THE "AXIAL" ("VANISHING AXIS") PERSPECTIVE

Daniel Sofron*

Abstract: The present paper approaches the axial perspective, a method of spatial representation that precedes the invention of the Renaissance geometrical perspective. Despite being typical to ancient Greek and Roman art, the axial perspective can also be identified during the Middle Ages and the early Renaissance period and it represents the first form of systematic convergence of parallel lines. At the same time, the paper presents Erwin Panofsky's theories on this spatial suggestion method. Trying to offer it a scientific foundation, the researcher builds a system that he calls "the vanishing axis perspective" and puts forward a series of arguments in favour of the existence of such a perspective. Although the axial perspectival constructions imply awkward superimpositions of planes that might seem geometrically inaccurate, this method of spatial structuring of the image constitutes an important stage in the process of identifying solutions for the faithful reproduction of concrete reality and an essential stepin the development process of thevanishing point perspective.

Keywords: axial perspective, vanishing axis perspective, space representation, ancient Greek art, ancient Roman art, optics

Most art historians agree that the first perspective representations can be identified in the art of ancient Greece, during the 5th and the 4th centuries B.C. According to the Roman architect Vitruvius (1st century B.C.), the first principles of perspective drawing were elaborated by the Greek philosophers Democritus (5th century B.C.) and Anaxagoras (500-428 B.C.), who mentioned the ways of representing buildings in theatrical scenery [1]. Approximately during the same period, the decorations from the Greek vases no longer had a purely ornamental character, one being capable of noticing the awkward attempts of linear perspective representation. In ceramic decoration, the artists were obviously becoming interested in representing the volume of objects, many architectural pieces being rendered through a combination of axonometric and linear perspective. All these representations prove the fact that the ancient Greek artists made use of reduced, non-systemised three-dimensional rendition means.

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* Teaching Assistant, PhD, Faculty of Visual Arts and Design, George Enescu University of Arts, Iaşi, Romania, E-Mail: danielsofron@gmail.com

[1] Zamfir Dumitrescu, *Ars Perspectivae*, Nemira Publishing House, Bucharest, 2002, p.120.

Analyzing antique art spatial representation, several researchers highlighted a distinctive method of perspectival construction, considering it to be typical to the Greek art (especially of the Hellenistic period) and the Pompeian painting, but also identifying it during the Middle Ages and the early Renaissance period: the axial or vanishing axis perspective. Under its simplest form, the method does not imply the convergence of parallel lines in a single vanishing point, as it happens in the case of classical perspective. The straight lines from the right and left sides of the image, which correspond to one another, meet as pairs in vanishing points that are situated on a vertical median axis. Initially, the method was used in representing the parallel beams of ceilings. In many cases, the vanishing point of the central pair of beams was placed outside the image and a certain degree of convergence was also attributed to the other pairs of parallel beams. The walls and floors were represented by following the same principle, which led to an inadequate superimposition of planes.

The oldest surviving example reflecting the use of the vanishing axis perspective is the decoration of a ceramic vase from South Italy, which dates back to the 4th century B.C. (Fig. 1 and 2).

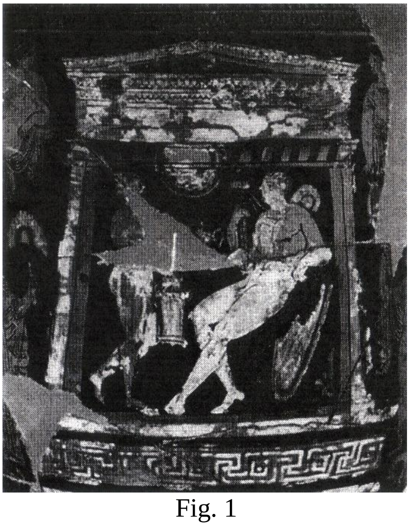

Fig. 1

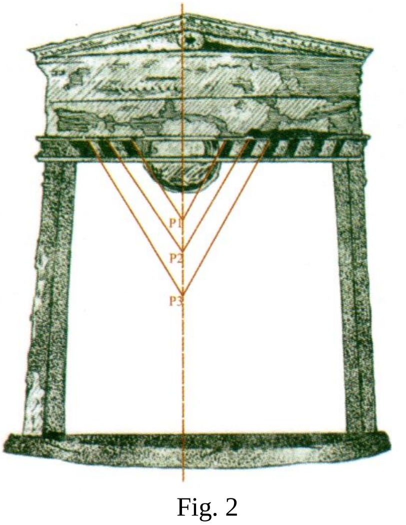

Fig. 2

Researchers gave various names to this spatial representation method. Viktor Lazarev[2] mentioned two articles that belong to Guido Josef Kern, in which the German painter and theoretician used the term *Teilungskonstruktion* (construction by division). The art historian Erwin Panofsky calls it "vanishing axis perspective" or "angle perspective". The

[2] Viktor Lazarev, *Originile Renaşterii Italiene, Protorenaşterea,* Meridiane Publishing House, Bucharest, 1983, p.338.

painter and professor Zamfir Dumitrescu[3] considers the vanishing axis perspective to be another version of the *Teilungskonstruktion* method. He differentiates one method from the other, showing that in the case of the "vanishing axis perspective" the parallel lines belonging to the same plane (lateral walls, the floor, the ceiling) aim at a single vanishing point, one for each plane.In any case, as Zamfir Dumitrescu states, both methods consider the same problem, that of the more or less geometrically accurate perspectival construction of the parallel lines, avoiding pure convergence[4].

Furthermore, the researcher Judith McKenzie[5] states that ancient Greek artists used the vanishing axis perspective starting from the Hellenistic period, identifying its presence in the decorations of some loculus slabs in Alexandria, which date back to the3rd century B.C. In the image presented in Fig. 3, the decoration of the ceiling is rendered by means of lines receding towards a vanishing axis. The same convergence of lines is to be observed in Fig. 4, the spatial depth being accentuated by the lines that suggest the beams of the ceiling.

The researcher goes on adding that these examples of the vanishing axis perspectival constructions are relevant for the development process of the central perspective with a vanishing point. McKenzie also launches the hypothesis that the vanishing axis perspective was developed in Alexandria. In her opinion, this is not surprising if we take into consideration the observations of Euclid on optical theories, he taught in Alexandria during the first part of the 3rd century B.C.

Fig. 3

Fig. 4

[3] Zamfir Dumitrescu, *op. cit.*, p.182.

[4] *Ibidem*.

[5] Judith McKenzey, *The Architecture of Alexandria and Egypt*, Yale University Press, 2007, p.109.

The vanishing axis perspective was widely used in the ancient period, but its traces can also be identified during the Middle Ages and the early Renaissance period. Still, the most significant examples come to us from the Roman art, namely the Pompeian painting. In the images bellow (Figs. 5 to 7) one can notice the convergence of parallel lines towards various vanishing points that are situated on the vertical axis of the image.

Fig. 5

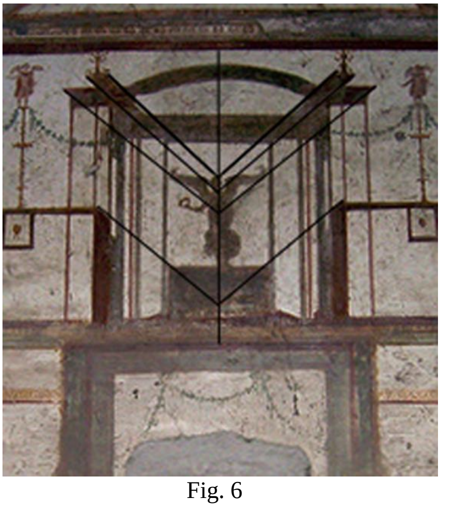

Fig. 6

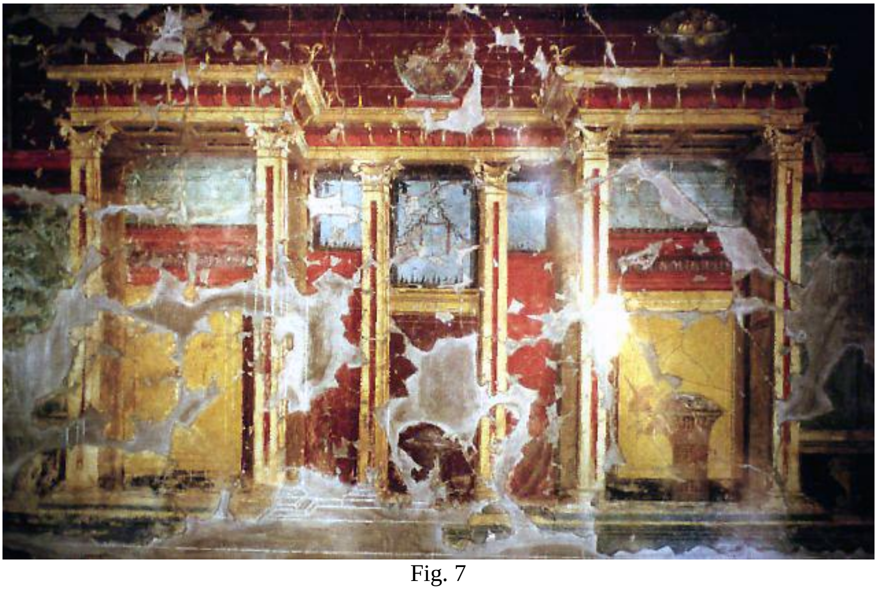

Fig. 7

If in the case of the Pompeian mural painting, we can speak about the use of the axial perspective as a coherent system, the rule of the convergence of the pairs of parallel lines being respected, in Medieval art this convergence has a rather arbitrary character. As it can be seen in Figs. 8 and 9, the vanishing point of the parallel lines of the pavement is situated above those corresponding to the lines of the ceiling. This aspect creates the sensation of a contradictory space and denotes insufficient knowledge of the principles of the vanishing axis perspective as far as Medieval artists are concerned.

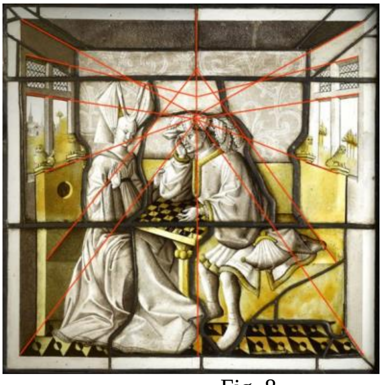

Fig. 8

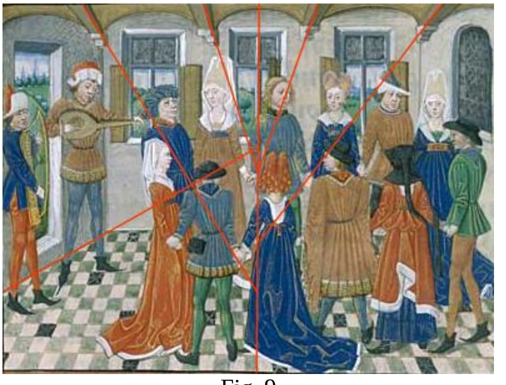

Fig. 9

The vanishing axis perspective as a coherent method of spatial structuring of the pictorial image reappears during the early Renaissance period and it is widely used before the scientific establishment of geometrical perspective. Zamfir Dumitrescu identifies the use of different versions of the method, sometimes combined with axonometric representations, in the works of many artists, such as Pietro Cavallini, Cimabue, Giotto (Fig. 10), Duccio, or Simone Martini. The vanishing axis perspective is also used by painters outside the Italian space, being discovered in the creations of Jan van Eyck (Fig. 11).

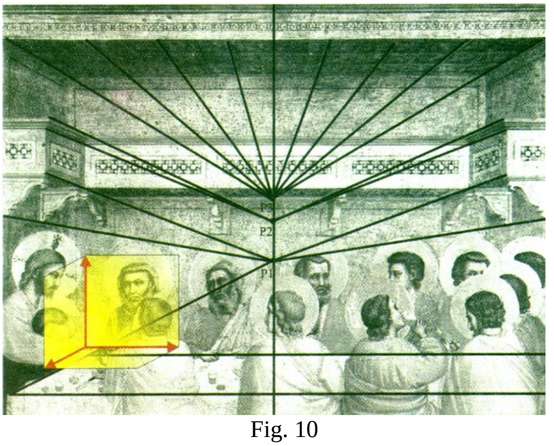

Fig. 10

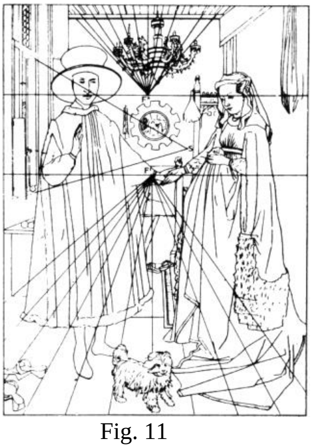

Fig. 11

Many researchers have wondered why the vanishing axis perspective was used as a method of spatial representation in the detriment of the much simpler system of the single vanishing point perspective. Even though some of them[6] claim that the ancient artists might have known the single vanishing point perspective and even elaborated a theory on it, this supposition is very unlikely to be valid.

The vanishing axis perspective also included the convergence in a single vanishing point, but this could only be observed for a very short period of time during the Pompeian painting, and exclusively in the upper part of the image. It seems that the painters were not very pleased with the powerful effect of convergence points, therefore they preferred to hide the "awkward" discrepancies behind escutcheons, draperies or decorative elements[7]. In other instances, the vanishing points of parallel lines were placed outside the visual field. One of the possible explanations of the reason ancient artists used the vanishing axis perspective may lie in the way we perceive parallel lines today. Recent experiments have demonstrated that normally, we do not perceive more than two parallel lines as if they aim at a single point. The more far away pair of parallel lines is situated to the left or right of the observer, the smaller the convergence degree. One may presume that this principle was intuitively known by ancient artists through direct observation, which discouraged them to use a single convergence point for the whole set of parallel lines, until the central convergence was scientifically proven by means of a projection plane and a fixed viewing point.

In his efforts to explain the inconsistent use of the principles of perspective representation in ancient painting, the prominent art historian Erwin Panofsky built a system that he entitled "vanishing axis perspective". When elaborating his theory, Panofsky took into consideration a series of factors that justify the existence of such a system. First of all, he mentioned the physiological aspect that the classical linear perspective ignores, namely that the retina is a curved, concave surface. According to Panofsky's theory, the retinal image is a projection on a spherical surface, and not on a flat one and the straight lines in space, projected on the concave surface of the retina, are seen as curves. Therefore, an artist who wants to paint what he sees should represent straight lines as curves.

This argument was analysed for the first time by the German mathematician Guido Hauck, who tried to explain the optical corrections of the Parthenon by using the hypothesis of the spherical projection surface. The theory became widely known due to Erwin Panofsky's famous article *Perspective as a symbolic form*[8].

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[6] Zamfir Dumitrescu, *op. cit.*, p.123.

[7] Erwin Panofsky, *Perspective as symbolic form*, Zone Books, New York, 1991, p. 40.

[8] The work was originally published under the title *Die Perspektive als symbolische Form* in 1927.

Another element that lays at the foundation of Panofsky's theory is represented by the words of the architect Vitruvius, found in *Ten Books on Architecture*: ”Perspective is the method of sketching the front with the sides withdrawing into the background, the lines all meeting in the centre of a circle”[9]. As the Greek architect P. A. Michelis[10] states, Vitruvius does not specify whether this centre is to be found inside the painting or it represents the midpoint of a spherical projection surface. For a long period of time, this centre was thought to be the equivalent of the vanishing point in linear perspective. However, Panofsky considers that this is very unlikely, as long as such a unifying vanishing point is not to be found in any of the ancient paintings that survived until today. Furthermore, he suggests a much more plausible explanation, namely that this centre might represent the midpoint of the optical projection circle formed by the visual cone beams.

In conclusion, according to Panofsky's theory, the geometric representation of the intersection plane is a spherical surface. Consequently, the horizontal lines of the object are no longer represented horizontally, unless they coincide with the skyline, and all the other curved lines (the upper ones upward and the lower ones toward the base). The vertical lines are represented with their extremities curved toward the viewing axis, which is perpendicular to the skyline and the only one remaining straight.

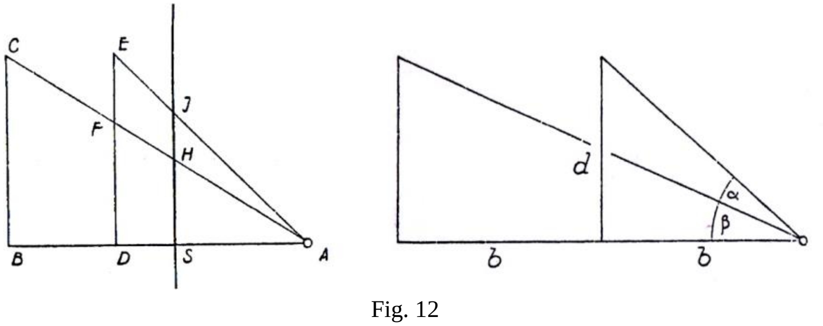

Fig. 12

In order to back up his theory, Panofsky refers to a postulate from Euclid's *Optics*, according to which the apparent difference between two equal sizes viewed from unequal distances is not determined by the ratio of the distances, but rather by the view angle where they are seen from (Fig. 12). If the visual rays are projected on subtended arcs and the dimensions are transferred from the arcs or their chords to the image plane, then the central perspective of a rectangular interior is very similar to a vanishing axis perspectival construction. Panofsky believes the ancient artists could have

[9] Vitruvius,– *Ten Books on Architecture*, The Project Gutenberg, EBook, 2006,Book I, Chapter II, Paragraph 2

[10] P. A. Michelis, *Esthétique de l’art byzantin,* Flammarion, Paris, 1959, p. 186.

used this theorem in order to determine the visible dimensions according to the angle of vision.

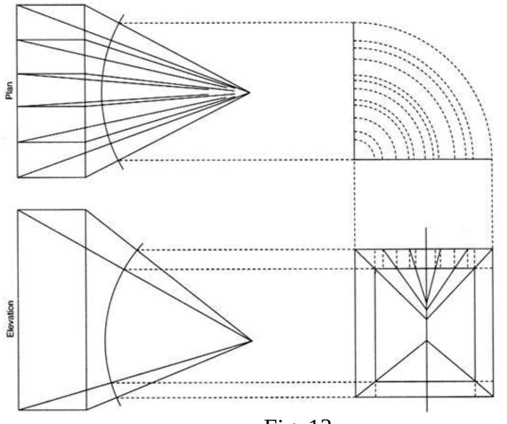

Fig. 13

Based on these considerations, Panofsky constructed the ”vanishing axis perspective” (Fig. 13). Still, as the author himself underlines[11], this theory suffers from instability and inconsistency as, unlike the classical perspective, it does not manage to render the continuous deformation of the three dimensions of the object. The vanishing axis perspective elaborated by the art historian is not able to wholly explain space representation in antique art. Nevertheless, this theory has the particular advantage of being more objective than the classical Renaissance perspective, if we are to admit that the eye moves in a circle in order to see[12].

There are also researchers who question the curvilinearity argument. One of them is the philosopher Klaus Rehkämper[13] who claims that it is of no importance whether the representation of a straight line on the retina is a curve, since we do not see our retinal images. Rehkämper emphasizes that the duty of the artist who represents the world is not to paint its image projected on the retina, but rather to produce a pattern of light on a two-dimensional surface that should be identical to the pattern of light emitted by the object observed from a certain point.

Even though the vanishing axis perspective cannot entirely encompass the spatial structure of ancient painting, as it is a theory with no apodictic claims, it was of crucial importance in ancient art space representation, as its own author asserts[14]. Nonetheless, it is the earliest

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[11] Erwin Panofsky, *op. cit.*, p. 40.
[12] P. A. Michelis, *op. cit.*, p. 188.
[13] Klaus Rehkämper, *What You See is What You Get - The Problem of Linear Perspective, p. 186* in *Looking into Pictures*, MIT Press, 2003, pp. 179 - 190.
[14] Erwin Panofsky, *op. cit.*, p. 39.

systematic form of parallel lines convergence, being widely used before the invention of the scientific perspective and representing a small but significant step towards the discovery of ideal visual representation solutions

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