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DRAWINGS OF FRIEDRICH BERNHARD WERNHER (1690-1776) AND GEOMETRY. PART 2. PERSPECTIVE

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Abstract. Friedrich Bernhard Wernher (Werner), a mapmaker and a drawer of urban landscapes born in Silesia, indicated in the titles of his drawings that he made use of geometrical methods of graphical projection, such as perspective. The article examines selected drawings representative of Wernher's "perspective drawings".

Keywords: Friedrich Bernhard Wernher (Werner), Silesia, graphical projection, perspective, maps.

1 Basic information

Wernher was a student of "Carolinum" in Nysa, a school of high academic standards and a well-stocked library. Although he discontinued his education there, he came into contact with engineering skills and knowledge in the army. He possessed skills allowing him to practise professions which required knowledge of geometry. For many years, he undertook jobs related to broadly understood cartography. He was a globetrotter and an enthusiast of urban landscape drawing. Such drawings constituted one of his sources of income. We know that many engravings depicting urban landscapes of European cities were based on his drawings. According to Wernher's journals, he studied perspective in Augsburg, under Carl Remshard (1678-1735), in the years 1729/30 [1/p. 11]. However, many of his drawings were subjected to criticism. Even so, they require scrutiny. The article shall attempt to characterise errors the artist made in the selected examples of perspective drawings.

Since the author of the article has made use of electronic copies of Wernher's works, information regarding the source of a discussed drawing shall be given traditionally, e. g. "p. 100", referring to page numbers inscribed on the original copy with a pencil. A second reference, such as "e120", shall be included, citing the page of the electronic copy available on-line. Due to long titles of individual parts of Topographies, entire titles shall be cited in bibliography, while shortened titles shall appear in the text.

2 General notes on Wernher's perspectives

Wernher labeled his drawings. Some titles inform us that a given work is a perspective drawing from a collection of graphics *Perspectivische vorschtelung* [...] (vol. 4) [5]. However, we do not know whether the artist meant a drawing constructed using even the simplest of geometric methods, or rather the character of the drawing as a sketch from nature.

Some of Wernher's drawings depicting architectural objects show some signs of awareness of basic elements of central projection, such as perspective.

2.1 Case study – elements of perspective in a drawing of Małomice

A drawing from Wehrner's *Perspectivische vorschtelung [...]* (v. 4) [5] (quote by [3/p. 147]) depicting a view of Lower Silesia's Małomice (*Mallmitz*) (Fig. 1) may be presented as an example.

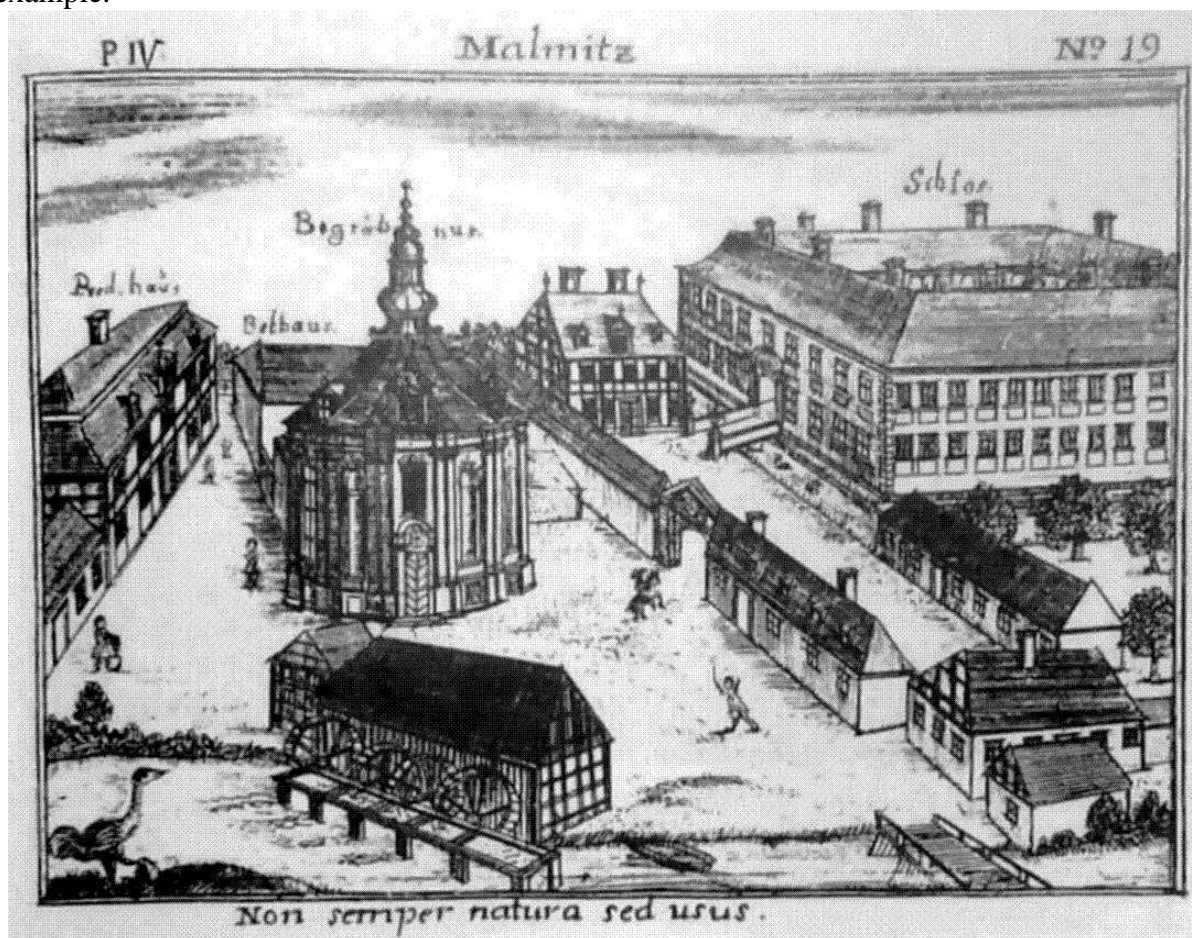


Figure 1: Małomice (*Mallmitz*), F. B. Wernher's work from *Perspectivische Vorstellung [...]* (v. 4) [5] (quote by [3/p. 147])

To begin with, our consideration shall be limited to the fundamental issue of convergence of lines in perspective drawing (see Fig. 2). Let us assume that the drawing portrays typical structures, whose sill plates, eaves and roof ridges are parallel to the plane on which they are situated. Let us begin the analysis with the image of the mill (object 1). It is portrayed using so-called two-point perspective, typical of Baroque art. The concept is often used in artistic fields of study. Although geometrically ambiguous, it helps to describe the image in concise terms. It should be noted that the expression describes only the method of an object's exposition, it does not refer to the type of perspective. The object in this perspective is so situated in relation to the observer, that the observer perceives the corner of the object together with the two adjoining walls, usually set at a straight angle. Two-point perspective has two vanishing points on the horizon, where the lines having the characteristic two directions converge.

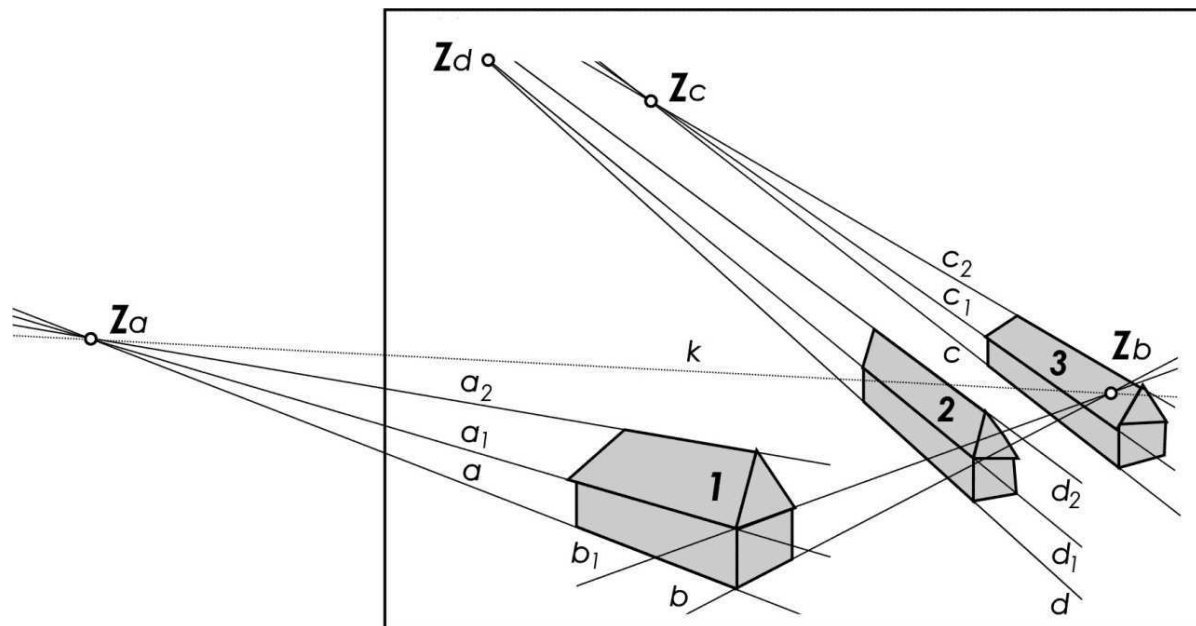


Figure 2: An analysis of Wernher's "perspective drawing" depicting Małomice. An extract from F. B. Wernher's work contained in *Perspektivische Vorstellung* [...] [5] (quote by [3/p. 147]) with elements of perspective construction added, by author

Let us draw lines a and b running through bases of the walls abutting the exposed corner, noting that all vertical edges of buildings are parallel to one another. Next, let us draw lines a_1 and a_2 running through the eaves and the roof ridge. All lines oriented along the direction a converge at the vanishing point Z_a . Lines along direction b , running through the base of the gable wall and through the base of the gable, converge at the vanishing point Z_b . The vanishing points of lines a and b should be located on a horizontal line called the horizon. The line k running through points Z_a and Z_b is not horizontal, which may be treated as an oversight or as a deliberate measure. However, lines along direction c , running through characteristic elements of the long building (object 3), converge at the vanishing point Z_c , which is located at a considerable distance from line k . If we assume that line k is the horizon of the drawing, vanishing points of all lines running through roof ridges, eaves and wall bases should be located on this line. In the case of the other long building (object 2), lines of direction d converge in pairs at different points. Lines d and d_1 converge at the point Z_d , but line d_2 does not run through this point. Lack of convergence of all the lines along direction d at one vanishing point may be considered an oversight, however, more importantly, direction d bears no relation to the line k . Lack of a horizon containing all vanishing points of directions a , b , c and d is the most characteristic construction error committed by Wernher in his "perspective drawings". The error cannot be attributed to inaccuracy or compositional methods employed in art through the ages. Moreover, convergence of lines of the same direction precludes the possibility of considering Wernher's drawings in terms of any other geometric construction, e.g. axometric projection.

The work portraying the Małomice mill contains other elements worthy of mention. Among others, part of the drawing portraying the mill's wheels deserves closer attention. Bearing in mind that the drawing is not a fully realised perspective construction, one must notice the ambiguity in presentation of this element. Let us analyse the Figures 3 and 4.

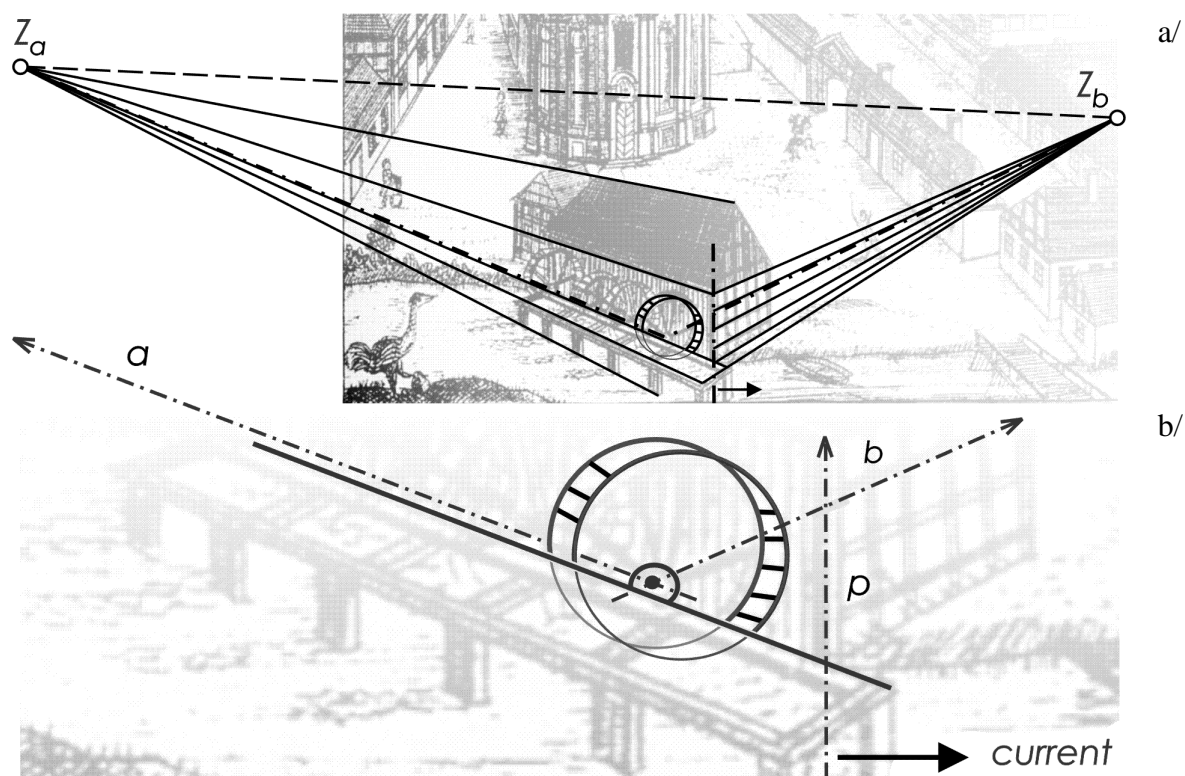


Figure 3: Elements of analysis of the part of the drawing containing the Małowice mill (see Fig. 1): a/ elements of the mill's perspective, b/ elements of the work selected for analysis: a water wheel (two circles connected with segment lines representing wheel blades), a wheel hub (an ellipsis with its centre marked), two lines, a and b , parallel to the object's walls, mutually perpendicular and running through the hub's centre, p direction of vertical edges of the structures, by the author

Figure 3 presents parts of the Małowice view depicting the mill. The author of the article has added elements of simplified perspective construction and elements selected for analysis to the drawing, namely:

- two lines of direction a and b running through the point marking the axis of the wheel embedded in a hub and a vertical line p ,
- a line marking the edge of the channel driving water onto the wheels,
- circles o_1 and o_2 (with centres marked by points S_1 and S_2) connected by short line segments, representing water wheels with blades. According to the author of the paper, the portrayal of water wheels raises doubt as to geometric correctness of the drawing (see Fig. 4).

First of all, in a perspective drawing, curves (here: circles) delineating the cylindrical shape of the lateral face of a wheel should take the form of ellipses with conjugate diameters of varying length. Instead, they are drawn as circles.

Secondly, the hub lies outside of the line segment whose end points constitute circle centres S_1 and S_2 . Such oversights may be considered negligible in a freehand drawing, if it were not for the ambiguity of the sketch, which constitutes its major fault. Since the artist did not shade the lateral faces of wheels, the drawing may be interpreted in two ways. The circles in the drawing intersect, creating two crescents. Let us assume that the outer face of the water wheel is white, while the inner is dark.

The first possible option is to leave the crescent on the left white, and shade the crescent on the right (Fig. 4a). In order to see the wheel face this way, the wheel would have to be mounted on the a axis. If so, the wheel would be located on a plane perpendicular

to the longer wall of the mill as well as to the current of the mill race (Fig. 3b). A wheel placed in such a position would draw water from the mill race and pour it into the channel.

The second option is to leave the crescent on the right white and shade the crescent on the left (Fig. 4b). In order to see the wheel in this position, its axis would have to be oriented along the line b . The wheel would be located on a plane parallel to both the longer wall of the mill and the current of the mill race. It would be, therefore, in a position typical for a mill wheel. However, despite overall correctness of the second option's spatial arrangement, it cannot be deemed completely right. Although the horizon k is positioned high in the drawing, we can see the upper segment of the inner face of the wheel. We should be able to perceive only the outer face of the upper part of the wheel.

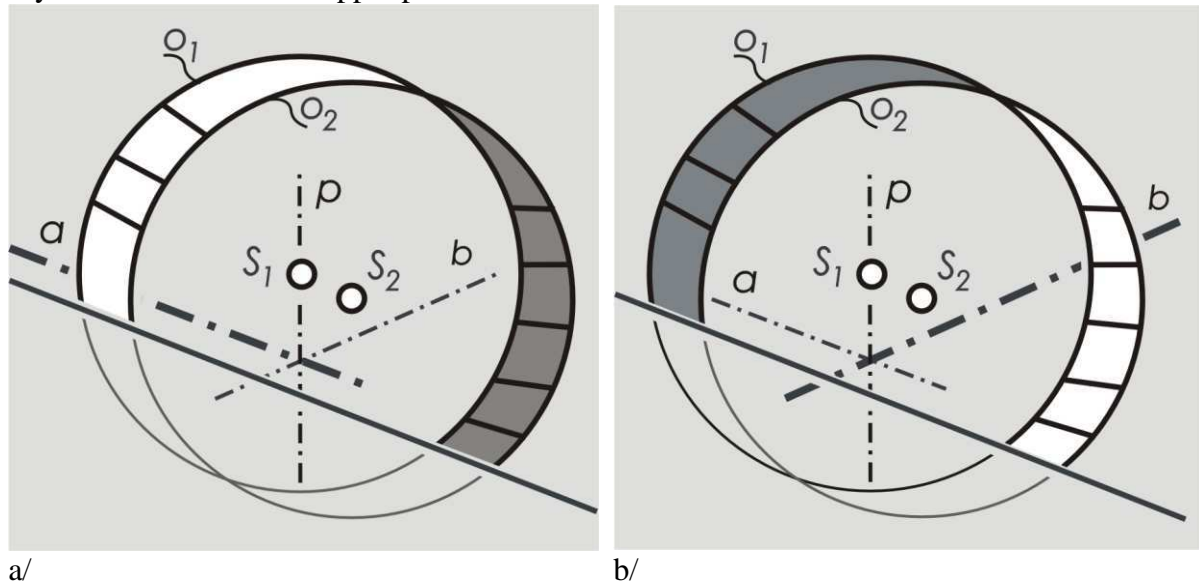


Figure 4: An analysis of the sketch depicting the water wheel of the Małomice mill (see Fig. 1): a/ the first possible interpretation of the sketch, b/ the second possible interpretation of the sketch, by the author

Let us introduce some corrections to the second interpretation. The results of the corrections are demonstrated in the Figure 5.

We will begin with placing the circle centres S_1 and S_2 on the axis oriented along direction b , and adjusting the position of circles o_1 and o_2 accordingly. Next, let us divide circle o_1 into twelve parts and draw line segments oriented along the direction b , connecting both circles. The outer face of the wheel shall be left white and the inner face shall be shaded. Finally, let us transfer the corrected wheel onto the relevant part of Wernher's drawing (Fig. 6).

There is a substantial difference between Wernher's wheel and a wheel constructed correctly. Regardless of whether the drawing of the mill was made "from nature", or constructed by use of geometric methods, it is simply incorrect. It may be that such errors are only visible to *the hawk-eyed* [2/p. 40], such as engineers specialising in geometry.

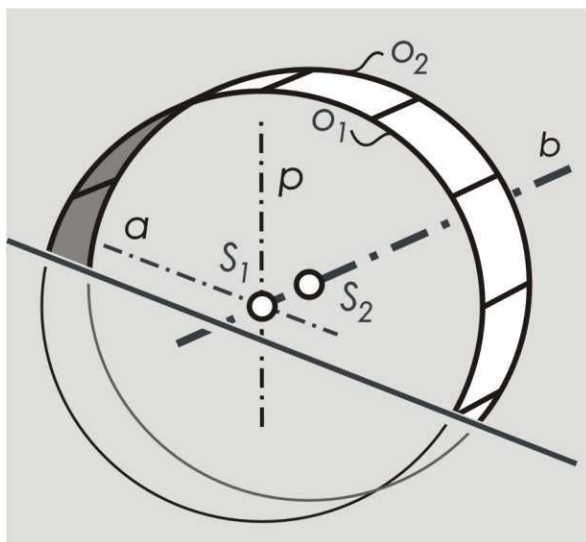


Figure 5: A sketch of a corrected drawing depicting the water wheel of the Małomice mill (see Fig. 1), by the author



Figure 6: The Małomice mill (see Fig. 1) with the corrected wheel, by the author

When writing about the complexity of *seventeenth-century methods of perception and depiction* [2/pp. 39-40] in her study based on Victor Stoichita's [4] research, Maria Poprzęcka remarks on the dichotomy typical of the artists' and the art consumers' attitudes in that era. According to Stoichita, two opposite notions, 'curiosity' and 'method', represented two different attitudes. The first is seen as *gathering, accumulation and combination of images*, while the other consists in mechanised actions, as in *camera obscura*. Can one of these approaches be attributed to Wernher, who worked in the eighteenth century? Did he seek solutions by himself, basing on a combination of his own notions regarding water wheels and

an accumulation of previously seen and remembered images? It remains uncertain. However, it is probable that Wernher belonged to the group guided by ‘curiosity’ rather than ‘method’.

3 The issue of polifocality in Wernher’s “perspective drawings”

When analysing Wernher’s “perspective drawings”, one should take into consideration the possibility that he employed polifocal perspective in his works. Polifocal perspective involves a combination of several perspective drawings, constructed from various points of view. In 17th and 18th centuries, this method was employed, e.g. in illusionist paintings of architecture. Moreover, adjustment of selected directions was used to enhance depth of a structure’s interior.

Among Wernher’s body of work we find a drawing that may, at first glance, create an impression of an image combining two properly constructed perspectives of one architectural complex. Namely, a front-view drawing of the Izbicko palace (*Stubendorf. von Vornen.*) [6/ p. 322/e167(left side)]. The complex consists of two parts: the palace courtyard with surrounding buildings and the garden. The garden is depicted from a bird’s eye view, while the courtyard and the buildings seem to have been constructed with the horizon positioned relatively low. However, on closer inspection of the latter, we can see that the artist did not set a horizon at all, and lines running through parallel edges of buildings do not converge at one vanishing point. Maybe that is the reason why Wernher drew the palace again on the very next page, this time resorting to monofocal perspective (*Lustgarten zu Stübendorf gegen das Schlos*)[6/ p. 323/e167(right side)].

4 Conclusion

Despite the errors discussed in the article, the author concludes that for an observer unversed in geometry, Wernher’s drawings may constitute an entirely adequate representation of space and objects contained in it. It is a convincing vision, conveying the essence of structures and their surroundings. However, his vision is an imprecise one, often preventing reconstruction of depicted objects’ geometrical characteristics, such as shape and dimension.

Wernher’s ‘perspective drawings’ require further study. For instance, his perspective drawings of interiors, such as a drawing of the court room in Wrocław city hall (*Der sogenannte Fürsten Saal auf dem Rathaus in Breslau*)[7/p. 203/e107] or a drawing of the princely room council in Münster city hall (*Fürsten Rats zu Münster*) [6/p. 247/e128], present to the researcher a topic of considerable interest.

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- gezeichnet, und in Kupfer befördert, von einem unpartheischen Verehrer Schlesischer Denckwürdigkeiten. Wrocław (?), 1751.
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- [7] Wernher F. B.: *Topographia oder Prodromus delineati Silesiae Ducatus*. Das ist Presentatio und Beschreibung derer Städte, Flecken, Klöster, Schlösser, Ritter Sitz, undt adelichen Häusern, Gärten, Kirchen, Dorfschafften etc. des Hertzogthum Schlesiens durch Viel Fährigemüsame Reiseum colligiret, oder zusammen getragen, von F. B. Wernher. Wrocław, 1755.

RYSUNKI FRIEDRICHA BERNHARDA WERNHERA (1690-1776) A GEOMETRIA. CZĘŚĆ 2

Urodzony na Śląsku rysownik map i widoków architektury Friedrich Bernhard Wernher (Werner) (1690-1776) posługiwał się w swoich rysunkach, jak wynika z tytułów jego rysunków, geometrycznymi metodami rzutowania, między innymi perspektywą. Artykuł poświęcono omówieniu wybranych przypadków rysunków, które są reprezentatywne dla „wernherowskiej perspektywy”.