CHAPTER 16

Finding the Eye-line

Introductory

After the session in the studio, we move out into the street. From the opening window we have learnt that any edge that lines up with the eye-line remains horizontal no matter at which angle it is relative to our line of vision. If we are to make use of this knowledge, we need to find the eye-line. As a general rule, students who come to my school assume that this is easy to do, but the evidence of the drawing they make suggests that they are likely to be deceiving themselves.

Looking down the hill

When demonstrating rules of linear perspective in the studio finding the eye-line is easy, because the floor is horizontal: It is just a matter of using the students' measured height. However, in many cases, a sloping ground-level creates an extra complication. For example, anyone emerging from the Painting School front door and looking left, will be greeted by the scene photographed in *Figure 1*. It is a view down a sloping road, towards the edge of the village. A glimpse of the countryside can be seen through a gap in the houses where, until the seventeenth century, there used to be a gateway known as "*La Porte Neuve*". Roughly speaking, the façade of the house which juts out from the right hand side at the bottom of the road and abuts this glimpse can be described as a rectangle with vertical edges. It is thus analogous to the closed window in the studio, when it was being traced on the tracing-glass. Accordingly, the mantels and sills of the windows and the lines of ancient lime-stone blocks, of which the house is made, all appear as being more or less horizontal, a feature which makes it an ideal starting point from which to continue the linear perspective lesson. As with the studio demonstration, the fist task is to establish the eye-line. The question is how to set about doing so.

Figure 1: View down the road from the front door of the Painting School

Experience indicates that a majority of students suggest placing a hand against an eye and then moving it out from there on what they sense to be a horizontal plane. Sometimes they choose an even vaguer way of doing things. Hardly ever is the suggested tactic a reliable method. One way of demonstrating their

shortcomings is to ask a number of students to try out their chosen procedures independently and compare the invariably different results. Occasionally, there is someone who has learnt or developed a more elaborate and painstaking way of doing things, which may work rather better. But, be that as it may, it is time to suggest a couple of alternative methods, both of which have three advantages:

- Reliability.

- Ease (once you have got hold of the principle being used).

- Requires useful learning about the characteristics of the scene in question that might otherwise be overlooked.

A first reliable method

To explain the first of the reliable methods of finding the eye-line when a scene is either being looked down upon or up at, the analogy of the opening window can be used. *Figure 2* shows the two halves of the studio window, with one closed and the other open. It will be noticed that all the bars on the left hand side half are all *horizontal*, whereas only the eye-line bar on the right hand side half is so (all the others are either sloping up or sloping down). Accordingly a way of determining our eye-line is simply to look at the two halves of it and see if a bar from the "*closed*" left-hand-side can be aligned with one on the "*open*" right-hand-side, so that the two make a straight, horizontal line.

Although the situation is more complex, the same simple state of affairs applies to the street scene in *Figure 1*. The visible part of the façade of the front-facing house to the right at the bottom of the road is perpendicular to the spectator's line of gaze in the same way as is the closed, left hand side half of the studio window in *Figure 2*. Accordingly, the roof line, the window tops and bottoms and the rows of limestone can be assumed to be more or less horizontal. In contrast, the house with the receding facade to the right of it can be mapped onto the open, right-hand-side half of the studio window, as illustrated in *Figure 2*. In this case, all except one of the actually horizontal features are perceived as sloping, namely the one corresponds to the eye-line. The problem is to find this one perceptually horizontal feature. This can be done by recourse to two of the most powerful analytic looking strategies used by artists, both of which use comparison, one depends on looking for *in front/behind relations* and the other on using *movement*. Our task is to find a horizontal feature on the receding facade (for example, a beam, a gutter or the base line of a row of bricks or of limestones).
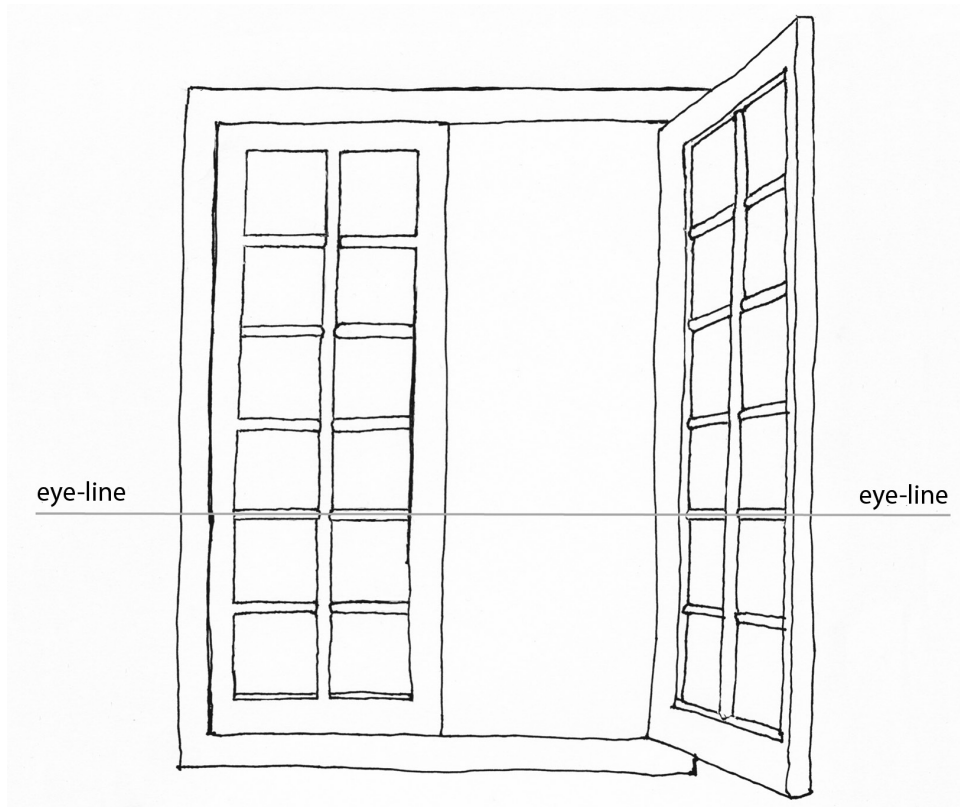
Figure 2 : A window opening out

When faced by the actual, three-dimensional scene, this can prove more difficult than might be expected, due to perceptual phenomena that we will be the focus of the next two chapters. However, we can take a useful step in the right direction since, as illustrated in *Figure 3,* we will easily see that some of the actually horizontal features on the receding facade are very evidently sloping *up* and others are equally obviously sloping *down*. Clearly, the horizontal feature that we are looking for must be located somewhere in between these. Having thus restricted our area of research we can take each of the horizontal features on the front-facing facade (window tops, window sills, rows of stones, etc.) to see if its makes a straight line with any of the real-world horizontal feature on the receding one (beams, garage door top, etc.). There can only be one outcome and this illustrated in *Figure 3* by a red dotted horizontal line, which we find to be very conveniently located on a beam. We can be certain that this is on our eye-line.

eye-line

Figure 3 : provides a diagrammatic representation of the two facades on the right hand side of the road in Figure 1. The horizontal red dotted line represents the eye-line, while the sloping red dotted lines show the perceived slopes of actually horizontal features on the receding surface to the right. The green rectangle indicates the inset used for Figure 4.

Using movement

above

below

level

Slope variations due to changes in the eye-level, as viewed from the far side of the road

Inset from Figure 3, showing three features that are horizontal in the real world but are only perceived as such when on the eye-line: When seen from above, they appear to slope down and when seen from below, they appear to slope up.

above

below

level

Slope variations due to changes in the eye-level, as viewed from the nearside of the road
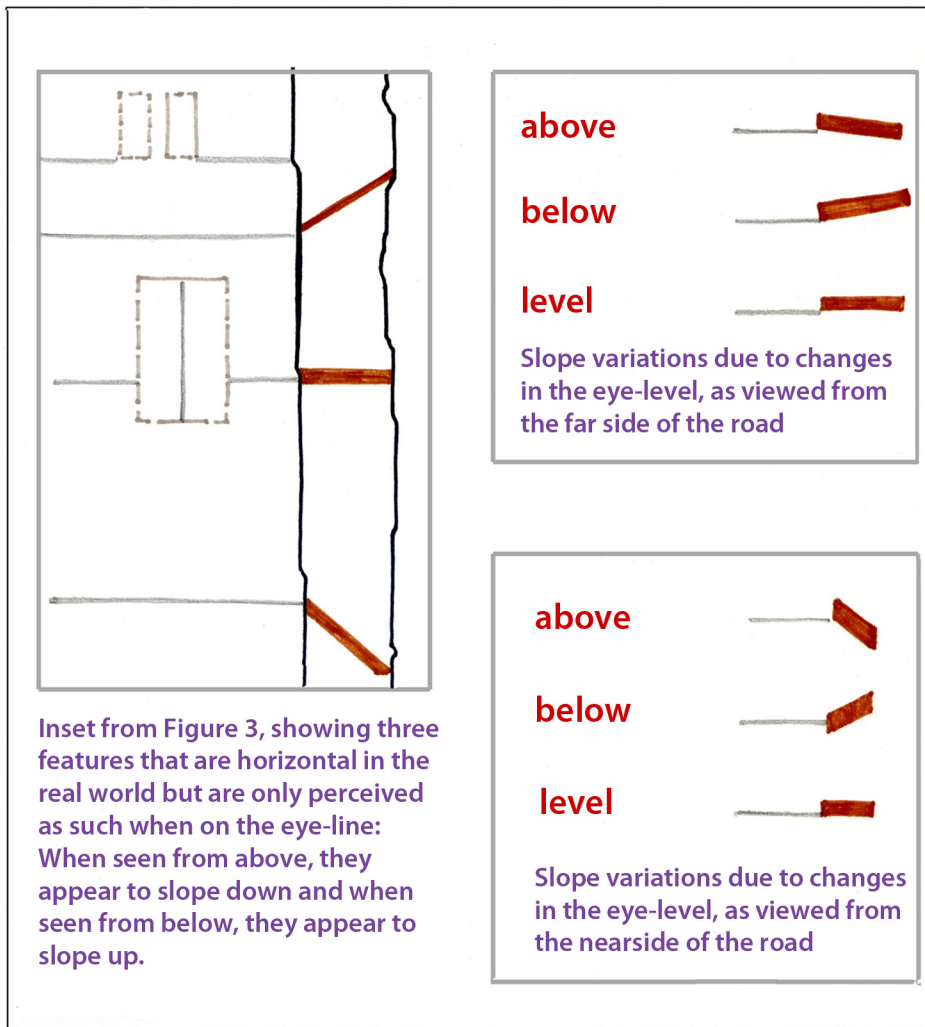
Figure 4 : Effects of moving down, up and across the road.

So far so good, but the problem is not yet solved. In the real world, there is little likelihood of an actually horizontal but seeming sloping feature on a receding surface being so conveniently on the eye-line. What would we need to do if this were not the case? One answer to this question depends on the revelatory power of *movement*.

Since matters are being looked at from the slope of a hill, the apparent orientation of the near-horizontal beam can be adjusted merely by walking up or down it. Moving up, causes the near end of the beam to move downwards relative to the far end of it, while moving down, results in a transformation in the opposite direction. Bearing this in mind, the following experiment is well worth trying. First, position yourself on the left-hand-side of the road (that is to say, the opposite side relative to the façade in question) with your eye level well above the beam under consideration. From this vantage point, it will appear to slope down from left to right (*Figure 4*, top right inset, top row). Now walk down the road until your eye level is well below the beam. From here, it will appear to slope in the opposite direction (*Figure 4*, top right inset, middle row). Now, keeping an eye on the beam as you go, walk up and down the road between these two limits. You will find that somewhere in between them, the beam will appear as being horizontal (*Figure 4*, top right inset, bottom row). When it does, check out that it is making a straight line with a feature on the façade of the neighbouring building (for example, one of the lines of limestone blocks, shown as grey lines in the inserts). If fails to do so, you can adjust your position until it does. When you are confident that it really is straight, you can safely assume that you have found your eye-line.

Or can you? Experience with many groups of students trying to find their eye-line relative to a particular feature (in this case the receding oak beam) shows that, even after all this rigmarole, different people choose different viewing positions. If three students do the exercise at the same time, their eyes should finish up at the same level, but often they fail to do so. Clearly the discrepancies need to be explained. Further experiment is called for. The approach suggested here, goes one step further in exploiting the revelatory power of movement. It also brings us back to the opening window and the rule that the wider open it is, the more dramatically the window-bars fan out above and below the eye-line bar. Keeping this in mind, let us cross from the left hand side to the right hand side of the road (that is to say, cross to the same side as the facade containing the beam in question). This manoeuvre, which does not change our eye-level (since the road-surface is horizontal) has the same effect on our perception of the orientations as further *opening the window*. All orientations are dramatised. Every movement up or down the street causes more rapid changes than before. Accordingly, if from the further side of the road the slopes move between the three orientations suggested in the top right inset in *Figure 4*, after crossing to the facade side they might appear as those illustrated in the bottom right inset. As a consequence, we find ourselves significantly more sensitive to

change and as a result are able to provide an even surer fix on the eye-line.

Very frequently this final experiment results is a change of mind about where to stand if the beam is to be found on their eye-line. How can this be? The answer to this question will be evident to anyone who reads the next two chapters.

Advantages of the method

But is it worth going to all this trouble just to find the eye-line? This is a matter for each individual to judge, but there are at least three good reasons for arguing that it is. The first of these may not be so very important, but the other two provide opportunities that should not be missed.

- The simple fact is that the eye-line chosen in the way described is not only likely to be much more accurate but also in a different place to that chosen by most other widely used methods. Often, the difference is embarrassingly large.

- The whole process of finding the eye-line using a combination of *in-front/behind relations* (with the receding surface containing the beam in front and the facade of the end house behind) and *movement* relative to what is being looked at provides a invaluable *learning experience*. It is particularly important to remember that, at least when first trying out this idea, the more toing and froing, upping and downing and moving from side to side of the street, the more reliable the judgement becomes.

- A highly desirable outcome of all the manoeuvring is that it has the effect of sensitising the relevant *visual-analytic systems.* All those who are prepared to give it a serious try out will find themselves becoming progressively more skilful at the kind of visual analysis required. In particular, they will become aware of smaller and smaller differences.

In short, the method as described, though often found to be cumbersome when first used, has great potential for training visual-analytic skills in highly desirable ways. Below and in the next two chapters, we find more evidence of power of body, head and eye movement as a way of gathering useful information that might otherwise be neglected.
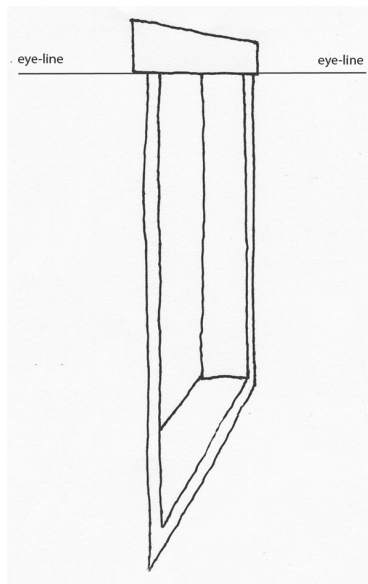
However, despite its many advantages, the above method does have its shortcomings. Most importantly, it can only be used where there is a convenient closed/ open window type comparison, involving in front/behind relationships. Where this is not available, another method is needed.

A second reliable method
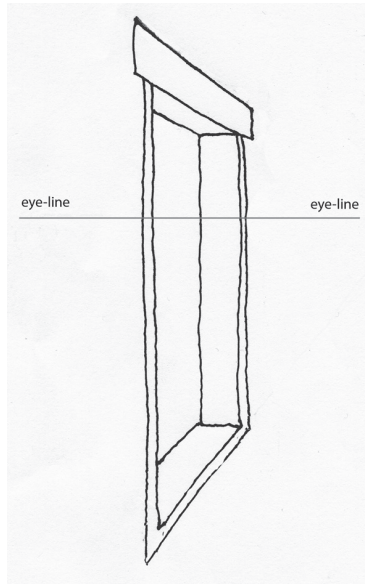
Figure 5: Finding the eye-line - Second method - Step one.

Figure 6: Finding the eye-line - Second method - Step two.

As a general rule houses have visible doors and windows, which means that there will always be horizontal straight-edges to use as guides. For example, windows have sills, doors have thresholds and both doors and windows have mantels. Also, there may be horizontal courses of bricks (or other building materials), beams, etc.. *Figures 5 and 6* suggest how these can help establish the eye-line. Once again, the use of *movement* is crucial.

Let us start by imagining ourselves standing on a slope in a position from which we can look at up at the mantel and down at the sill. This situation is represented in *Figure 5*, in which both the underneath surface of the former and the top surface of the latter are clearly visible. Evidently, the eye-line must be somewhere in between.

In *Figure 6*, the eye-line is level with the mantel and its underneath surface has disappeared. This viewpoint can be found by walking slowly backwards, up the road. The further we go, the less of the underside of the mantel will be visible. At a certain point, it will disappear altogether. At this moment, its base-line will be both horizontal and on the eye-line as illustrated in *Figure 6*.

It all seems very easy. However, a word of warning. A problem can come from overconfidence in the reliability of the evidence of our eyes. Many students assume that their first attempt must be right. As soon as they judge that the top of the mantel has reached the crucial disappearing point, they assume that the eye-line has been definitively found. However, the possibility that something might be wrong is often indicated by the fact that within a group of students, different people come to different conclusions.

If a student is on her own, there is another way of introducing a salutary and educational uncertainty. Instead of comparing the conclusions of different people, an individual student can be asked to repeat the same sequence as before with a view to checking whether it produces the same result. If not, she is encouraged to repeat the process until it does so. It can be astonishing how often the final viewing position and, therefore, the decision concerning the location of eye-line has to be revised.

If the students were to have walked further down the hill, it would have been the sill rather than the mantel that would have moved in the direction of horizontality. If they had proceeded past this point and then looked back up at the sill, they would no longer be able to see its top. Indeed, if they had gone still further down the hill and looked back up it, they would come to a point where other hori-

zontal surfaces that are lower down than the windowsill would be on the eye line. For example, this might be the case with the surface of one of the steps leading up to the front door of the building. To use one of these to establish the eye-line it would be necessary to move to a position from which its upper surface is visible and then back track until it disappears. At that moment the top of the chosen doorstep will correspond exactly to the eye-line.

A paradox

Both the above methods of establishing an eye-line provide a further opportunity to draw attention to a recurring paradox relating to drawing practice. Thus, while the demonstration using the tracing-glass has underlined the key importance of using a *stationary viewing position* when drawing from observation, both the methods of finding the eye-line just described show how body movement can be used to hone visual awareness. It is difficult without actually going through the recommended procedures to appreciate the amazing difference that can occur to the sensitivity of visual judgements in general as a result of repeated exposure to *movement-generated visual transformations* of the kind just illustrated or indeed of any other kind.[1] No need to get hung up on analysing why: it just happens automatically as a function of how the eye/brain motor-control systems work. In short: *Good drawing practice requires knowledge not only of when to keep still but also of when to move*. Few people seem to realise how much trouble they could save themselves if they learned to use movement appropriately.

The position of the drawing board

Anyone who has tried to hang a picture on a wall, without the help of an aligning edge, will know how difficult it is to get its top and bottom edges to be horizontal. The reason for this is the total dependence of the human visual-orientation system on *contextual cues*. We cannot manage without them.

Unfortunately contextual cues do not always help. As we shall see in *Chapter 5,* when we come to the astonishing implications of the *bakery facade illusion*, reliance on context can also lead us woefully astray.

One example of how we can be deceived comes from the effect on appearances of the position of the *drawing-board*. To better understand why, reference can be made to the section in the previous chapter under the heading of, "*Changes*

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1   Perhaps most importantly for all shapes made with *in front/behind* relations.

in the orientation of the picture plane", which explains how the shape of tracings can vary spectacularly with changes in the orientation of the *tracing-glass*. Thus, when the *tracing-glass* is set up as being perpendicular to line of sight, its horizontal edges are not only traced as sloping as required by the standard rules of linear perspective, but also perceived as sloping, whereas if it is set up as parallel to the fireplace, they are likely to appear as being both horizontal and parallel. Without the reference provided by the tracing-glass frame, it is anybody's guess how they will be perceived and consequently how they will be drawn.

Figure 7 : Looking down on the esplanade wall.

With these observations in mind, imagine drawing a section of a long, low wall, such as that found on the esplanade at *Castelnau de Montmiral* and illustrated in *Figure 7*. In this image the wall top is clearly sloping up, away from the viewer. Often my students draw it as horizontal. The reason is not "intellectual realism" (drawing what you know rather than what you see), it is a consequence of the orientation of the drawing board. If the drawing board is parallel to the

wall, the artist is likely to see the wall as horizontal. If the drawing board is perpendicular to the artists line of sight, she is likely to see the wall as sloping. Why this is the case is explained in the text relating to *Figures 6, 7 and 8* in the previous chapter. These illustrate how both the angle of viewing and the angle of the drawing board have an important effect on way we see the fireplace. With the drawing board perpendicular to the artist's line of sight (*Figure A*), tracing of the fireplace has the familiar trapezoid shape of a perspective drawing. With the drawing board parallel to the face of the fireplace (*Figure B*), a tracing of the fireplace produces a rectangular shape. There will be no sign of any of the horizontal features sloping towards a vanishing point.

If we now return to the sloping wall in *Figure 7*, we will now understand why that, if the artist places her drawing board perpendicular the line of sight, she will see it as sloping. However, if she places it so that is parallel to the wall, it is likely that she will see the wall top as being horizontal. There is nothing wrong with drawing the wall either way, or for that matter in any of the other ways that would result from other orientations of the drawing board. The point being made is simply that *effects due to drawing-board orientation can often lead to unwanted outcomes*.

Implications

If they are to get the linear perspective right in drawings from observation artists need not only to identify their eye-line but also consider all the main variables:

- *Their viewpoint and gaze direction.*
- *The position and orientation of the picture surface.*
- *The distance and angle from which the completed picture is to be viewed.*
- *The characteristic shapes of objects and features in the scene being analysed.*

Little has been said about the last of these variables because they need separate chapters to themselves. It is these which come next.