

Communications

The perspectograph

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In Gerofsky's (2011) contribution to *For the Learning of Mathematics*, she mentions Duerer's grid for perspective drawing (Figure 1, in her text). It is just one example of the many grids used for drawing before the introduction in mathematics of what are now called Cartesian coordinates. I have an example where the presence of numbers is even more evident and in which a justification of the standard orientation may be found. The example comes from the famous handbook *Le Due Regole Della Prospettiva Pratica* by Jacopo Barozzi, published in 1583 after the author's death by Egnatio Danti, a few decades after the publication of Duerer's treatise in 1525.

Barozzi describes the use of an instrument called a perspectograph (see Figure 1). [1] The perspectograph consists of



Figure 1. The original drawing (from Barozzi da Vignola, 1682, p. 60).



Figure 2. Two sixth-graders at the perspectograph.

two graduated rods (a horizontal one that is fixed and a vertical one that can move) that identify the virtual frame. Looking through an eye-piece, the artist centres on the point he wants to draw. Using a system of threads and linkages he can move the vertical rod until it touches the visual ray. Then he dictates to his assistant the coordinates of the point, as read on the graduated rods. His assistant then uses these coordinates to draw the point on the real frame, which has a grid on it.

The starting position of the vertical bar is on the left of the artist (where 0 is located). It is natural from the image to identify the frame where the virtual image of the statue is contained as the first quadrant of a Cartesian system of reference, where the x -axis is towards the right and the y -axis goes up. This arrangement seems to depend of the fact that the artist is expected to be right-handed and will control the wheel—a very delicate operation—by means of the right hand. The use of the instrument is, in this case, easier, from an ergonomic point of view.

The same treatise contains several other instruments with graduated rods [2]. A collection of working instruments is stored in the Laboratory of Mathematical Machines of my university, the University of Modena and Reggio Emilia. The instruments are often on show and can be used by visitors and students: in Figure 2, two young students are drawing a star polyhedron using a reproduction of the perspectograph.

Notes

- [1] Animations showing how the instrument works, and extracts from the original text can be found at archiviomacmat.unimore.it/PAWeb/Sito/Inglese/213i.htm
[2] They can be seen on different pages of the same website mentioned in note 1.

References

- Barozzi da Vignola, J. (1682) *Le Due Regole della Prospettiva Pratica*. [Two rules of practical perspective]. Bologna, Italy: Gioseffo Longhi.
Gerofsky, S. (2011) Ancestral genres of mathematical graphs. *For the Learning of Mathematics* 31(1) 14-19.