Christian Leborg
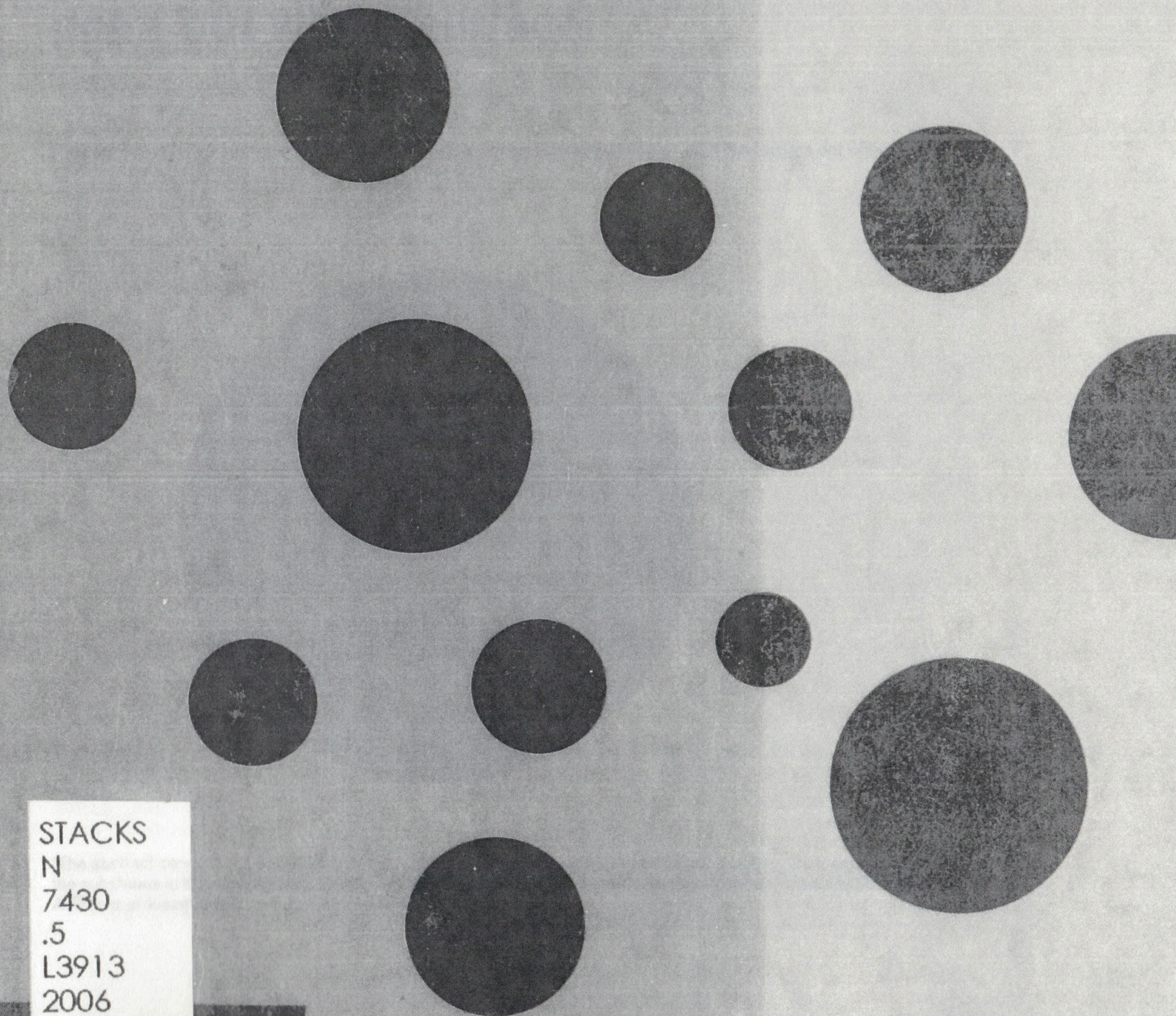## Visual Grammar
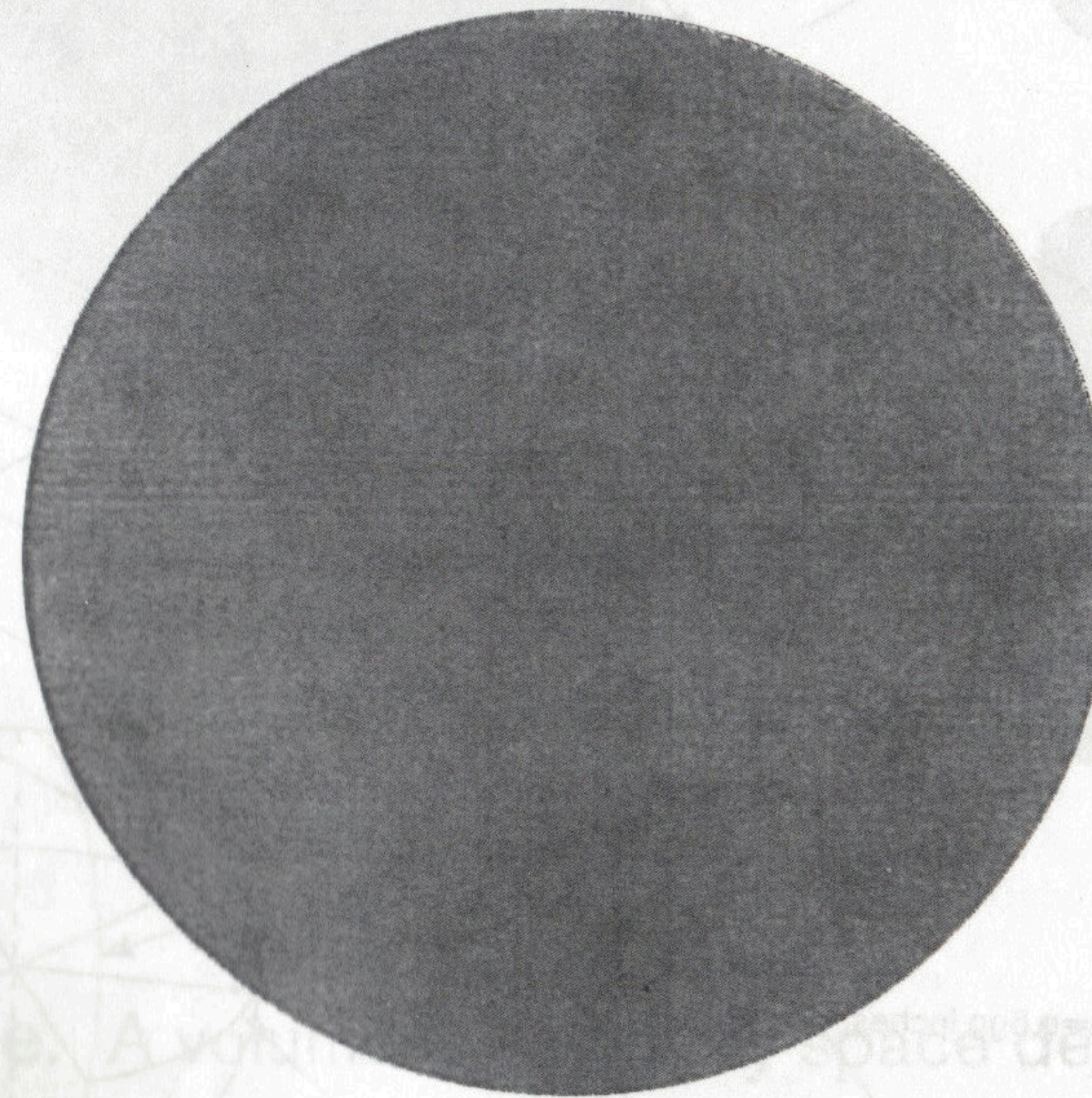
A DESIGN PRIMER

Abstract Objects. Abstract objects are ideal shapes that cannot be physically created. When you try to draw a point, for example, you do not end up with a point but with a surface.

The above illustration may look like a point, but it is only the representation of a point. It is actually a dot with a surface. Its size is 0.1% of that of the illustration below.

"The abstract conveys the essential meaning, cutting through the conscious to the unconscious, from experience of the substance in the sensory field directly to the nervous system, from the event to perception." Donis A. Dondis, *A Primer of Visual Literacy.* (Cambridge: MIT Press, 1973), 81.

Point. You cannot see or feel a point; it is a place without area. The point has a position that can be defined by coordinates (numbers on one, two, or three axes).
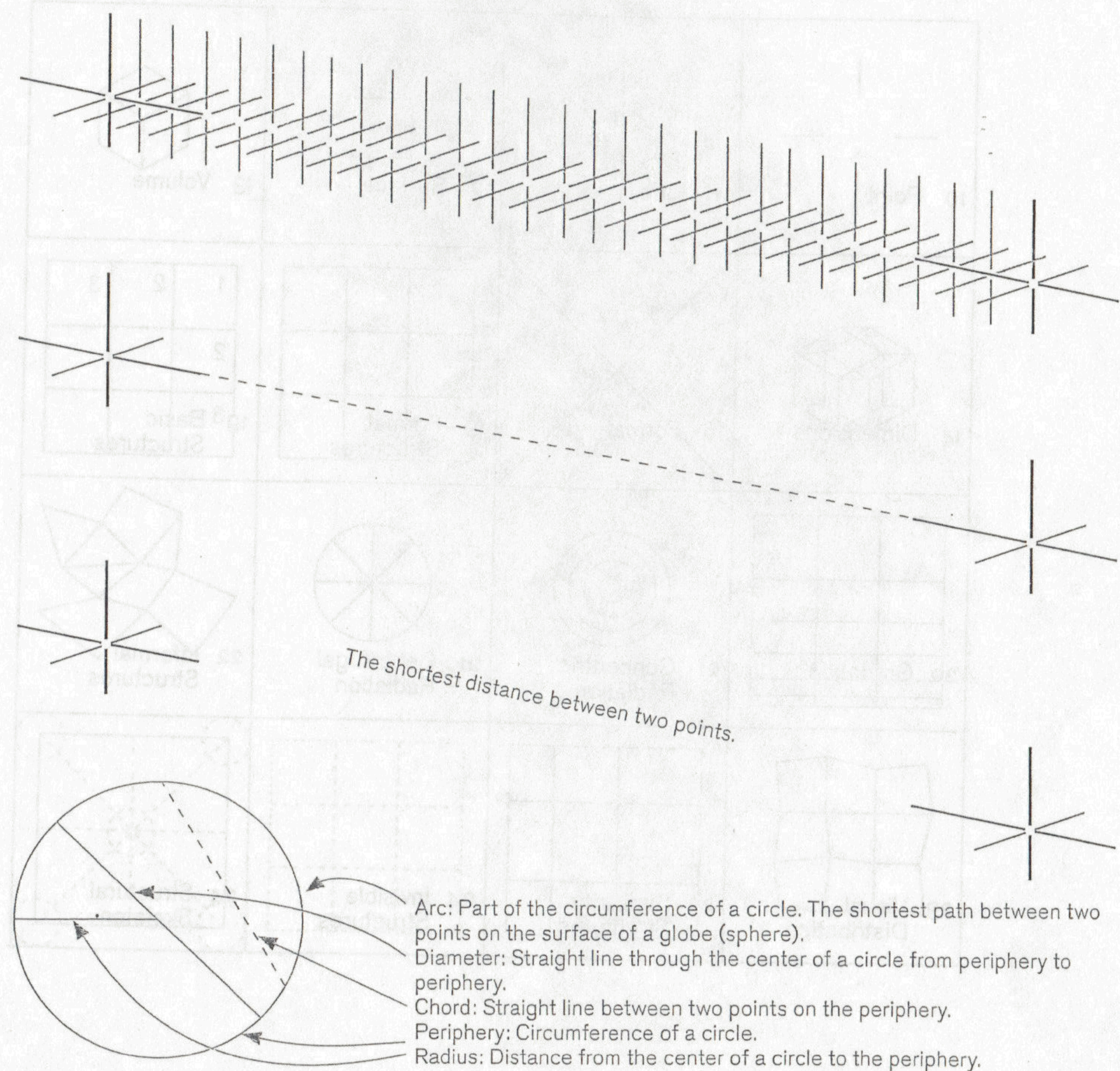
z

y

x
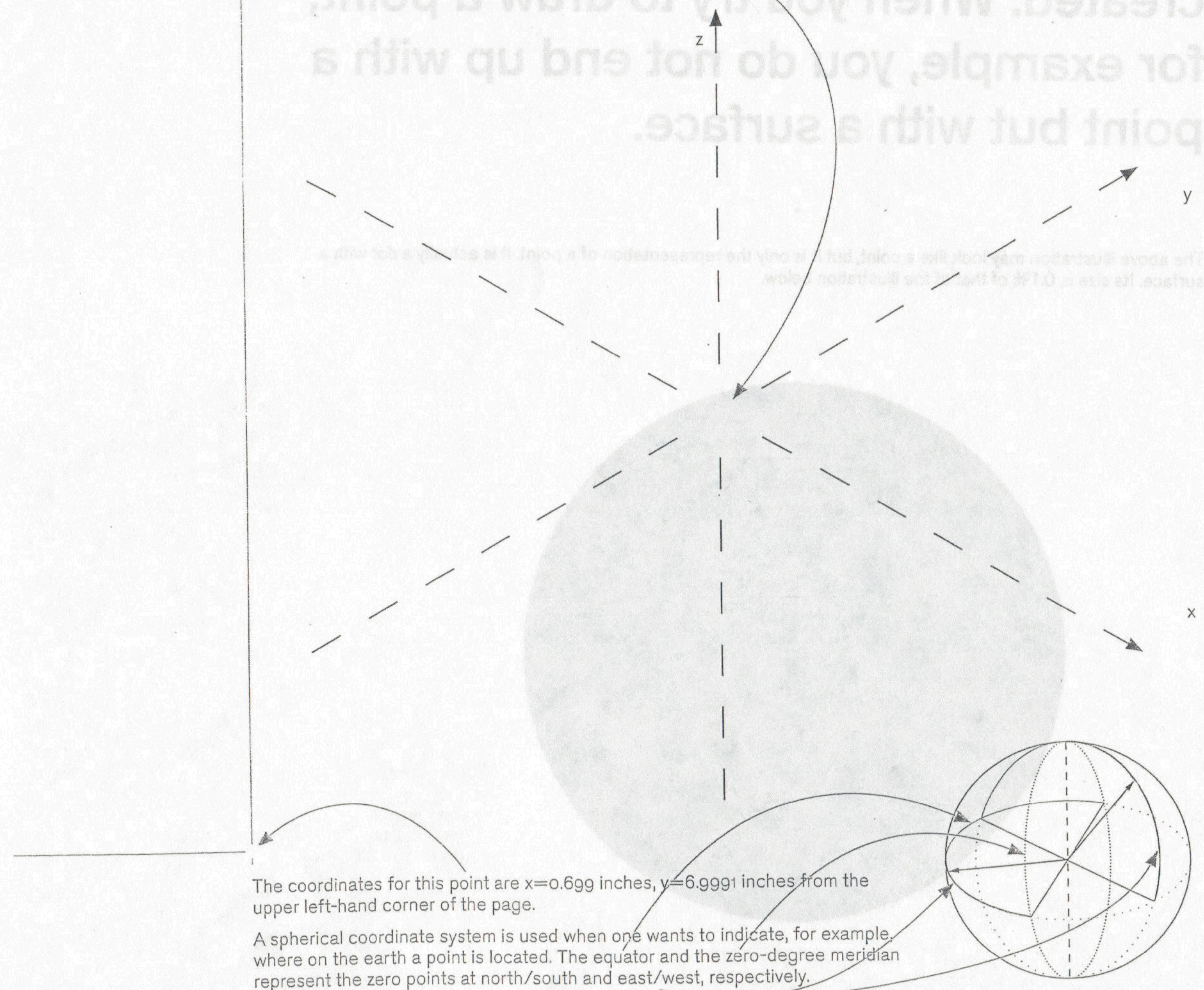
The coordinates for this point are x=0.699 inches, y=6.9991 inches from the upper left-hand corner of the page.

A spherical coordinate system is used when one wants to indicate, for example, where on the earth a point is located. The equator and the zero-degree meridian represent the zero points at north/south and east/west, respectively.

"The geometric point is an invisible thing. Therefore, it must be defined as an incorporeal thing. Considered in terms of substance, it equals zero." Wassily Kandinsky, *Point and Line to Plane* (New York: Dover, 1979), 25. First published in 1926 as *Punkt und Linie zu Fläche* in a series of Bauhaus books edited by Walter Gropius and L. Moholy-Nagy.
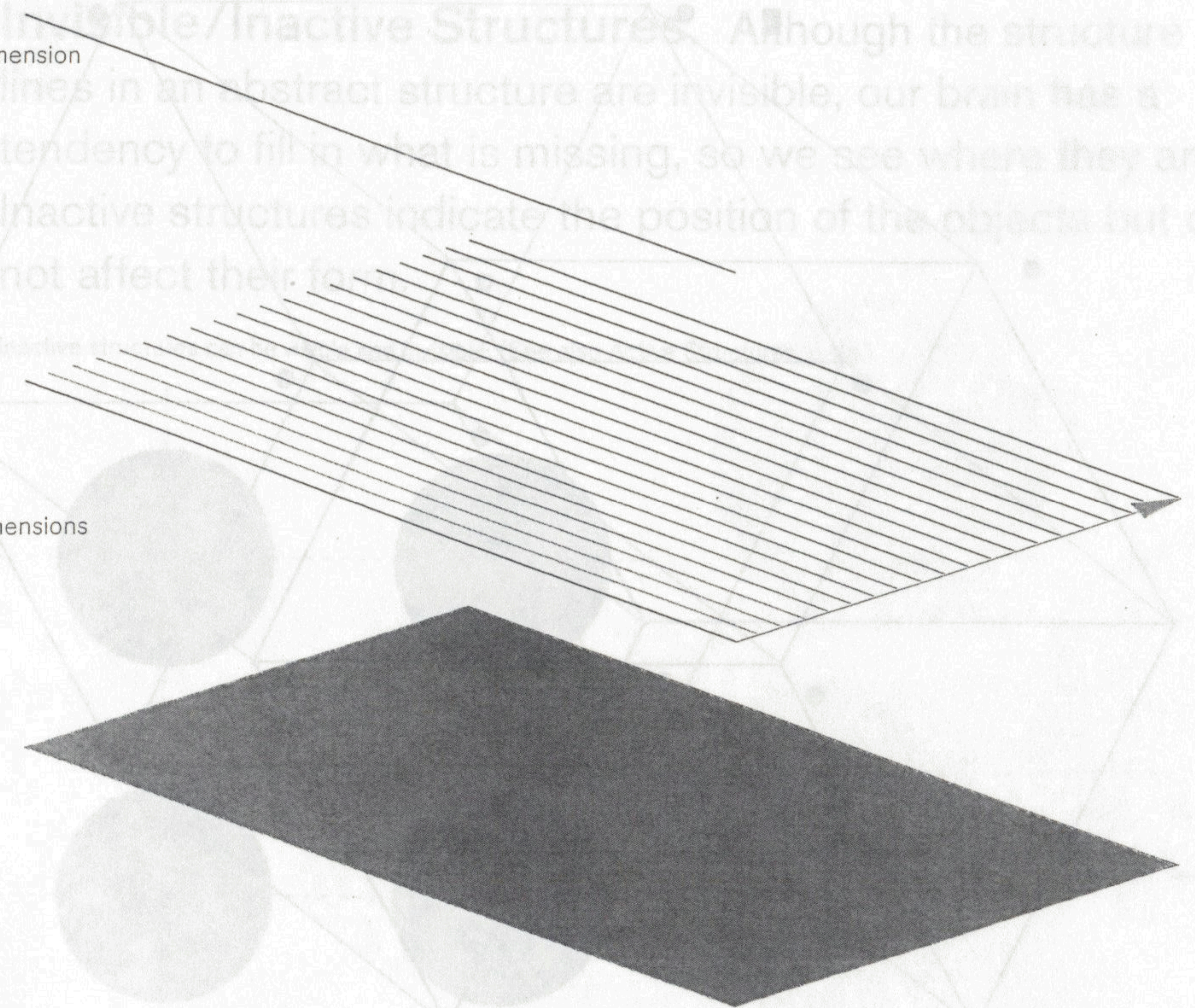
Line.
A line can be understood as a number of points that are adjacent to one another. A line can be infinite or have two endpoints. The shortest distance between two points is a straight line.

The shortest distance between two points.

Arc: Part of the circumference of a circle. The shortest path between two points on the surface of a globe (sphere).
Diameter: Straight line through the center of a circle from periphery to periphery.
Chord: Straight line between two points on the periphery.
Periphery: Circumference of a circle.
Radius: Distance from the center of a circle to the periphery.

"Line rarely exists in nature. But line does appear in the environment: the crack in the sidewalk, telephone wires against the sky, bare branches in winter, a cable bridge. The visual element of line is used mostly to express the juxtaposition of two tones. Line is utilized most often to describe that juxtaposition, and in this, it is an artificial device." Dondis, *A Primer of Visual Literacy*, 44.
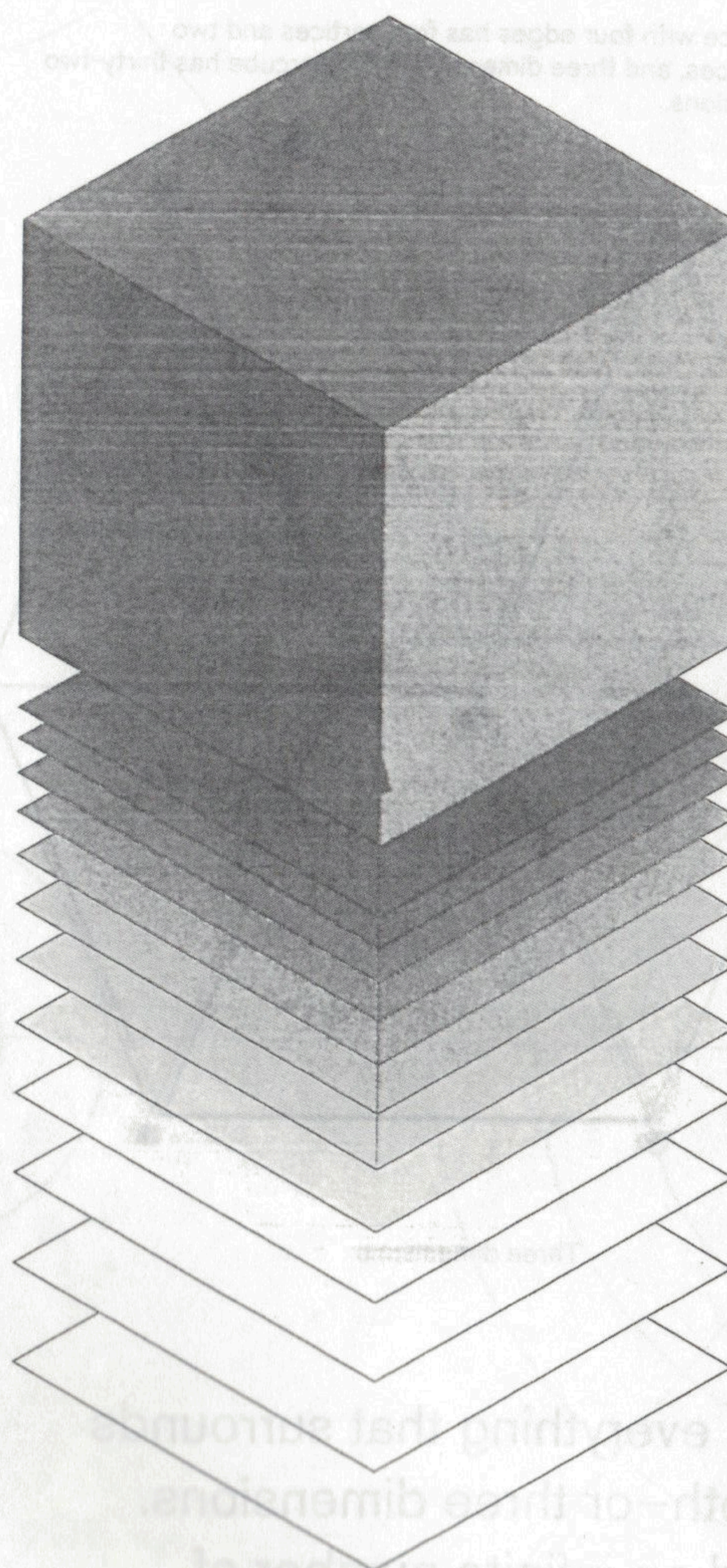
One dimension

Two dimensions

Surface. A surface is defined by two lines that do not coincide or by a minimum of three points that are not located on a line. If the two lines have one coinciding point, the surface will be a plane.
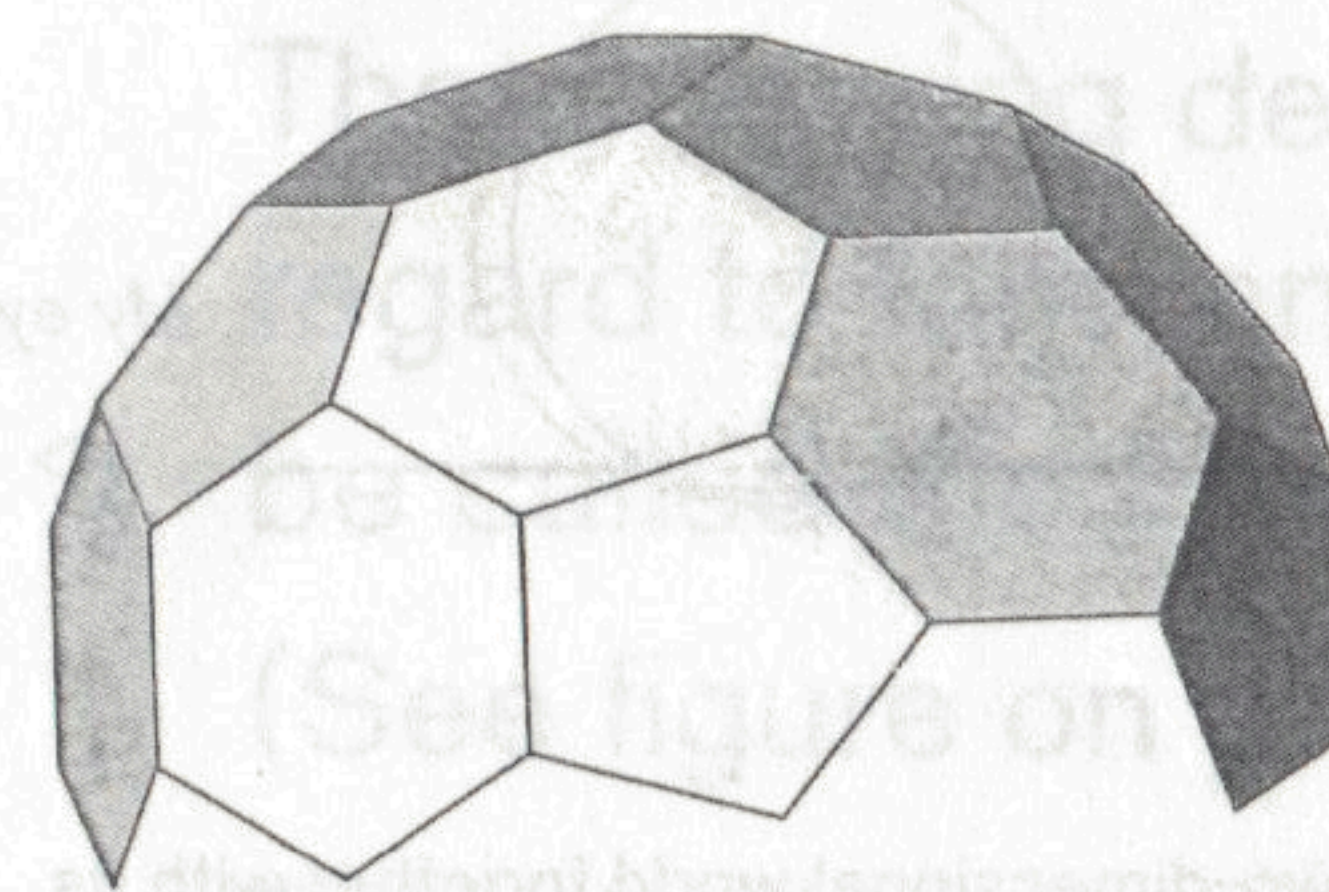
In the same way that a line can be described as a row of adjacent points, a surface can be defined as a row of lines. Points are stacked in one direction to form a line; a surface is created when a row of lines is stacked at a right angle to that direction. These directions can also be seen as axes and dimensions. Because a surface is a point that is proliferated in two directions, a surface has two dimensions.

The outside of a volume is a surface. It can be a continuous surface with different curves, or a collection of polygons, or a multiangular surface such as the figure on the left.

"The path of a line in motion becomes a plane. A plane has length and breadth, but no thickness. It has position and direction. It is bound by lines. It defines the external limits of a volume." Wucius Wong, *Principles of Form and Design* (New York: Van Nostrand Reinhold, 1993), 42.

In the same way that a surface is a row of lines, a volume is made up of a number of surfaces. Here the points are proliferated in three directions, the figure's three dimensions. A cube has eight vertices (the points where the lines intersect). On the inside of the surfaces stretching between these vertices is empty space. This space does not contain anything but is defined by its edges.
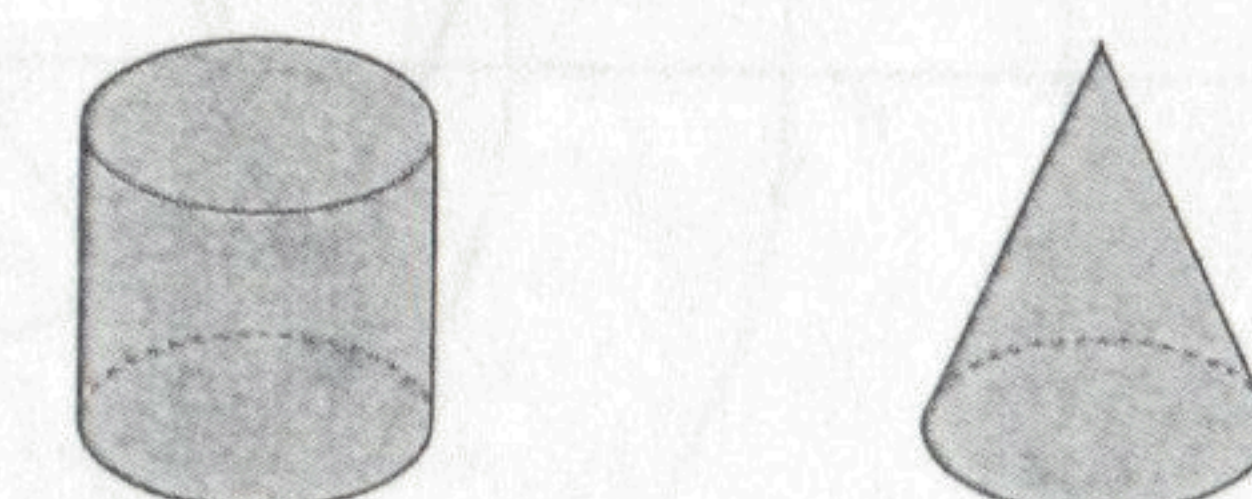
The various geometric volumes cannot be reproduced exactly in reality because the material we use to reproduce them either does not or cannot have such a perfect design. Geometric figures are mathematical, abstract models.
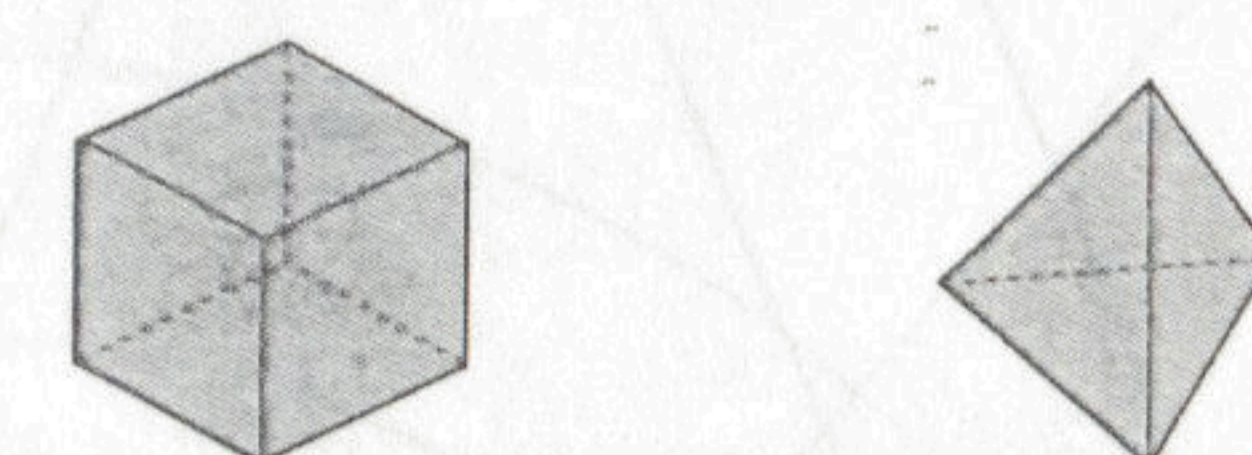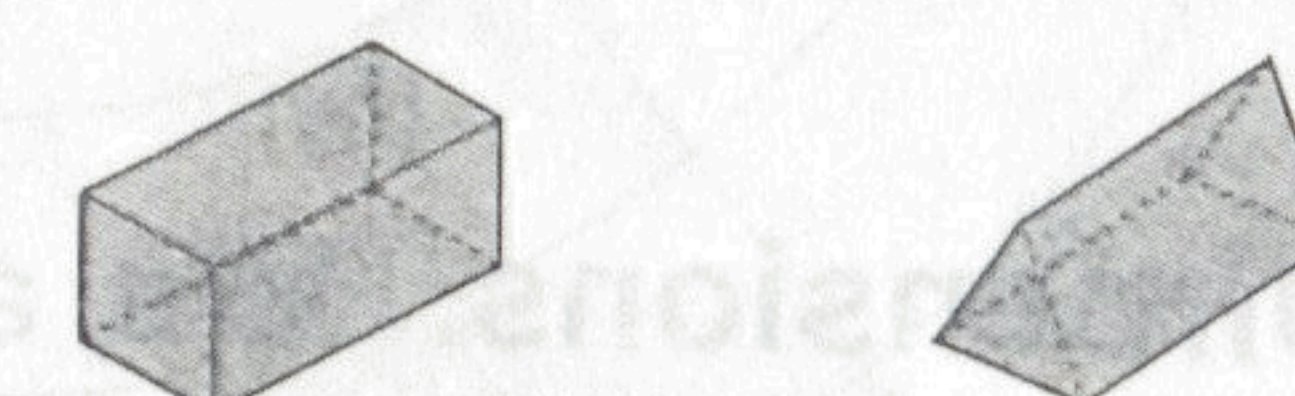
Cube and tetrahedron

Sphere and hemisphere

Cylinder and cone

Rectangular prism and prism

# Volume. A volume is an empty space defined by surfaces, lines, and points.

"The path of a plane in motion (in a direction other than its intrinsic directon), becomes a volume. It has a position in space and is bound by planes. In two-dimensional design, volume is illusory." Wong, *Principles of Form and Design*, 42.

A line has one edge, two vertices, and one dimension. A surface with four edges has four vertices and two dimensions. A cube has twelve edges, eight vertices, six surfaces, and three dimensions. A hypercube has thirty-two edges, sixteen vertices, twenty-four surfaces, and four dimensions.

One dimension   Two dimensions   Three dimensions
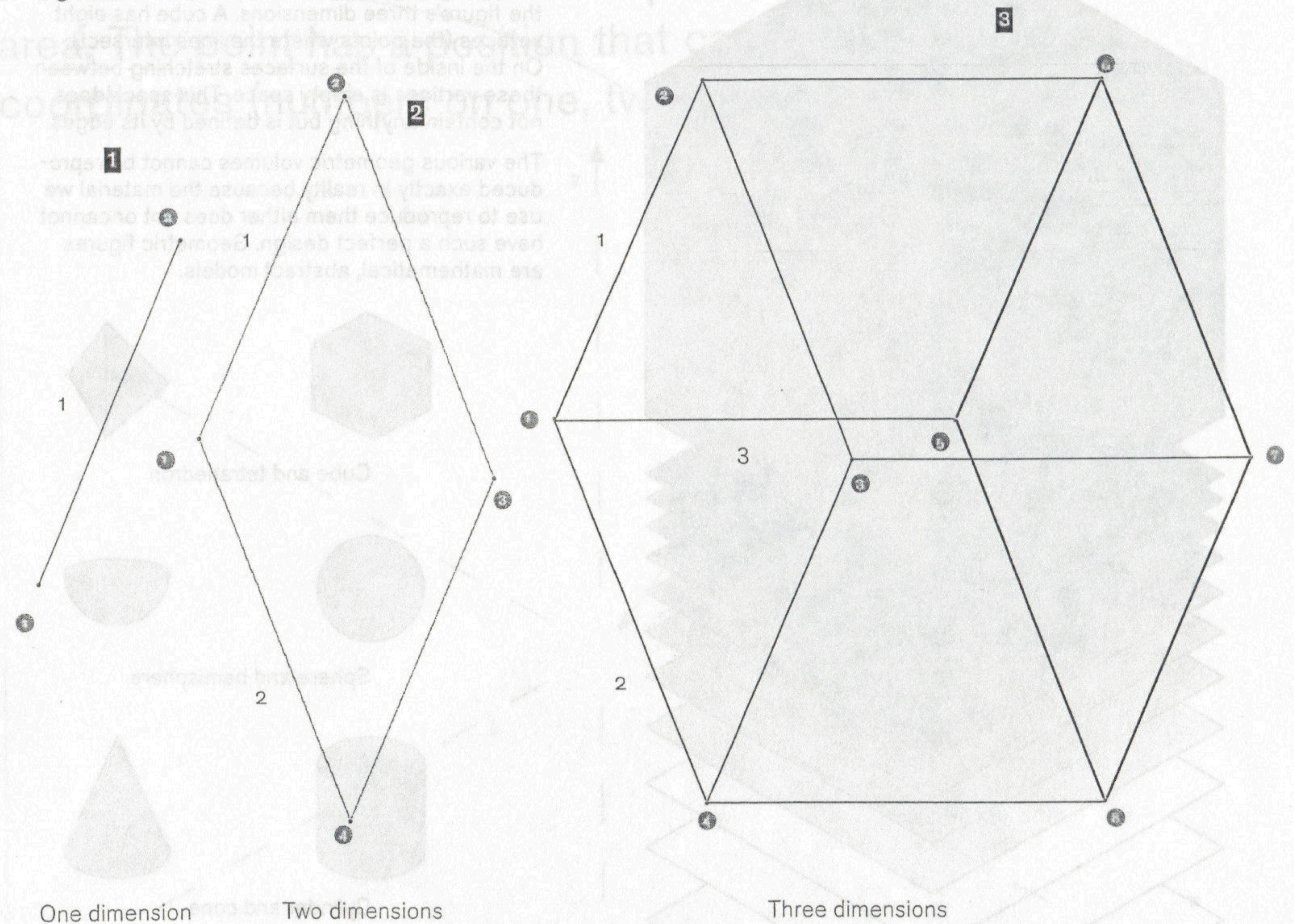
Dimensions.
We, along with everything that surrounds us, have height, width, and depth—or three dimensions. Objects can have four, five, and an infinite number of dimensions, but we cannot perceive these. More or less than three dimensions are abstractions for us; we can only imagine them.

"Dimension exists in the real world. We cannot only feel it, but with the aid of our two-eyed, stereoopticon sight, we can see it." Dondis, *A Primer of Visual Literacy*, 59–60.
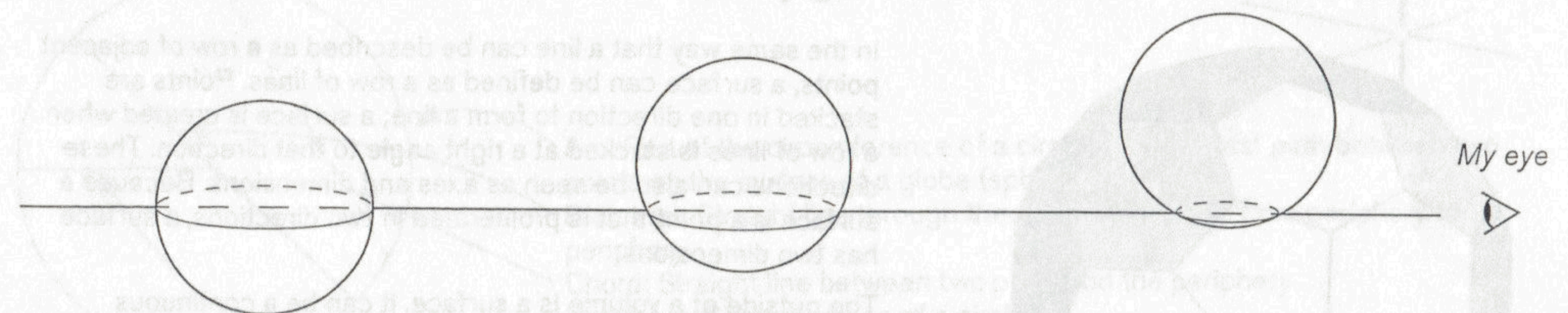
4

Four dimensions

4
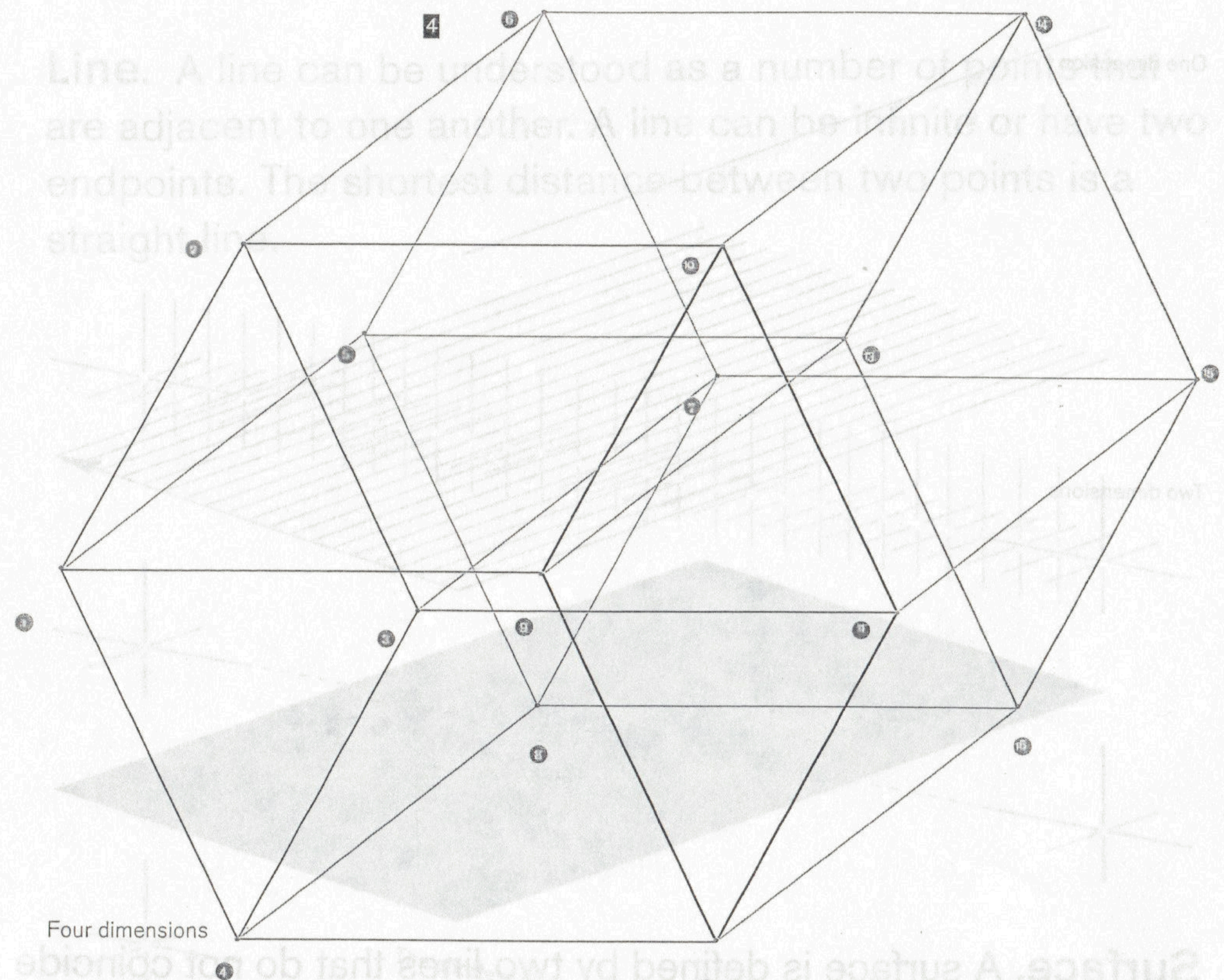
The sphere with its section
at full size

The sphere rising

The sphere on the
point of vanishing

My eye

Edwin Abbott Abbott's book *Flatland* tells the story of a square that lives in a two-dimensional world together with its family of geometric figures. One day a three-dimensional sphere comes to visit. When the square tells the clergy about meeting someone from another dimension, it is imprisoned for blasphemy. Above we see the sphere's visit as viewed by the square. Illustration based on Abbott's drawing. Edwin Abbott Abbott, *Flatland* (London: Seeley & Co, 1884).

Invisible/Inactive Structures. Although the structure lines in an abstract structure are invisible, our brain has a tendency to fill in what is missing, so we see where they are. Inactive structures indicate the position of the objects but do not affect their form.

Inactive structures can be visible and invisible. (See also Active Structures, p. 35.)
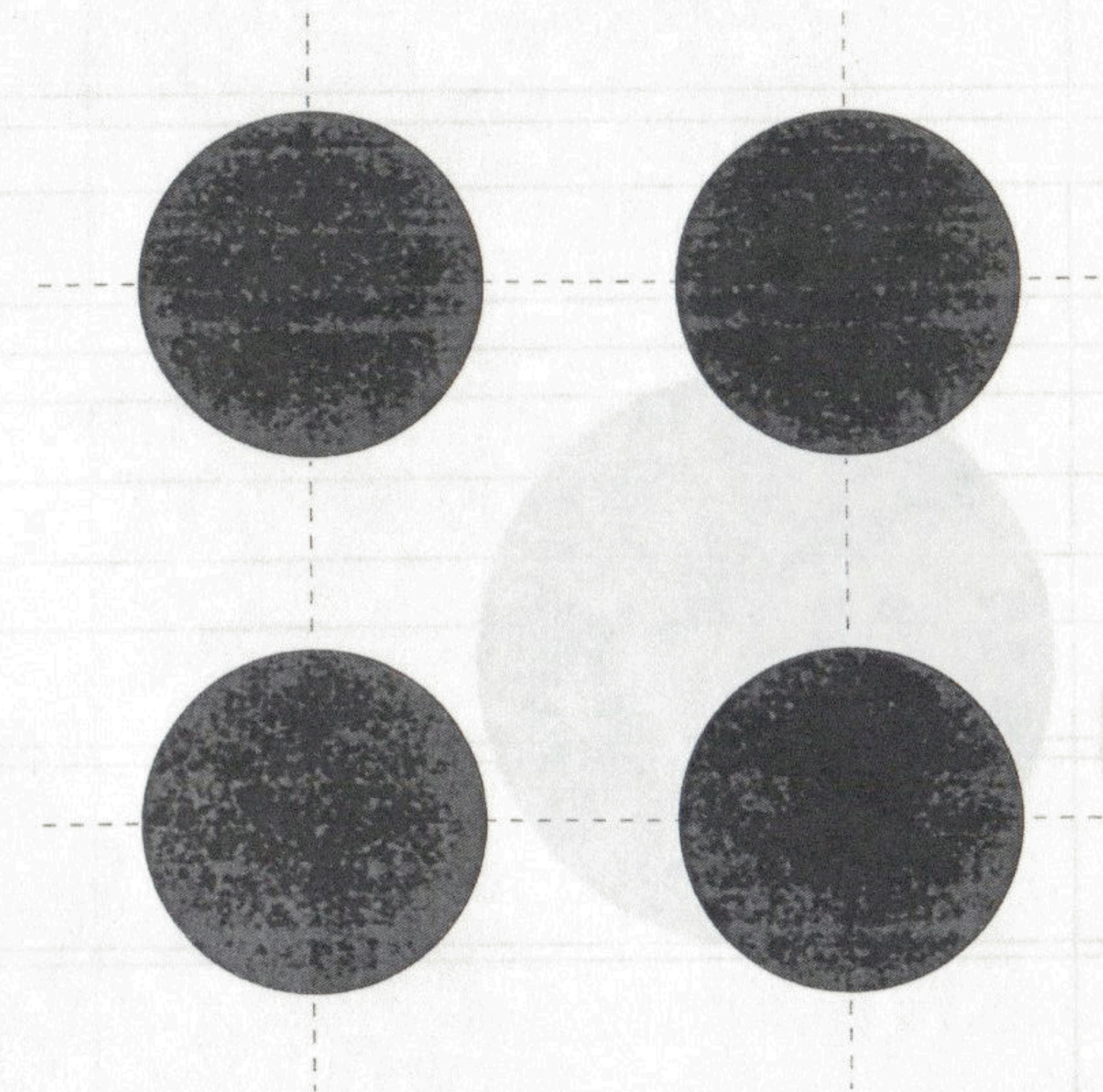
Structural Skeleton. In all compositions or objects there are forces that are bound by the limits of the surface. These varying degrees of energy follow certain axes with regard to form and proportions. These axes, or paths, can be called the format's or object's structural skeleton. (See figure on p. 25).

"So the nature of a visual experience cannot be described in terms of inches of size and distance, degrees of angle, or wave lengths of hue. These static measurements define only the 'stimulus,' that is, the message sent to the eye by the physical world. But the life of a percept—its expression and meaning—derives entirely from the activity of the perceptual forces." Rudolf Arnheim, *Art and Visual Perception* (Berkeley: University of California Press, 1964), 16.
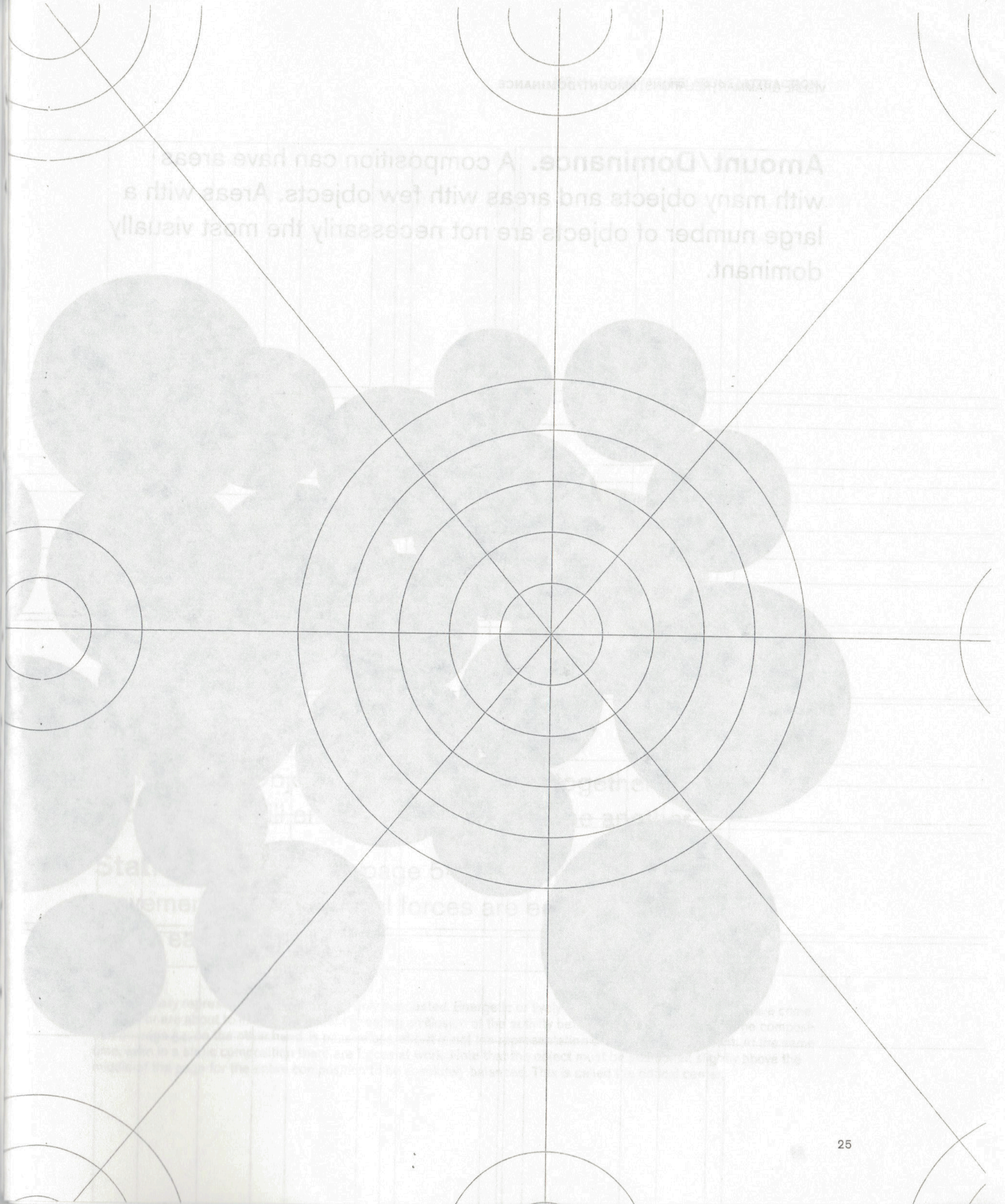
Amount/Dominance. A composition can have areas with many objects and areas with few objects. Areas with a large number of objects are not necessarily the most visually dominant.