The National Edition of *De Prospectiva Pingendi*: a Philological Approach to the Drawings in the Treatise

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The monumental editorial initiative to publish a National Edition of *De prospectiva pingendi* by Piero della Francesca (Sansepolcro c. 1410-1492) has recently been completed. The initiative is sponsored by the Ministry of Cultural Heritage and Activities and Tourism (MiBACT) and the Fondazione Piero della Francesca [1]. The book, published by the State Mint and Polygraphic Institute, is the third volume in the epic series –the National Edition of Writings by Piero della Francesca– established by Presidential Decree 26.2.1974 and initiated in 1985.

The critical edition of *De prospectiva pingendi* by Giusta Nicco Fasola was published in 1942 [Piero della Francesca 1942]. Although it is undoubtedly an important critique, the author did not consider all available texts, in other words he did not compare the many versions of the manuscript, some in the vulgate, and others in Latin. Instead linguists are interested in Piero's writings precisely because of the peculiarities of the language he uses: a Tuscan vernacular, very different to Florentine, and with Umbrian nuances [2].

In 1984 an anastatic copy of Nicco Fasola's edition was reprinted: it includes several critical essays [Piero della Francesca 1984]. One year later the need for a philological approach led to renewed study on the manuscripts written by the painter and treatise writer from Sansepolcro. The initial results of these new studies was the publication of the *Libellus de quinque corporibus regularibus* in 1995 [Piero della Francesca 1995].

The Ministry nominated Cecil Grayson, who had edited the vulgate texts written by Leon Battista Alberti [Alberti 1960-1973], as chair of the scientific commission. He was later as chair replaced by another member of the commission, Marisa Dalai Emiliani, currently assisted by two co-chairs: Ottavio Besomi and Carlo Maccagni.

The National Edition continued in 2012 with the publication of the *Trattato d'Abaco* [Piero della Francesca 2012] and two parallel publications about *De Prospectiva pingendi*, published respectively in 2016 (National Edition of the Parma Codex 1576, in vulgate) and in 2017 (National Edition of Bordeaux Codex 616, in Latin). The last envisaged publication will focus on the *Archimedis Opera*. Every National Edition is a meticulous, Herculean, and undeniably scientific task: each one is an extremely interesting national endeavour backed by a substantial financial investment, but it is also and above all pregnant with expectations. The MiBACT website contains the following paragraph: "National Editions satisfy the basic scientific need to ensure the protection, enhancement and fruition of our literary heritage and philosophy, as embodied by the written texts of Italian authors: in fact, these initiatives guarantee the publication of the *opera omnia* of an author (or, in some cases, the most important works of a group of authors) in editions based on the identification and critical transcription of all pertinent manuscripts. They propose all the published and unpublished texts of an author and use all available documentation to clarify the history and structure of the texts" [3].

The National Edition of *De prospectiva pingendi*

The enormous amount of work focusing on *De prospectiva pingendi* was published over a two-year period; the study was divided into two separate series (each made up of three books) and is presented in two box sets.

The first series, marked by the letter A and published in 2016, tackles the vulgate draft of the 1576 codex housed in the Biblioteca Palatina in Parma. The second series (2017), marked by the letter B, focuses on Latin Codex 616 preserved in the Bibliothéque Municipale in Bordeaux.

Each series is made up of three books. The work on the texts is performed using the same approach and in parallel: Book I presents a critical version of the text; Book II provides a critical edition of the drawings; Book III contains the anastatic copy of the surviving text.

The work was carried out by several scientific referents: Chiara Gizzi (critical edition of the vulgate text), Franca Ela Consolino (critical edition of the Latin text), and Riccardo Migliari (critical edition of the drawings) [Piero della Francesca 2016; 2017].

Flavia Carderi curated the critical edition of the Latin text (Book I, III.A), Chiara Gizzi curated the critical edition of the vulgate text (Book I, III.B), while the critical edition of the drawings (Book II, III.A and Book II, III.B) was a joint effort by Riccardo Migliari, Leonardo Baglioni, Marco Fasolo, Matteo Flavio Mancini, Jessica Romor, Marta Salvatore (Sapienza Università of Rome) and Federico Fallavollita (Alma Mater Studiorum-University of Bologna). Alessandra Sorci inputted some philologically critical contributions.

It is the many different features of this edition of the treatise that makes it so important.

First and foremost, it's important to note that the two different versions of the text (vulgate and Latin) were studied in parallel using the same method. This synchronised interpretation provided important data about the language used by the author who, unlike Alberti, appears to have written in Italian and only afterwards translated the text into Latin, not vice versa. Piero della Francesca wrote the text using the language he spoke everyday and then translated it into an aulic language in order to be considered a humanist. In any event, this is the first time the Latin version of the treatise has been published. The fact it

is contextually compared to the vulgate version allowed important headway to be made regarding the glossaries since the latter are crucial when an in-depth study is performed on its contents and the *humus* that existed when it was written [4].

This undertaking is the product of a truly interdisciplinary team, another unique feature of this initiative during which the fourteen scholars pooled their skills and expertise (historians, art historians, language historians, philologists of both the vulgate and Latin, experts in the fields of descriptive geometry and perspective). Rather than working separately they adopted an integrated approach, toiling side by side in order to enhance our knowledge of such a key text in Italy's artistic and scientific landscape. Indeed, the topic of the manuscript –the codification of the perspective method during the Renaissance– is indissolubly linked to Italy's culture and its status in the world.

In order to get a better understanding of the concept of 'interdisciplinary' research –a crucial characteristic of this new edition of *De prospectiva pingendi*– let us turn to the words written by Migliari in another essay: "Interdisciplinary research is in fact the form of collaboration that produces the best, most fertile results. Researchers who are experts in their own fields work together, compare their findings, and continually exchange their results. They learn from each other because as they study they first clarify the work they are doing in their own minds and then explain what they are doing to each other; they communicate their drive, reasoning, successes and setbacks" [5]. This approach is what makes the publication so radically innovative. This publication –perhaps for the first time– exploits an integrated methodology and parallel studies

to examine both the text and graphic images. Each investigation was inspired by another investigation, or better still, 'in conjunction with' another investigation: the effectiveness of this synergetic exchange was acknowledged by all the scholars who inputted into the success of the undertaking as well as by the chair of the scientific commission, Professor Dalai Emiliani.

The traditional philological approach to the manuscript was based on a documented comparison between all the known surviving texts (in this case three vulgate and four Latin codices [Baglioni 2018, p. 7]. It also included a double, 'diplomatic' and 'critical interpretation' of the treatise and drawings. This methodology was elaborated after many detailed discussions between all the experts and was adopted for the first time on this occasion. The need for a double edition of every drawing is a characteristic of the National Edition of the Writings by Piero della Francesca. The idea was a brilliant intuition by Francesco Paolo Di Teodoro, curator of the first treatise, the *Libellus de quinque corporibus regularibus*. In De prospectiva pingendi this mechanism appears to have been adjusted and updated as well as particularly effective in revealing features of the text that are not only profoundly innovative, but also inspired by the culture and science of past centuries.

In addition, after a new and meticulous philological interpretation, the undeniable progress in the range of available options provided by increasingly sophisticated graphic models makes the analysis of the images particularly enjoyable but, even more importantly, effective and incisive *vis-à-vis* the comprehension of the originality and historical importance of the manuscript as well as future developments.

The *De prospectiva pingendi* and the edition of the drawings

The strict parallelism between the work on the text and the approach to the drawings made it possible to verify and reveal the logic between these two parts of the treatise, assigning the work its truly important feature, i.e., its status as the first, real scientific instrument used to present a representation method based on its subjacent scientific procedures, and exploiting all the devices available to the author and reader to achieve this goal.

The manuscript was written between the 1470s and the 1480s. Before the fifteenth century even most of the instruments used to find directions in a city were in written form and the difficulties associated with the dissemination of images meant that urban cartography basically depended on written lists and descriptions [6]; this situation began to change during the second half of the fifteenth century. Given the above, it's easy to understand how Piero della Francesca's text must have appeared 'modern' and explosive due to its most important characteristic: drawings accompanying the text, and a text that helped to interpret the graphics. Finally the time was ripe for a study of this combination and its specific, decisive role as precursor of so much subsequent scientific literature. As mentioned earlier, the only way to do this was to implement an approach and method undertaken jointly by those who had focused on the text (historians and philologists) and those who had concentrated on the drawings using a multifaceted, methodical and above all joint procedure.

The approach to the drawings developed by Riccardo Migliari and his research and work team involved analysing each of the graphic images in the treatise. This analysis can be used as an important starting point for any future comprehensive study of Piero's work; it can also act as an example of how to study texts with numerous graphic images that are, quite rightly, not only part of the *corpus* of documents about the history of representation, but also constitute its most important chapters. Migliari is convinced that "a researcher […] has to develop new, more general, and more efficient procedures" [7] in order to create experiences that can always be reviewed, repeated and verified at any moment. It's true that these experiences represent the end result of a process, but they are also the starting point of any future research [8].

As mentioned earlier, when working on the *Libellus* the curator highlighted the close link between Piero's text and drawings, emphasising the need to consider the textual description and graphic description as equally important insofar as they were closely interrelated and integrated to form a *unicum*, the importance of which can only be understood if they are considered as a single unit. In his *Introduction* to Book II. *Drawings* of the National Edition of the *Trattato d'Abaco* [Piero della Francesca 2012, p. XIII], Vladimiro Valerio acknowledges that this brilliant intuition was not however adopted in later studies about Piero. It was Valerio who took up the gauntlet of this proposed philological approach to the drawings, one which

Fig. 1. Piero della Francesca, De prospectiva pingendi, codex 616, Bibliothèque Municipale, Bordeaux, sheet 72v: last figure illustrating the proposition dedicated to the perspective of the capital [Piero della Francesca 2017, Book III, sheet 72v].
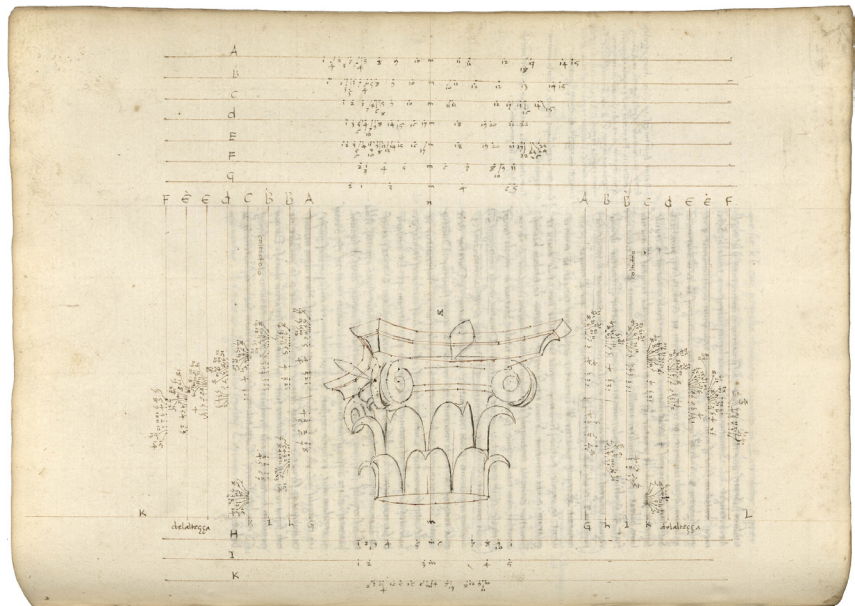
he continued to focus on and develop in his own work on the *Trattato d'Abaco*. The work on *De prospectiva pingendi* moves along the same tracks; the close link between text and images appears to be the key issue and in particular structures the part we are most interested in, i.e., the edition of the drawings and the way in which they were tackled, studied and re-proposed, clearly based on the intention to initiate a novel philology of historical geometric drawings. The importance of *De prospectiva pingendi* as part of the work of its author is undeniably obvious, as is the role of what is considered the first systematic treatise of perspective theory. However, the modernity of the treatise lies in the fact that it was the first text which, between the lines, revealed the existence of a precise relationship between space and its two-dimensional representation obtained thanks to perspective construction. The latter –the subject-matter of the treatise– is proposed as one of the graphic transpositions of the spatial model, something that emerges from the continuous operational and functional exchange between orthogonal projection and, specifically, perspective.

As mentioned earlier, this is the first treatise on perspective in which the text is systematically illustrated by more than 150 autographed drawings [Migliari 2016a, p. XIII]. This forced the group working on the drawings to perform a critical assessment; it involved drafting and defining an approach method in line with what was proposed for the textual philology.

A philological approach to the text traditionally distinguishes between a 'diplomatic' interpretation and a 'critical' interpretation. While the former involves re-proposing the text as it is, the latter not only provides an interpretation,

but also highlights the many possible interpretative solutions (including the ones that are clearly excluded) based on the analysis of all existing 'surviving texts', in other words all available documents, in most cases manuscripts.

The work on the graphic images in the treatise is therefore based on a similar philologically-based matrix. It defines a methodology to perform a philological critique of the drawings [9] based on a 'diplomatic' edition of each of the graphics (i.e., relating to the codified restitution of the material and objective appearance of the drawing 'as it appears' in the treatise) as well as on a 'critical' edition (in which the drawing is based on an accurate analysis of the written text).

The methodology developed for Piero's work is also based on the execu-

tion of intermediate study drawings that help to understand the geometric concept behind the propositions in the three books of *De prospectiva pingendi*. The goal of the diplomatic edition of the drawings was to present drawings that were as similar as possible to the originals. The objective was to try and portray the size of the graphic image and the different kinds of signs. The latter were reproduced with variable thicknesses in order to indicate the speed with which they were drawn. The beginning and end of the signs were highlighted, and certain special signs were also identified, for example, the presence of visible notches on the sheet of paper [Migliari 2016a, p. XVI]. As Migliari himself points out, this work was heavily influenced by the quality of the copies

Fig. 2. Jessica Romor, diplomatic edition of the figure on sheet 72v of the treatise [Piero della Francesca 2017, Book II, sheet 72v, p. 150].
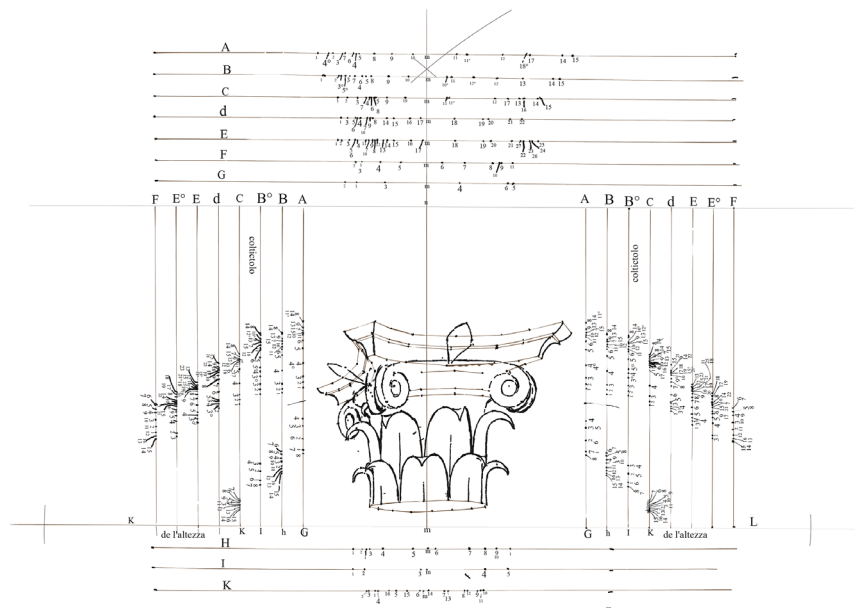
of the original sheets of paper and the quality of the acquisitions on which the work necessarily had to be based. Although they are high resolution acquisitions they are often deformed or lit in such a way that they do not reproduce the actual pattern of the signs on the sheet of paper (this refers not so much to the ink marks but to the just as interesting 'silent' signs, in other words graphic construction signs, notches, or the holes made by a compass) [Migliari 2016a, pp. XVI, XVII].

The objective of the critical edition of the drawings is instead to convey the message transmitted by combining the text and the graphic works. Its goal is to turn the meticulous textual indications into signs, taking the reader by the hand and recreating their construction step-by-step by trying to follow Piero's reasoning, his work logic, and the summarised didactic method he used to 'communicate' what he wanted to transmit. Here the signs are all the same thickness and the letters are all the same height. Any omissions in the drawings (lines and points indicated in the text, but not present in the drawing) are appropriately highlighted. Likewise, the geometric shapes that are not cited in the text, but present in the drawing. This version of the drawings does not provide a 'qualitative' reproduction of the autographed drawings but instead focuses on the procedure behind the construction.

The chosen method involved initially studying the scansion of a drawing in the treatise (fig. 1). A diplomatic version was then developed (fig. 2), followed by a critical edition (fig. 3). Unlike what happens when there is a close link between text and drawing, it's obviously impossible to separate these three drawings (the first is an autographed drawing, while the other two are critically developed). They must be studied together (and contextually with the text) in order to recreate the unity that was philologically dismembered to provide readers with enhanced data as well as unusual and systematic interpretations.

The fundamentally new approach was developed after thoughtful, joint considerations not devoid of methodological doubts and gradual rapprochement; it led to an important decision regarding the role of the illustrations accompanying a scientific text. Their role is considered as functional on various levels: they are 'demonstrative', insofar as they reveal what exactly one obtains when the proposed scientific method is applied; they are 'educational', because the drawings accompanying a text are tools to ensure whether or not the method has been learnt by the user, but perhaps even earlier, by the treatise writer himself, since drawings act as a continuous exercise arena to improve the clarity of the presentation and verify the procedure in question [Migliari 2016a, p. XIII]; finally, they are 'experimental', since "the theoretical hypothesis is validated by an experiment providing the expected result"; it is intended to dissipate every possible interpretative misunderstanding and eliminate the danger of subjective interpretations [Migliari 2016a, p. XIII].

Fig. 3. Jessica Romor, critical edition of the figure on sheet 72v of the treatise [Piero della Francesca 2017, Book III, sheet 72v, p. 151].

The *Introduction* to the work on the Drawings

Apart from the graphics and restitution, one should not forget the critiques and historical contributions that the work
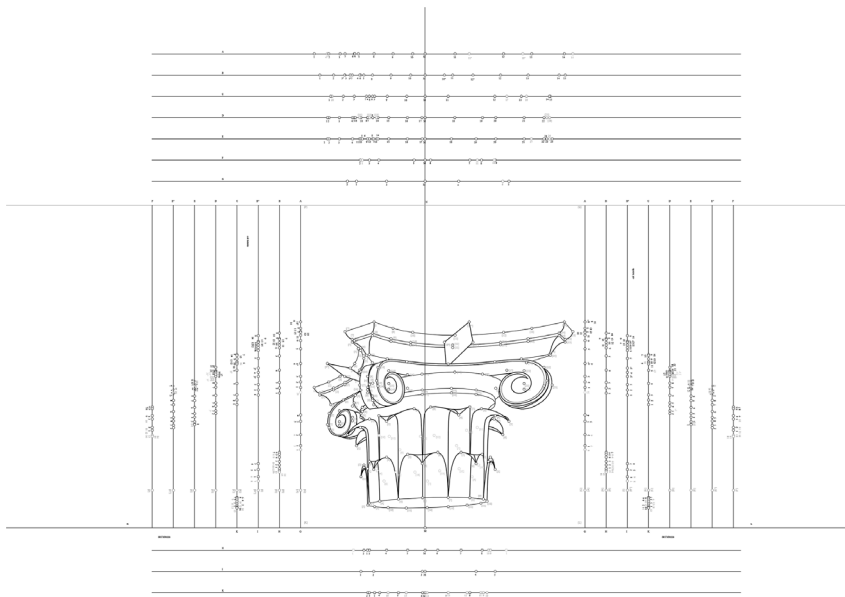
on the drawings provides in the essays published in the *Introduction* to Book II. *Drawings*, as well as in the Parma codex (III.A) and Bordeaux codex (III.B).

Traditional introductions generally underline certain features of the work and suggest an interpretation. However this *Introduction* contains the critical assessment of both the work that was performed and the conclusions drafted at the end of the study.

The contributions are organised so as to create a unitary discourse. They purposely leave aside personalisms and the albeit recognisable paternity of each essay in order to convey the fact that this was a team effort. By doing so they structure the initiative and provide solid justification as regards methodology. The contributions help readers during the complex approach they need to adopt in order to not only understand the treatise, especially Piero's drawings, but also their diplomatic and critical restitution. At the same time the written words reveal the amazement generated by the authors' discovery of the 'freshness' of Piero's work, the effectiveness of his method, and the intelligence of the painter from Sansepolcro. In short, these essays reveal not only the authors' love of research, but also the adventure which, with great difficulty, involves rethinking, backtracking, and starting over, but in the end leads to unexpected, but always exciting results. In order to create a unified *Introduction*, these contributions (but I would prefer to say 'this contribution') provide a particularly enlightened and documented 'technical' interpretation of the two different ways in which Piero approaches perspective construction. The latter emerges in all its clarity and effectiveness and finally reveals many of the aspects which had so far remained difficult to comprehend.

The *Introduction* is divided into three parts.

In the first part Migliari clarifies what is intended by philological critique of the drawings and how it is performed. He introduces the diplomatic and critical edition, clarifying the structure of the technical sheets. He then goes on to tackle the issues related to terminology. Romor instead focuses on the digital technique that was adopted, the graphic conventions, and the general features of the illustrations.

The second part focuses on several general features of the illustrations in the treatise. The contribution describing the laws of degradation of apparent magnitude is particularly interesting. It is written by Migliari who notes how in the text, and despite Piero's extremely clear exposition, there are no figures next to the explanation. Migliari therefore proposes a critical interpretation and provides clarification in the form of graphic images.

The law of degradation presented here was used by Piero when he adopted his first method to create perspective representation in Books I and II of the treatise where the constructions begin with what is called "*vera forma*", describing the objects "as they are", and then the objects "as they appear", in other words their perspective (Baglioni and Fasolo).

One important observation by Migliari focuses on the disambiguation of "puncto A", a point that appears in all the illustrations of the first method and Piero calls "*ochio*", whether it be the centre of projection, or the point where the perspectives of the straight lines perpendicular to the picture plane converge, in other words what we would call the "principal point" of the perspective. His interesting hypothesis is that point. A is derived from the strong link with

catoptrics, a science well known in the Renaissance and extensively present in fifteenth-century perspective construction. In this case, it is possible that "in point *A* of the perspective Piero simply sees the reflection of the eye observing the scene" [Migliari 2016b, p. XLI; Baglioni, Migliari 2018]. Once again, this is what we now call the "principal point", one which we would describe as the vanishing point of straight lines orthogonal to the mirror or picture plane, even if we should not omit to say that this awareness, or better still, this way of interpreting perspective construction was unknown when Piero was alive since it was developed during seventeenth-century studies [Migliari 2016b, pp. XLI, XLII; Baglioni, Migliari 2018, pp. 42-51].

When studying Piero's treatise Fasolo identifies the concept of "*veduta vincolata*" (proposition 1.12) and the limits of the visual field, i.e., the angle of aperture of a cone with a vertex in the monocle eye of the observer and axis aligned with the particular direction of space which, connecting point *A* in space with point *A* on the picture plane, represents the orthogonal to the picture plane itself. This approach, as I have had occasion to say, appears to be derived almost directly from Ptolemy's conclusions when he broadened the field of optics to include stereoscopy. In fact, Ptolemy spoke of an "*axis communis*" orthogonal to the binocular distance and considered the points in space nearest to this axis as points of clear vision. This particular research approach led Ptolemy to identify an privileged orientation for a plane in space, the one orthogonal to this axis. By adopting this line of thought he anticipated the fifteenth-century approach of linear perspective executed on a vertical picture plane, with point *A* in a central position

compared to the painting or frescoed wall [Carlevaris 2003] [10].

While marginal aberrations are tackled by Fallavollita also with regard to later developments of large-scale architectural perspective, Salvatore explains how the drawings associated with this first method are not simple two-dimensional images, but three-dimensional models. Something that is irrefutably established by the current initiative.

In the third part of the *Introduction*, Mancini, Romor and Fasolo explain the 'complex' illustrations, the ones that refer to the "*corpi più deficili*" [Piero della Francesca 2016, vol. III.A, Book II. *Drawings*, pp. XLIX-LXXXIX] (the "*corpora difficiliora*" [Piero della Francesca 2017, vol. III.B, Book II. *Drawings*, pp. XLIX-XCI]). For a variety of reasons the analysis and interpretation of these illustrations is particularly difficult. Piero tackled the perspective construction of these figures in Book III of the treatise. He introduced a second method; alternative to the first, but just as effective and simpler to understand, this was a method he could apply to complex cases. Romor emphasises how this second method "cannot be considered a representation method since it does not lead directly to the construction of the perspective image but requires intermediate representations in plan and elevation" [Romor 2016, p. LIV].

In this case Piero works in space using double and associated orthogonal projections so as to determine the intersection between the visual pyramid and the picture plane ("*termine*" of perspective). He performs operations in space, such as translations, rotations and rabattement, and works on the projections of the object as if he were working on the object itself. By performing these operations he obtains the perspective of the object.

Given all the above, and everything else we cannot add for brevity's sake, this *Introduction* to Book II. *Drawings* of the National Edition of the treatise by Piero della Francesca represent a masterful critique of Piero's work.

In light of this careful and meticulous scientific interpretation of the *De prospectiva pingendi* –a text which if rapidly interpreted is both fascinating and perhaps 'easy' to understand– actually turns out to be rather complex, sophisticated and, above all, full of clues that provide a broad understanding not only of its author and his ideas about perspective theory, but also of the approach adopted by the Renaissance to its 'sweet' invention [11]. At the same time the text also hints at the future developments that were to take place in the field of perspective theory.

Notes

[1] <http://www.fondazionepierodellafrancesca.it/interno.php?id=139> (accessed 2018, June 27).

[2] Extract of the words spoken by Carlo Bertelli at the presentation of the National Edition: Rome, Accademia di San Luca, 15 December 2017.

[3] The Ministry provides acknowledgement and support to the National Editions. After consulting the Council of national committees and national editions, the Ministry of Cultural Heritage and Activities and Tourism issued a decree assigning their production "to a board of scholars with specific expertise responsible for monitoring both the scientific and operational implementation of the editions". The board was also responsible for establishing the criteria of each edition, choosing collaborators, authorising publication, and referring to the MiBACT by submitting annual reports: <http://www.librari.beniculturali.it/it/edizioni-nazionali/index.html> (accessed 2018, June 25). There are currently ninety-eight National Editions.

[4] Extract of the words spoken by Lucia Bertolini at the presentation of the National Edition: Rome, Accademia di San Luca, 15 December 2017.

[5] Migliari, R. La ricerca nell'ambito della geometria descrittiva. In Carlevaris 2017, p. 18.

[6] For example the *Mirabilia Urbis*, textual and "non-spatial" instruments intended for those who travelled to Rome: Pazienti 2013, p. 33.

[7] Migliari, R. La ricerca nell'ambito della geometria descrittiva. In Carlevaris 2017, p. 16.

[8] See Migliari, R. La ricerca nell'ambito della geometria descrittiva. In Carlevaris 2017, p. 16; Carlevaris, L. La ricerca che impara, la ricerca che insegna. In Carlevaris 2017, p. 8.

[9] In the field of philology, the Italian term "*ecdotica*" (from the Greek "*ἔκδοσις*" = publication), means the preparation of a critical edition of a text. Its objective is to "reconstruct an ancient text in a form as similar to the original as possible through study and the comparison of any surviving texts (mostly manuscripts)": cfr. Item "Ecdotica". The product of this kind of preparatory work is the so-called "critical edition" that refers not only to the hypothetical text written by the philologist, but also the variants that were discarded.

[10] For Ptolemy's text, see also Lejeune 1989.

[11] "Oh what sweet thing is this perspective": this sentence is reported to have been said by Giorgio Vasari to Paolo Uccello [Vasari 1758 (1559), p. 211]. It is often used when defining this "thing" that is the centre of art, science and mathematics, certainly from the Renaissance onwards, but perhaps, as many have repeatedly asserted, even before that (think, for example, of the illusory space recreated in Roman frescoes). Coupling the adjective "sweet" with perspective was re-employed and disseminated by Parronchi 1964.

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