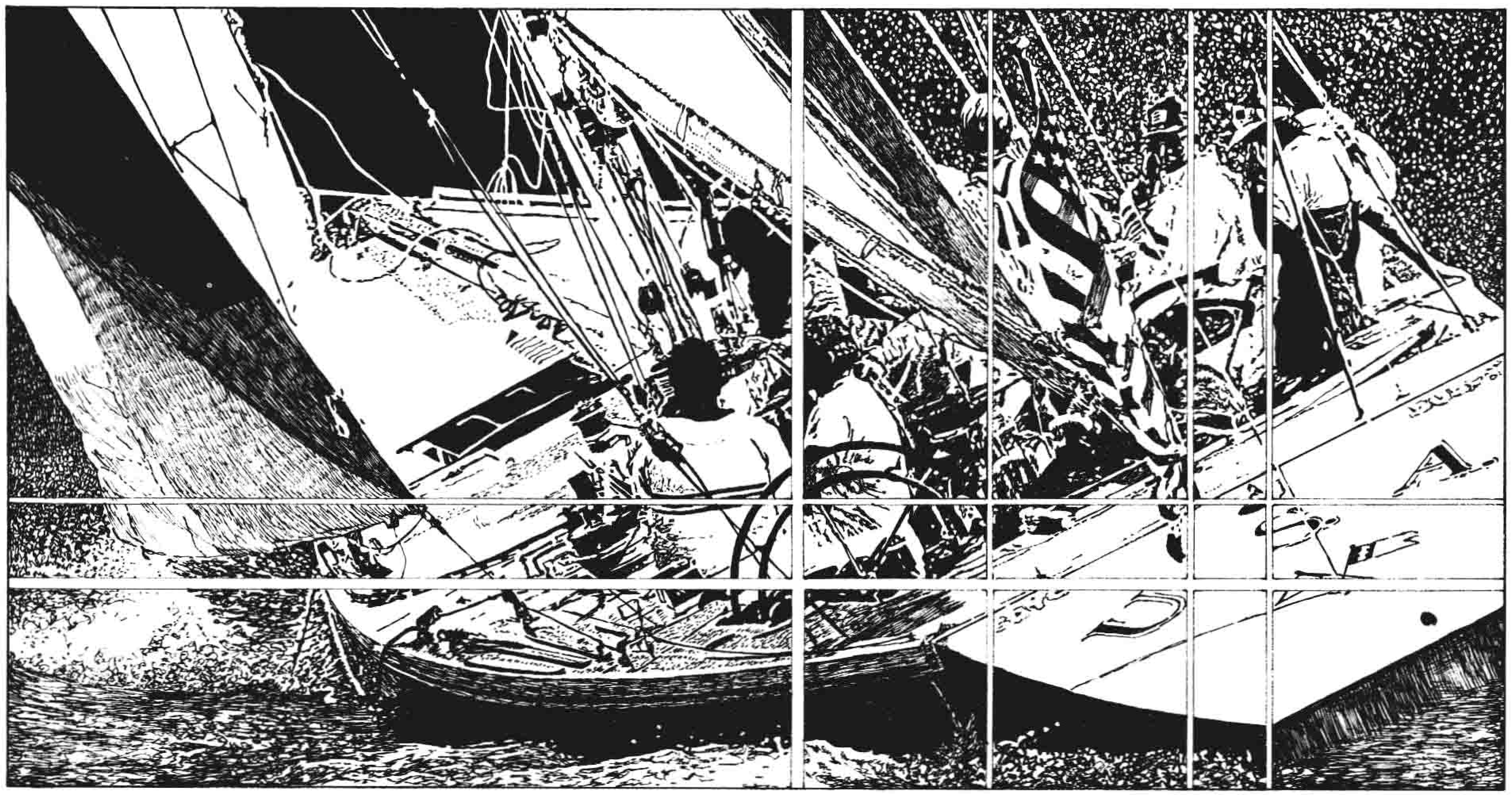
The Basic Axial Structure

Research using the Eye Movement Recorder--a sophisticated apparatus for tracking the movement of the eye over two-dimensional visual information--has established that the eye and brain make an initial scan of visual matter to determine the basic equilibrium, or balance, of an image. This is established when the location and relationship of the main horizontal and vertical forces within the image have been identified. Recognition of this underlying structure is important because it functions as the backbone of a composition. These basic axial forces are also embodied in both regular and irregular shapes contained within the image--their balancing vertical and horizontal axes being easily sensed.

1



You can practice the isolation of these basic axial force lines by studying different magazine photographs selected at random. First, draw a horizontal line through each photograph to summarize where you think the main lateral thrust occurs. Follow this by drawing vertical lines to represent each major perpendicular axis. The point at which the axes intersect usually defines the key area of a composition, i.e., the visual fulcrum, or center of balance, that is unique to each image. It is important to be aware that the axes may not coincide with lines or edges in the photographs. Rather, each is a linear summary of the key massing and its placement within the format.



3

Some images may contain a whole series of horizontal and vertical axes that reflect a hierarchical structure of grids that underline a more complex or intense distribution of information.