

The Representation of Staircases in Italian Treatises from the Sixteenth to Eighteenth Centuries

Vincenzo Cirillo

Abstract

The representation of the staircase is part of the more general theme of architectural drawing. Since ancient times, the designing of the staircase has been worthy of attention, due to both its useful function in overcoming the differences in floors as well as the not immediate mental visualization for articulated spatial solutions; as a consequence, its graphic representation is just as difficult. It has therefore been interesting to investigate this theme by researching it in the Italian treatises that, from the sixteenth to eighteenth centuries, both in literal and graphic form, welcomed and manifested the debate on the designing of staircases.

The aforementioned theme was carried out through the analysis of the sources contained in the treatises of Serlio, Palladio, Vignola (commented by Danti), Scamozzi, Guarini and Vittone. Working through the similarities and differences, the ways of describing the staircase have been highlighted and the results placed in the historical-scientific contexts of reference in relation to the geometric coding of the methods of representation. Without prejudice to the common use of drawing as a conceptual conception of visual synthesis, aimed at creativity, knowledge and communication, the reading of the sources has confirmed, on the part of the treatises, the existence of a critical choice of the most appropriate geometric methods of representation (although not yet scientifically codified) or exemptions from them to better describe the spatial qualities of a complex architectural element such as the staircase.

Keywords: Staircase, Treatises, Geometric representation methods, Graphic techniques, Modelling.

Introduction

This study does not pretend to examine the question of the staircase models discussed by the Italian treatise writers from the sixteenth to eighteenth centuries in their multiple thematic aspects, but, mainly, to investigate them from the perspective of the various ways of their graphic representation through drawing, intended as a visual language according to which mental images take shape through the aid of devices, whether they are analogical or digital: from the primordial experience of marking with a finger the shadow of the profile of a face projected onto a surface [Sgrosso 1984, p. 9], to a writing tip with ink on paper; to the contemporary computer tools that allow to draw lines on a screen.

Starting from the staircase models proposed by the Italian treatise writers (Serlio, Palladio, Danti, Scamozzi,

Guarini, Vittone), the ways of visualising these *exempla* have been investigated through the use of graphic analysis, along with a scientific comparison in terms of application (intuited and not yet fully coded) of the geometric methods of representation such as orthogonal projections, perspective and axonometry.

The analysis started from a review of the different models proposed and their cataloguing through the structural configuration (pillar, shaft, wall plug), geometric configuration of the planimetric layout (straight, curvilinear, mixtilinear and, therefore, square, rectangular, circular, ovate, polygonal), as well as the number of ramps and stairs (from one to four or double, triple, quadruple). This made it possible to verify how the different

staircase models, in addition to presenting themselves as the outcome of a lively theoretical experimentation (and, therefore, of ideational expression), are also the result of construction techniques coeval with the historical period of reference, which have made their "putting into shape" possible. The technique has always been a functional component of the form and, in its deepest meaning, determines the modalities of real and material existence of the model itself. Therefore, the analysis of the structural configuration seemed to be essential from the formal analysis; so much so that the introduction in more recent times of more advanced technological and constructive systems has allowed the creative imagination to configure increasingly efficient models of staircase [Calvo López 2001, pp. 38-51].

However, the mental imagination of the staircase (especially in the case of very complex structural and formal configurations) has always appeared to be a difficult operation, just as the description and communication in terms of graphic representation have never been a simple operation, revealing in the reading of these treatises a rather difficult application. This entailed that, in the above-mentioned treatises, the image of the proposed model was often associated to a detailed explanation in writing to guide the reader both in the mental imagination of the spatial configuration as well as in the comprehension of the proposed models in typological and constructive terms. Moreover, the difficulty of transposing on paper a complex architectural element such as a staircase required, not only the choice of suitable geometric methods of representation, but also the use of artifices and/or exemptions from the methods themselves. This circumstance has also been related to the specific biographical profile of the treatise writer, recognizing in the use of different methods of conventional application of architectural drawing, a differentiated communication goal: a different approach to the treatment (more or less theoretical-practical) or an argument aimed at a different audience of readers (generalist or specialist like that of the architect).

In conclusion, the architectural systems of the staircase models, catalogued by the treatise writers, were distinguished by structural and typological form and analysed graphically in relation to the geometric matrix [De Rosa, Sgrosso, Giordano 2000] by analogies and/or differences. In this operation, the modelling [Migliari 2003] and the digital visualization of the models (here used for the first

time by the writer in almost all the types presented) took on a particular importance, which allowed to better describe the peculiar spatial connotation as well as graphically represent the architectural models introduced by the treatise writers in the written form. Thus, the graphic representation has once again confirmed the historical role of the conceptual means of visual synthesis, aimed at creativity, knowledge and communication.

Representation of the staircase in Italian treatises from the sixteenth to eighteenth centuries between design and communication

Drawing, in the more contemporary meaning of the term, means "to draw lines on a surface", but to draw is to establish a purpose, to expose an intention, to describe a program, it is also 'to design' [de Rubertis 1994, p. 11]. Thus, designing is representing a mental form translating it into an image through graphic signs.

The forms that, in an intuitive or conscious way, are destined to become a graphic sign do not constitute reality but only the model since the act of drawing (i.e. the action, guided by the mind, of drawing a shape on a surface with the aid of an instrument) implicitly implements a specific selection of the characteristics to be expressed. Whether wanting to use the drawing as a tool to clarify intentions or use it to propose the latter to different receivers, the graphic operation is never immediate, but requires numerous reviews to prepare a summary image that can be understood when read by the public who will use it.

According to this function, the drawing becomes a conceptual means of visual synthesis aimed at communication or the process through which the transmission of information between author and recipient takes place through the exchange of messages elaborated according to the principles of shared graphic codes. The graphic signs (drawings and/or writings) constitute a powerful means of expression, so much so that their reading by the receiver can take place even in the absence of the one who transmits the message.

All this occurred in the treatises analysed. The graphic representation of the staircase presupposed an author (the treatise writer, who communicated his instructions) and a receiver (the architect, who accepted the message). Thus, the drawing, as an instrument of communication of the author, represents an indispensable means for the "putting

into shape” of his intentions (whether they are aimed at creativity or knowledge), just as geometrical methods of representation are fundamental (intuited or codified) to which the author refers for the description of the mental model [Giandebiaggi 2016, pp. 99-109].

From this, it follows that the methods of graphic representation of an architectural model (the body of the staircase) can differentiate according to the different formative profile of the author. Therefore, in order to evaluate the motivations underlying the use of multiple geometric methods of representation used by the treatise writers examined here, it was considered useful to relate them to their different biographical profile, hypothesising in this difference the possible reason for a different representation of the representation itself, although all the treatise writers examined in the context of those scientific foundations of the representation (*ichnographia*, *orthographia*, *scaenographia*) described by Vitruvius in the *First Book* of the treatise *De Architectura libri decem*.

The theme of the designing of the staircase, which for its important function of vertical connection is as old as architecture itself, leads to interesting developments in the production of treatises from the sixteenth to eighteenth centuries when space systems with increasingly complex geometries were introduced to the Italian and European scene [Zerlenga 2017, p. 45].

Specifically, in the Renaissance and Mannerist treatises, the body of the staircase still appears as an element linked only to the functional reasons of the act of “going up”. Only through the successive and numerous conceptual and formal experiments of the Baroque period (due also to the codification of new architectural types linked to the noble residence), is it possible to see the elevation of this element at the fulcrum of the architectural project, in which the shape of the space plant becomes one of the most peculiar and representative characteristics of the home.

An analysis of the architectural treatises examined here shows a wide variety of staircase models: from the more traditional to more innovative ones [Gambardella 1993], from the simplest spatial solutions to the most complex. This entails a growing difficulty not only of mental imagination but also of the correct visualization of these spaces.

As already anticipated, the modes of graphic representation privilege a communication according to the classic references of the Vitruvian tradition with the need to recall, though intuitively, to geometric methods only subsequently codified, so that the drawings of the treatises examined

here can be traced back to the usual three methods of scientific representation in perspective (Serlio), axonometric (Danti in Vignola) and orthogonal projection (Palladio, Danti, Scamozzi, Guarini, Vittone).

The “infallible rule” of Sebastiano Serlio and the “most important” staircases drawn “foreshortened”

Sebastiano Serlio (1475-1554) described different staircase models in *Libro II*, published in Paris in 1545, which was part of his more general work *I sette libri dell'architettura*, with it dedicated to perspective and scenography. The iconographic apparatus through which Serlio presented the various staircases is proposed through a collection of types with an exclusively straight-line geometric-configurative matrix and rectangular and square planimetric layouts (fig. 1A). The curvilinear staircases, and in particular the circular ones, are only mentioned in the text and, due to their construction, Serlio suggested adopting the same procedures described for the square-shaped model.

Specifically, Serlio stated that «among the things that have great strength in the demonstrations of prospects, I find staircases to be the best, since they return the best effect» [Serlio 1545, p. 53 v]. The “most important” staircases proposed by Serlio (mainly external) are represented in perspective and, therefore, the drawings are drawn by Serlio “foreshortened”. The arrangement of the architectural space with respect to the representation frame is frontal, with points of view in relation to the staircase located both in the central and asymmetric direction and whose derived perspective views are respectively defined “in profile” and “per side” (fig. 1B). In describing the geometric construction for the perspectives of the proposed models, Serlio recommended always applying “this rule, which is infallible” [Serlio 1545, p. 55 v]. Beginning with the “easier” types, the writer stated that “for the ordinary, a step, it is half a foot in height, and a foot in width, that is, its plane” [Serlio 1545, p. 51 v] and, therefore, referred to both the horizontal and vertical plane to an orthogonal lattice having the aforesaid measurements on its sides. The lattices and measurements allow to easily draw the proposed models, once the measurements of the staircase have been defined as multiples of these values. Moreover, the verbal description continually refers to the drawings, which show the lines of geometric construction: the sloping lines of the ramps, those “pulled to the horizon with

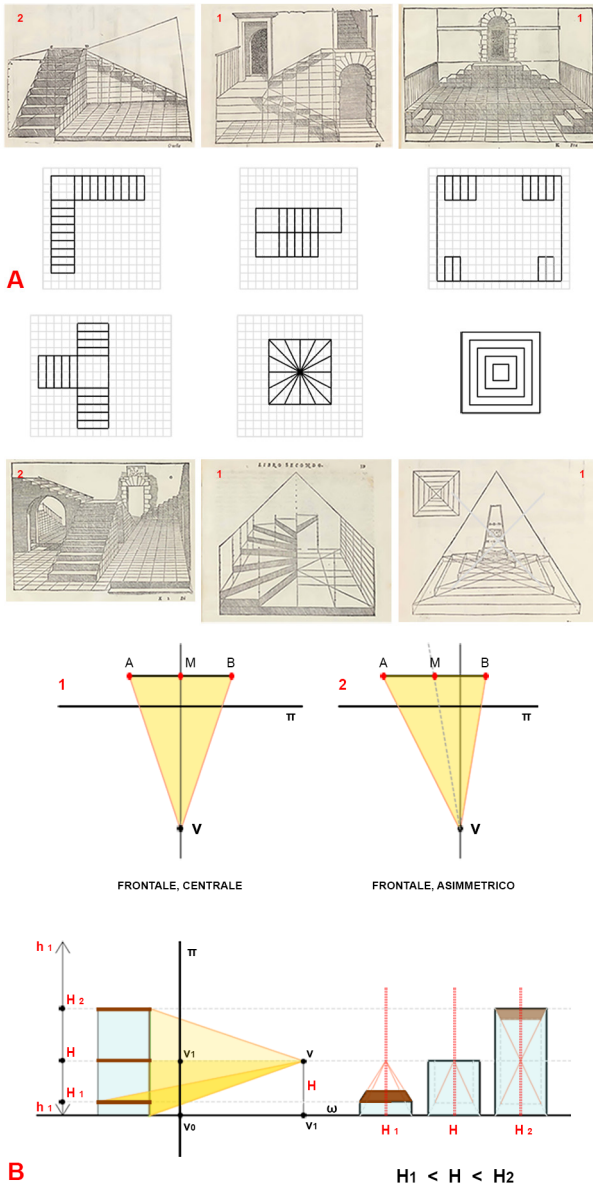


Fig. 1. Sebastiano Serlio: "infallible rule" to draw staircases "foreshortened" and geometrical patterns (graphic elaboration by the author).

occult lines" [Serlio 1545, p. 51 v] and others, still called "occult" and drawn as dashed lines [Serlio 1545, p. 53 v]. It is worth mentioning the last two staircase models that Serlio described. They have a square plan and are represented in frontal and central perspectives. The typology refers to the "lumaca quadra" (spiral) staircase [Serlio 1545, p. 55 v] and to that which "from all sides are assembled" [Serlio 1545, p. 57]. In the first model, the drawing placed at the bottom refers to the plan of the subdivision in steps, while the one at the top gives a perspective representation of the staircase, in which on the left part of the geometric construction, it is indicated to put nine steps in perspective while on the right only the planimetric and altimetric lattices are marked, which lead to the spatial configuration of the steps. In the second model, the geometric construction is established to realise the aforementioned staircase starting from the "slatted lines" [Serlio 1545, p. 57] (or diagonals of the square), which is proposed for half of its development as a staircase for courts, altars and similar things. This same construction is adaptable to make "round stairs, and still eight faces, or six" [Serlio 1545, p. 57]. Serlio does not correspond any drawings to this indication.

The drawing of the "various ways" of staircases in the treatise of Andrea Palladio

Andrea Palladio (1508-1580) was interested in the treatment of *Delle Scale, e varie maniere di quelle, e del numero, e grandezza de' gradi* in the XXVIII chapter of the treatise *I quattro libri dell'architettura* (1570). The architectural treatment presented a decidedly taxonomic approach in describing the different structural characteristics and typological elements that make up a staircase. He listed the staircases in relation to the geometric shape of the planimetric basin, combining them in curvilinear, of which "round" (referred to by the writer as "à Lumaca" or "à Chiocciola" (spiral) and "ovate", and rectilinear (called "straight"). The verbal descriptions of these models are accompanied by two full-page graphic tables, which contain eight scale drawings, all referenced in the text. Both the curvilinear and straight stairs are grouped by static behaviour depending on whether they have cantilever ramps ("Spiral staircase empty in the middle", "Ovate staircase without columns", "Straight staircase without walls") or supported by load-bearing elements

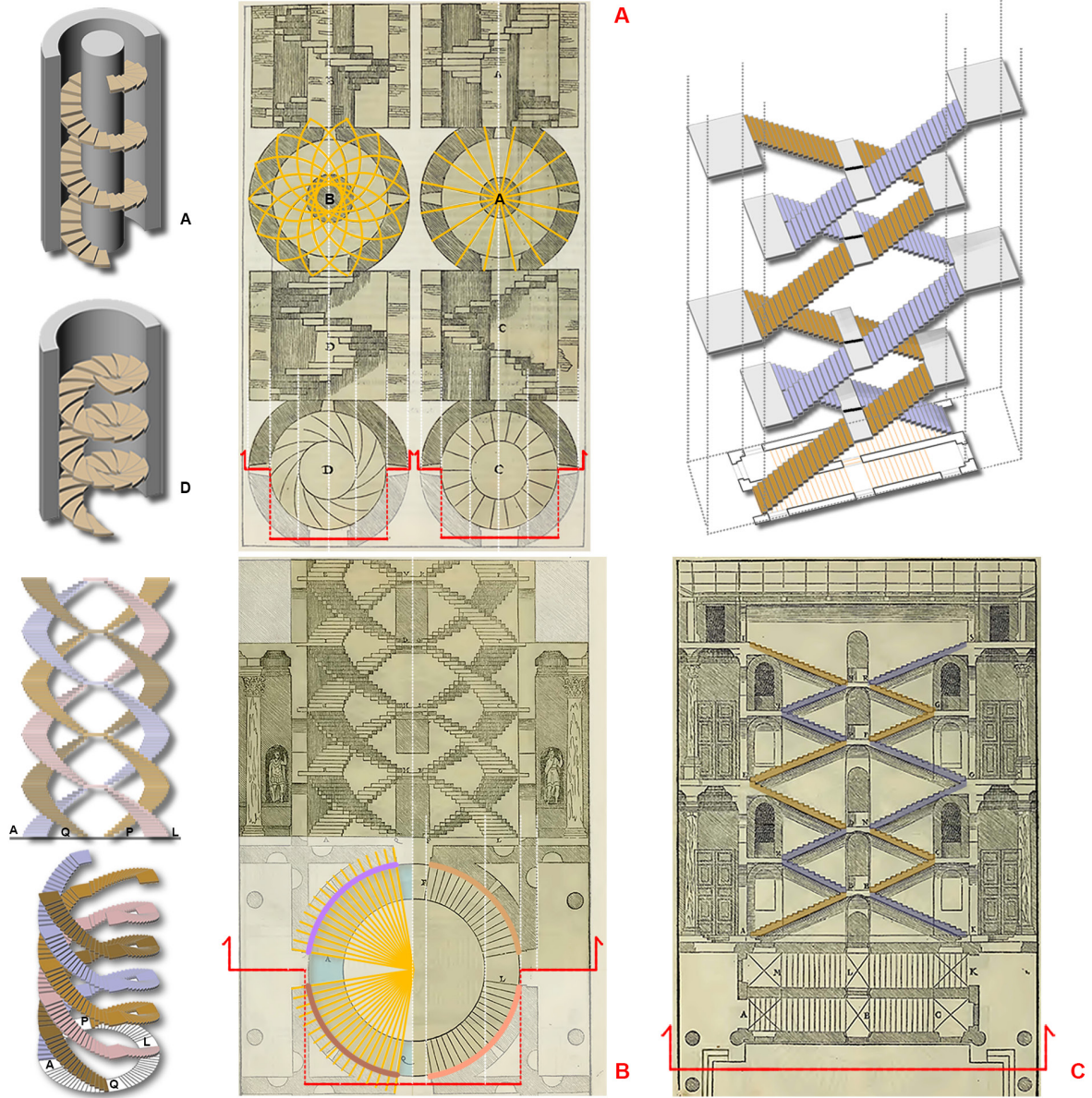


Fig. 2. Andrea Palladio: visualization of the "various ways" of staircases (graphic elaboration by the author).

in a central position (respectively “Spiral staircase” or “Ovate staircase with a column in the middle”, “Straight staircase with a wall inside”). For the “Spiral” staircases, Palladio distinguished two other types: “with twisted steps” or “straight” or with the profile of the circular step (i.e. portions of circumferences that revolve around the common centre of the staircase) or straight (fig. 2A). Rectilinear staircases, on the other hand, differ in the number and arrangement of the ramps, being “spread out in two branches, or square, which turn into four branches” [Palladio 1570, p. 61], but also due to the presence of resting landings in the corners (called by Palladio “Requie”) which, absent in circular staircases, appear in this model as well as the “ovate” staircase, with the latter presenting a greater number of steps along the longitudinal axis.

The last staircase model presented by Andrea Palladio is that of the staircase built by King Francis I in the Château of Chambord in France. This is a “spiral staircase” made up of “four Staircases, which have four entrances, each one having its own, and ascending one above the other, so that it is in the middle of the building; they can serve four apartments, without those who live in one, going up the staircase of another: and being empty in the middle; everyone can see each other going up and down, without creating the least impediment to each other” [Palladio 1570, p. 64] (fig. 2B). On this configurative criterion, Palladio proposed one last staircase model, which he called “Double Staircase” and which, set on a rectangular system, consists of two parallel ramps with an independent development (fig. 2C).

Andrea Palladio, theoretical architect and builder, represented the staircase models described above, not in perspective (i.e. according to allusive drawings of the three-dimensionality of the architectural space), but rather as floor-plans and cross-sections. The two distinct images (drawn in the same scale of representation) are not however recalled by straight canons in orthogonal projection but are arranged according to a reading in vertical succession that binds the plan to the cross-section, and vice versa. As already noted elsewhere for the architectural drawing introduced by Sebastiano Serlio in his treatise, these drawings “reveal with great immediacy how the modern concept of relationship is acquired in the mutual reference of the prospectuses, exactly executed and completely devoid of perspective corrections to the relative plants” [Sgrosso 2001, p. 136]. This principle is also adopted by Palladio in his drawings, which appear rich

in graphic and aesthetic sensibility even if not without surprises. In the drawings from “A” to “F”, observing the relationship between the floor-plan and cross-section, it is possible to verify how in reality the writer uses an artifice to better describe the difficult nature of the development of the proposed models in the space. The risers of the ramps do not correspond to the cross-section plane passing through the centre of the planimetric plant (circular or ovate), but to a view only possible by removing the front half of the walls and leaving the entire helical development of the ramps in place.

Similarly, this artifice is also used to illustrate the complex quadruple “spiral staircase” of Chambord in France as well as the double one with a straight planimetric layout, where the continuous articulation of the independent ramps is made visible by eliminating the opacity of the perimeter walls (in the first case) and in front (in the second), while the canonical cross-section plan is respected only for the side areas.

The drawing of “double”, “triple” and “quadruple spiral” staircases by Egnatio Danti

In his commentaries on the treatise *Le due regole della prospettiva pratica* (1583) by Jacopo Barozzi da Vignola (1507-1573), Egnatio Danti (1536-1586) recalled the theme of the “double spiral” staircase, also citing that of the aforementioned castle of Chambord [Barozzi 1583, p. 144]. Specifically, two models were presented. In the first one, called “open”, the ramps rest on a central pilaster system (fig. 3A), which allows the staircase to be flooded with “light”. Danti compared this staircase to that of the well of Orvieto, stating that it has not caved into the tufa and that instead of the ramp, there are the steps. In the second, the staircase is open in the middle and cantilevered, with the steps being “stuck with the head in the wall and placed one above the other, one on top of the other, with the same steps making up the staircase” [Barozzi 1583, p. 144].

This “double spiral” staircase model can also be applied to an oval planimetric profile, which Danti does not draw considering it more difficult [Paris, Ricci, Roca De Amicis 2016] because in the oval profile the lines «go to different points» unlike the circular ones, which go to the “point and centre of the middle”. The two circular models are represented in floor-plans and cross-

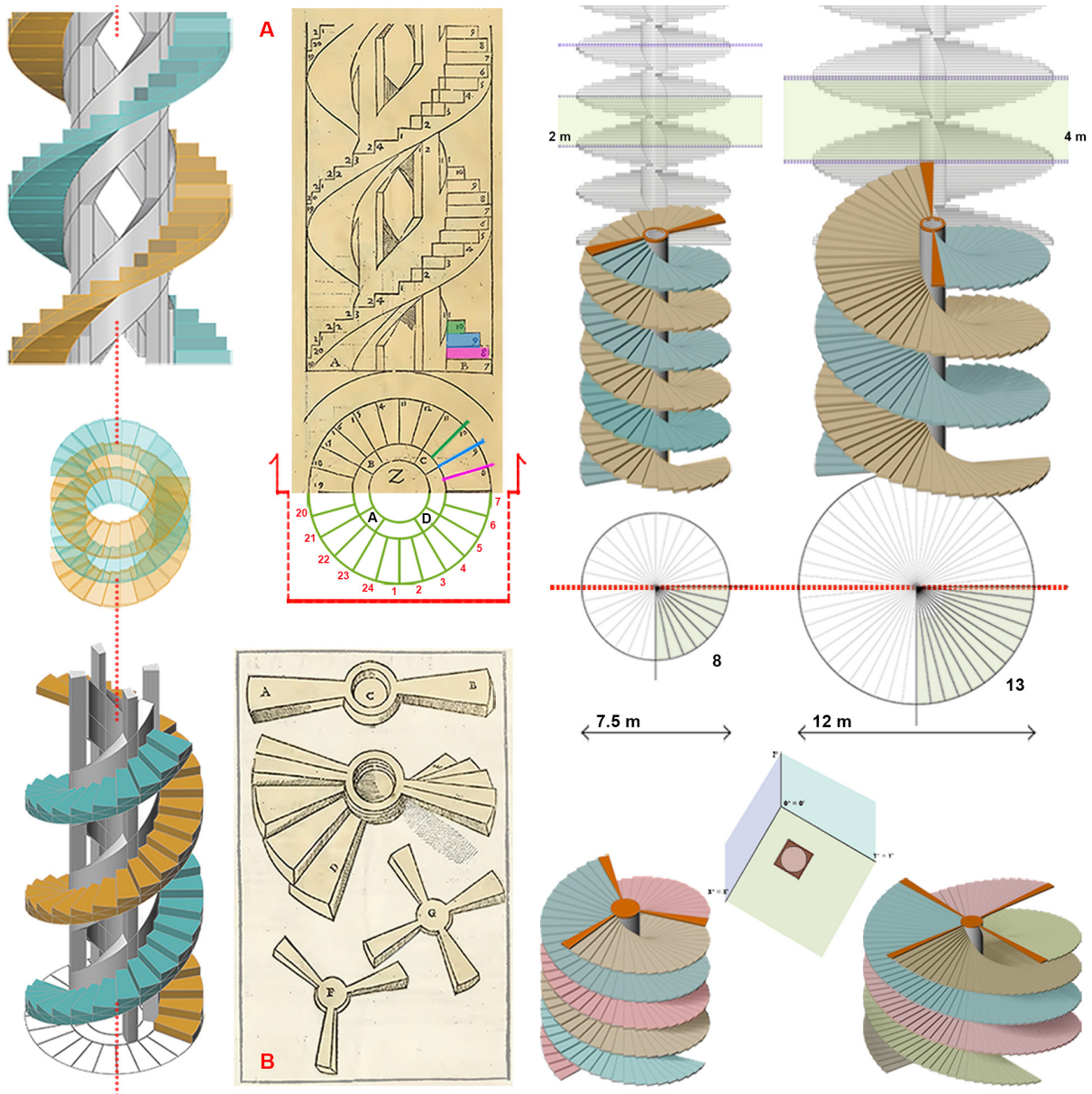


Fig. 3. Egnatio Danti: visualization of "double", "triple" and "quadruple spiral" staircases (graphic elaboration by the author).

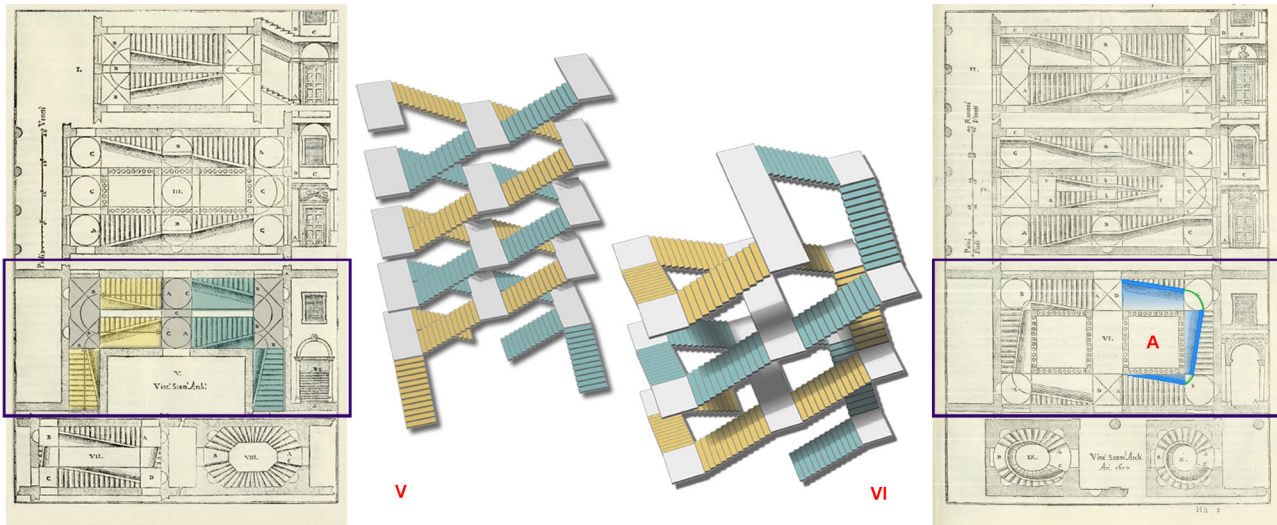


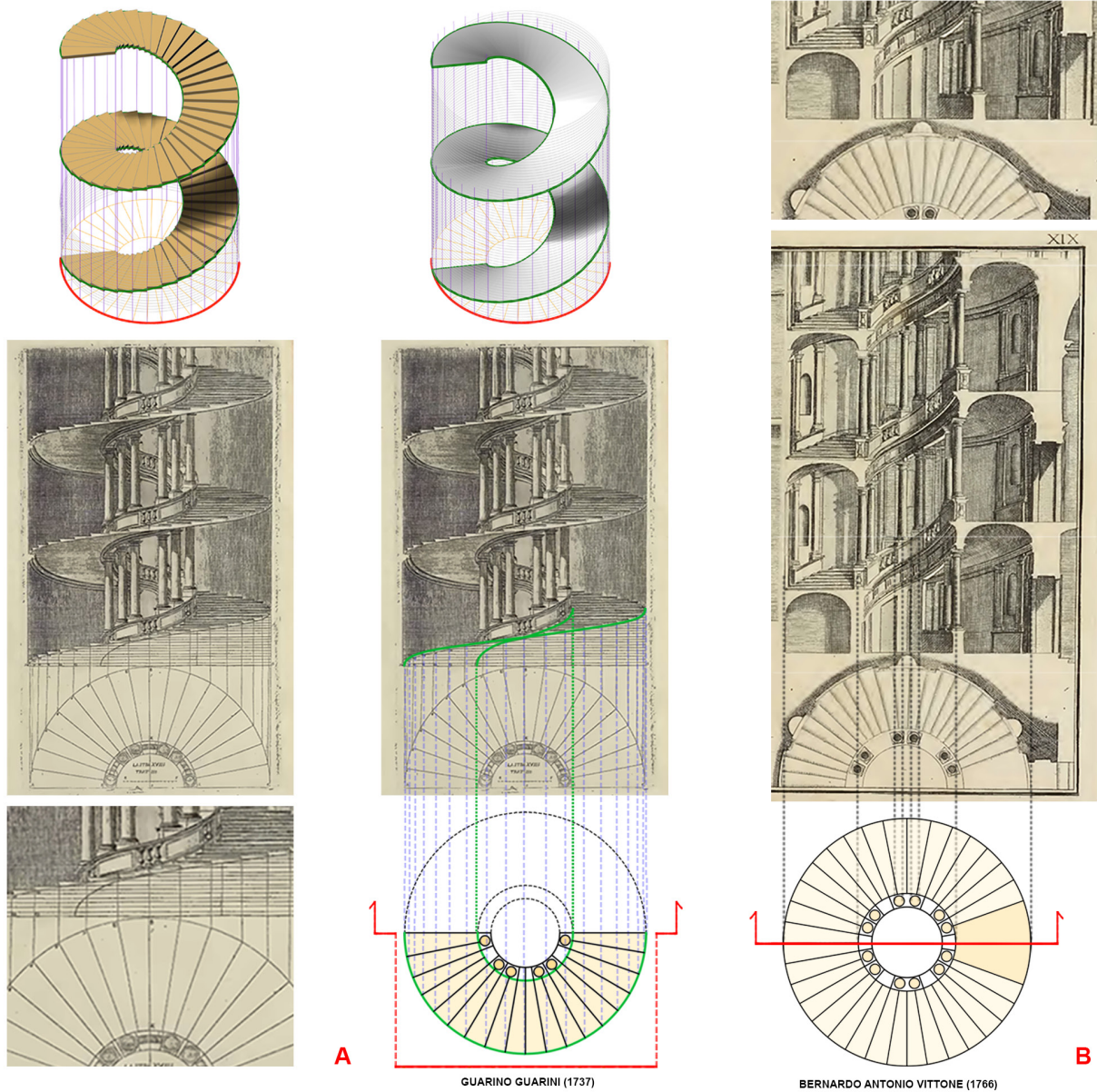
Fig. 4. Vincenzo Scamozzi: visualization of the “main staircases” (graphic elaboration by the author).

sections, drawn in the same scale of representation and according to the usual vertical arrangement that places the elevation-cross-section above the plant. However, from the examination of the drawings it is easy to notice the inversion of the sense of reading of the plant with respect to the elevation and since perceptually these drawings allude to a spatial view of the interior made possible by the removal of the perimeter walls. What is particularly interesting for the historical-cultural context linked to the history of geometric methods of representation is the discussion of the last example described by Danti. These are circular double, triple and quadruple staircases, which the writer considered as a set of unified elements whose assembly configured the staircase. Specifically, Danti drew the staircase obtained so and the standardized elements with two, three and four steps in oblique military cavalier axonometry, whose top view well represents the measurement and spatial composition of the elements (fig. 3B). This unusual way of representation places these drawings in the chapter of the parallel projection, anticipating one of the most interesting works on the theme, *Lo inganno de gl'occhi* by Piero Accolti (1578-1627), published in Florence in 1625.

The “Drawings of the Staircases described in different forms” in the treaty by Vincenzo Scamozzi

The formal experimentation of the Baroque period elevated the staircase to a scenographic element of the home, so much so that in the treatise *L'idea della architettura universale* (1615) by Vincenzo Scamozzi (1548-1616), Chapter XX discusses *De' siti, e forme convenevoli a varie maniere di Scale private ad uso de' tempi nostri, e alcune introdotte dall'Autore* [Scamozzi 1615, p. 312]. Six pages are dedicated to the subject, two of which include the “Drawings of Staircases described in different forms” [Scamozzi 1615, p. 315]. In introducing the theme, Scamozzi affirmed that the “ways of the staircases are many, and different, but according to our opinion, they can be reduced to ten ways, or forms” [Scamozzi 1615, p. 312].

In line with tradition, from a formal point of view Scamozzi confirmed the already known planimetric systems with curvilinear matrix (circular and ovate) and rectilinear (rectangular, square, polygonal). In particular, the polygonal form is defined by the treatise “à mandorla” and referred to by these as a way realized in the staircase of the “stellata in Prague of Bohemia” [Scamozzi 1615, pp. 314, 315], current Star Summer Palace. Similarly, from a structural point of view,



GUARINO GUARINI (1737)

BERNARDO ANTONIO VITTORE (1766)

Fig. 5. Guarino Guarini and Bernardo Antonio Vittone: comparison between scientific representation and technical-perceptive representation (graphic elaboration by the author).

the staircases can be supported by pillars and columns, by “full walls” or be “suspended in the air” or cantilevered.

The choice of the site where the staircase is located assumes particular importance for Scamozzi, since most of them mainly serve noble houses. He distinguished the “main staircases” from the “secret” ones or those that “are very good among the apartments of the rooms” [Scamozzi 1615, p. 314]. Consequently, from a typological point of view, Scamozzi introduced several ways of “main staircases”, some of them “invented by us” [Scamozzi 1615, p. 314] (like V and VI, analysed in fig. 4), in which the ramps are articulated according to a symmetrical bilateral system, generating models of double staircases with one or two “wells” (synonymous with the previous term “empty”), often destined to house a “secret staircase” in the void.

The staircase models proposed by Scamozzi and drawn in Roman palms or Venetian feet, foreshadow complex spatial articulations in the succession of ramps and landings; the choice to represent these “ways” in floor-plans and cross-sections does not facilitate communication. Scamozzi, while recurring in the written text to detailed explanations with references to the drawings, in the latter he introduced some graphic artifices to overcome the absence of an allusive image of the three-dimensionality of the system. In representing the plant of the ramps, Scamozzi overlapped the vaulted intrados of the ramps and used graphic symbols to indicate the common dismount of the ramps to favour the mental imagination of the spatial path (fig. 4A). In general, the reading of the spatial configuration of the “main staircases” introduced by Vincenzo Scamozzi in his treatise is not immediate and requires a considerable effort to understand both the decoding of the graphic signs as well as the spatial imagination, since the planimetric drawings do not adequately correspond to the altimetric cross-sections, with only a discrete mention of the span of access to the staircase on the ground floor. Therefore, for the ways V and VI digital models were used to better describe the spatial articulation. These models were viewed in perspective.

Guarino Guarini and the awareness that “Ichnography depends on Ortography, and this on the other”

The theme of the staircase is developed by Guarino Guarini (1624-1683) in the posthumous *Architettura civile* (1737). In *Chapter Seven of the Treatise II*, entitled *Del modo in generale di disegnare le Piante*, Guarini addressed the description *Della*

pianta delle Scale and in introducing the argument he stated critically that: «The staircases are the most difficult parts, that the House has to accommodate, maxims that Vitruvius gave no rule for, if not of their ascents” [Guarini 1968, p. 105]. Guarini distinguished “three types of Staircase” and referred to the verbal description of the models proposed to the figures contained in *Table VII* of the *Treaty*. The first example of staircases corresponds to those that “in ascending diminish, and have steps that are always shorter, or get bigger” [Guarini 1968, p. 105]. The second type corresponds to staircases «with branches, or arms, which ascend with equidistant steps, and parallel, and always equal» [Guarini 1968, p. 105]. For this second type, he distinguished three models according to the different number of ramps, the shape of the planimetric basin (rectilinear, square, hexagonal), the static behaviour (“full in the middle, or empty, or horn, that is with the vaults that ascend like the Staircase, or with the vaults level”) [Guarini 1968, p. 105]. Moreover, he attributed the hexagonal type to the model published by Palladio in his treatise, namely the double staircase of “Sciamburg in France made by King Francis” [Guarini 1968, pp. 105, 106]. The third type of staircase is “round, or ovate” and, as usual, can be made “with a column in the middle, others vacuous, and suspended” as well as “with rising horns, or on level” [Guarini 1968, p. 106]. From the point of view of the history of the geometric methods of representation, Guarini has a fundamental role: “he is in fact concerned with giving back to the discipline all those scientific supports of which most of the coeval texts, addressed to the practical operators and artists, appear to be lacking” [Sgrosso 2001, p. 296]. During his lifetime, Guarini loved to call himself “a mathematician”, with this being his greatest vocation: this training led him to understand architecture as part of mathematics, placing his studies among the anticipations of the projective geometry of Girard Desargues (1591-1661) [Docci, Migliari, Bianchini 1992] and the codification of the double orthogonal projection by Gaspard Monge (1746-1818) [Cardone 2017]. The judgment of objective representation that Guarini placed in orthogonal projections is explicitly expressed in *Trattato II, Capo Settimo, Del modo in generale di disegnare le Piante* where he stated: “knowing how to draw the plants perfectly, and carry out the documents of Ichnography, depends on Orography, and this on the other; so without knowledge of both, it is difficult to know how to draw on a perfect Ichnography” [Guarini 1968, p. 96]. With reference to this method, in *Trattato III, Capo Vigesimoquinto, Osservazione sesta*, Guarini described a circular staircase (similar to the *Scala Regia* of the

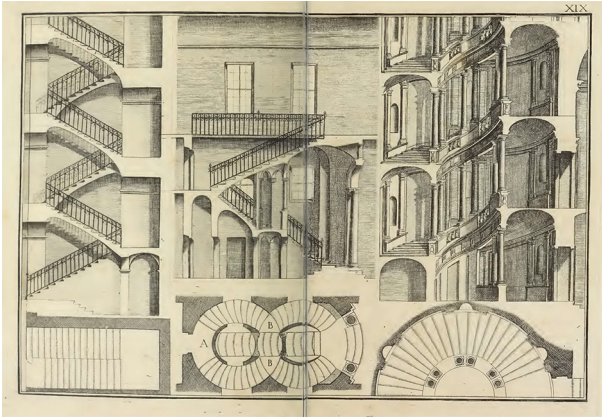


Fig. 6. The drawings of the staircases by Bernardo Antonio Vittone in floor-plan and cross-section.

Palazzo Farnese di Caprarola [Paris 2016]) which is illustrated in Table XXVI of the Treaty (fig. 5A). For this type of scale, he believed that "Spiral staircases in expressing them in drawing hold the same difficulty as oblique plants, and something more to be not only oblique, but also ascending" [Guarini 1968, p. 274]. Assigned the plant, Guarini described in detail the geometric construction "to place the plant above the orthography". Proceeding step by step, he defined the points that "will determine the floor-plan of each step, and will have the cut of the staircase towards the outer wall; there will be more towards the soul, or we would like to say the horn of the same staircase, if in operating we will observe the same rules" [Guarini 1968, p. 274]. However, it should be noted that the arrangement of the plant below the cross-section appears in a reversed position and that the cross-section itself is likewise imagined (as for Palladio and Danti) without the front perimeter walls in order to visualize the complete development of the cylindrical helix in the space.

***Delle Scale* represented in the *Tavole* of the treatise by Bernardo Antonio Vittone**

In the treatise by Bernardo Antonio Vittone (1704-1770), *Istruzioni diverse concernenti l'officio dell'Architetto Civile* (1766), the author dedicated a large paragraph (eight pages of written text) to the theme of *Delle Scale*, in

which he described with a wealth of detail seventeen examples of theoretical and built models. The seventeen examples are then recalled in separate tables (ten) which, in a large format and according to the now more and more consolidated technical representation in floor-plan and cross-section, present the types described. From a morphological point of view, the proposed solutions appear to be highly articulated due to the presence of more ramps that are enveloped in space on the basis of planimetric plants with a straight, curvilinear and, above all, mixtilinear matrix. The unprecedented concave-convex trend connotes several unpublished examples, as well as the sinuous staircase on a double page in *Tav. XXII*.

The comparison with Guarini is particularly interesting in relation to the graphic representation by Vittone for the "grand Staircase of the famous Castello di Caprarola" [Vittone 1766, p. 152] (fig. 5B), shown here "half" in table XIX. Despite the interest of Vittone being mainly directed to the morphological and perceptive aspects of the spatial peculiarities of this staircase, the drawing that he published seemed to be correctly executed in terms of the orthogonal projections with respect to that of Guarini. Furthermore, the architectural plan in floor-plan and cross-section drawn by Vittone not only has a technical value, but also a strongly perceptive value since the skilful graphic techniques which he used make it possible to restore, through the application of chiaroscuro, the complex plastic dimension of the staircase, almost as if a modern photorealistic effect (fig. 6).

Conclusions

The contribution offered by this paper on the theme of the ways to represent staircases in Italian architectural treatises from the 16th to 18th centuries aims to demonstrate how it is included in the more general history of architectural drawing, although specifically documenting two central nodes. The first is expressive of a critical reading of the different ways of representation through which the staircase has been analysed. This diversity highlights how representation is never neutral but is affected by its cultural and scientific contexts [Fatta 2016].

The second relates to the world of digital innovation and, the modern concept of modelling, where this practice allows to give shape to complex and/or never figured design ideas. In the analysis of the sources referred to

here, the verbal description of the staircase models often presented does not correspond to the graphical representation or the same is insufficient to describe the peculiarities, resulting in a greater difficulty in imagining the spatial configuration of the same for the reader. The modelling elaborated and the subsequent visualization of these models through adequate axonometric or per-

spective views has been useful for the critical representation of the spatial characteristics, favouring a more immediate understanding to the specialists of the sector and not only. Thus, the study aims to demonstrate that visualization gives a significant result, while also playing a powerful strategic role: giving voice to creativity, knowledge and communication.

Author

Vincenzo Cirillo, Department of Architecture and Industrial Design, Università degli Studi della Campania "Luigi Vanvitelli", vincenzo.cirillo@unicampania.it

Reference List

- Barozzi, J. (1583). *Le due regole della prospettiva pratica*. Roma: per Francesco Zanetti.
- Calvo López, J. (2001). Arquitectura oblicua y trazas de monte. In *Revista de Expresión Gráfica en la Edificación (EGA)*, 2, 2001, pp. 38-51.
- Cardone, V. (2017). *Gaspard Monge padre dell'ingegnere contemporaneo*. Roma: DEI Tipografia del Genio Civile.
- De Rosa, A., Sgrosso, A., Giordano, A. (2000). *La Geometria nell'immagine. Storia dei metodi di rappresentazione*. Torino: UTET, p. 136.
- De Rubertis, R. (1994). *Il disegno dell'architettura*. Roma: La Nuova Italia Scientifica.
- Docci, M., Migliari, R., Bianchini, C. (1992). Le «vite parallele» di Girard Désargues e Guarino Guarini, fondatori della moderna scienza della rappresentazione. In *Disegnare. Idee, immagini*, No. 4, pp. 9-18.
- Fatta, F. (2016). Scienza e arte tra tempo e luogo: sei punti di vista. In *XY digitale*, No. 1, pp. 45-57.
- Gambardella, C. (1993). *L'architettura delle scale: Disegno, teoria e tecnica*. Genova: Sagep.
- Giandebiaggi, P. (2016). Disegno: espressione creativa. In *XY digitale*, No. 1, pp. 99-109.
- Guarini, G. (1968). *Architettura civile*. Milano: Il Polifilo.
- Migliari, R. (2003). *Geometria dei modelli. Rappresentazione grafica e informatica per l'architettura e il design*. Roma: Edizioni Kappa.
- Palladio, A. (1570). *I quattro libri dell'architettura*. Venetia: Dominico de' Franceschi.
- Paris, L. (2016). The helicoidal staircase at Caprarola by Jacopo Barozzi da Vignola. Formal innovation between theory and practise. In S. Bertocci, M. Bini (eds.), *Le Ragioni del Disegno. Pensiero, Forma e Modello nella gestione della complessità*. Proceedings of the 38° Convegno dei docenti delle discipline della Rappresentazione. Florence, 15-17 September 2016. pp. 523-530. Roma: Gangemi editore.
- Paris, L., Ricci, M., Roca De Amicis, A. (2016). *Con più difficoltà. La scala ovale di Ottaviano Mascarino nel palazzo del Quirinale*. Roma: Campisano Editore.
- Scamozzi, V. (1615). *L'idea della architettura universale*. Venetia: Giorgio Valentino.
- Serlio, S. (1545). *Le premier livre d'architecture... Le second livre de perspective*. Paris.
- Sgrosso, A. (1984). *Il problema della rappresentazione dello spazio attraverso i tempi*. Napoli: Massimo.
- Sgrosso, A. (2001). *Rigore scientifico e sensibilità artistica tra Rinascimento e Barocco*. Torino: UTET.
- Vittone, B.A. (1766). *Istruzioni diverse concernenti l'ufficio dell'architetto civile*. Lugano: per gli Agnelli e comp.
- Zerlenga, O. (2014). Staircases as a representative space of architecture. In C. Gambardella (ed.), *Le vie dei Mercanti. Best practices in Heritage Conservation Management from the world to Pompeii*. Proceedings of the XII International Forum, Aversa-Capri, 2014, June 12-14, pp. 1632-1642. Napoli: La scuola di Pitagora editrice.
- Zerlenga, O. (2017). Disegnare le ragioni dello spazio costruito. Le scale aperte del '700 napoletano | Drawing the Reasons of Constructed Space. Eighteenth-Century Neapolitan Open Staircases. In *disegno*, No. 1, pp. 45-56.