Reviews

Giovanna Spadafora

Fondamenti e applicazioni di geometria descrittiva

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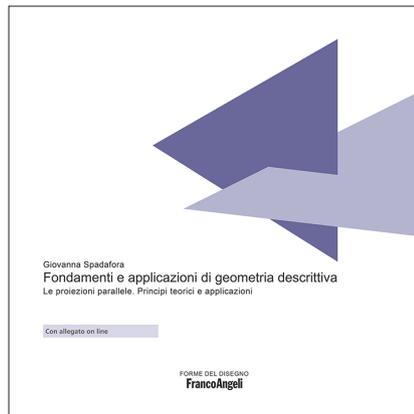
The scheme of the architectural representation process, and therefore its theoretical basis, is all enclosed, even today, in the famous passage written by Marcus Vitruvius Pollio, the Roman architect of the Augustan era, which takes up and fixes literally, in organic form, a tradition already consolidated for centuries, and not only within the Roman civilization. In his treatise *De Architectura*, Vitruvius identified the modes of architectural representation as *Ichnographia*, *Orthographia* and *Scaenographia* (I, 2, 1). These, essentially, consisted of a two-dimensional method capable of identifying the future spatial realization, codifying the elements that constituted the *dispositio*, that is, the correct positioning of the architectural elements in a well-structured whole. The ways in which the latter had to be realized (but also those representations corresponding perfectly to precise moments of construction) were based on proportions and geometry, as is easily deduced by reading the treatise, which accurately describes the proportional and geometric elements for all the parts of a building and its whole.

The procedure described by Vitruvius was confirmed in the following centuries as well, progressively enriched with contents going beyond the brief description given by the architect from Fano.

Leon Battista Alberti, in his *De re aedificatoria*, written around 1450 but printed in Florence only in 1485, transcribes it impeccably, thanks to his literary and legal studies in Padua and Bologna.

But it was around 1520, in a text destined to become famous as the "Letter to Pope Leo X," that Raphael Sanzio and Antonio da Sangallo the Younger formalized the system of rational representation of architecture through drawings in plane projection of plans, elevations and sections, reworking the core of the Vitruvian and Albertian theory [Thoenes 1998]. Since then, for five hundred years, architects have used these tools to solve the conceptual problem of having to represent on a sheet of paper, in two dimensions, and using only a drawing instrument, a building that, in reality, extends in space. The system described by Raphael and Sangallo is sophisticated, because capable of interpenetrating representative method and constructive practice much the same as the Vitruvian formulation, and at the same time simple, because based solely on the reduction of 3D to 2D and on the use of geometry as a technique for the construction of the drawing/project. In this way, it definitively confirms a union that has also been fundamental to the architect's activity for centuries, as indicated confidently in the *incipit* of the *Livre de Portraiture* by the medieval Picardian master builder Villard de Honnecourt: " *en cest livre pue on trover grand consel de le grant force de maconerie et des engiens de carpenterie et si troverez le force de la portraiture, les trais ensi come li ars de io-*

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metrie le command et ensaigne" [Villard de Honnecourt 1225-1235, pl. II].
Geometry, therefore, not only fulfilled the essential role of a tool for "dealing with" forms, but also played the role of a graphical-mathematical system of reference for constructing on paper the conformation of the spaces and other configurations of a building [Quaroni 1977, pp. 150, 151]. Later, the progress of studies in this discipline provided a unifying scientific substrate and the generalization to an eminently practical system, allowing its codification as a means of design with wide uniformity in time and space.
Even if the introduction of digital systems to the representational process of architecture has had, as James Ackerman wrote, an "importance comparable perhaps to that of the introduction of paper" [Ackemann 2003, p. 256], and digital three-dimensional modelers have called into question the basic operational scheme based on the reduction of 3D to 2D, nevertheless, the two-dimensional approach remains, because, however the digital visualization of the project, it is nothing more than a projection of geometric entities onto a plane (screen or printer) and the manipulation of these entities follows geometric processes conceived graphically, even if calculated numerically. Moreover, and perhaps even more so, our conceptual and practical heritage of architectural discourse is still based on the Vitruvian scheme which therefore continues to be, by similarity or by difference, our main experience on which to base the new.
Giovanna Spadafora's *Fondamenti e applicazioni di geometria descrittiva* lies within this framework. It is a text comprising lessons on parallel projections preceded by elements of projective geometry addressed to students enrolled

in the first year of the Degree Course in Architectural Sciences.
A didactic volume that, due to a series of choices made by the author, is at the heart of today's debate between consolidated traditions and the effects of digital technologies and of that - today probably of greater importance due to the effects of the global pandemic that has been going on for a year now - between the permanence of traditional didactic methods and new teaching methodologies.
If the centrality of the text in relation to the first *querelle* has already been acknowledged, justifying the permanence of the volume's topic within a context that is still at the heart of the "knowledge" that forms an architect, its role within the second question, regarding our discipline, is the one that, in my opinion, provokes greater interest, because capable of proposing interesting answers to the most compelling questions.
First of all, the question of the expositive form.
The most widespread form of transmission of the "knowledge" of the representative disciplines is traditionally given by a great number of manuals, volumes well known to the community of reference. The main reason for this can be found in the very definition of a manual as a work that gathers together the essential aspects of a given discipline or subject, generally in function of the divulgative or didactic needs of the public to whom it is destined, summarizing the theoretical and, above all, practical aspects, which constitute most of the knowledge necessary for an architect.
Spadafora's book fits into this context in a new form. As astutely noted by Vito Cardone in the presentation of the volume, "While clearly a text for exercises,

in many ways it is halfway between a theory book and a collection of solved exercises". The "corpus" of "knowledge" and connected "know-how" is achieved by proposing a hybrid system for the construction and application of knowledge. The traditional expositive form for drawings and text on paper is flanked by one for navigable digital models that puts the student directly in contact with the spatial formulation of the problem and, at the same time, with its two-dimensional solution, restoring the course necessarily disrupted in the two-dimensional reproduction of the "translation" from 3D to 2D.
Concretely, the structure of the text is based on one of the classical approaches to teaching the discipline: problems of position (condition of belonging, parallelism, perpendicularity), notable problems, objective configurations, representation of solids, plane sections of solids, section between solids etc., all solved using the canonical form as well as the so-called technical form. Furthermore, axonometric projections, which follow the chapter on orthogonal projections, are also treated using the tri-orthogonal triade of planes as a system of reference, thus linking in a logical didactic sequence the reasoning performed in the orthogonal projections with that performed in the axonometric projections. The difficulty of presenting the solution of the various problems by breaking down movements and projective operations in space into graphic constructions on the plane of the drawing sheet is diminished through the use of navigable digital models, contained in the pdf downloadable from the website of the publisher, Franco Angeli (Multimedia Library area) [1]. These, as the author notes, "on the one hand are functional to the description of the operations to

be carried out and on the other help to trigger in students the habit of thinking about geometric elements in their mutual spatial position".

Fondamenti e *applicazioni di geometria descrittiva*, therefore, describes consolidated knowledge using an original form capable of exploiting the didactic effects of the techniques of interactive three-dimensional digital visualization for restoring continuity to an expository technique in which the necessary discretization of the analog form had certainly not served to facilitate learning nor favored the formation of a specific *"foma mentis"*. In this sense, the book originally placed itself in the path that Riccardo Migliari, the forerunner of the use of navigable models to explain three-dimensional themes of descriptive geometry, had already indicated more than ten years ago: "Yet, to date, […] there is no reference manual that can open the way to a new structure of the discipline. Perhaps this, instead, is precisely the goal we should reach, working together" [Migliari 2007, p. 171].

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Notes

[1] <www.francoangeli.it> (accessed 2020, December 10).

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