Notes On Perspective For Drawings From Observation

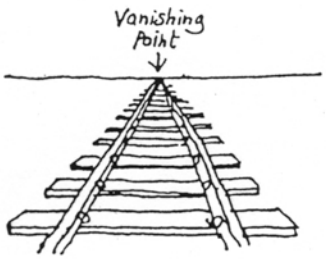
Andrew Newland

TEACHING ART & DESIGN

Sheeaun, Kilmaley, Ennis,
Co. Clare, Ireland.

Points To Note About Perspective

An understanding of how perspective works will help enormously in getting an accurate drawing of a three dimensional object, particularly objects with straight edges.



Parallel lines in perspective appear to converge at a point in the distance known as a 'Vanishing Point'. In reality of course they do not, so we have to be clear that this is again an illusion of reality on the picture plane surface. The vanishing point is at 'Infinity', an imaginary point in the far distance where the distance between the parallel lines has appeared to narrow to such an extent that it has become apparently non existent. This effect is most easily seen in the landscape where parallel lines appear to converge on the horizon. On most objects lines are of course nowhere near this long, but they can be projected to infinity to find the position of the vanishing point.

There are several facts to note when working out the perspective in a drawing:

1. The direction towards the vanishing point is always away from the observer.

2. Lines that are not going away from the observer will not be in perspective. These are lines that are parallel to the picture plane, and they will remain parallel in the drawing.

3. Only lines that are parallel to each other in the real world will appear to converge on a vanishing point.

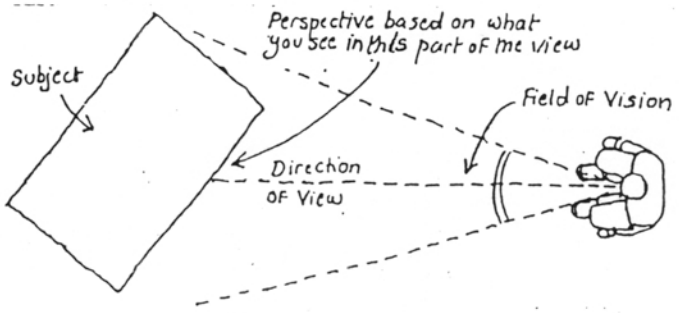
4. The vanishing points will be on your eye level if the lines are in reality horizontal edges.

5. If in looking at the subject, you are looking upwards or downwards, then the lines which are in reality vertical will also appear to converge on a vanishing point.

6. Lines that slope uphill away from you, will converge at a vanishing point above your eye level. Lines that slope downhill away from you, will converge at a vanishing point below your eye level.

7: There will be as many vanishing points as there are directions of lines on the real object, except for lines parallel to the picture plane.

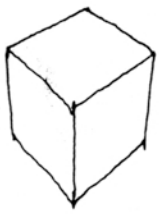
8. The perspective must be based on the direction of view in the centre of the field of vision.



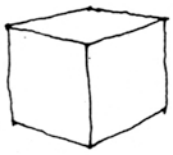
The position of vanishing points in a drawing will depend on the angle at which you are seeing the object, the distance that you are from the object, and the position of your eye level relative to the object. When drawing from observation it is therefore impractical to try and establish vanishing points before drawing the object itself. An understanding of the structure of the perspective is best used to check that what you have observed, does in fact match up with the theory. In other words, if the appropriate lines are extended do they appear to converge on vanishing points, and are these in the right place.

Establishing The Eye Level

Since some of your vanishing points are almost certainly going to be on your eye level (see note 4 above) it useful first of all to establish where this is going to be.

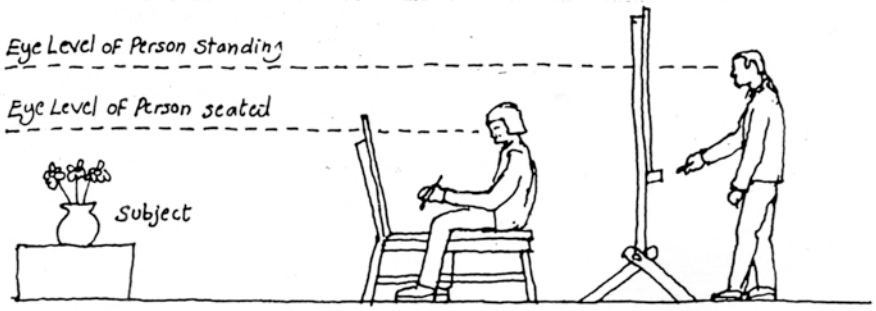


Perspective of a cube From a higher Eye Level



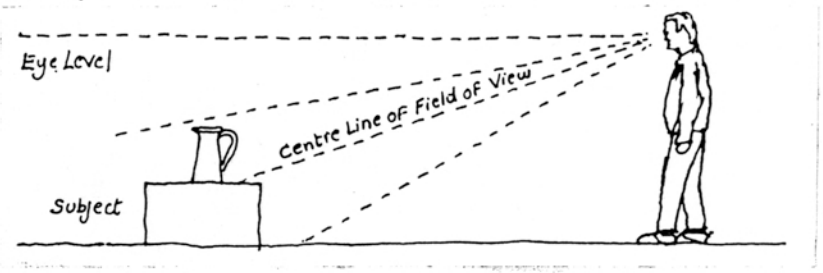
Perspective of a cube from a lower Eye Level At the same distance from the Subject

Essentially it is a horizontal level, at the height of your eyes. Obviously if you stand up to look at a subject you will have a higher eye level than if you are sitting down. It can be likened to the horizontal surface on a sheet of water. Try to imagine the surface of the water at the level of your eyes, and work out where the water surface would be in relation to the subject you are drawing.



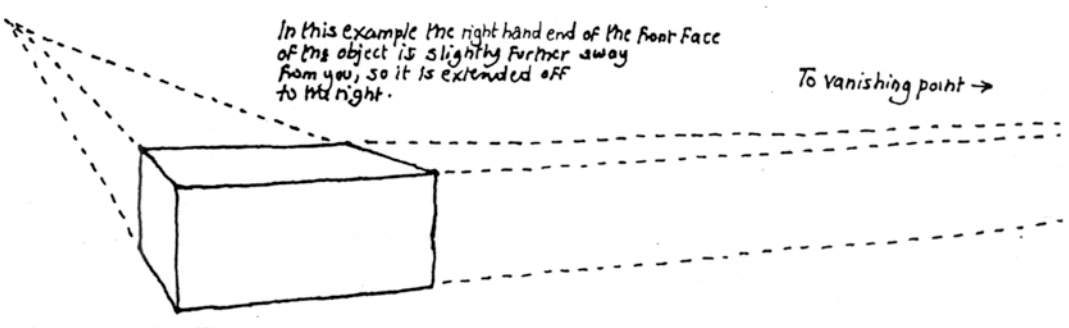
The eye level is sometimes referred to as the horizon line. This is because if you were to extend your eye level to infinity, it would be effectively on the horizon (assuming a flat landscape).

It doesn't matter if you are looking upwards or downwards, your eye level will always remain horizontal.

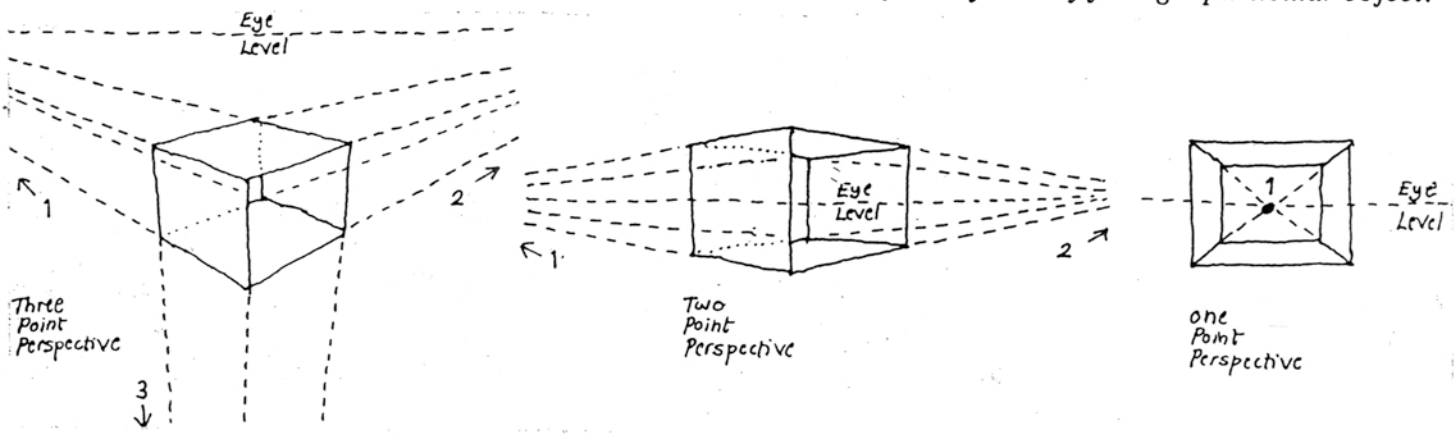


Establishing The Positions Of Vanishing Points

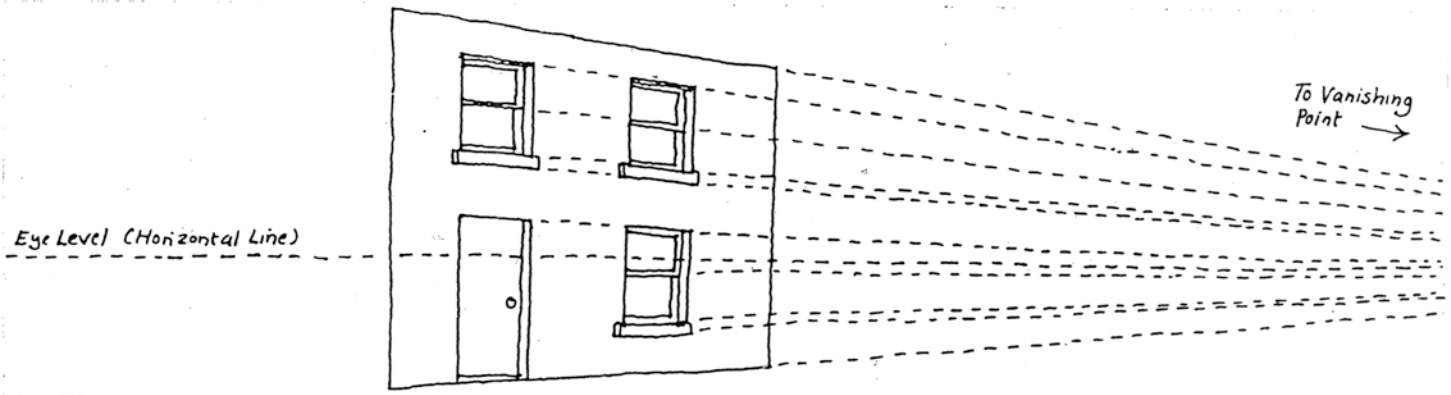
Assuming you have already drawn the object itself, the first thing to do is to extend the various straight edges as feint construction lines. This lines should all be extending away from you. (See note 1 above). Sometimes when an object is placed at only a very slight angle to you, it is difficult to know which way the lines should be extended. In this case work out which end of the line is further from you.



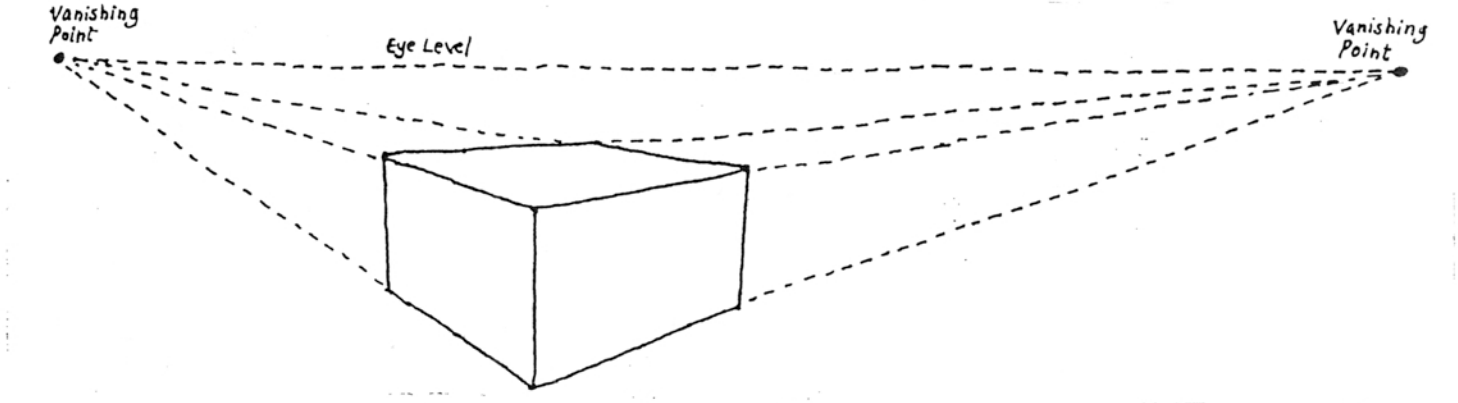
If any edges on the object are parallel to the picture plane (in other words part of the object is face on to you), make sure that these are shown as parallel lines in the drawing. (See note 2 above). If you are not looking upwards or downwards, vertical edges on the subject will probably come into this category. If you are drawing a rectangular shape with a corner nearest to you, then you will normally have three vanishing points; a 'Three Point perspective' (one for each of the three dimensions of the object). However if the box intersects your eye level, there will be no perspective in the vertical lines, so you will have a 'Two Point Perspective. If you are facing one of the sides of the box, there will be no perspective on this face either, so you have a 'One Point Perspective' (the remaining vanishing point being for the sides going away from you. Such perspectives can sometimes look artificial however, because in reality one is very rarely exactly facing a particular object.



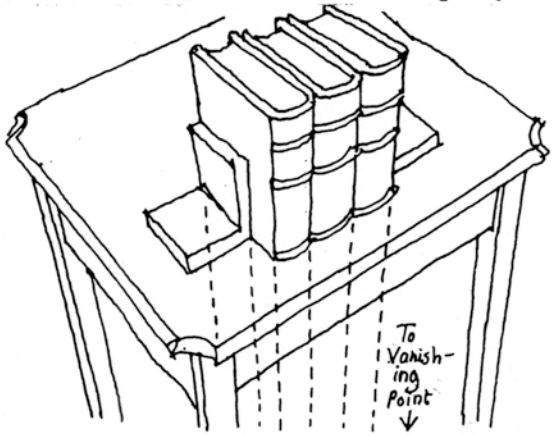
Extend the lines to check that those which are parallel on the real object, intersect at the same vanishing point. (See note 3 above). Very often a vanishing point will be off the edge of the paper, and it will be necessary to estimate the position of it. Sometimes it is easier in these circumstances to look at lines heading in the direction of the vanishing point. If the vanishing point is on the eye level for example, there should be a gradual change in the angle of the lines as you move down across the drawing, passing through the eye level where any line will be horizontal. It should look as if they are radiating like a fan. A common mistake is to make some of these lines parallel to one other.



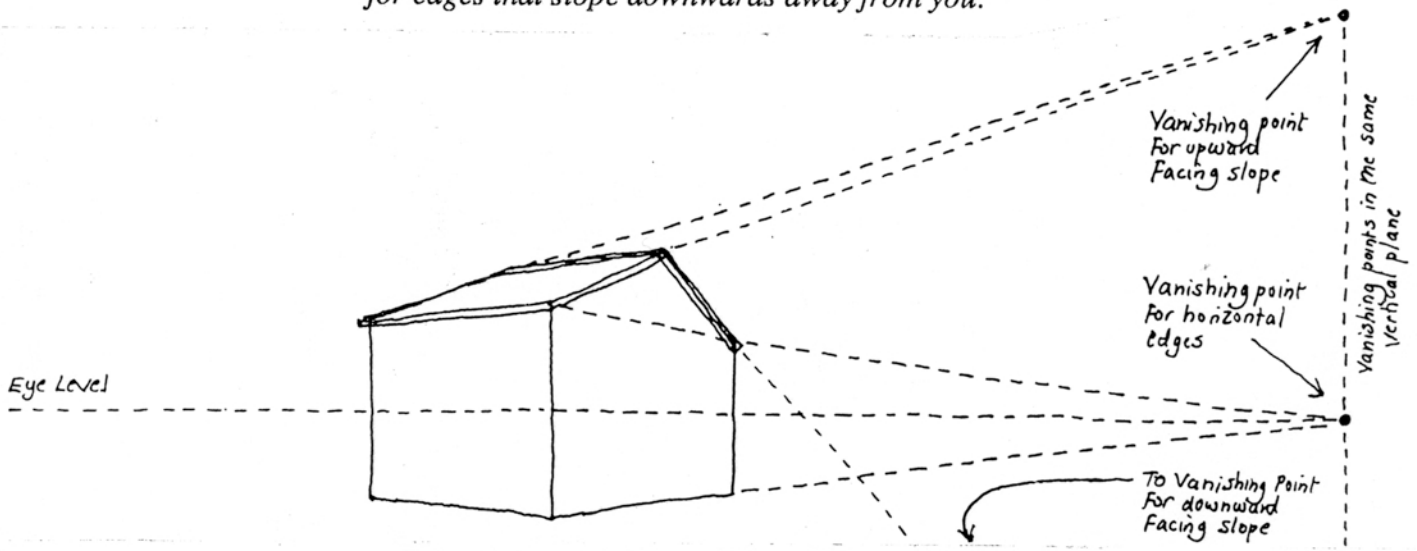
If some of the edges are horizontal on the real object, make sure that these converge on vanishing points on your eye level. (See note 4 above). One of the most common mistakes in perspective drawing is not having such vanishing points on the eye level line.



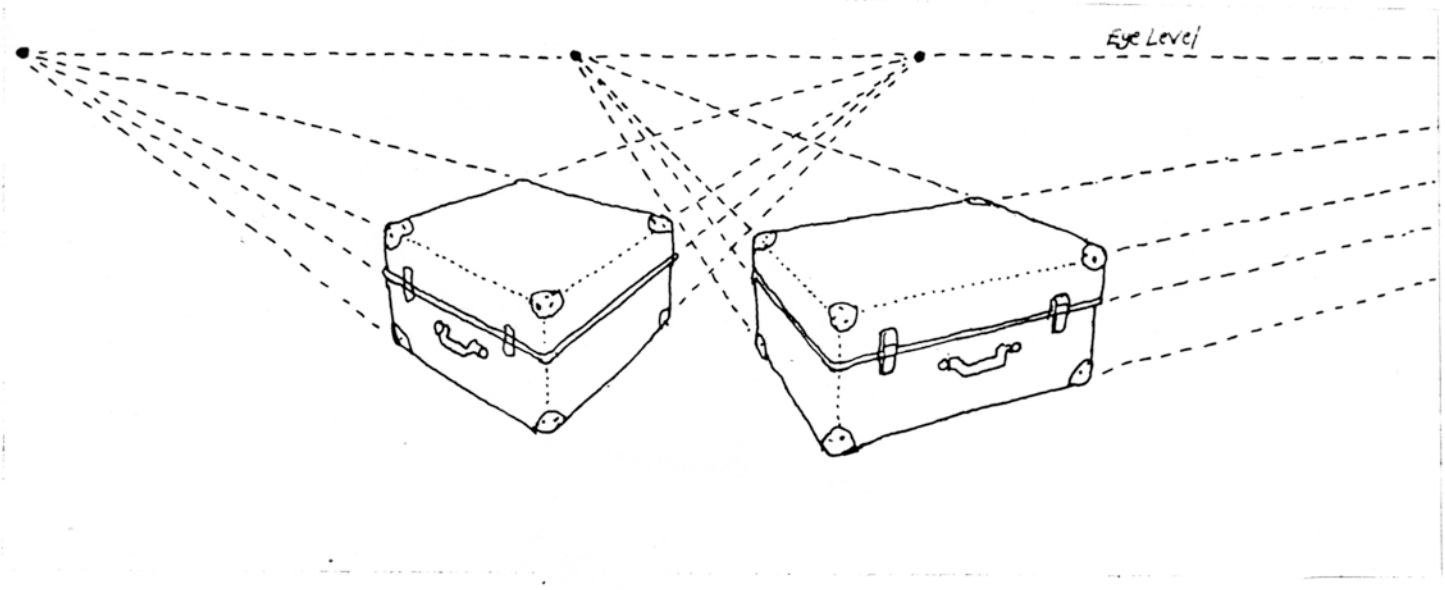
If you are looking down at an object on a table, the vertical edges will be travelling away from you, and thus need to be made to converge on a vanishing point off the bottom of the paper. (See note 5 above). In theory it will be at a point at infinity, vertically below the position that you are viewing from, although this may need to be modified if you have a wide angle of view.



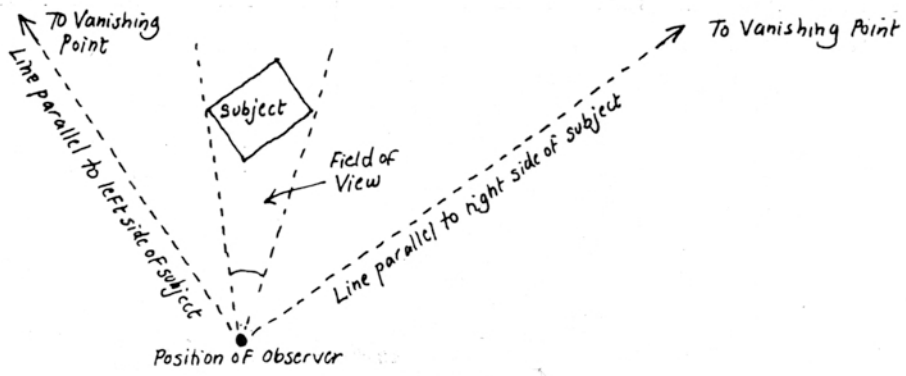
Edges on the subject that are going uphill as they move away from you will appear to converge at a vanishing point somewhere above the eye level, depending on the steepness of the slope and the angle of view. (See note 6 above). If this edge is in the same vertical plane as a horizontal edge, the vanishing point for the sloping surface will be directly above that for the corresponding horizontal edge. The inverse is true for edges that slope downwards away from you.



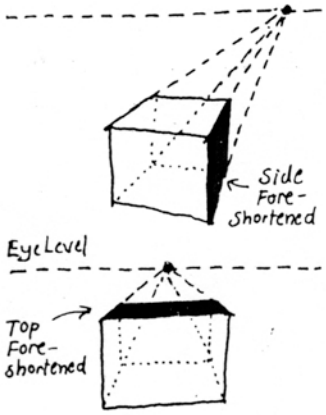
In many instances many elements in the subject will be, in reality, parallel to one other, and the number of vanishing points limited. But if you have a subject where different items are all set at different angles to one other, then each object will have its own vanishing points. (See note 7 above).



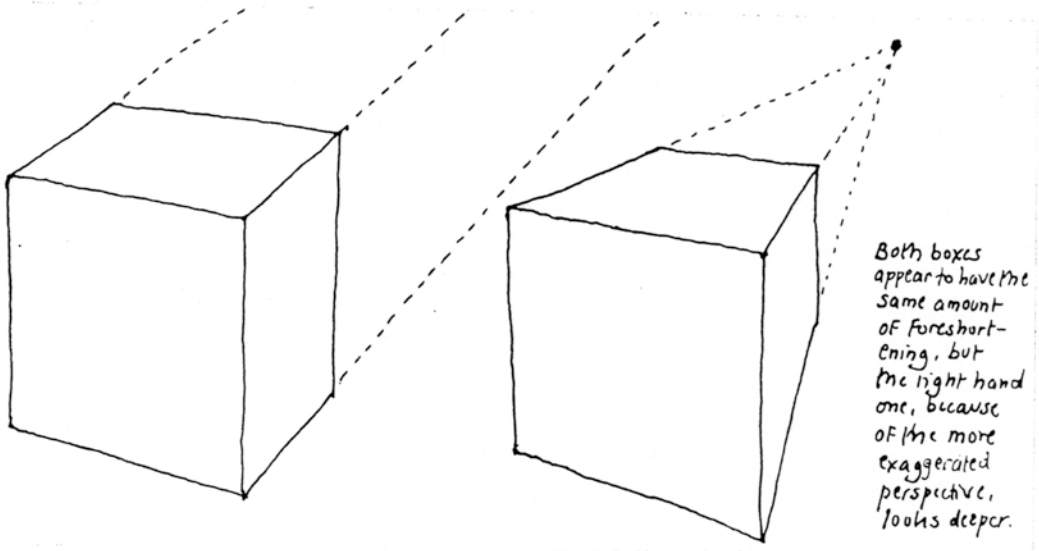
In theory it is possible to work out where vanishing points should be. To find the vanishing point for any particular edge on the subject, imagine a line of sight parallel to that edge, from your viewing position to a point at infinity. If you can locate this point in relation to your subject, it will show you where the vanishing point should be. In practice however, you may have to modify this position, by moving it further away from the picture area, due to the problems in dealing with a wide angle of view.



The Relationship between Foreshortening and Perspective



A surface on an object will become increasingly foreshortened, the closer it is aligned with the centre line of your field of vision. Thus if the edge of an object is pointing nearly directly towards you, it will appear foreshortened. Similarly if a horizontal surface is close to your eye level it will appear very foreshortened. The proportion of the subject must be very carefully examined in these circumstances, as the foreshortening is often much greater then expected. However simply reducing the front to back distance on the object will not look right unless the perspective is correctly observed as well. Because the surface will in such cases usually be very close to the vanishing point, the amount of convergence in the lines can be quite exaggerated.

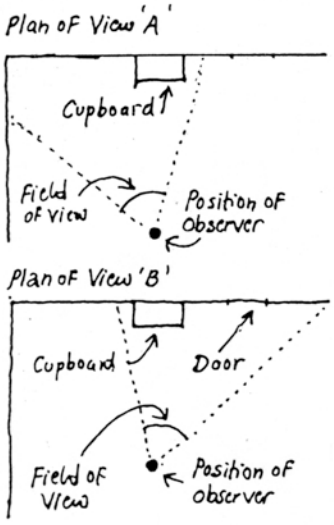


Problems In Dealing With A Wide Angle Of View

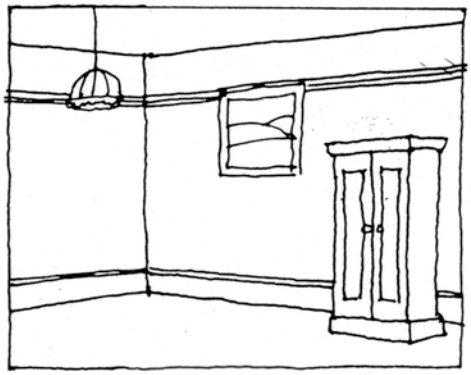
This item (See note 8 above) needs more detailed explanation. In most drawings of smaller subjects this is not usually a problem and you may not even become aware of it, but it can be confusing when you come to draw something larger such as a building or the interior of a room.

When you look at a subject such as this, you will probably move your eyes across the subject and make a total composite picture in your mind. This is natural enough as you will want to take in the whole subject. If you do the same in a drawing. however, you will be viewing different parts of the subject from different angles, and the resulting parts of the drawing will not therefore fit together; they will have different perspectives. In the same way, if you try to fit together photographs to make a composite image, you will find that the lines do not join up at the same angles, particularly if you have used a wide angle lens.

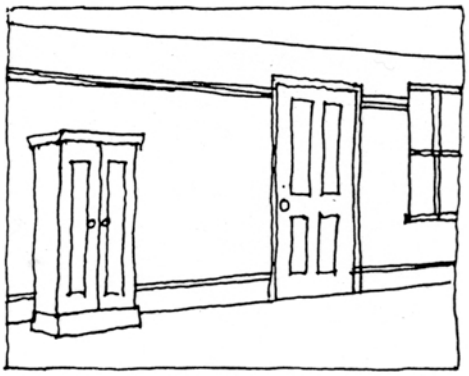
The exaggerated example below shows what happens. The two pictures are both taken from the same spot, but the perspective of the cupboard is changed in each view. To try and join the two views together is obviously not possible without changing the overall perspective.



View 'A'



View 'B'



The only thing that is practical in this situation, is to base the perspective on what you see at the centre of your field of vision. In other words to measure the apparent angles of the walls at this point, and then to extend this perspective out to the edges of the picture. You may find in extreme circumstances that you have to change what you see quite a bit, especially at the edges of the picture area, to get it to fit the overall perspective. To achieve a satisfactory perspective in these circumstances is really a compromise.

Most commonly this is a problem with a wide angle of view from one side of the picture to another, but it can equally apply if you are trying to draw something very tall, this time from top to bottom.

This modification of the perspective is actually what a camera lens does when you take a photograph. It is most apparent when using a wide angle lens; if you pan across with the camera but concentrate on one part of the subject you will see how the lens changes the perspective to suit the overall view.

All of this arises because we are trying to flatten a three dimensional view of things that are all around us onto a flat surface. Of course this really applies to any drawing but usually the distortion is so slight that we don't notice any problem.

The only other alternatives are to join the lines up with curves (interesting, but probably strange to most people's eyes), or to draw on a concave surface (you're pretty unlikely to find one). Of course the eyeball is concave inside, which is presumably why it all looks normal in reality.