Spatial vision anomalies in Renaissance art: Raphael, Giorgione, Dürer

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Abstract—Two-dimensional views of three-dimensional space are based on conventions. Renaissance perspectival drawing invented by Brunelleschi is one of them. It caused difficulties to fifteenth and sixteenth century and later artists, although readily taken up by those understanding mathematics. Raphael was amongst those who did not seem to have understood some of its elements: this is illustrated in the first section. The second addresses the question of whether a squint may manifest in an artist’s work. Giorgione’s ocular anomaly was well documented by several of his self-portraits, and reference is made to some of his paintings with a special analysis of The Tempest. The final section deals with chromatic stereoscopy, with particular reference to the work of Dürer. His apparently anomalous spatial sense is tentatively explained with the suggestion that he may have suffered from a defect of colour vision (protanomaly).

Keywords: Perspective; squint; chromatic stereoscopy.

1. INTRODUCTION

The manner in which artists picture space is a matter of convention. As some of their optical illusions show, the Romans were aware of the problem of rendering three-dimensional space on a two-dimensional surface, but, as shown in Pompeii, failed to solve it. In fact, in Europe the skill was advanced by Brunelleschi’s, an architect’s, discovery of vanishing points (cf. Manetti, 1423–1497). It is noteworthy that before Masacchio, who was the first painter to grasp its significance, it was the sculptor Donatello who made use of it in his low relief of Christ among his Disciples (1429). In contrast, early Japanese woodcuts follow the isometric principle, although Hiroshige embraced the European system when Japan opened its doors to the West in the middle of the nineteenth century. Earlier Chinese
paintings show isometry, axonometry and perspective, having been exposed to Jesuit influence. The convention adopted in the Assisi frescoes, attributed to Giotto, appears to be making a concession to an observer in motion in that, for example, an oblong object in the picture plane may be rendered as it would appear from the left and the right in turn. Northern fifteenth century artists rendered space as it would appear if the eyes were to move from one spot to another, scanning space. The story of picturing Western space has been described in detail by White (1957).

Note that Brunelleschi used one eye to fixate one point — called the vanishing point, because it is pictured to be at infinity — with one subsidiary vanishing point left and right each. Standing on the steps of the cathedral of Florence, Brunelleschi viewed the nearby chapter house through a pinhole, thereby discovering the apparent convergence of parallel lines.

Now it is easy to uncover flaws or inconsistencies in an artist’s work. Thus Frans Hals’ portrait of Willem van Heythuysen in the Louvre shows him sitting on a shadowless stool, and Breughel’s Wedding Feast in Vienna shows a foot apparently without an attached body. These, however, are understandable oversights. But if there are to be found inconsistencies in the rendering of space under idiosyncratic conditions, i.e. when this would not be necessarily observed with other artists, then it is legitimate to inquire into Why? While stylistic predilections can never be ruled out, the question arises whether they may not result from anomalies in the artists’ eyesight.

Visual anomalies used not to be as rare as they may be now. For example squints were as common four or five hundred years ago in Europe as they are now in Africa, where eye operations are not as readily available as in privileged countries. Again, colour defects affect even today one man in twelve, and it would be surprising if the artists of yesteryear had been free from them either by self selection or by chance: the condition was not mentioned before the late eighteenth century.

2. RAPHAEL (1483–1520)

Under the influence of Alberti’s theoretical work (1966) the new way of presenting space caught on fairly rapidly. It is clear that Leonardo da Vinci understood it — witness The Last Supper (but see also his early Annunciation) — and that Piero della Francesca, who was a mathematician, had mastered it more than most.

It must, therefore, come as a surprise to learn that Raphael, who came later than either of the above, presents a conundrum. Since we are dealing with visual space there is no need to dwell on his portraiture, on his palette, on his psychological insight, etc. What we are concerned with is how he rendered space in general, and to what extent he had rendered space on the basis of Brunelleschian perspective. That said, it needs stressing that he had a large studio, and, much like Van Dyke, he may have left to other hands details which he considered unimportant. But Vasari does not mention the name of any assistant: all the credits are claimed for Raphael himself. It is in the so-called The School of Athens (Fig. 1), in the Vatican, that one