5

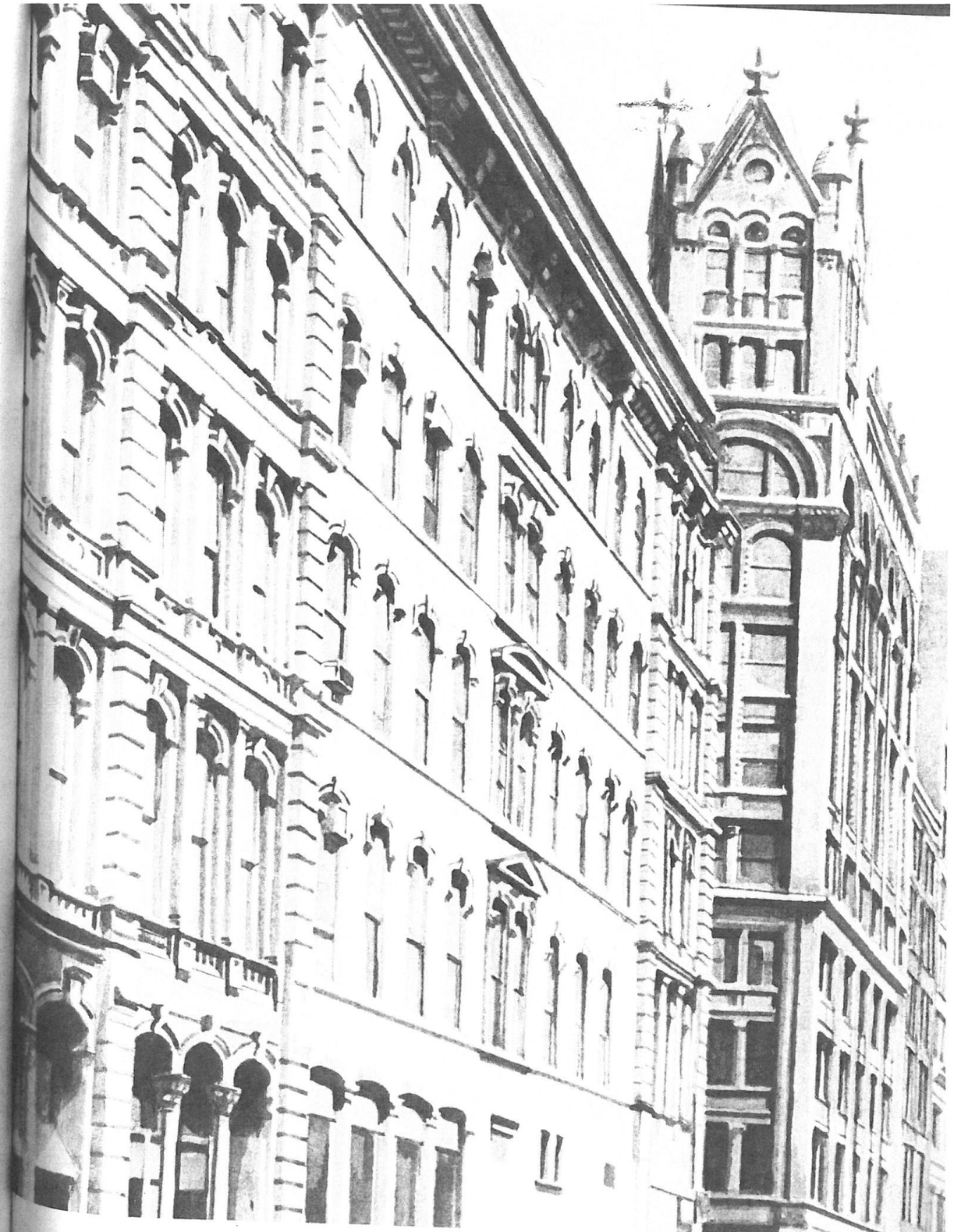
THE ILLUSION OF DEPTH

OVERLAPPING FORMS • DIMINISHING SIZES • CONVERGING LINES • SOFTENING EDGES AND CONTRASTS • DRAWING THROUGH • SIGHTING ANGLES • USING EYE LEVEL AND VANISHING POINTS • DRAWING ELLIPSES

Recently I asked a friend, a novice at drawing, to sketch the corner of his living room for me. He began confidently, first drawing the vertical line where the walls joined. Next he drew the joint where one of the ceiling beams met the wall. Then he was stuck. He had observed that the beam appeared to be on a slant, but every time he started to draw it, he was stopped by the knowledge that the beam was actually level. He couldn't decide which way to make it.

I've seen this paralyzing conflict between seeing and knowing many times in beginning students. Often they will want to turn their paper over and start again, hoping the problem will resolve itself with a fresh start. I insisted, however, that he stay with his original drawing, and I encouraged him to overrule his knowledge that the beam was level in favor of his seeing that the beam was slanted. To reinforce this choice, I had him hold his pencil level in front of him and compare it to the angle of the beam. The beam did indeed appear slanted, and that gave him the confidence needed to draw it that way. By trusting his eye and occasionally using his pencil/level to clarify, he was able to convey a credible three-dimensional room.

Creating depth in a picture is largely a matter of drawing what you see. For those times, however, when you simply don't understand what you're seeing, or desire more exactitude, or wish to push the depth illusion, you will need a few concepts to reinforce your observations. In this chapter, we will cover devices that create and enhance the illusion of depth. You will learn the principles of perspective and some quick methods to check your observations.

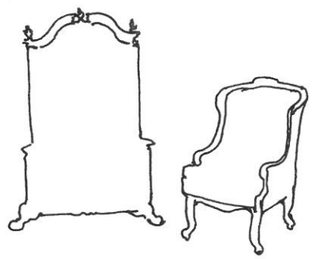


Richard Haas, *18th Street and Broadway*. From a photograph.
Brooke Alexander, Inc., New York

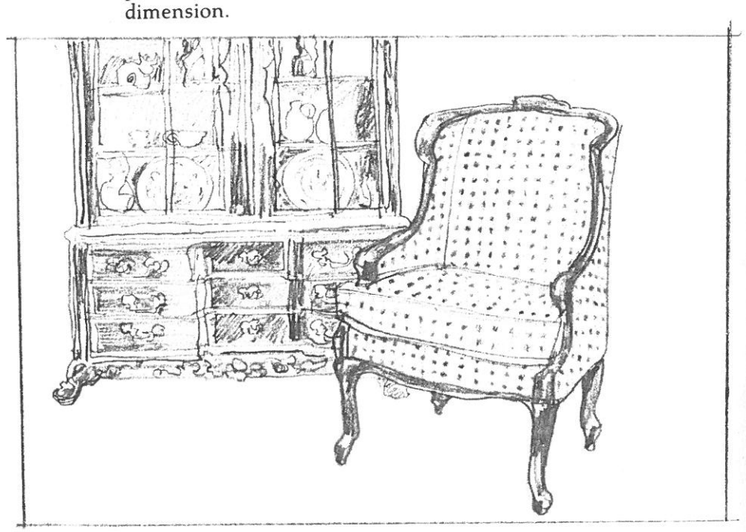
Four ways of creating depth

The illusion of depth is created by devices which mimic the way the eye sees three-dimensional space. For the most part, these devices are simple and readily understood. Four are shown here:

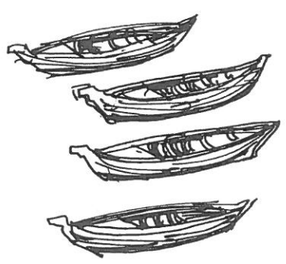
Overlapping shapes—When two shapes overlap, the eye perceives one as being behind the other, thus creating a third dimension.



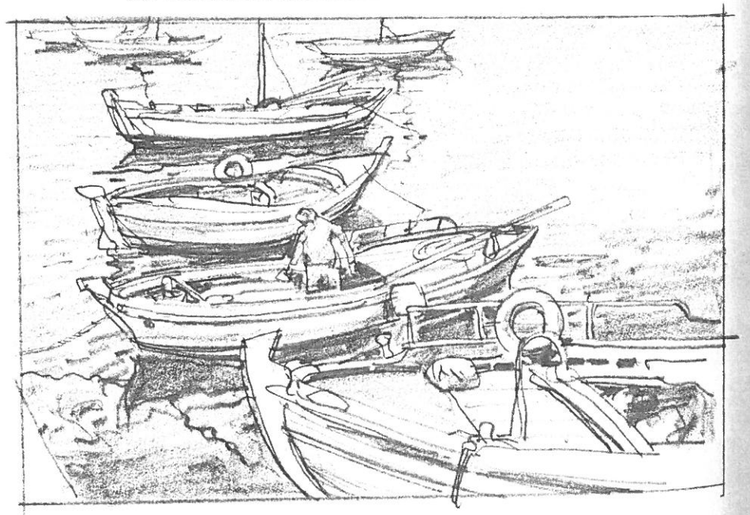
Simply by overlapping, a sense of space is achieved between the chair and the dresser.



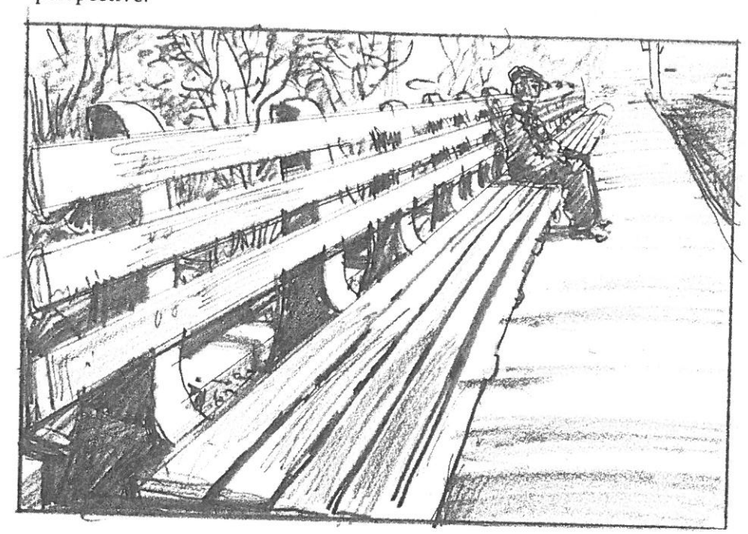
Diminishing sizes—Same-size objects which recede into the distance appear to get smaller. Even objects of irregular size, such as clouds, are better able to suggest depth if those nearer the horizon are drawn smaller.

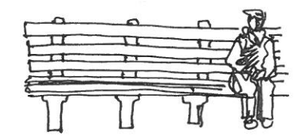


By drawing these boats different sizes, you "place" them in space.



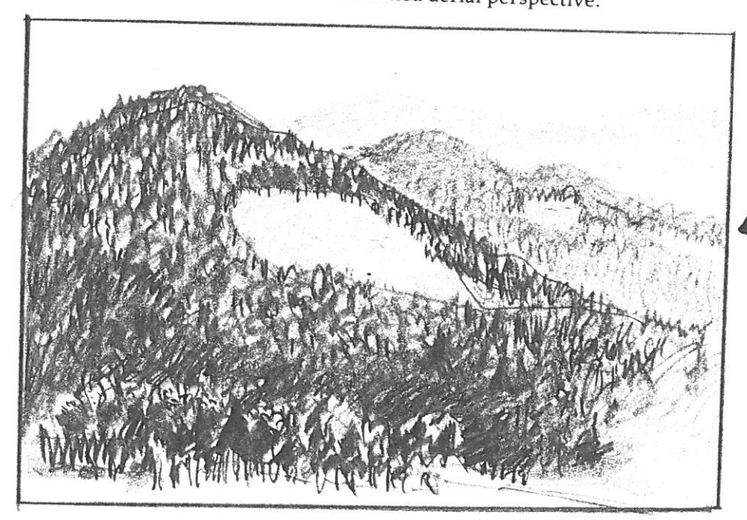
Converging lines—Sets of parallel lines like highways, railroad tracks, and telephone lines will appear to converge as they meet the horizon. This phenomenon is the basis for linear perspective.





We know that the slats of this bench are parallel, but, viewed from one end, they appear to converge at the far end.

Softening edges and contrast—As objects become more distant, the intervening atmosphere will soften edges and lessen contrasts. This is sometimes called aerial perspective.



Because of intervening atmosphere, these hills become increasingly softened and blurred as they recede into the distance.

Intensifying depth

The four characteristics of depth on the preceding page are not only principles of seeing distance, they are keys to drawing it as well. Easy to remember and requiring no special knowledge, they are especially handy in enhacing the depth illusion. Subtly emphasizing each characteristic deepens the picture space and intensifies the viewer's experience. To that end, we should feel free to exaggerate or even invent when necessary.

Overlapping objects creates an instant three-dimensional effect. If you're doing a still life, overlap the objects when setting them up or simply move one shape behind another on the paper. If you're drawing a distant landscape, you can increase the sense of space by putting something in the foreground to serve as an overlap. If a near tree, for instance, doesn't exist in your scene, you might borrow one from another view.

Diminishing size is a well known aspect of depth perception. You can emphasize the phenomenon by deliberately shrinking background objects further in order to enhance the feeling of depth.

A random selection of shoes . . .

. . . placed in overlapping positions conveys a sense of depth.

Converging lines also do a great deal to convey receding space. Even a few fanning lines such as those of floorboards or table tops can make a difference. Also known as perspective, the art of converging lines will be discussed in more detail later in the chapter.

Softening edges and contrasts is usually reserved for distant backgrounds where detail and color are lost, but you may impose the same principle within the confines of a room or on a shallow still life. You can suggest depth in these cases by slightly blurring the edges or the more distant areas and sharpening the details of those nearer, even if the difference is just a matter of a few inches.

It doesn't take much of this sort of thing to intensify the illusion of depth. A little emphasis here, a softening there, a slight enlarging, a subtle rearranging — when used in combination, they exert a powerful cumulative effect. This kind of invention invites the viewer to look into the drawing as well as at it.

The illusion of depth is increased with the addition of diminishing sizes, converging lines, and softening edges and contrasts.

Project 5 - A — Intensifying With Depth Principles

Set up six or eight cartons and old rummage items such as stacks of magazines and children's toys. Arrange them haphazardly but ensure that they go back in space. Make a drawing of them, intensifying with the four depth principles. Unless you can place these items on a tile floor or wooden floor boards, you may need to omit the converging lines principle. Draw the shapes by eye but feel free to exaggerate, adjust, and change what you see to deepen the sense of space. Use rubbing and erasing techniques to soften the most distant objects. Do not include a background. Work in pencil or charcoal and allow one hour.

Shape drawing of coffee cup . . .

. . . coffee cup "drawn through."

Project 5 - B — Drawing Through

From direct observation at any angle you wish, make a pencil drawing of a chair. First construct by drawing through a three-dimensional cube that corresponds to the legs and seat of the chair. The four points upon which the legs rest will comprise the corners of the cube's base. The seat of the chair will comprise the cube's top. Superimpose the chair over the cube, mixing shape drawing with drawing through. Draw what you see and, in this case, what you don't see, such as the points where the chair legs attach to the underside of the seat. Draw the trapped shapes created by the chair's struts. Use the sighting strategies to measure angles and to compare heights with widths. Work in line; do not be concerned with light or shade. Restate as necessary. Allow 20-30 minutes.

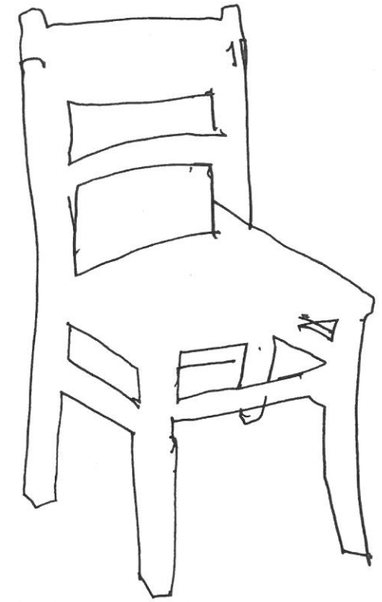
Drawing through — a method for experiencing depth

One of the best ways to create a convincing three-dimensional effect is to actually experience the third dimension as you draw by means of a method called *drawing through*. In drawing through, we act as though our subject were transparent. We draw both what is seen and what is unseen, and we go beyond just drawing the outer shape to capturing the underlying structure. In this way we get a felt sense of volume and depth in space.

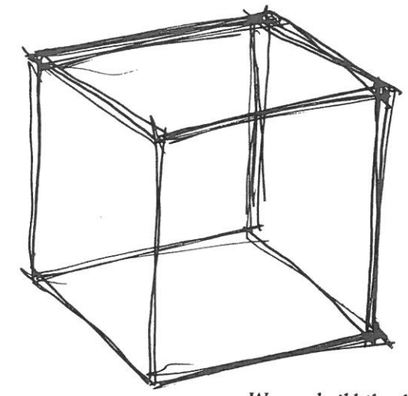
You will recall from Chapter 4 that all objects can be reduced to just four basic forms: the sphere, the cube, the cylinder, and the cone. In drawing through, you go one step further and treat your reduced forms as if they were made out of glass. If you were drawing a layer cake, you would draw not only the top ellipse but the bottom and center ones as well. If you were drawing a chair, you would imagine that the seat, four legs and floor comprised a cube, and you would draw, albeit lightly, right through the seat and get all six sides. As a result, you would avoid lopsidedness and the illusion that any part of the object was floating. When I want to be sure that an object like a box, a jar, or the wheels of a car look planted squarely on the surface, I make use of drawing through. It's a simple way to help prevent a lopsided box, a flattened jar, or a floating tire.

Another good drawing-through subject is the human figure. With its neck, torso, and limbs, the figure can be looked on as a set of modified cylinders. I especially like to draw through belts, necklaces, watches, collars, cuffs, and anything else that encourages my pencil to go around rather than across the cylindrical form. If you take the pains to lightly draw through in this way, you will be surprised at what a sense of solidity and dimension you achieve. Of course, if you try to draw through every form in your picture, you'll end up with a hopeless tangle of lines. Drawing through is a method that is best used sparingly and when symmetry and structure are important. With practice, you'll be able to accomplish drawing through without making a line.

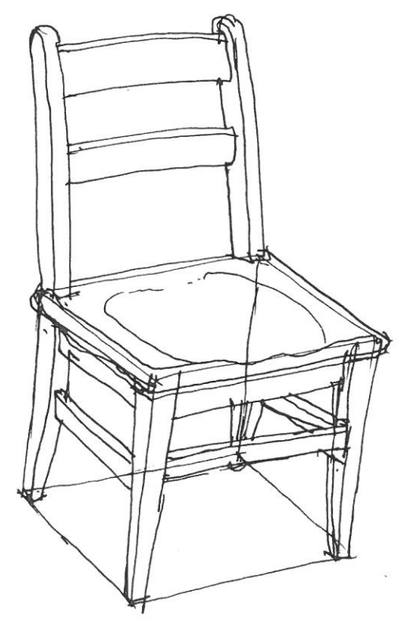
Years ago I worked as an instructor at the Famous Artists School in Connecticut. One of the assignments I regularly corrected required that the student draw a barn and silo which are a modified cube and cylinder. In the years I worked there, I corrected thousands of barns and silos of all types and from all angles. My repeated redrawing of student errors deeply ingrained in me the advantage of drawing through. My eye became trained to see the basic forms underlying all structures, and now, even when I don't use the method, I clearly see things in solid three-dimensional terms, making drawing considerably easier for me.



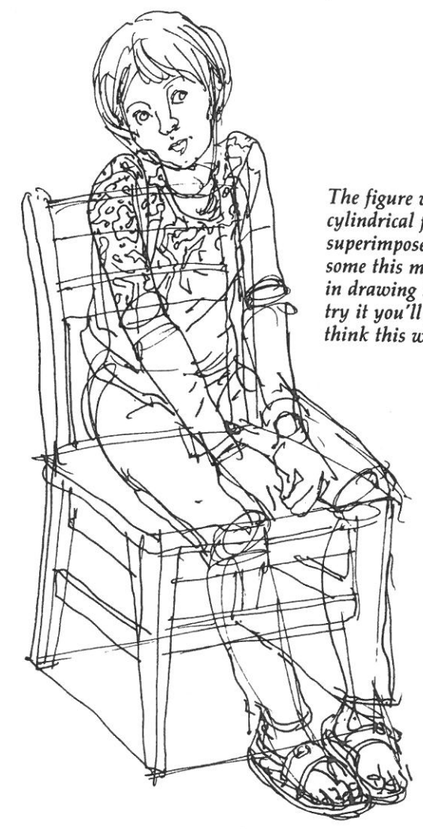
This shape drawing of a chair gives us a good sense of the "character" of the chair but lacks accurate structure.



We can build the chair in space when we establish a basic cube by "drawing through" to all four sides.



Seat and chair legs contain within them this basic cube. Now the chair rests firmly on the floor.



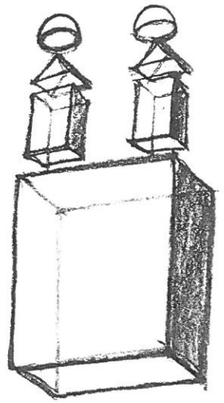
The figure with its basic cylindrical forms can be superimposed over the chair. For some this may be going a bit far in drawing through, but if you try it you'll gradually learn to think this way.

Thinking of structure

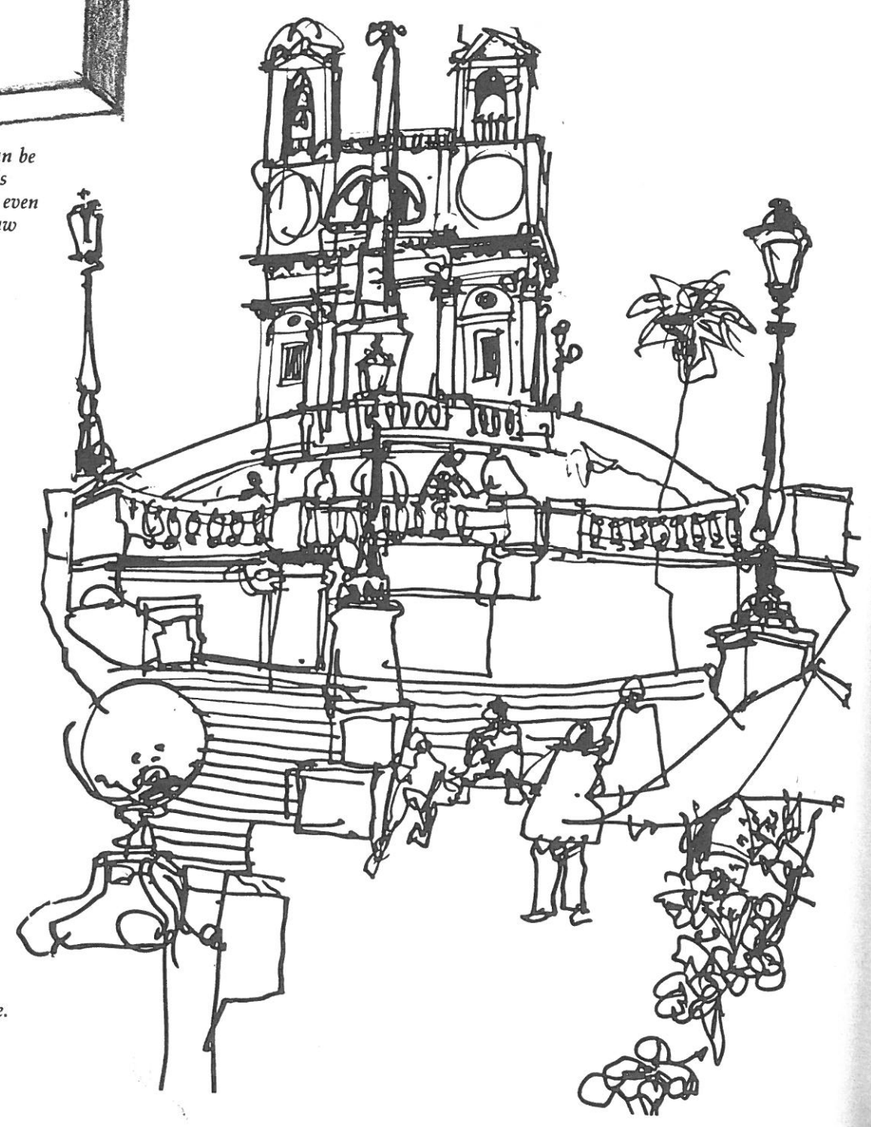
In many sketching situations, particularly with architectural subjects, you're simply trying to get as much information down as quickly as possible. You haven't time for lengthy analysis or precise perspective. You know that much of architecture is a series of basic cubes, and you also realize that a lot of drawing through will tend to be confusing and perhaps spoil the charm of the sketch. In such cases, I like to substitute *thinking through* for drawing through.

In my mind, I imagine the building as a group of boxes stacked and clustered in various arrangements. Often I move my pencil in the air as if drawing through. If I'm not too rushed, I might even do a preliminary "study of boxes" to really understand what I'm looking at. Most of the time, however, I'll just plunge right in, keeping the cube principle in mind while I work.

You'll notice there is an obvious freehand quality to the sketches on these pages. Although you won't always want to work this loosely, it's a good idea to learn to draw buildings by eye and without the need of a straightedge. In spite of the helter-skelter look you'll sometimes create, this approach helps prepare you for more precise studies.

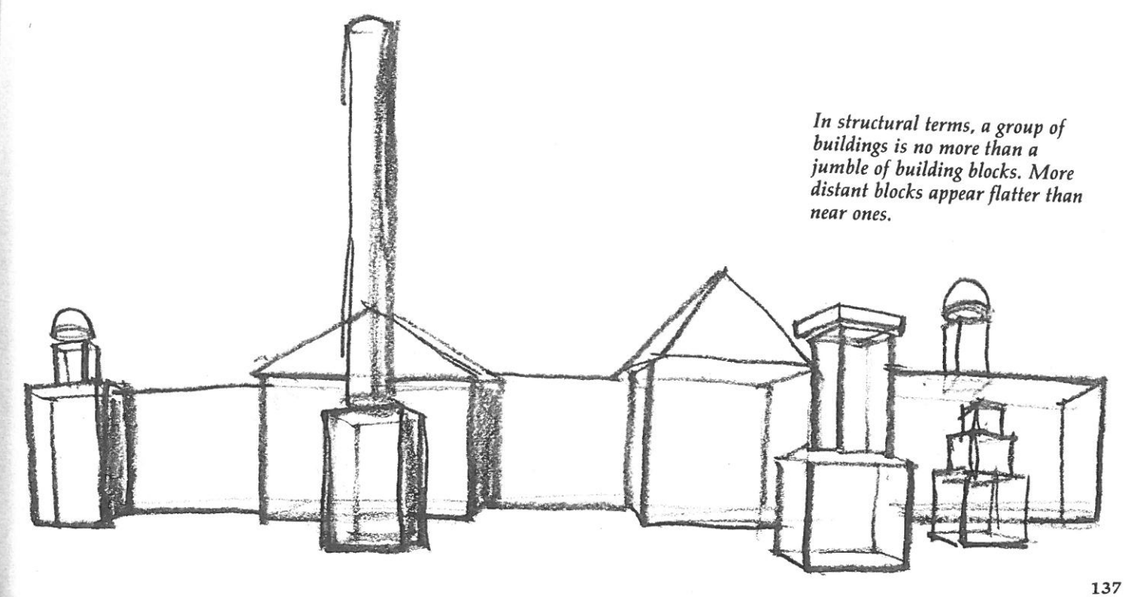


Every geometric structure can be reduced to its basic form. It's good to think in these terms even when you don't actually draw through.



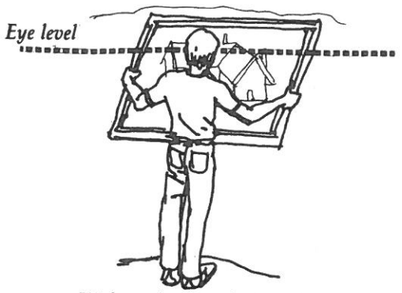
The Spanish Steps, Rome.

Trafalgar Square, London.

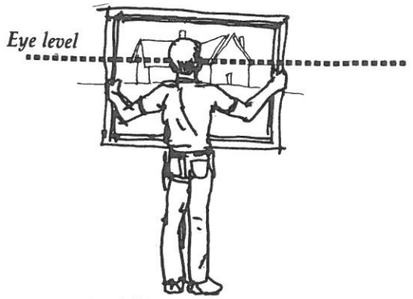


In structural terms, a group of buildings is no more than a jumble of building blocks. More distant blocks appear flatter than near ones.

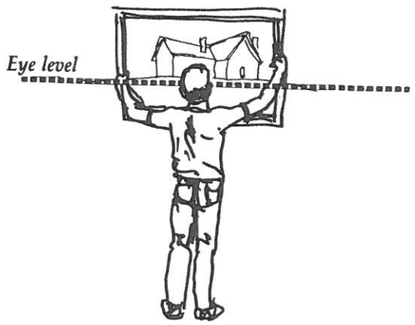
Everything in your picture will be related to your eye level.



High eye level — looking down at objects.



Middle eye level — looking across at objects.



Low eye level — when looking up at objects, your eye level is low.

Perspective — a visual approach

Linear perspective is a formalized system for drawing three-dimensional space, particularly where straight, parallel lines are concerned. It's an elaborate system open to a wide spectrum of study. At one end is a strict set of rules involving precise calculations and mechanical drawing instruments. At the other end of the spectrum are a few simple principles which aid observation.

This book takes the latter, more casual, approach to perspective. I want you to be able to go out sketching and successfully tackle a Victorian house or a city street if you choose. Those of you who become intrigued with complex architectural scenes and the science of perspective can obtain books which explain the formulas in detail. For the rest of us, a rudimentary knowledge of the principles of perspective is all we need to use it effectively. A general grasp, coupled with good obervation, is enough for most working artists.

Eye level and vanishing points

Take a moment and look at one of the corners of your room. Look straight out as if you were gazing past the walls and all the way to the horizon. Imagine that, in front of you floating is a horizontal line that cuts right across your corner. This is your eye level or horizon line — the two terms are used interchangeably.

Notice that all the horizontal lines above your eye level, like the window lintels, the top of the door frame, and the ceiling molding, appear to slant downward as they go away from you. All the horizontal lines below the eye level, such as table edges, window sills, and base boards, appear to slant upward. If there happens to be a horizontal line exactly at eye level, it will have no slant. The vertical lines of doorways, window, and walls remain vertical because they maintain, more or less, the same distance from you throughout their length. This is the essence of perspective.

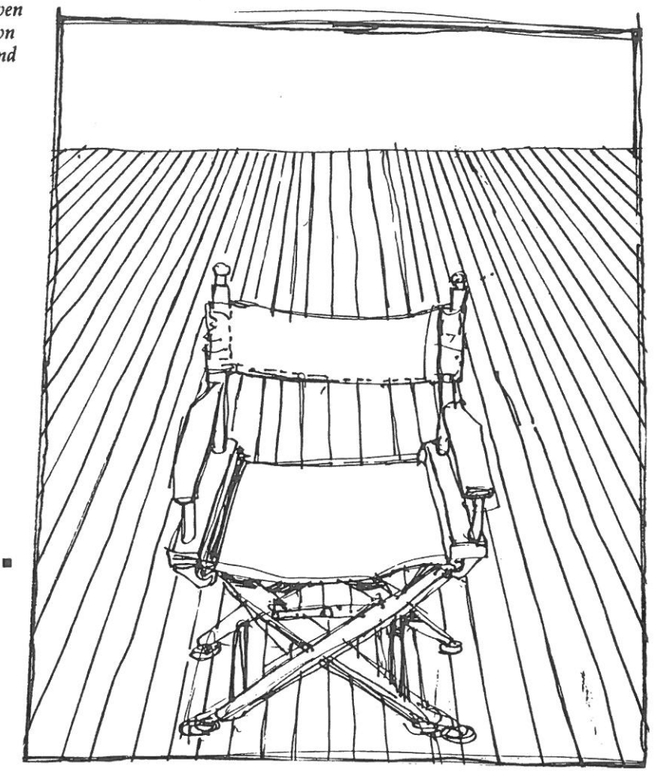
If you're drawing loosely, you might simply measure the angles of the converging lines by eye, reinforcing what you see by occasionally sighting level lines as discussed in Chapter 3. For greater precision, and to fit the whole into a cohesive scheme, you'll sometimes want to rely on the perspective system of vanishing points.

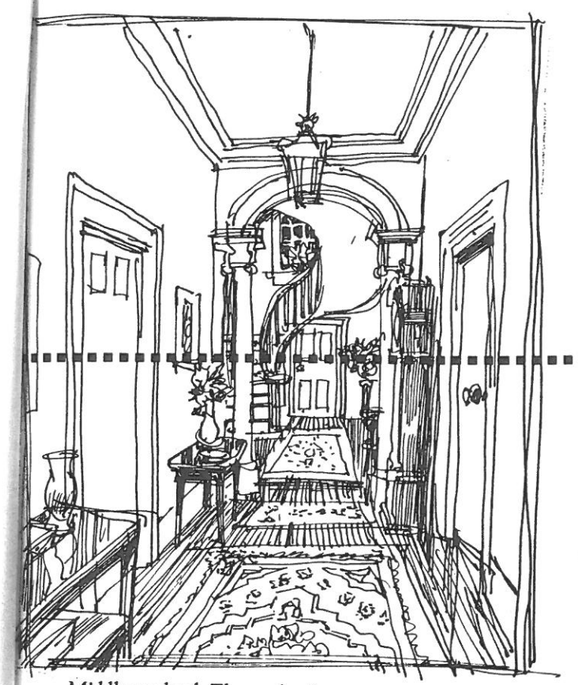
A vanishing point is a spot where parallel lines appear to meet. All parallel horizontal lines going back into space will appear to converge at a point somewhere on the eye level. These points give you an exact method for determining the angle of each and every receding horizontal line.

Sometimes eye level and vanishing points are located on your paper and sometimes they are not. Sometimes you have one and not the other. When the horizon line and both vanishing points are on the paper, you have an easy time of it. If you have an extreme over or under view, however, the horizon line will be above or below your paper, and, more times than not, one or both vanishing points will be off to either side.

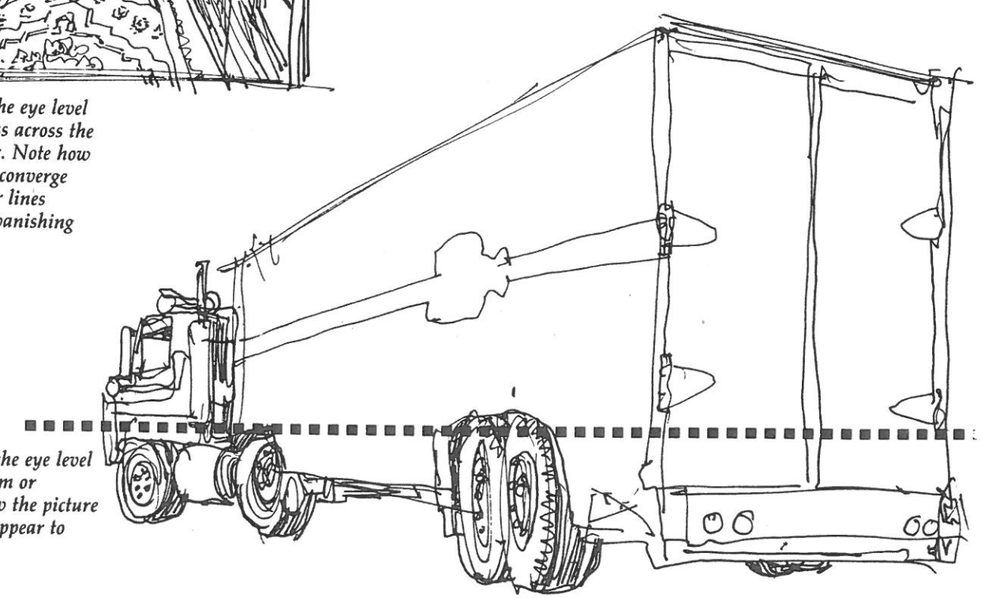
If you are drawing at a large table, you can treat its surface as an extension of your paper, establish the horizon line out there and use push pins or dots to mark your vanishing points. Sitting outdoors with a sketchbook in your lap, however, requires that you imagine their locations and estimate the slant of the converging lines. It takes practice to work beyond your paper in this way, but it can be done.

High eye level: The eye level line is in the upper portion of, or even above, the picture area as shown here. Note how floor boards tend to converge.





Middle eye level: The eye level line cuts more or less across the center of your paper. Note how ceiling lines tend to converge downward and floor lines upward to a single vanishing point.



Low eye level: Here the eye level line is near the bottom or sometimes even below the picture area. Parallel lines appear to converge downward.

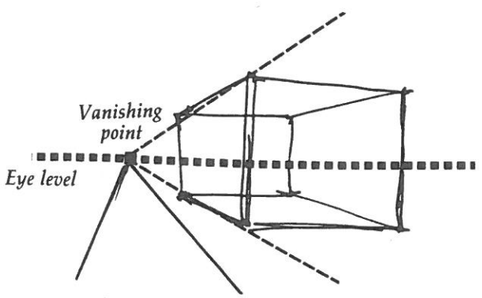
Project 5 - C — A One-Point Perspective Drawing

Make a drawing looking toward the far end of a long room, church, or hall. Include the sides of the room and all windows, doorways, and furnishings in your scene. Establish your eye level line lightly on your paper. Estimate the vanishing point and indicate it as well. All lines parallel to the side walls will appear to converge at this vanishing point. Draw free by hand, by eye, and restate as necessary. Use pencil or pen. Allow one hour.

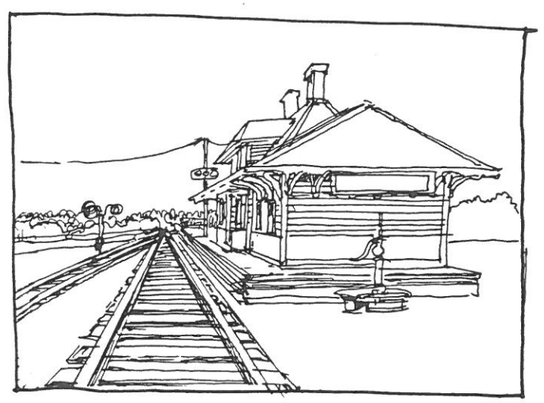
Perspective with one vanishing point

We need only one vanishing point when we orient ourselves squarely down a street, hallway, or room or look at the end or side view of a chair, building, or vehicle.

We don't need mathematical formulas for finding the eye level and the vanishing point. We establish these by simply observing. Looking directly down the railroad tracks in the example on this page, we can see clearly how the parallel rails converge at the horizon. When both eye level and vanishing point are contained within the picture area, as they are in this case, drawing is made a lot easier. The lines parallel to the tracks such as the front of the station, the platform, the station roof line, windows, and doorways also run to the same vanishing point. We could lay a straight edge from each of these to the vanishing point and draw them with considerable precision, or we could simply estimate the angles using the vanishing point as a guide. In most sketching situations we would choose the latter.

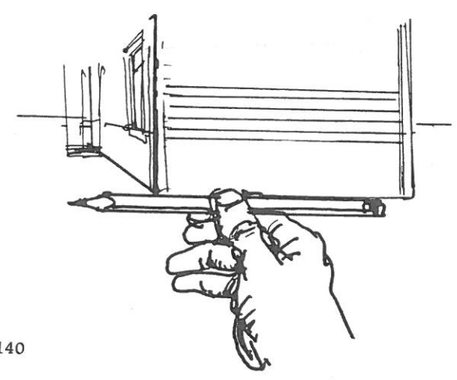


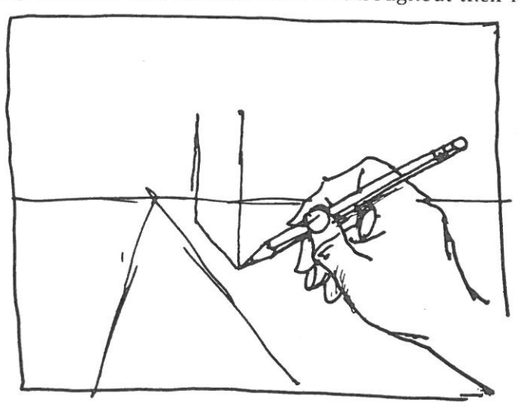
Parallel lines appear to converge at the eye level whether high, low, or middle.



In the one-point perspective view, the railroad ties and this side of the building are so nearly parallel to our eye level that they can be treated as straight horizontal lines. Be aware of the diminishing sizes of the railroad ties. Not only do they get narrower and shorter as they recede, they also get closer together as do the spaces between the doors and windows of the depot.

The vertical lines are all straight and parallel because they maintain their distance from us throughout their length.





Perspective with two vanishing points

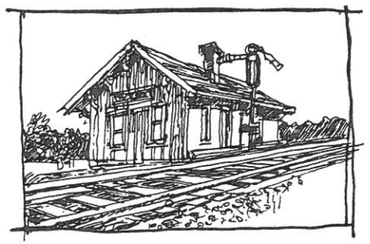
When two vanishing points are involved, as when we face into a corner of a building, room, or other geometric object, we can be pretty sure that at least one vanishing point and sometimes both will be outside the picture area. This adds more guesswork because we have to imagine the vanishing point in space beyond our page. For this reason, we'll want to employ the sighting strategy from Chapter 3.

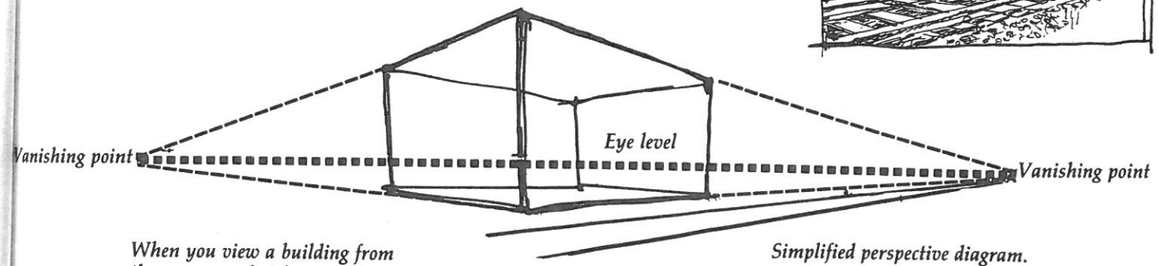
To sight angles, simply hold your pencil level in front of you, closing one eye and comparing any angle in your subject with the horizontal of your pencil. When you draw that angle, use the horizontal edges of the paper as a guide. From time to time, you'll want to check the accuracy of your angles by asking yourself, "Do all the parallel lines of each plane seem to be converging toward the same point?" You can judge this with reasonable accuracy even when the point is off your paper.

In all this discussion of measuring and checking, let's not lose sight of the fact that for the most part we are drawing by eye, using the look-hold-draw process discussed in Chapter 1. Do your measuring after you've already sketched in some of the lines. Loosely capturing the big picture and then modifying it is easier than preplanning each line before you put it down. It's also less mechanical. Measuring by sighting and checking with perspective should be used as a basis for restating and refining.

Project 5 - D — A Two-Point Perspective Drawing

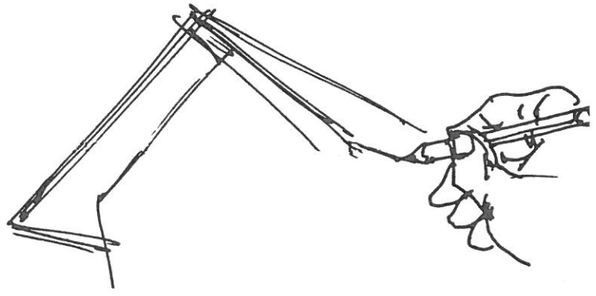
Make a drawing looking toward one corner of a house. Show the entire house, and as you draw imagine it as a large simple cube. Establish your eye level line lightly on the paper. Notice how the roof line and the foundation line of each of the two sides you see appear to be converging toward separate vanishing points on the eye level. Imagine the location of those two points in space on either side of your paper. Sight level lines to estimate the angles. Use pencil or pen and restate as necessary. Allow one hour.





When you view a building from the corner, each side appears to converge at a vanishing point on the eye level.

Simplified perspective diagram.



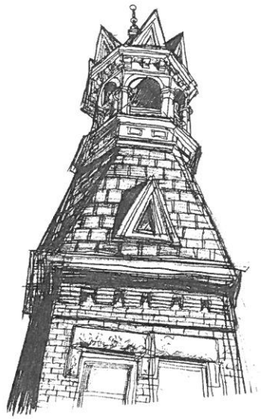
You can measure angles by sighting or by the perspective method in which parallels are drawn to the vanishing point.

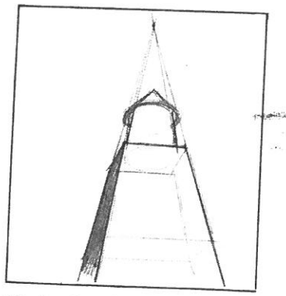
Vanishing points not on the eye level

So far in our discussion we've considered a perspective view of things that are looked at straight on. In such cases only the horizontal lines appear to converge while all the vertical lines remain parallel and vertical. But what happens in the case of tall buildings, for instance, when we must look up or down at objects near us?

Here we confront a new problem. As we look up at a building, the parallel sides recede from us so they too will appear to converge at a point *above* the building. This requires an extra vanishing point since we will still have one or two vanishing points on the horizon. The same situation occurs when we look down at objects and the extra vanishing point is located *below* it.

In a third case, where the planes are pitched at various angles not parallel to the ground, as in the case of a many-faceted roof top, you may have multiple vanishing points not on the eye level. It's rarely important, for our purposes, to determine the exact location of these points. We only need to develop the ability to observe the convergences. Simply by being aware of the vanishing point in space, you can feel its pull as you draw. The vertical lines of the cabinet doors and stove in the sketch at lower right generally tend toward convergence even though they are sketched in.





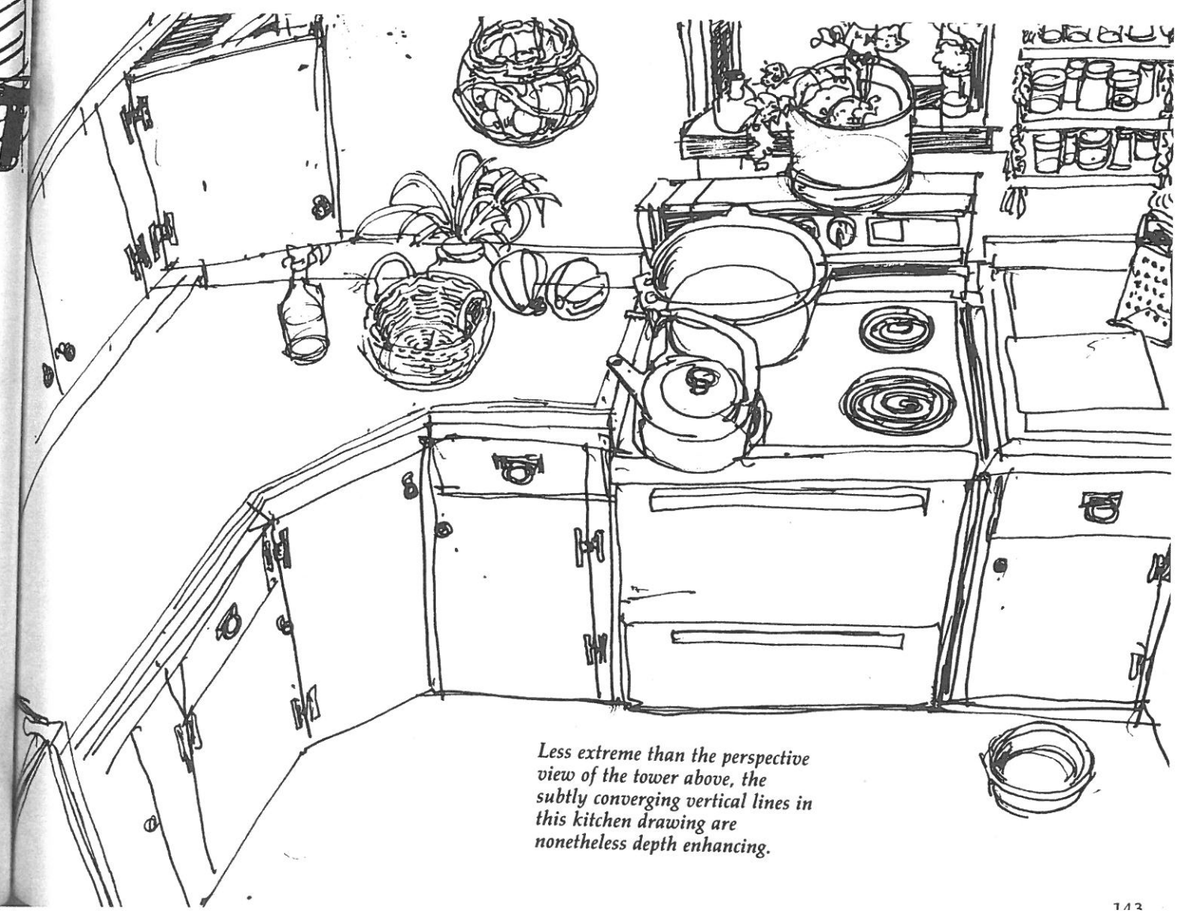
It's hard to draw while looking up at something in this way . . .

. . . but it helps to realize that the tower is a basic rectangle, the sides of which are converging toward a vanishing point somewhere above it.

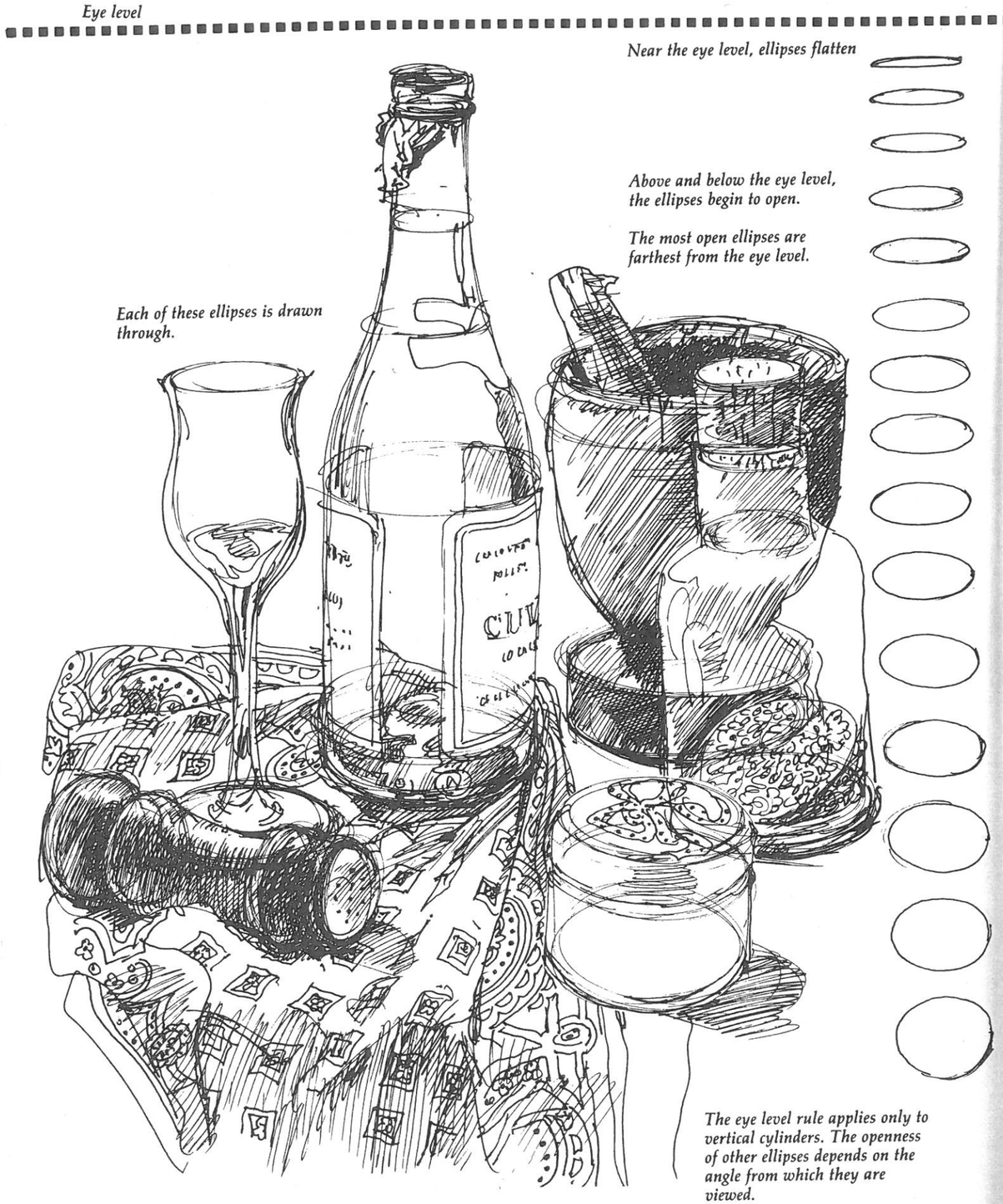
Eye level and vanishing points are basic to an understanding of linear perspective. My advice is to reread, study the illustrations, continue your drawing through, and see architectural subjects as boxes. You will soon find yourself making use of these two important tools to confirm what you already see.

Project 5 - E — Looking Down on Objects

Make a drawing looking down on objects from a high vantage pont, such as lower buildings seen from a high window or a view from a balcony into a room below. By holding your pencil out vertically, observe how all vertical lines appear to be converging at a point somewhere below. Imagine the location of that point and, even though you're drawing by eye, try to slant your vertical lines so as to converge at that point. Use pencil or pen and restate as necessary. Allow one hour.



Less extreme than the perspective view of the tower above, the subtly converging vertical lines in this kitchen drawing are nonetheless depth enhancing.



The eye level rule applies only to vertical cylinders. The openness of other ellipses depends on the angle from which they are viewed.

Ellipses

An ellipse is a circle seen in perspective. Anytime you draw a bottle, glass, dome, pole, coin, wheel, bowl, or other cylindrical, spherical, or half-spherical object, you will be involved with ellipses. The rules for ellipses are relatively simple but frequently violated by beginners.

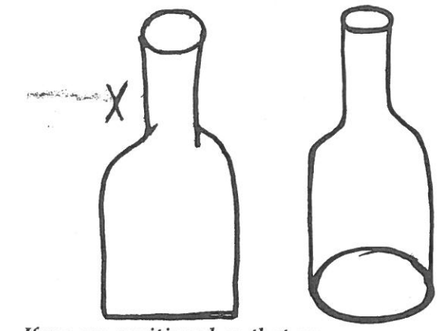
You may have seen drawings like the one of the bottle at immediate right. The top of the bottle is drawn as if we were looking down on it, while the bottom of the bottle is flat. This is two different eye levels for the same object. It's not so much that this is wrong — the Cubists did this sort of thing regularly — it's just impossible from a single perspective. If we choose the view that shows the top ellipse, it means that our eye level is above the top of the bottle. If we choose the view represented by the bottom of the bottle, it means our eye level is low — in line with the base.

This brings us to Rule #1 for drawing ellipses: establish your eye level. We must know whether to make our ellipse open (more nearly round) or closed (more flat). We determine this by how near to or far from the eye level the ellipse is. This gives us Rule #2: the ellipse closes, or flattens out, as it nears your eye level.

We can see how this works in the drawing on the facing page. The bottle has several sets of ellipses, all parallel—at the top of the bottle, at the top and bottom of the label, and the bottom thickness of the bottle. We place the bottle on the table and, observing Rule #1, establish our eye level as a line just above the top of the label. Rule #2 tells us that the label top will be nearly flat, being so near the eye level. It also tells us that as we get farther from the eye level, the ellipses will gradually open up, the roundest areas being at the two extreme ends of the bottle. (Good observation would tell us exactly the same, but these two little rules are good to keep in mind when your eye is uncertain).

Accurate ellipses

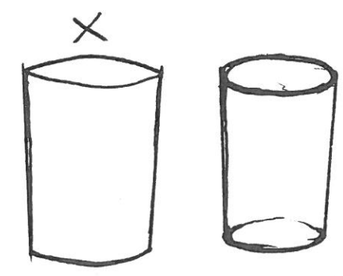
Drawing a good ellipse takes practice. You'll have a lot more success if you keep in mind that it is absolutely symmetrical, and the ends are always rounded, never pointed, as illustrated in the drinking glass examples at right. If you want precision, you can place your ellipse within a rectangle, keeping in mind that an ellipse is always divisible into four equal quadrants. In the end, however, you should learn to draw an ellipse with a loose, free-swinging stroke. Drawing through is helpful in this regard, but basically these are no shortcuts. To make a good ellipse, you will have to draw a lot of them.



If we are positioned so that we can see down into the top of the bottle, the bottom of the bottle will appear as an ellipse as well.

Project 5 - F — Ellipses

Make a drawing of a group of bottles, glasses, and cans arranged on a table. Choose at least five items of varying heights and widths, much like the still life on page 144. Draw from an eye level that is slightly above the top of the tallest bottle. Establish your eye level line lightly on your paper. Take special care to draw the ellipses symmetrically and rounded at the ends. Each ellipse will vary in openness according to its distance from your eye level. Draw through all ellipses, even those you don't see on the bottoms of the cans and bottles. Use any medium and allow 45 minutes to an hour.



Ellipse ends are always rounded, never pointed.

KEYS TO CHAPTER 5 — The Illusion of Depth

- **Use the four depth principles.** Overlap forms, diminish sizes, converge parallel lines and soften edges and contrasts to increase the illusion of three-dimensional space.
- **Draw through** solid objects as if they were transparent in order to gain an understanding of their basic construction.
- **Sight angles.** Use plumb and level alignments as a quick way to measure the angles of objects seen in perspective.
- **Establish eye level and vanishing points.** When drawing architectural or mechanical subjects, first determine the eye level and vanishing points. It helps to estimate them even when they aren't on your paper.
- **Draw ellipses.** When drawing circles in perspective, make them symmetrical, with rounded ends, and related to the eye level.

SELF-CRITIQUE OF YOUR PROJECTS

Project 5 - A — Intensifying With Depth Principles

	YES	NO
• Do the elements in your drawing appear to move back in space?	____	____
• Did you overlap at least some of your objects?	____	____
• Did you soften the most distant objects by rubbing or erasing?	____	____
• Did you exaggerate the size difference between the nearest and furthest objects?	____	____

Project 5 - B — Drawing Through

	YES	NO
• When drawing through, did you visualize the forms as if they were made of a transparent material?	____	____
• Do the chair legs look as if they are resting firmly on the floor plane?	____	____
• Does the seat plane appear parallel to the floor plane?	____	____
• Did you draw some of the trapped shapes?	____	____
• Did you use sighting?	____	____
• Did you restate?	____	____

Project 5 - C — A One-Point Perspective Drawing

	YES	NO
• Were you looking squarely at the far end wall?	____	____
• Did you include the side walls?	____	____
• Did you establish your eye level line on your paper?	____	____
• Did you establish your vanishing point and was it on your eye level line?	____	____
• Do all lines parallel to the side walls appear to be converging at the vanishing point? Use a straight edge to check.	____	____

Project 5 - D — A Two-Point Perspective Drawing

	YES	NO
• Did you draw through the basic cube form of the house, including the sides you didn't see?	____	____
• Did you establish your eye level on the paper?	____	____
• Did you imagine a vanishing point for each set of parallel lines represented by the two visible walls?	____	____
• Do the parallel lines for each wall, including windows, doorways and roof line, appear to be converging toward one vanishing point?	____	____
• Did you use level alignments to help estimate the proper angles?	____	____

Project 5 - E — Looking Down on Objects

	YES	NO
• Did you imagine a vanishing point below, toward which all vertical lines appear to converge?	____	____
• Do the vertical lines near the outer edges of your paper lean inward more than those near the center?	____	____
• Did you make use of one or two other vanishing points on your eye level for the converging horizontal lines?	____	____
• Did you use plumb lines to help estimate the proper angles?	____	____

Project 5 - F — Ellipses

	YES	NO
• Did you establish your eye level lines on your paper?	____	____
• Are the ellipses nearest eye level the most flattened?	____	____
• Are the ellipses farthest from eye level the most open?	____	____
• Did you draw through all ellipses?	____	____
• Are your ellipses symmetrical and rounded at the corners?	____	____