

## CHAPTER 4

### Renaissance ideas about light and space

#### Introductory

This chapter has four main purposes. These are to:

- Introduce some traditional ideas about the depiction of space and light.
- Discuss their limitations.
- Suggest that these are more comprehensive and satisfactory alternatives.
- Prepare the way for a better understanding of the significance of Seurat's science and colour based innovations.

The first of objectives is met by elaborating on three aspects of painting which, after being explored in some depth by the Renaissance artists, became embedded in the academic tradition. Although satisfactorily serving their purpose for the artists who followed them, it was these that were found wanting by the Impressionists, and that were given a new dimension by Seurat and those who built upon his ideas. The three aspects were detailed in the last chapter:

- Effects of the atmosphere on the appearance of distant hills (Aerial perspective (Leonardo da Vinci, Claude of Lorraine, Turner, etc.).
- Whole-field lightness relations (*chiaroscuro*) as a means of introducing a sense of the quality of light in the space that is being depicted (Leonardo da Vinci, Titian, Vermeer, Rembrandt, etc.).
- Shading, shadows, and highlights, used as a means of achieving of realism in paintings (Piero della Francesca, Caravaggio, Velasquez, etc.).

Significantly, as we shall see, it is only with respect to the first item on the list (atmosphere) that colour of any sort was seen as having a role to play. Even then the only one needed was blue.

In contrast, the academic rules guiding the depiction of the quality of light and shading provided no function for colour. The practice of the Renaissance artists and the teaching of the Academies placed the emphasis exclusively on variations in "lightness" (what the English call "tone" and the Americans term "value").

#### AERIAL PERSPECTIVE

The early *Modernist Painters* often referred, usually disparagingly, to the "laws" or "rules" as taught in the academies. Of these, the ones relating to *aerial perspective* can be traced back at least as far back as Leonardo da Vinci, in the fifteenth century. Almost two centuries later, Leonardo's ideas were refined by the French landscape painter known as Claude of Lorraine (1600-1682).<sup>1</sup> His conclusions were given the status of laws during his lifetime by the recently created *French Academy*. Ever since, right up to the present day, they have been slavishly followed, not only by innumerable artists, both amateur and professional, but also by teachers and the vast majority of author's of how-to-paint books.

Claude's rules concern the effect of viewing distance on appearances. They assert three consequences of an increase in the distance between viewers and the part of a landscape at which they are looking. According to them, the greater the viewing distance:

- The *bluer* (on sunny, blue sky days) or *greyer* (on over-clouded days) it will appear to be.
- The *smaller the contrasts* between neighbouring colours.
- The *less evident the texture*.

The question arises as to whether an unbiased visual analysis, of the sort advocated by the *Impressionists*, would confirm or deny the validity of these rules. Four quotations (the first two from Renoir and the second two from Monet) indicate the answer:

- "You come before nature with theories and nature throws them to the ground."
- "When I am painting, I forget all the rules, if there are any that is."
- "I am always horrified by the rules."

<sup>1</sup> His real name was Claude Gellée.

- “When I look at Nature, all the rules go out of the window.”

They do not actually say which rules they were referring to, but Claude’s rules were almost certainly amongst them for, as we shall see shortly, it is hard to find a scene where they are not broken over and over again.

### The basis of Claude’s rules

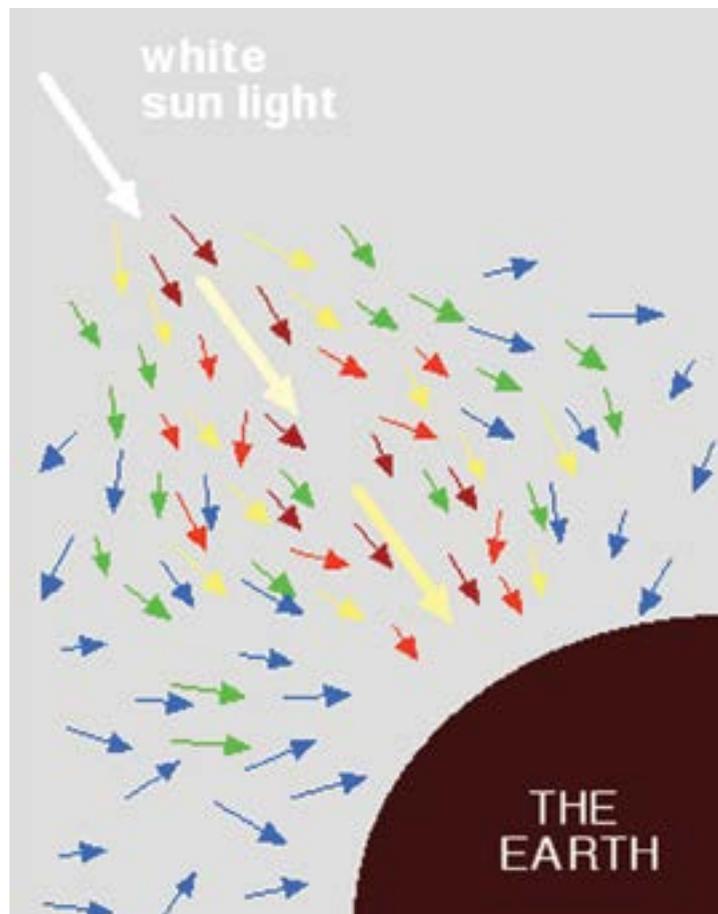


Figure 1: Atmospheric scattering

Does this mean that the rules aerial perspective completely worthless? The answer is certainly not: They represent a visual phenomenon that everyone can experience and which can be authoritatively explained by science. This was first

described in a rigorous mathematical manner in terms of the scattering of light by the atmosphere about the time of the *Impressionists* by Lord Rayleigh and, consequently, came to be known to scientists as “*Rayleigh’s scattering*”. Figure 1 illustrates what he found. It shows that different wavelengths of light are scattered differentially by the various kinds of particles they encounter on their passage through the earth’s atmosphere (mainly water vapour and dust). The shortest visible wavelengths (those which are associated with the colour *blue*) are regularly more widely scattered than the longest ones (those which are associated with the colour *red*) and this is why the sky looks blue. A corollary of this is that the light from the red end of the spectrum comes more directly through to our eyes than the light from the blue end, which explains why, according to the density/depth of atmosphere to be traversed, the sun appears to be slightly yellowish or even reddish.

Though the blue of the sky gives the impression of being far above and separate from us, the atmosphere from which it comes envelopes and hugs the earth, inhabiting the space between us and any object we may choose to look at. Just as it filters the light of the sun, so also it also filters the light being reflected from each and every one of the objects that we perceive in the visual world. Because the atmospheric particles are so sparsely distributed we are not aware of their presence when we look at near objects. They only become evident when the objects are further away and the number of intervening particles is correspondingly greater. As Leonardo observed and Claude asserted, this means that there is indeed a *rule-bound tendency* for everyone, when looking at distant objects, to see them as if through a translucent bluish or greyish screen.

### So why did the Impressionists question the rule?

They questioned them because, when they looked at actual objects in actual landscapes they found that it was contradicted time and time again. The reason for this was simple: the law-makers had failed adequately to acknowledge:

- The fact that both the characteristics and the distribution of atmospheric particles are highly variable.
- The existence of other variables that influence the appearance of distant objects in addition to atmospheric intervention.

Thus, on a clear, bright day, after a rainstorm, when all the dust had been flushed out of the sky, the atmospheric filter may only marginally effect the ap-

pearance of objects even when seen at a considerable distance. In contrast, on a swelteringly hot and dusty summer day, its influence can be very marked on relatively near objects. However, “*relatively near*” does not mean close-up. It is rare for the atmosphere to cause visible bluing or contrast-reduction on objects that are within 50 metres. Certainly no normal interior is large enough for the colour of anything in it to be affected by atmospheric intervention.

### Other variables

So what are the other factors that can have an effect on the brightness and blueness of distant objects? Here are two of the most common:

- *The reflective properties of surfaces.* For example, while out walking this morning, I was looking across a valley illuminated from behind me by the weak winter sun. The trees were leafless, the shadows not very pronounced and even the red earth of the fields was muted by a haze of green, due to a multitude of tiny blades of as-yet-barely-visible winter corn. A good kilometre away was a white-walled farmhouse, flanked by a barn whose huge doorway revealed a deep-black interior. In front of this was a bright, almost luminously red rectangle, which I supposed to be a red-painted vehicle or large container of some kind. In this scene, easily the lightest colour was the façade of the white house, easily the darkest colour was the interior of the black barn, easily the greatest contrast was where the white and the black abutted one another<sup>2</sup> and far and away the most fully-saturated colour was the luminescent red. Clearly, I was looking a scene in which the rule that states that more distant objects appear bluer and that contrasts between colours are perceived as more muted was being broken in a spectacular manner.

However, the fact that atmospheric interference did not dominate appearances in this instance does not mean that it was not having an influence on them. It certainly must have been. But, as only too often is the case, its effect on the ordering of the relativities of lightness was not strong enough to compete with the ordering according to the intrinsic reflective properties of the surfaces involved.

- *Partial cloud cover.* The near landscape can be in the shadow of clouds

<sup>2</sup> A white of a given reflective value will look much brighter if set against something black than the same white contrasted with a pale grey. Accordingly, if strongly contrasted with its context, the same white can look brighter when further away.

when the distance is brilliantly lit by sunshine. Under these circumstances sunlit objects, even though considerably farther away, are almost certain to be perceived as significantly lighter and more contrasted than nearer, cloud-shaded objects of similar reflective properties.

### A widely held belief

Another myth owing its origins to misunderstood science is that blue painted surfaces in paintings are, by their nature, perceived as being further away than red painted ones. This claim is also based on good science but almost invariably falls foul of conflicting variables. In particular the receding property of blues relative to reds will never be a significant factor in figurative paintings. It can only be of importance in specially produced abstract paintings perceived under strictly controlled viewing conditions. For a detailed treatment of this subject see “*Painting with Colour*”, the second book in this volume, where the origins of this phenomenon and its use in abstract paintings is discussed in depth.

### The only reliable test

Despite inveighing against the “*rules*”, it is not true that *Impressionists* were against them on principle. Rather, what they balked at was being expected to apply them when they were not supported by the evidence of their eyes. For example, none of the *Impressionists* would have questioned that the rules of aerial perspective describe an important and frequently visible phenomena. What they argued was that the only safe way of finding out how much or little they were reflected in actual appearance is by direct visual analysis.

### WHOLE-FIELD LIGHTNESS VARIATIONS

Nor was the rejection of the academic teaching tradition by the *Impressionists* as root and branch as some commentators would have us believe. Certainly, there was at least one, time honoured principle upon which they laid great stress and which, as we will see in the next chapters, was to have great influence on future developments. This was the principle of *gradation* which had been given solid support by the best artists and scientists from Leonardo da Vinci onwards. For example, John Ruskin (1819-1900), the influential theorist and self-appointed champion of Turner was in line with the ideas of generations of his predecessors when he insisted that:

*“Whenever you lay on a mass of colour, however large it may be, or however small, it shall be gradated. No colour exists in Nature under ordinary circumstances that is not gradated... I must press on you the pre-eminent necessity of introducing it everywhere”.*<sup>3</sup>

The reason he used the word “necessity” was his passionate belief that:

*“The first beauty in colour is gradation.”*

A century earlier, a highly skilled but perfectly conventional academic artist, Jean-Baptiste Oudry (1686-1755), pupil of the royal portrait painter Nicholas Largillière, gave the following advice on the subject of painting a still life composed mainly of white objects.

*“The different whites will make you assess the precise tone of the white that you need to render your silver vase, since you will know by comparison that the colours of one of these white objects will never be the same as those of the others.”*

Between them, these quotations illustrate the importance being given by artists working within the Italian Renaissance tradition to local and whole-field variations of lightness. Notice that at this time there is no mention of chromatic variations, which at this time were not thought to be either necessary or desirable.

### Introducing colour into the equation

In contrast, not many years after Ruskin, we find the following quotation in the science-infused book on painting by Ogden Rood, which had a profound influence of Seurat:

*“One of the most important characteristics of colour in nature is the endless, almost infinite gradations which always accompany it. It is almost impossible to escape the delicate changes which the colour of all natural objects undergoes, owing to the way that the light strikes them... If a painter represents a sheet of paper in a picture by a uniform white or grey, it will seem quite wrong, and cannot be made to look right till it is covered by delicate gradations of light and shade and colour.”*<sup>4</sup>

At first glance this last quotation may be taken to be saying much the same

things as Ruskin and Oudry. It is only the very last word that shows a revolution has taken place for, suddenly, we find the word “colour” appearing in the context of how to paint shading. If we ask where it came from, we can be certain that its presence reflects the influence of scientific input and particularly that of the scientists, described in the last chapter, who were responsible for developing the new ideas about the wavelength composition of light and the idea that colour and, indeed, all other visual experience, is not a property of surfaces in the external world, but a creation of the eye/brain.

### Implications

*For Renaissance artists attempting to represent effects due to aerial perspective the only question relating to the use of pigment-colour was how much blue to add to create the required sense of distance. They had no colour-related ideas concerning shadows, shading or chiaroscuro. Nor was this state of affairs to change much until the arrival of the Impressionists and Seurat, with their interest in contemporary scientific ideas.*

<sup>3</sup> From John Ruskin, ‘Elements of Drawing’, edited by Bernard Dunstan, Herbert Press, 1991. First edition 1857

<sup>4</sup> Rood, O. N., 1879, Modern Chromatics, New York 1879.