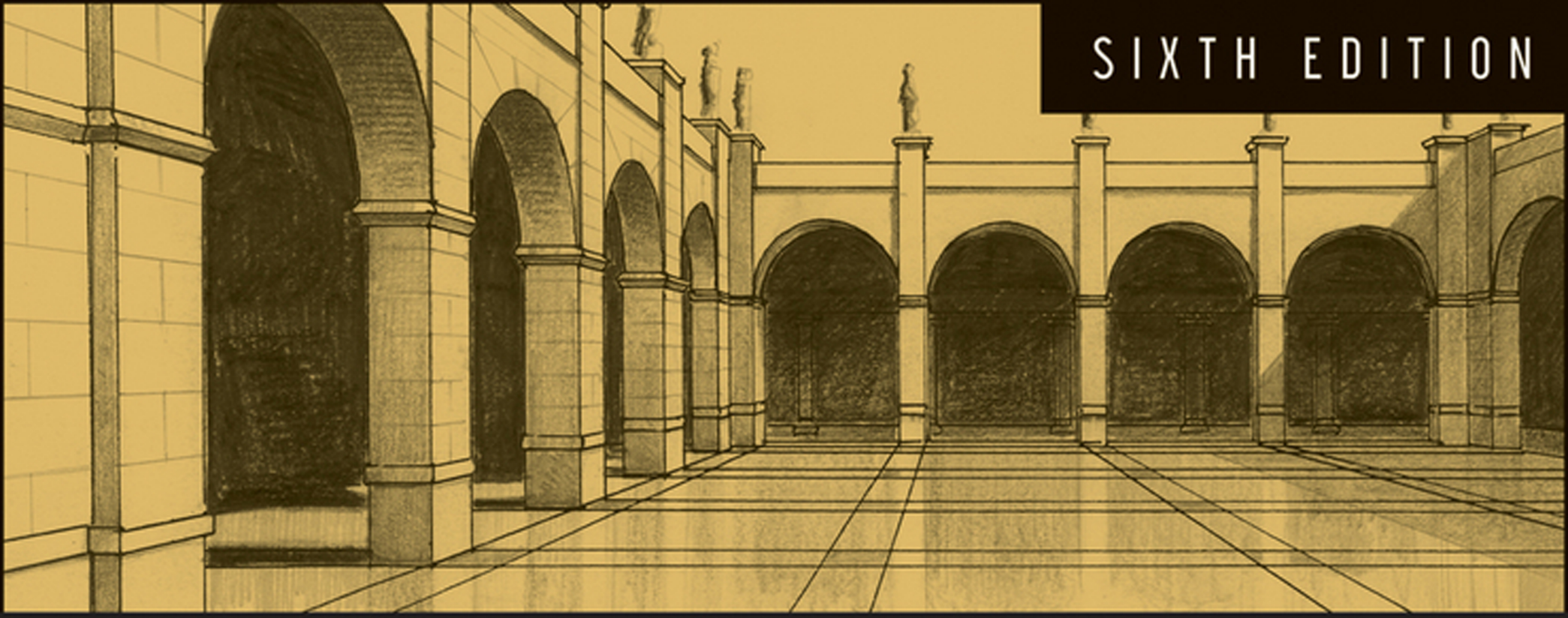

SIXTH EDITION

BASIC PERSPECTIVE DRAWING

A VISUAL APPROACH

JOHN MONTAGUE

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PREFACE

Basic Perspective Drawing is now in its sixth edition. Over the years the book has been expanded and refined in response to the direct feedback from artists, architects, designers, illustrators, teachers, and students who use the book as a reference, a self-learning tool, or as a text book.

With this edition the Online Supplementary Material (available at www.wiley.com/go/perspectivedrawing) has been expanded with the addition of several demonstration and tutorial videos. The videos address some of the particular techniques that students have often found difficult. The new videos are extensions of the text and address some of the basic concepts in paraline drawing, dropping plans into views, geometric tools, slopes, curves, and shadows. The following icon is used throughout the text to indicate topics that are featured in a corresponding tutorial video:

The Online Supplement includes units on *Learning to Look, Thinking in Three Dimensions,* a demonstration of the *Sketchbook Project* and an extensive reference *Perspective Photo Gallery.*

Previous users of the book will notice some subtle changes and clarifications in the illustrations and general presentation. In the interests of keeping the book within a manageable size, a number of step-by-step illustrations in the Appendix have been combined and condensed. Also in the interests of space and in keeping with the book's mission to focus on the basics, the chapter "Perspective Drawing and the Computer," first added in the 3rd edition, has been eliminated. Fortunately, since that 1998 edition, a plethora of information on digital perspective programs is now readily accessible making the inclusion of the material here less critical. In this regard, it is important to remember that perspective drawing is as much a way of seeing and understanding the visual world as it is a technique for reproducing it. Thus an understanding of the fundamentals of perspective presented here promises to provide an essential foundation for exciting new digital tools that are still evolving.

Basic Perspective Drawing is organized such that it can be studied sequentially and/or used as a reference. The first chapters provide an orientation and overview while subsequent chapters address more specific problems and techniques. For greatest effect, the book should be treated as a learning tool to be drawn in, written in, highlighted, and even colored in. Like reading and writing, perspective drawing is a learnable skill. And, like any other skills, mastery and fluency are gained with practice and patience, by moving from the known to the unknown, and from the simple to the complex.

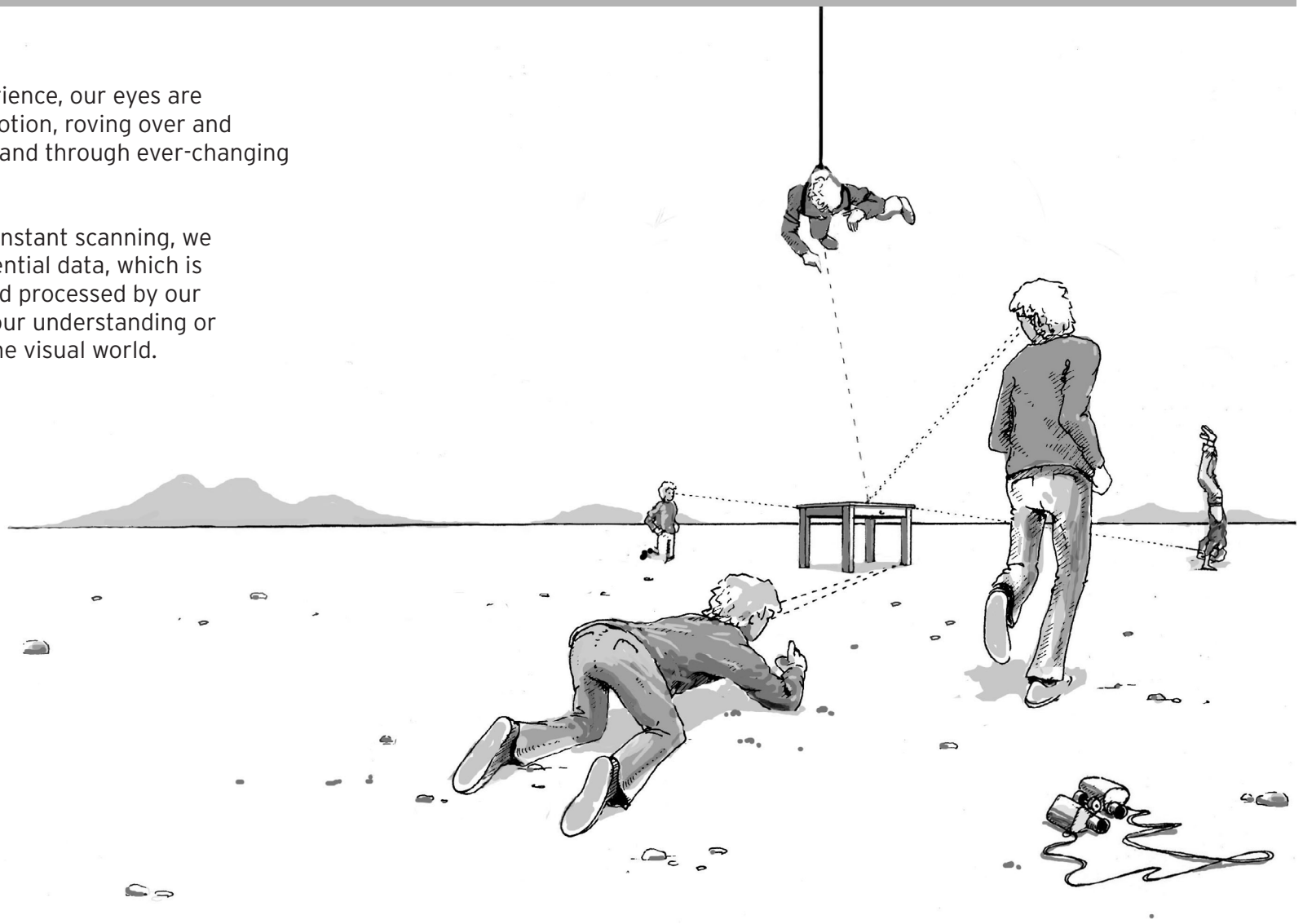
This book is designed to lead the user through that rewarding process as directly and efficiently as possible.

OVERVIEW

1

In normal experience, our eyes are constantly in motion, roving over and around objects and through ever-changing environments.

Through this constant scanning, we build up experiential data, which is manipulated and processed by our minds to form our understanding or perception of the visual world.

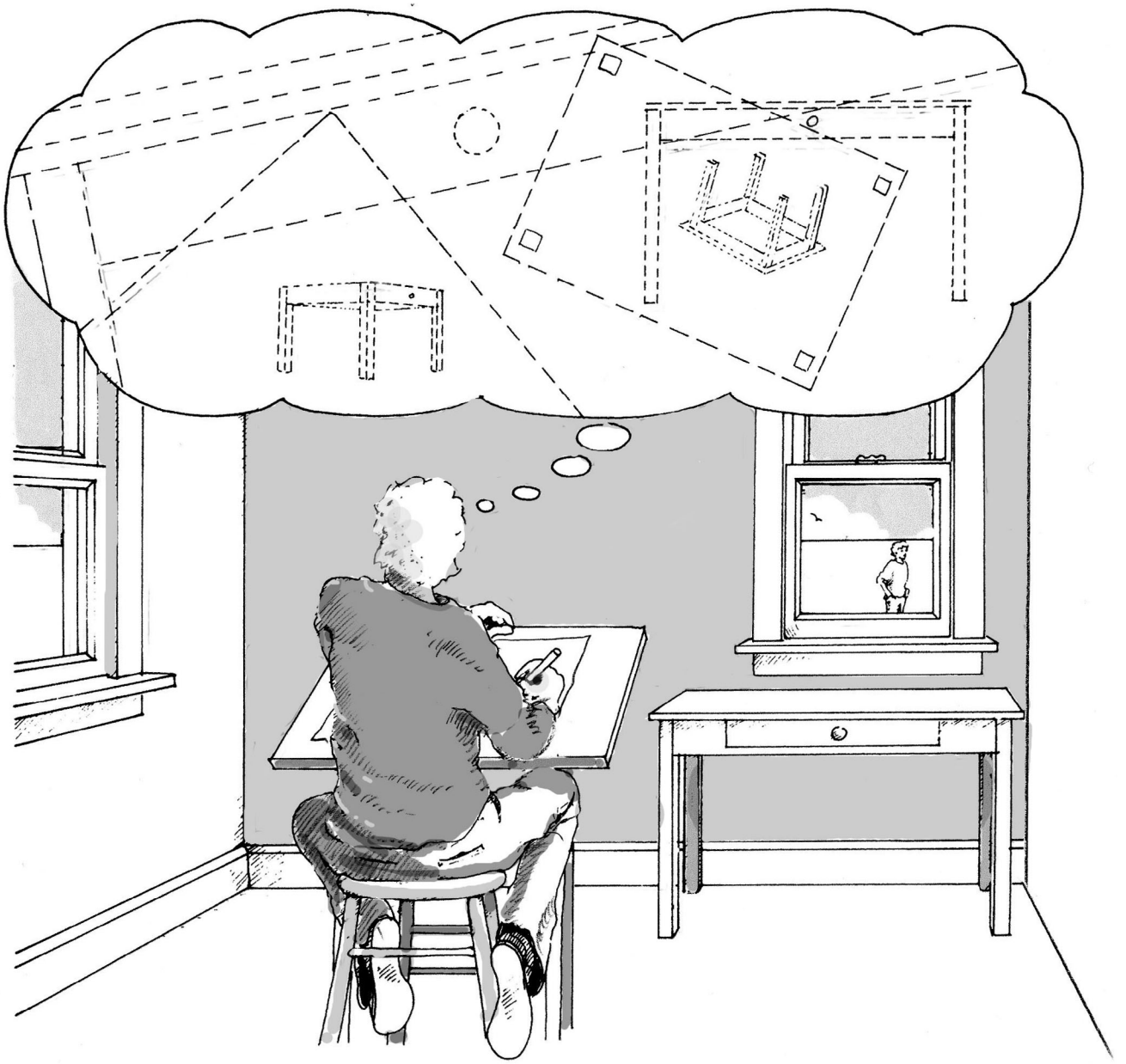


These mental images of the visual world can never be in an exact one-to-one correspondence with what is experienced. Our perceptions are holistic; they are made up of all the information we possess about the phenomena, not just the visual appearance of a particular view.

As we gaze at the object or view, we sense this perceptual information all at once—colors, associations, symbolic values, essential forms, and an infinity of meanings.

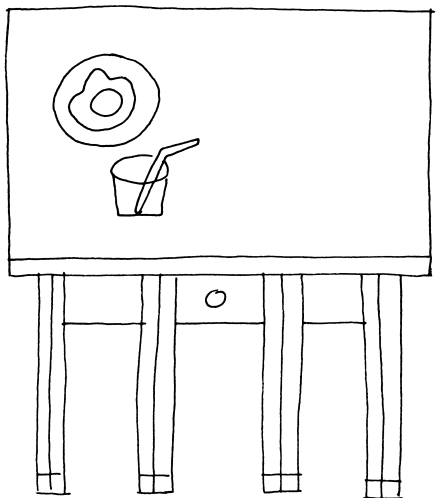
Thus, our perception of even such a simple object as a table is impossible to express completely. Any expression of our experience must be limited and partial.

Our choice of what can or will be expressed is greatly affected by the various limits we self-impose or that are imposed upon us by our culture.

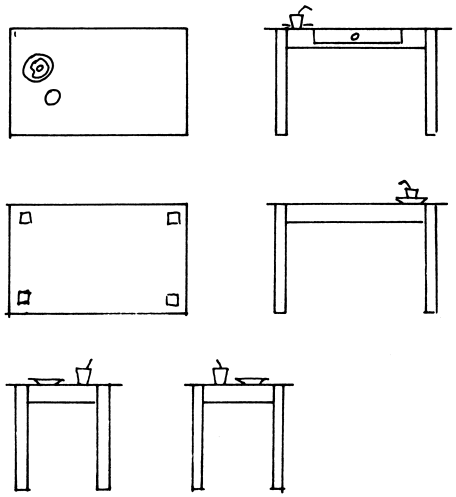


In expressing visual data, individuals and cultures as a whole make choices—some conscious, some unconscious—as to which aspects of their experience of a phenomenon can or should be expressed.

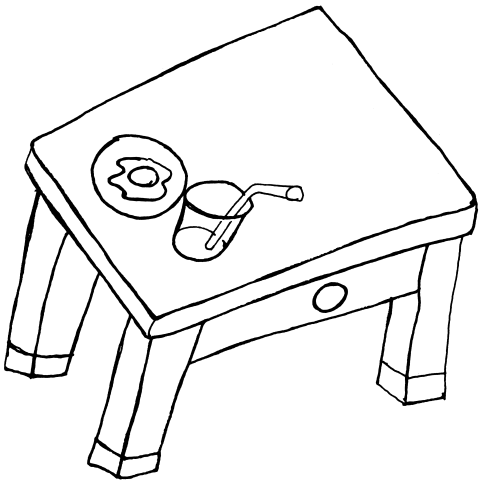
Consider the different images on the right. Each of these drawings of a table is expressing different sets of information about the table, and each is "correct."



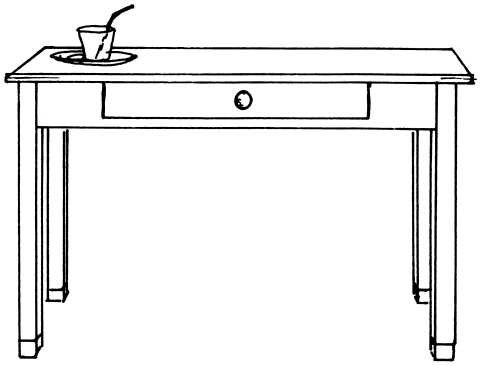
A.
Several views are presented simultaneously.



B.
Parts are separated into measured plans and elevations.



C.
Parts are arranged to express feeling, emotions, and weight.



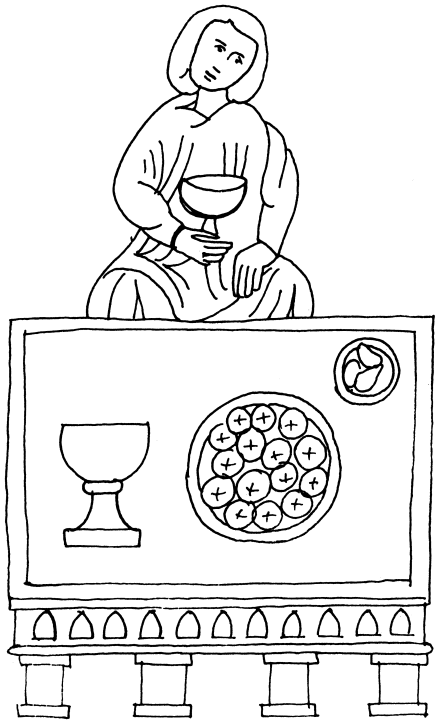
D.
A single point of view is selected to produce an optical appearance.

POINTS OF VIEW

For every advantage gained from a particular system of representation, other possibilities are lost. Thus, linear perspective is only one of many representational systems and is certainly not always the most useful or appropriate technique.

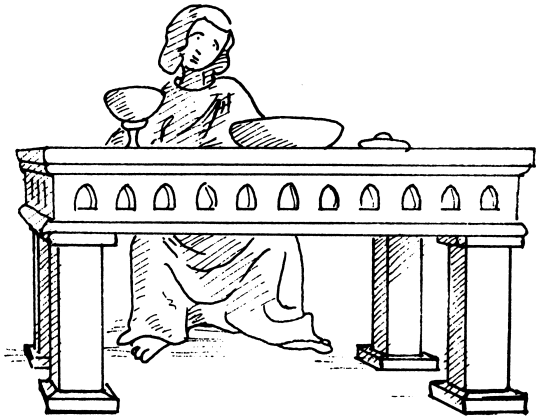
Several Points of View

This system of representation has dominated art of the Middle Ages, nonwestern cultures, primitive art, the art of children, and much of the art of the twentieth century. This system represents what is important or what is known about the subject, not just the way the subject appears optically from a single point of view.



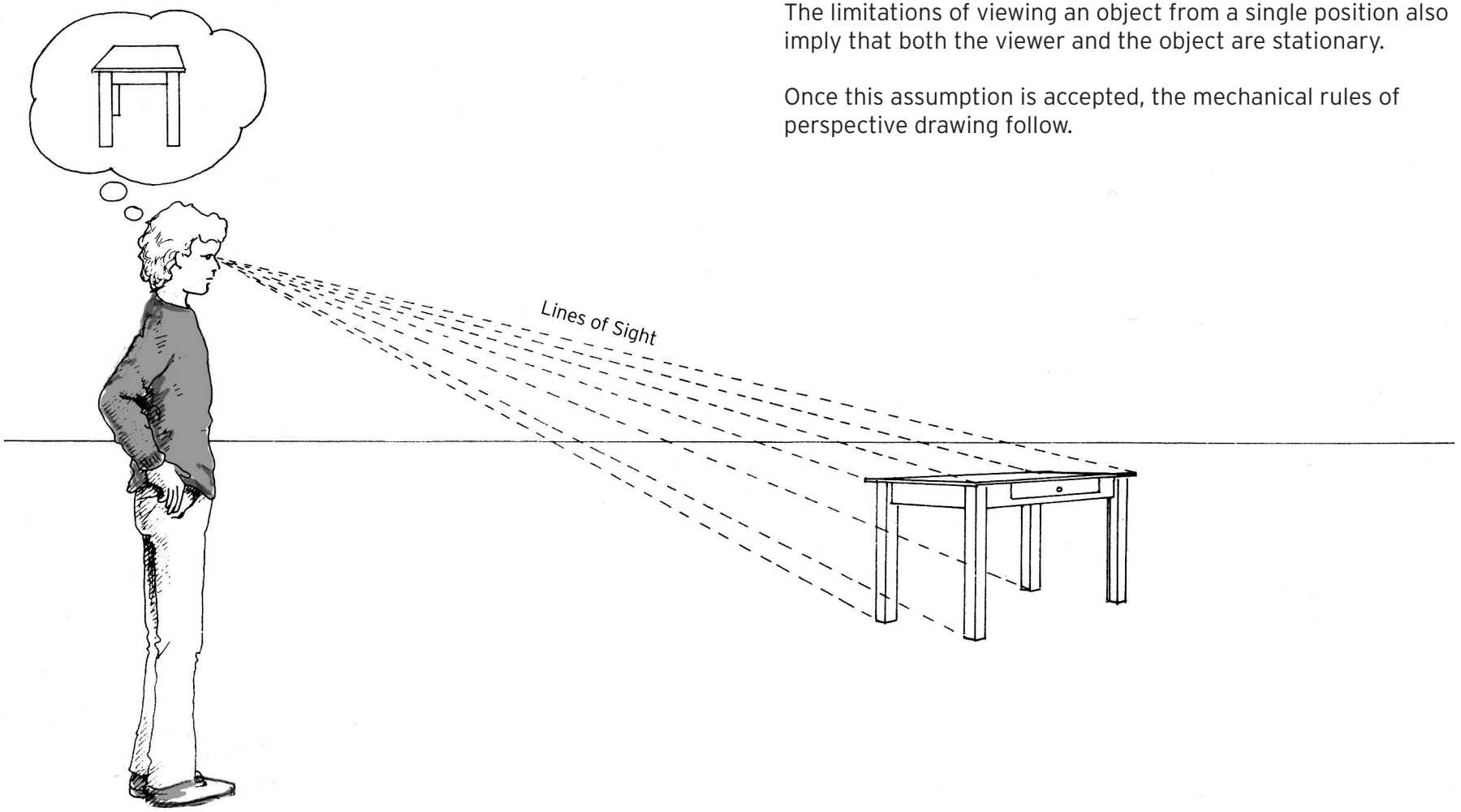
Single Point of View

This system of representation was established at the time of the European Renaissance (c. 1450). It represents the appearance of reality; that is, appearance from a single point of view, as if traced on a window. Note that this "realistic" view prevents us from seeing the apples and the second cup.



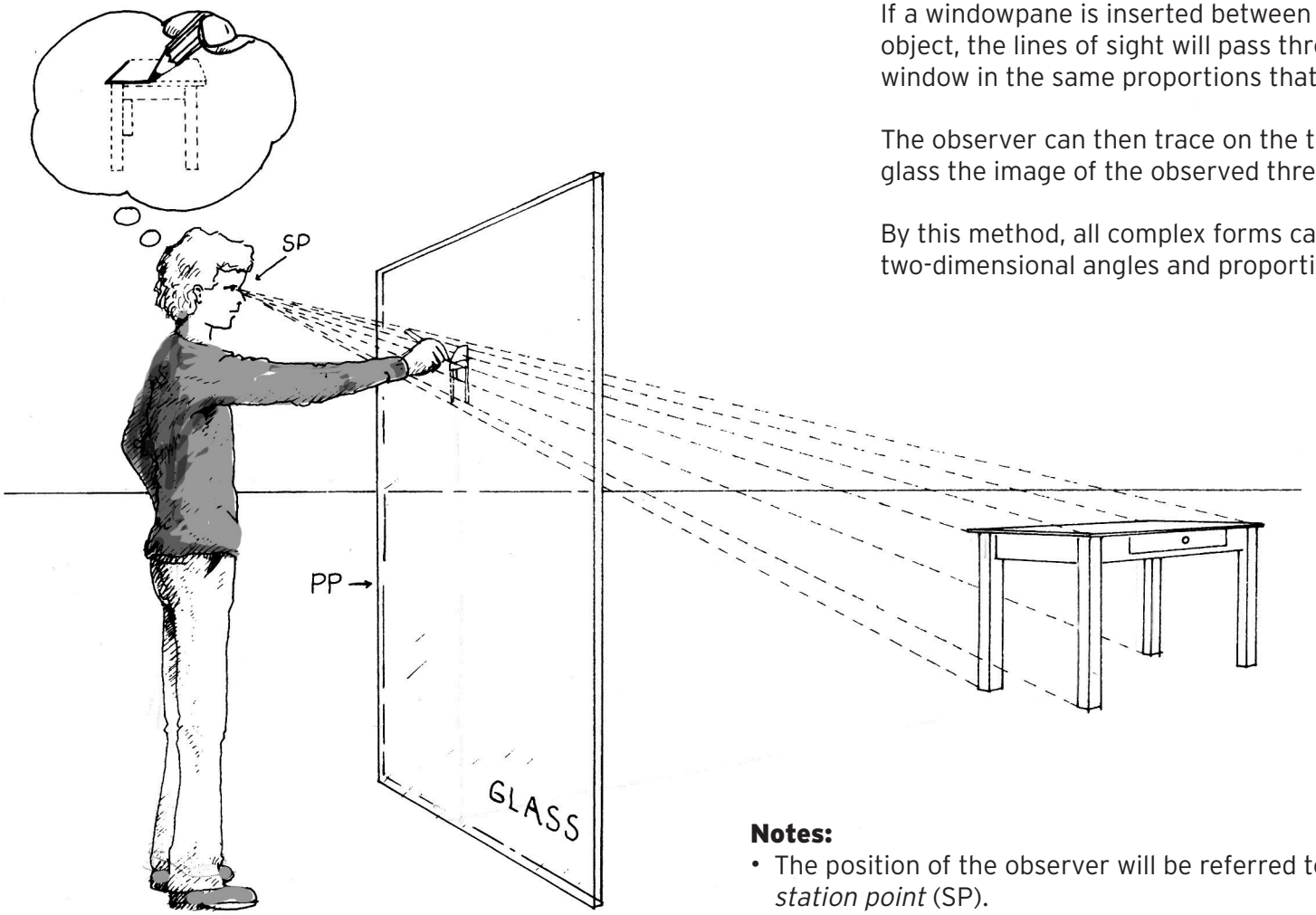
The limitations of viewing an object from a single position also imply that both the viewer and the object are stationary.

Once this assumption is accepted, the mechanical rules of perspective drawing follow.



While the object reflects light (visual information) in all directions as shown here, only the light reflected in the direction of the observer conveys the visual information necessary for the viewer's image of the object.

The Picture Plane



If a windowpane is inserted between the observer and the object, the lines of sight will pass through the plane of the window in the same proportions that reach the eye.

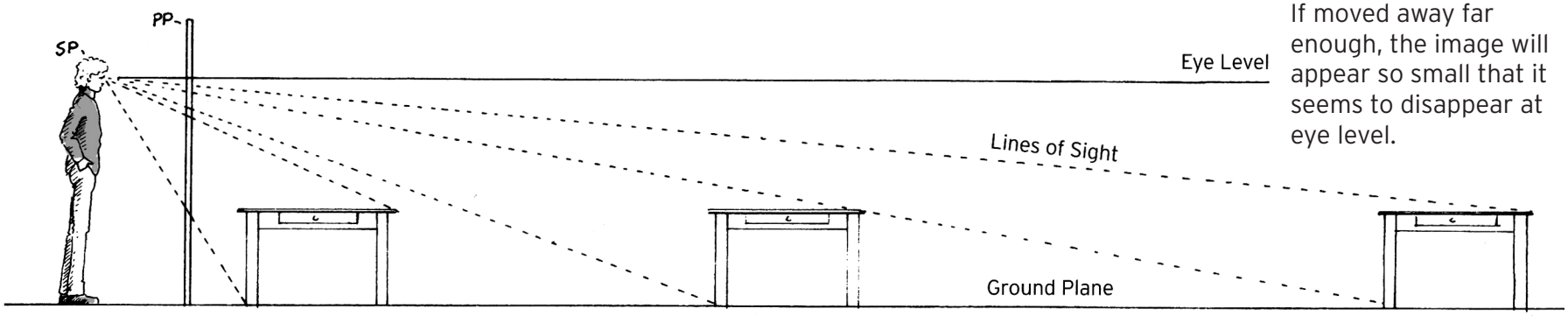
The observer can then trace on the two-dimensional plane of glass the image of the observed three-dimensional object.

By this method, all complex forms can be reduced to simple two-dimensional angles and proportions.

Notes:

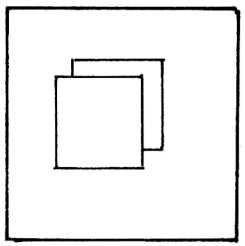
- The position of the observer will be referred to from now on as the *station point* (SP).
- This imaginary window will be referred to from now on as the *picture plane* (PP).
- For the purposes of perspective drawing, the drawing paper can be assumed to be the transparent plane of the picture plane window.

The illusion of depth in linear perspective is suggested by the relative size, position, and shape of lines on the picture plane. The most obvious of these cues is size. The further away an object, the smaller it appears. This is demonstrated here. Notice that the farther the object moves away from the observer, the narrower the lines of sight on the picture plane, and the closer those lines approach eye level.



If moved away far enough, the image will appear so small that it seems to disappear at eye level.

The following illustrations are some cues used to suggest depth on a two-dimensional surface. Seeing these forms as 3-D is not a universal experience. Some cultures refuse to interpret any 2-D image as anything by 2-D—even a photograph! Similarly, Western cultures find it impossible to see certain 2-D images as truly flat.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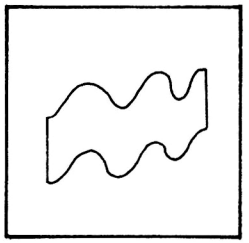
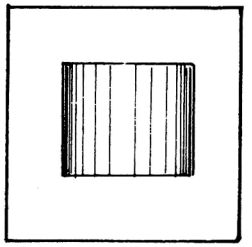
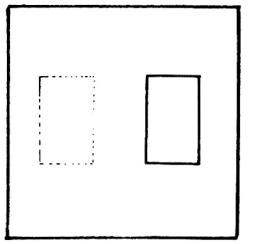
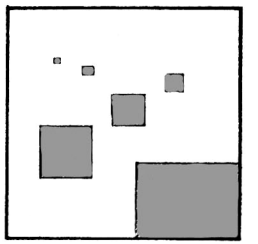

Shape


Shading


Clarity

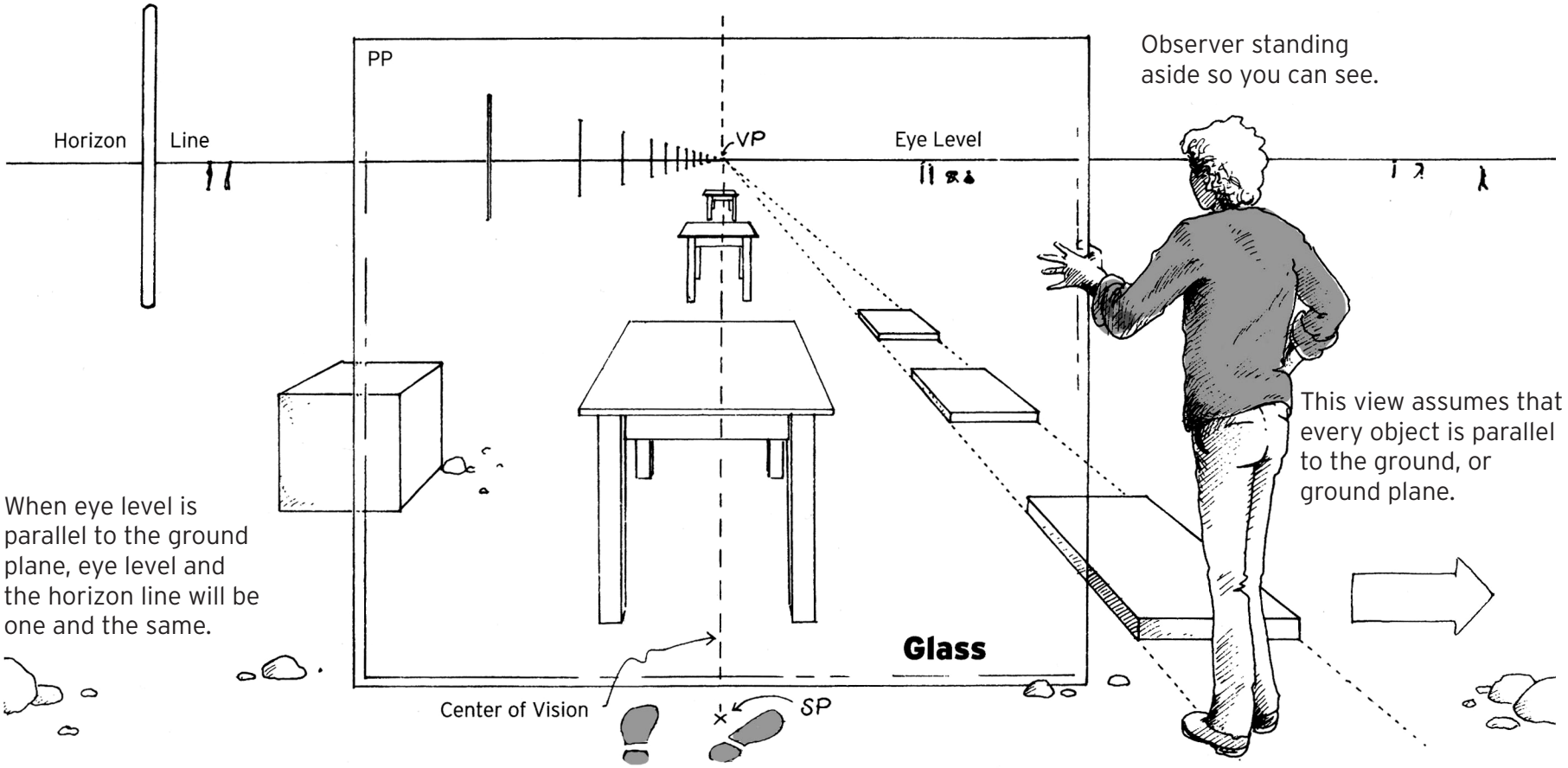

Size and Position

View from Behind the Station Point

In relation to the picture plane, all objects moving away from the viewer gravitate toward the viewer's eye level while getting smaller at the same time.

Note that lines parallel to each other in the scene converge toward a common point at eye level, where the distance between them becomes so small it seems to disappear.

The point at which lines converge is called the *vanishing point* (VP).

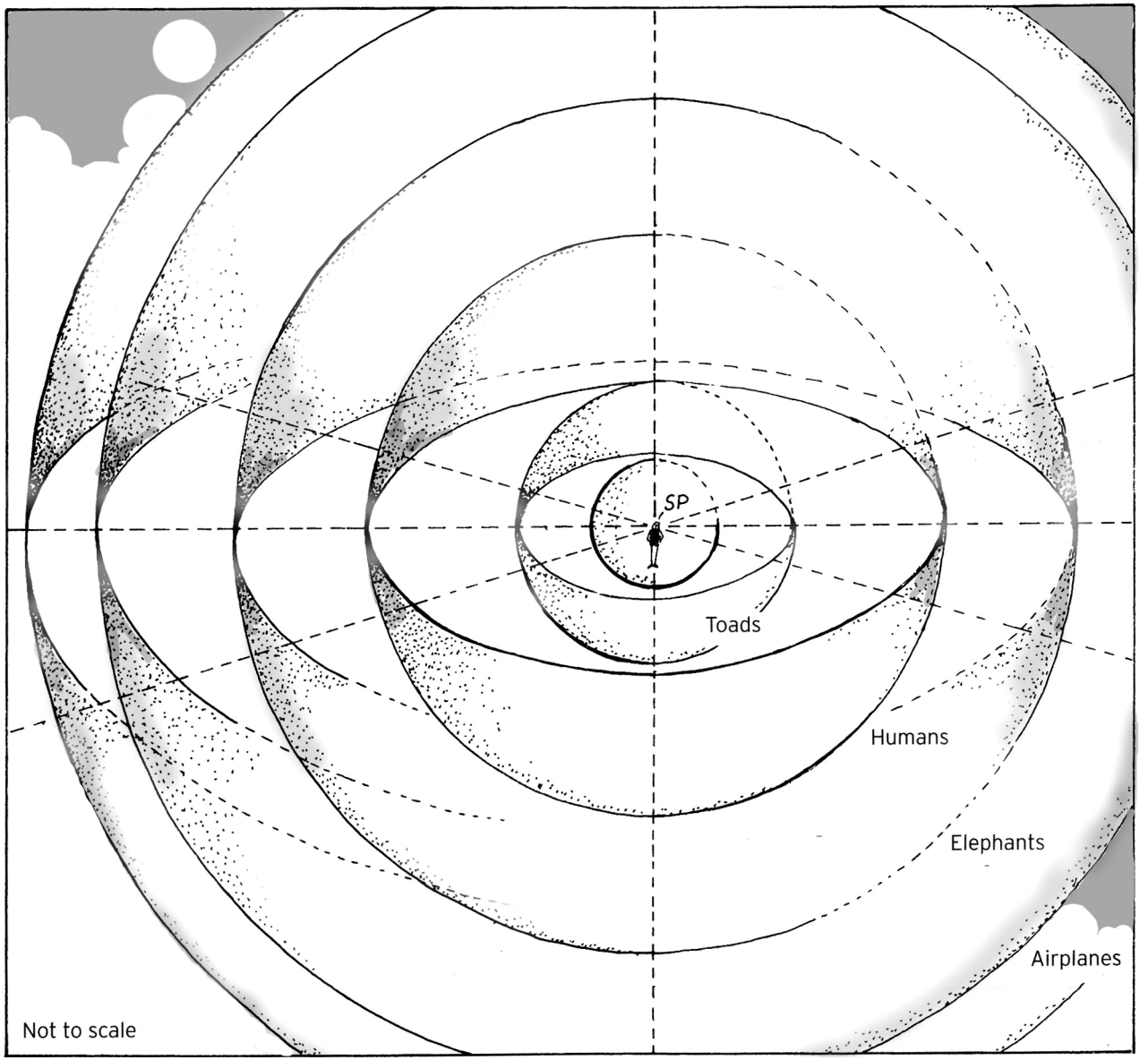


SPHERES OF DISAPPEARANCE

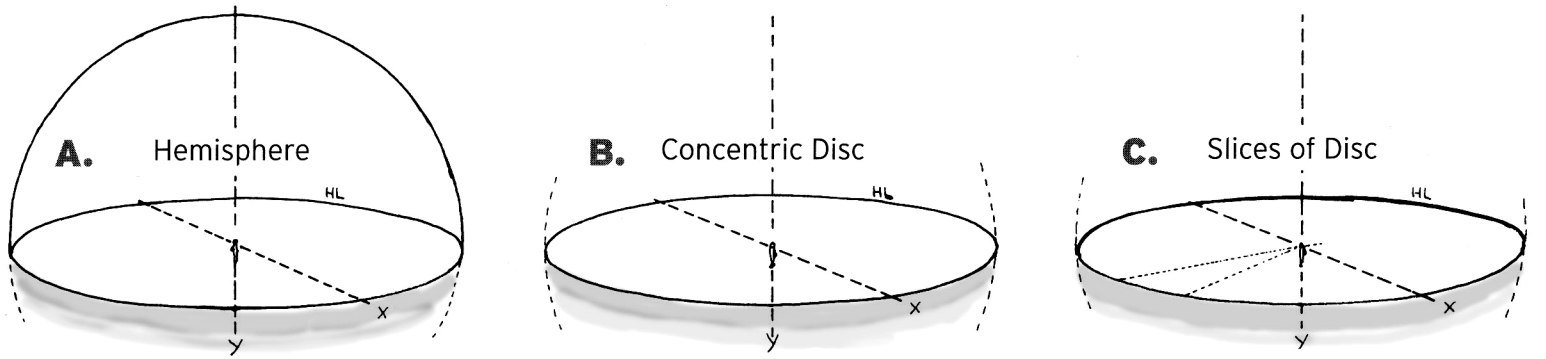
From the observer's position in space, objects can recede in any direction, not just along lines parallel to the ground. Therefore, for each observable object, there exists a *sphere of disappearance* encompassing the observer. An object receding in any direction from the observer's point of view (station point) will appear to decrease in size until it reaches the outer limits of its own sphere, vanishing completely.

The size and brightness of the object determine the magnitude of its sphere if all other factors are equal.

There are as many concentric spheres of disappearance as there are objects observed.

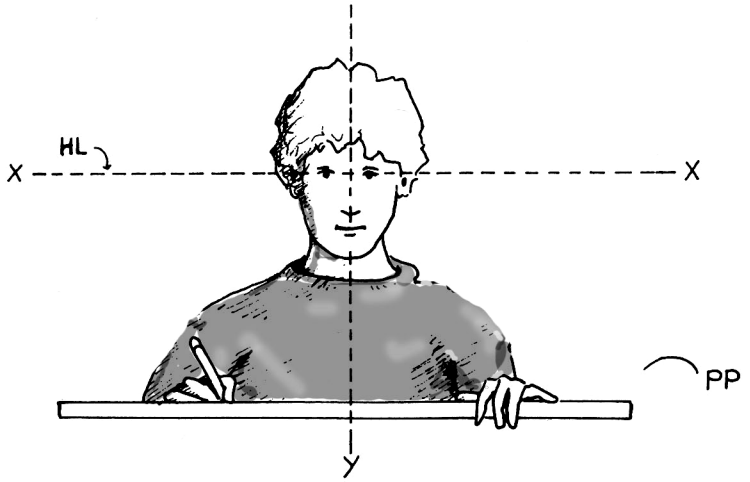


Most of the time, people observe things while their feet are firmly planted on the ground. As a result, spheres of disappearance can be reduced, for practical purposes, to the following types:

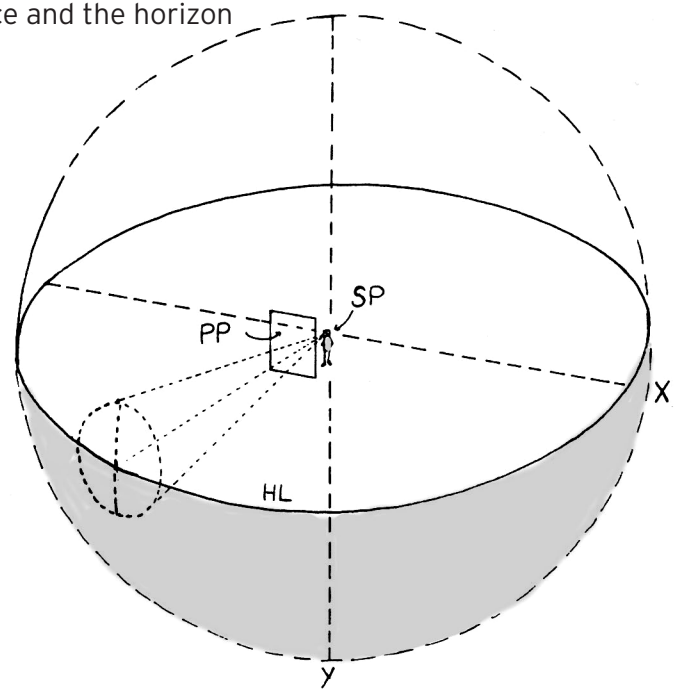


Since our normal experience is concentrated on observations on the ground plane, spheres of disappearance can be reduced to a *horizon line* (HL) surrounding a disc, analogous to the ground plane (B). Because we can look in only one direction at a time, the disc is reduced to a slice and the horizon line to a segment (C).

The physical arrangement of our bodies provides us with natural horizontal and vertical axes.



This slice of the sphere, hemisphere, and disc is actually conical in shape.



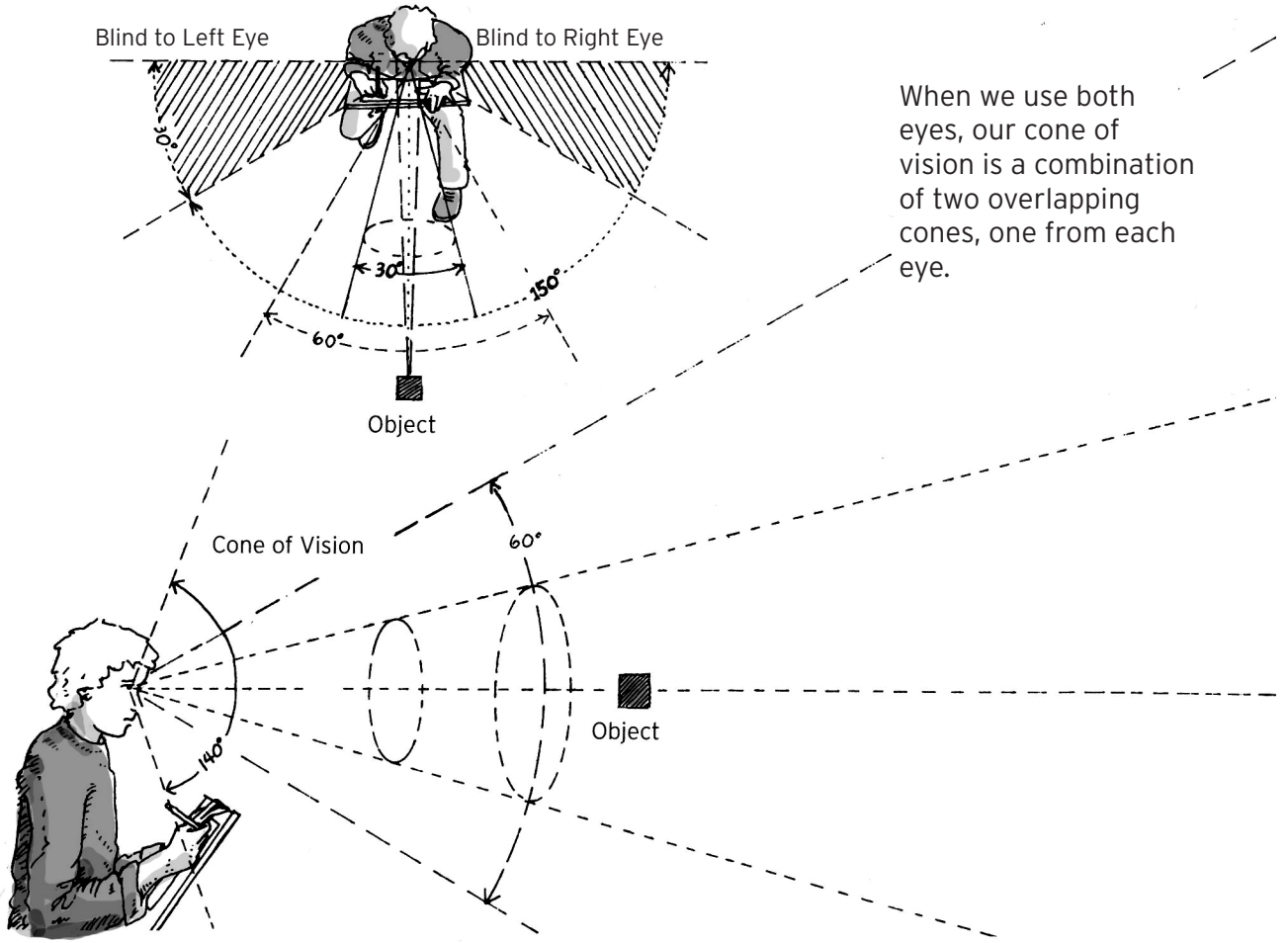
CONE OF VISION

The parts of our eyes that receive light are hemispherical, each gathering light from a cone of about 150 degrees. When these two cones overlap, we gather light from almost 180 degrees.

Only in the area where the fields from both eyes overlap does binocular vision occur.

Within this broad field of vision, we actually focus clearly through cones of about 30–60 degrees. When objects are outside of these standard cones of vision, we generally consider them to be distorted, as images appear through a wide-angle lens.

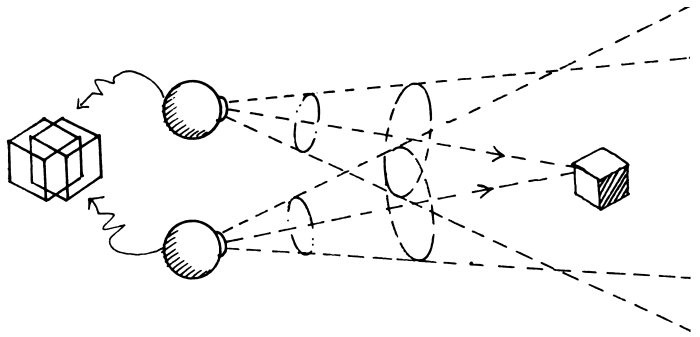
Vertically, our vision is limited to about 140 degrees, our sight being cut off by eyebrows, eyelids, and cheeks.



When we use both eyes, our cone of vision is a combination of two overlapping cones, one from each eye.

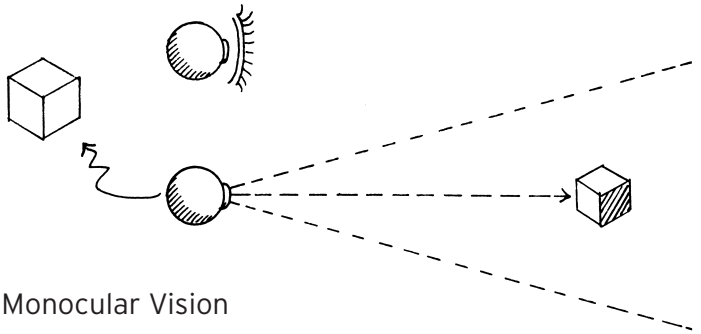
Optics of the Eye Relative to the Cone of Vision

Each eye perceives the object from a slightly different angle. This gives the brain a strong cue as to the depth of the object. The brain harmonizes both two-dimensional views and creates a three-dimensional image.



Binocular Vision

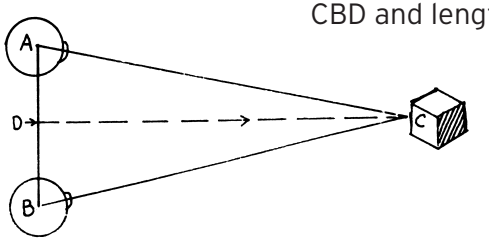
In perspective drawing, it is necessary to use only one eye. Remember that the perspective system is based on one point of view. In other words, the two-dimensional drawing is based on the two-dimensional view from a single eye.



Monocular Vision

Our eyes remain at a constant distance from each other as they angle toward the object of focus. Thus, through a kind of intuitive triangulation, we are aided in estimating the distance to the object. This intuitive aid is lost when only one eye is used; as a result, there will always be a marked difference between the drawn image and the observed world. Stereoscopes and stereo cameras attempt to put this vision back together by showing slightly different views to each eye, thereby creating a sense of depth artificially.

With geometry, one can find distance DC if angles CAD and CBD and length AB are known.

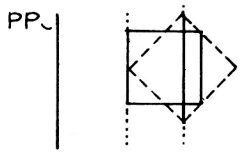


Depth Perception and Stereo Vision

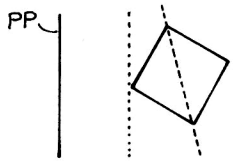
FOUR PERSPECTIVE ANGLES

The angle at which the object is viewed through the picture plane is an important factor in determining the method of drawing a perspective view.

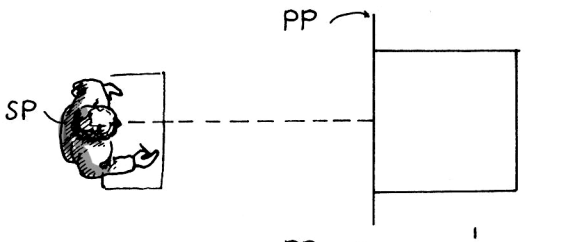
One- and two-point parallel perspective can have a major axis parallel to the picture plane.



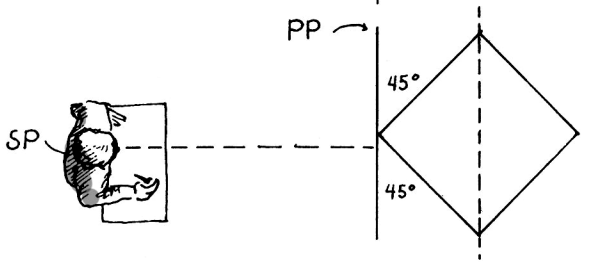
The object can be at an angle to the picture plane, so that not even its 45-degree diagonal is parallel.



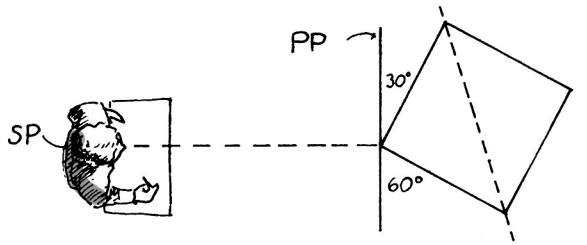
Three-point perspective can be drawn with either of the above object angles.



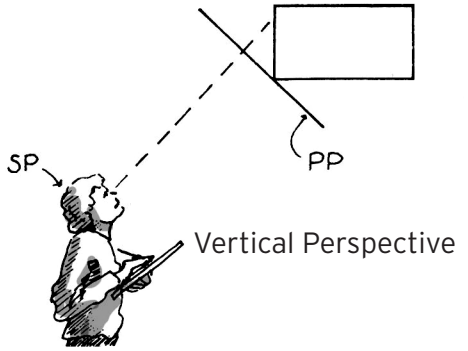
One-Point Parallel Perspective



Two-Point Parallel Perspective



Two-Point Angular Perspective



Vertical Perspective

Three-Point Angular or Parallel Perspective

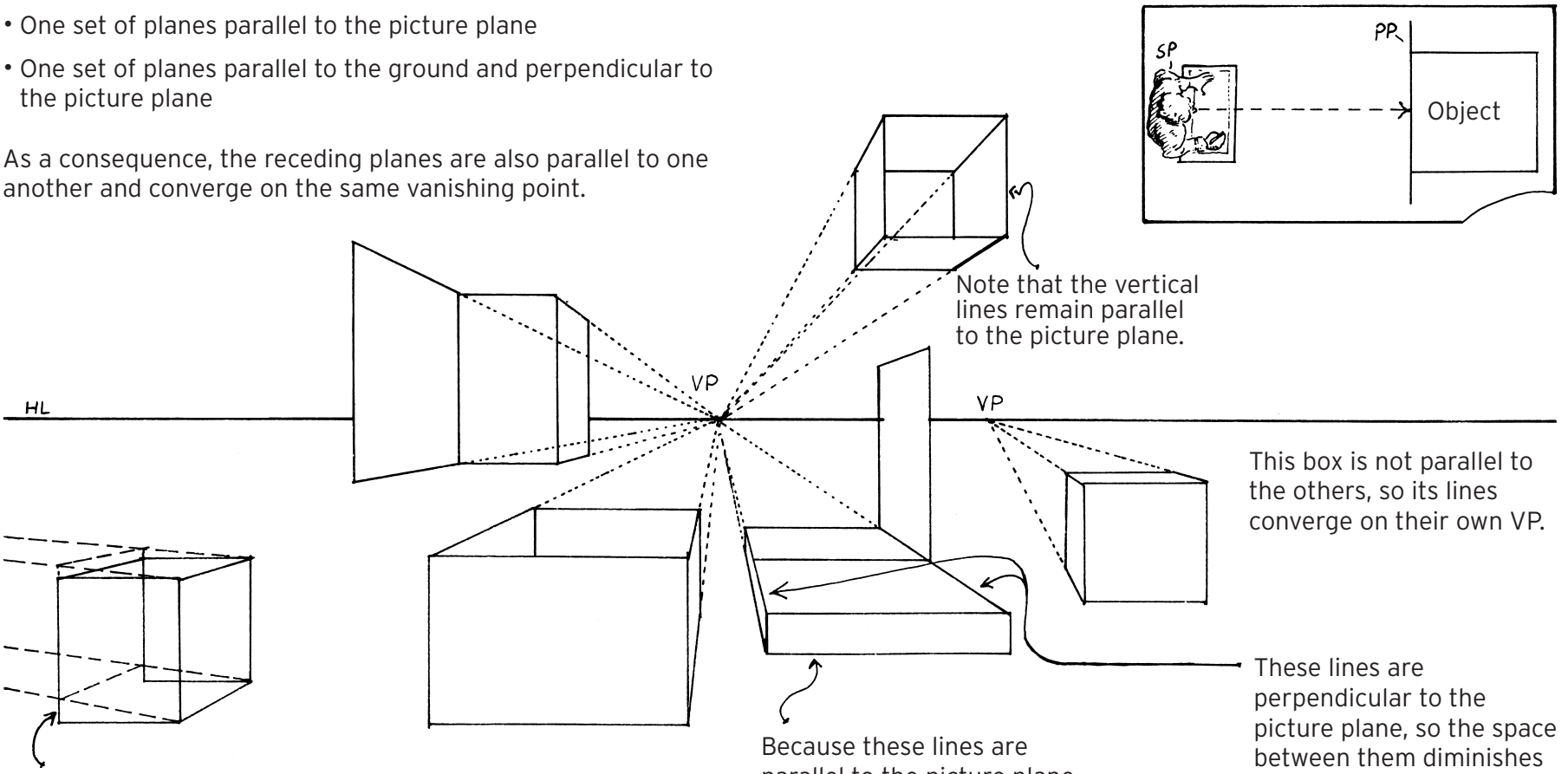
Here, "point" refers to the number of vanishing points in each type of view.

One-Point Parallel Perspective

The rectilinear objects shown here have the following characteristics:

- One set of planes parallel to the picture plane
- One set of planes parallel to the ground and perpendicular to the picture plane

As a consequence, the receding planes are also parallel to one another and converge on the same vanishing point.

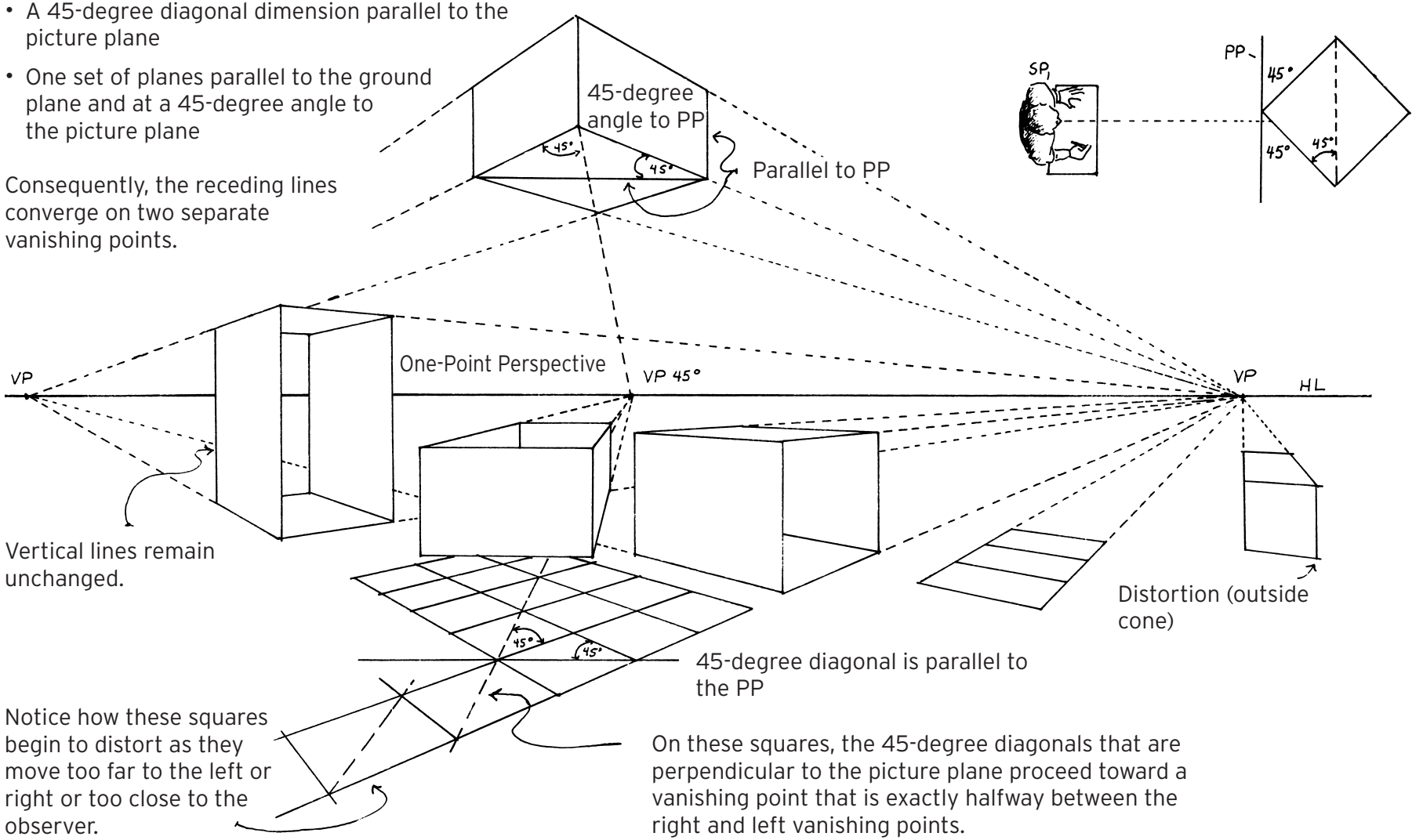


Two-Point Parallel Perspective

The rectilinear objects shown here have the following characteristics:

- A 45-degree diagonal dimension parallel to the picture plane
- One set of planes parallel to the ground plane and at a 45-degree angle to the picture plane

Consequently, the receding lines converge on two separate vanishing points.

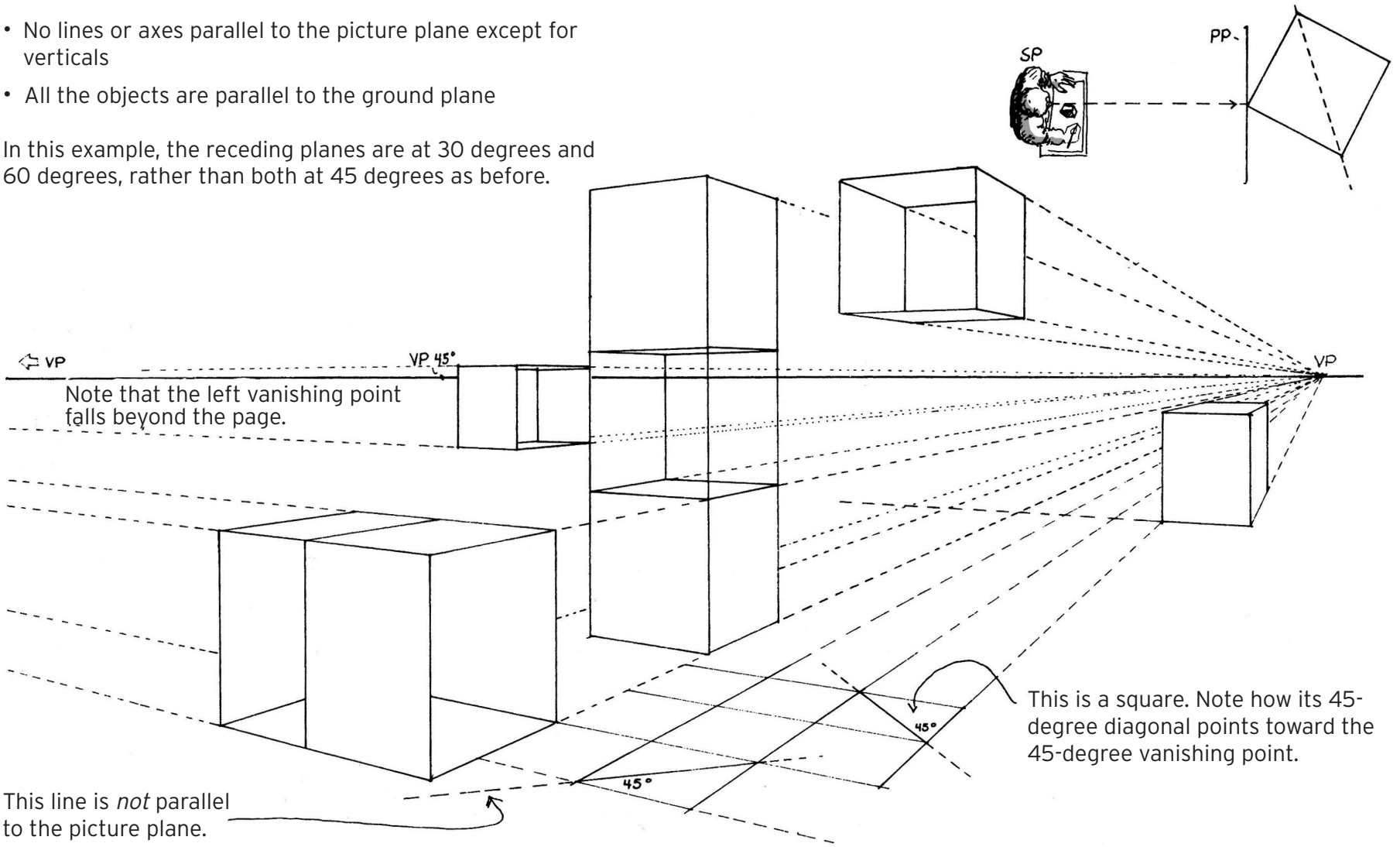


Two-Point Angular Perspective

The rectilinear forms shown here have the following characteristics:

- No lines or axes parallel to the picture plane except for verticals
- All the objects are parallel to the ground plane

In this example, the receding planes are at 30 degrees and 60 degrees, rather than both at 45 degrees as before.

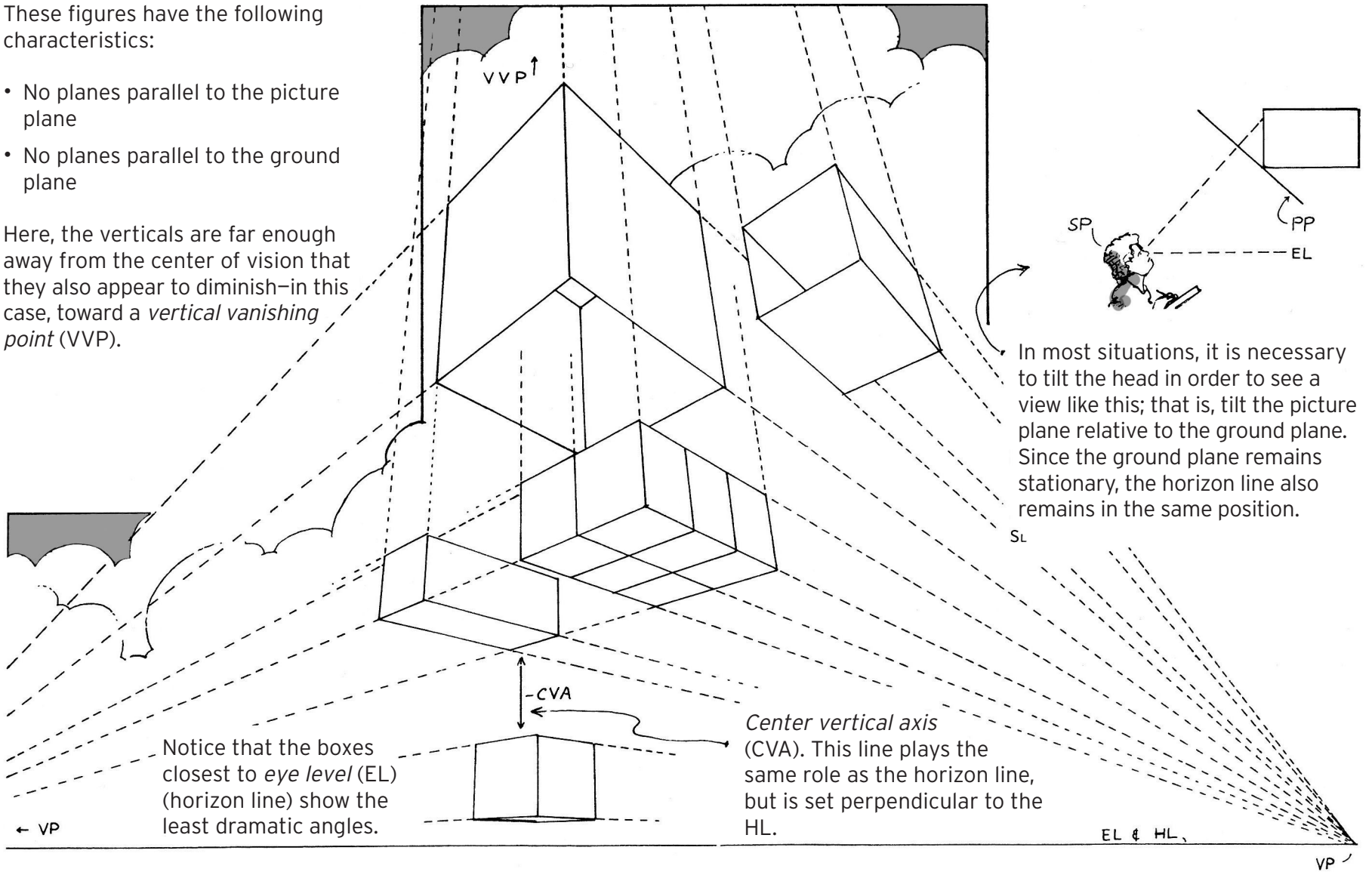


Three-Point Angular or Parallel Perspective

These figures have the following characteristics:

- No planes parallel to the picture plane
- No planes parallel to the ground plane

Here, the verticals are far enough away from the center of vision that they also appear to diminish—in this case, toward a *vertical vanishing point* (VVP).



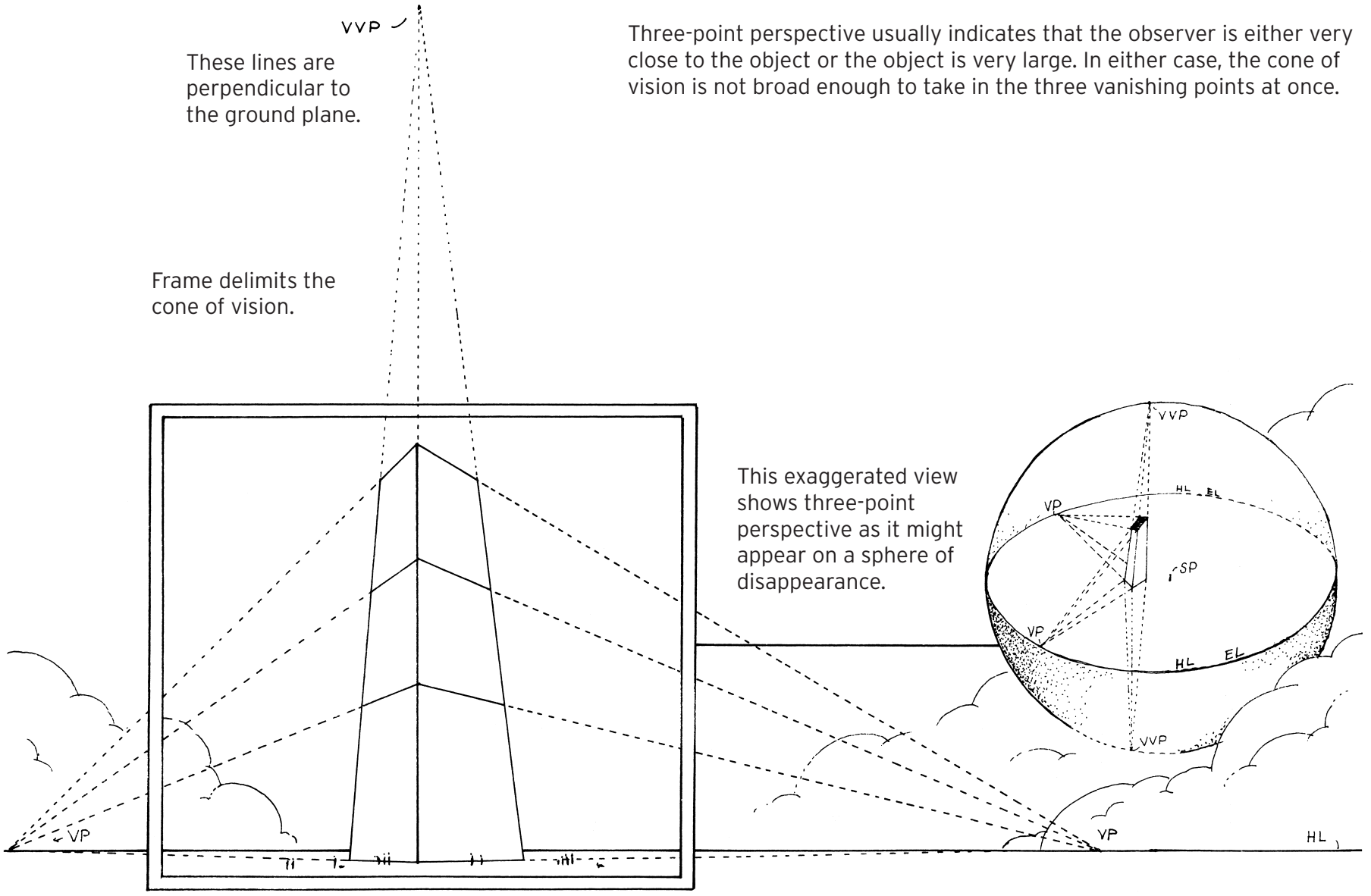
In most situations, it is necessary to tilt the head in order to see a view like this; that is, tilt the picture plane relative to the ground plane. Since the ground plane remains stationary, the horizon line also remains in the same position.

Notice that the boxes closest to *eye level* (EL) (horizon line) show the least dramatic angles.

Center vertical axis (CVA). This line plays the same role as the horizon line, but is set perpendicular to the HL.

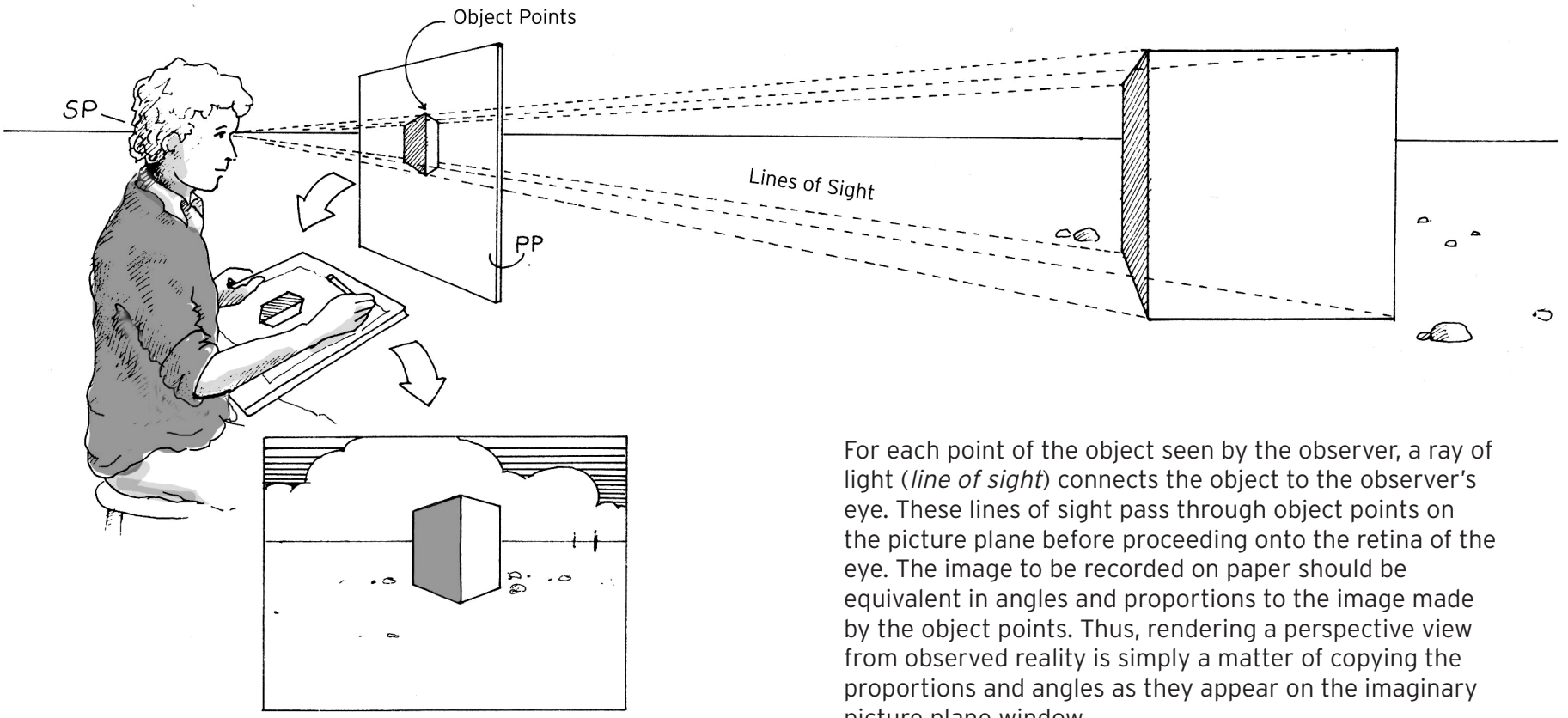
Turn this image upside down for an aerial view of the verticals diminishing downward.

Three-point perspective usually indicates that the observer is either very close to the object or the object is very large. In either case, the cone of vision is not broad enough to take in the three vanishing points at once.



RENDERING PERSPECTIVE VIEWS FROM OBSERVED REALITY

2



For each point of the object seen by the observer, a ray of light (*line of sight*) connects the object to the observer's eye. These lines of sight pass through object points on the picture plane before proceeding onto the retina of the eye. The image to be recorded on paper should be equivalent in angles and proportions to the image made by the object points. Thus, rendering a perspective view from observed reality is simply a matter of copying the proportions and angles as they appear on the imaginary picture plane window.