POLITECNICO DI TORINO
Repository ISTITUZIONALE

Regola and Licentia in the Extraordinario Libro by Sebastian Serlio

Original
Regola and Licentia in the Extraordinario Libro by Sebastian Serlio / Spallone, Roberta; Vitali, Marco. - STAMPA. - (2018), pp. 123-128. (Intervento presentato al convegno Nexus 2018: Relationships Between Architecture and Mathematics tenutosi a Pisa nel 11-14 June 2018).

Availability:
This version is available at: 11583/2711312 since: 2018-07-25T22:00:13Z

Publisher:
Kim Williams Book

Published
DOI:

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

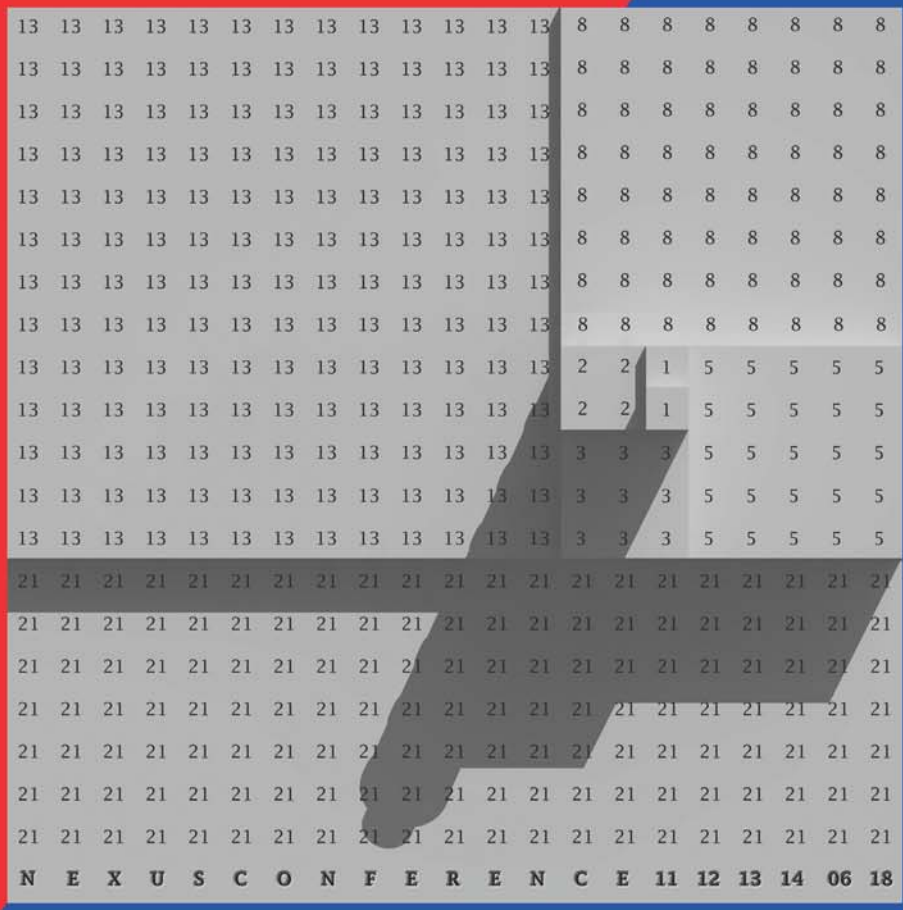
(Article begins on next page)

19 April 2024

NEXUS 2018

Architecture and Mathematics

Conference Book



KWB
KIM WILLIAMS BOOKS

Dipartimento di Ingegneria dell'Energia, dei Sistemi,
del Territorio e delle Costruzioni
University of Pisa

and

Kim Williams Books

present

Nexus 2018
Architecture and Mathematics

Conference Book

edited by

Kim Williams and Marco Giorgio Bevilacqua

KWB
KIM WILLIAMS BOOKS

Nexus 2018: Relationships Between Architecture and Mathematics
11 – 14 June 2018, Pisa, Italy

Organised by:

Dipartimento di Ingegneria dell'Energia, dei Sistemi, del Territorio e delle Costruzioni (DESTEC) University of Pisa

UNIVERSITÀ DI PISA

With the Patronage of:

UID – Unione Italiano Disegno

unione italiana disegno

Scientific Committee

Kim Williams, Chair (Italy)
Marco Giorgio Bevilacqua, Chair (Italy)
Sylvie Duvernoy, Secretary (Italy)
Kenza Boussora (Algeria)
Ahmed Elkhateeb (Egypt)
Alessandra Capanna (Italy)
Hooman Koliji (USA)
Cornelie Leopold (Germany)
José Calvo López (Spain)
Anna Marotta (Italy)
Michael Ostwald (Australia)
Mine Özkar (Turkey)
Antonia Redondo Buitrago (Spain)
Michela Rossi (Italy)
Roberta Spallone (Italy)
Stephen R. Wassell (USA)
João Pedro Xavier (Portugal)
Maria Zack (USA)

Ph.D. Day Scientific Committee

Michael Ostwald – Chair (Australia)
Marco Giorgio Bevilacqua (Italy)
Sylvie Duvernoy (Italy)
Cornelie Leopold (Germany)
Anna Marotta (Italy)
José Calvo López (Spain)
Michela Rossi (Italy)
Stephen R. Wassell (USA)

Organising Committee in Pisa

Marco Giorgio Bevilacqua
Stefania Landi
Lucia Giorgetti
Alessandro Ariel Terranova

Published by:
Kim Williams Books
http://www.kimwilliamsbooks.com

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other ways and storage in data banks. For any kind of use permission of the copyright owner must be obtained.

Copyright © Kim Williams Books 2018
ISBN 978-88-88479-47-7

Cover image: Nexus 2018 Logo designed by Ivan Mechkunov

"Nexus: Architecture and Mathematics" and "Nexus Network Journal" are registered trademarks of Kim Williams Books

CONTENTS

Monday, 11 June 2018
Perspective, Space, Dimension, Geometry

13 CORNELIE LEOPOLD. The Development of the Geometric Concept of Relief Perspective

19 AGOSTINO DE ROSA, ALESSIO BORTOT. Hunched Curves in the Vatican: The Vestibule Arch of the Pio Clementino Museum, Between Stereotomy and Anamorphosis

25 JOÃO PAULO CABELEIRA. Deconstructing the Imaginary Space of a Quadratura

31 GIUSEPPE D'ACUNTO. Notes on Oblique Space

37 SNEZANA LAWRENCE. Lost and Found: Some Mathematical Messages from Renaissance Tuscany to a 21st-Century Teacher

43 ALESSANDRA CAPANNA. The Four-Dimensional House Theorem

49 COSIMO MONTELEONE. The Mathematical Space of Daniele Barbaro

55 LAURA CARLEVARIS. N-Dimensional Perspective: The Mathematics behind the Interpretation of Ancient Perspective

61 STEFANO CHIARENZA. Peter Nicholson and the First Interpretation of Greek Architectural Mouldings as Sections of a Cone

67 RIZAL MUSLIMIN. A Grammatical Investigation of Utzon's Spherical Schema Evolution

73 ANTONIA REDONDO BUITRAGO. On Polygons, Set Squares and Mudéjar Carpentry

79 RADOSLAV ZUK. The Visible and Invisible Geometries of Venice

Tuesday, 12 June 2018
Historical Analysis

87 FRANCESCA FATTA, DOMENICO MEDIATI. The Design of Roman Mosaics in North Africa and their Geometric References

93 ASLI AGIRBAS. Algorithmic Decomposition of Geometric Islamic Patterns: A Case Study with Star Polygon Design in the Tombstones of Ahlat

99 BERNARD PARZYSZ. What We Can Learn from Roman Geometric Mosaics about the People Who Made Them

105 JOHN KENDALL HOPKINS. A Unified Schema of the Façade of San Miniato Al Monte: The Simultaneity of Interlocking Symbolic Harmonic, Irrational and Perfect Numbers

111 SANAZ AHMADZADEH SIYAHROOD, ARGHAVAN EBRAHIMI, MOHAMMADJAVAD MAHDAVINEJAD. Application Of Cubit–Gaz and Shape Grammar in Architecture Plan Design

117 ATHANASSIOS ECONOMOU. The Six Vitruvian Principles of Architectural Design Reframed within Contemporary Computational Design Discourse

123 ROBERTA SPALLONE, MARCO VITALI. *Regola* and *Licentia* in the *Extraordinario Libro* by Sebastiano Serlio

129 ORNELLA ZERLENGA, VINCENZO CIRILLO. *Della pianta delle Scale* of Guarino Guarini

135 ANNA MAROTTA, URSULA ZICH, MARTINO PAVIGNANO. Theories and Approaches in Fortifications Design: The Figure of Gaspare Beretta

141 STEFANO BRUSAPORCI, PAMELA MAIEZZA, GIANFRANCO RUGGIERI. A Reflection on the Cistercian *Bernhardinischer Grundtypus*

147 DANIELE CALISI, MATTEO MOLINARI. Giuseppe Valadier's Urban Layout for Piazza del Popolo in Rome

153 ISABELLA FRISO, ANDREA GIORDANO. The Design Process in the Salk Institute by Louis I. Kahn

159 VINCENZO BAGNOLO, ANDREA PIRINU, MARCELLO SCHIRRU. Geometrical Design Algorithms in Nineteenth-Century Prisons: The case of the *Rotunda* in Tempio Pausania

165 JOÃO PEDRO MARQUE SÊCO DIAS CARMONA. Urban Morphology of Geometric Pattern in the Villa Imperial de Petropolis

171 ARTURO GALLOZZI, MICHELA CIGOLA. Considerations on the Representations of the Analemma in Renaissance Editions of Vitruvius's *De Architectura*

Wednesday, 13 June 2018
Contemporary Analysis, Structures, Techniques of Design, Algorithms, Rule-Based Design

179 DENISE ULIVIERI, LUCIA GIORGETTI, BENEDETTA TOGNETTI. Vittorio Giorgini Spatiology-Morphology Architect: From 'Curved Systems' to 'Conventional Systems'

185 MICHAEL J. OSTWALD, MICHAEL J. DAWES. An Isovist Analysis of Frank Lloyd Wright's Hollyhock House

191 MICHAEL C. DUDDY. Logical Accidents: The Problem of the Inside Corner

197 ORIEL E.C. PRIZEMAN, CAMILLA PEZZICA, MARIANGELA PARISI, CLARA-LARISSA LORENZ. Function Should Follow Form: Futures for the Radiant Logic of Carnegie Public Libraries

203 SHEN GUAN SHIH, YI FENG CHANG. Composite Interlocking Structures of *SL* Strands

209 ASSUNTA PELLICCIO, MARCO SACCUCCI, ERNESTO GRANDE. A Key Nexus for Vault Systems from Lecce: Stereometric Correlation Between Shape and Structure

215 VALENTINA BEATINI. Morphology of Kinetic Structures by Means of Bar and Plate 4R-Linkages

221 MARCO HEMMERLING, CARLO DE FALCO. ArchiFold: An Educational Approach for the Integration of Mathematics in the Architecture Curriculum

227 MASSIMILIANO LO TURCO, URSULA ZICH, MARCO TRISCIUOGLIO, MICHELA BAROSIO, MARIA LUISA SPREAFICO, YOSEPH BAUSOLA PAGLIERO. Algorithmic Modeling and Design of the Architectural Shape: A Didactic Experience

233 FABIO BIANCONI, MARCO FILIPPUCCI, LORENZO CICULI. The Form of Music: Experiments between Cymatics and Engineering

239 MARCO CARPICECI, FABIO COLONNESE, Toward an Algorithm of Visual Design: The Mathematical Approach of Hermann Maertens' *Optische-Massstab*

245 CETTINA SANTAGATI, FEDERICO MARIO LA RUSSA, MARIATERESA GALIZIA, EUGENIO MAGNANO DI SAN LIO. Towards a Generic Parametric Algorithm for the Geometric Investigation of Baroque Oval Plans: An Application on Sicilian Cases

251 MANUEL ALEJANDRO RÓDENAS-LÓPEZ, PEDRO GARCÍA MARTÍNEZ, PEDRO MIGUEL JIMÉNEZ-VICARIO, ADOLFO PÉREZ EGEA, MARTINO PEÑA FERNÁNDEZ-SERRANO. Parametric Design Applied to Analysis and Optimization of Spatial Deployable Structures

257 MARIE-PASCALE CORCUFF. Jules Bourgoin (1838-1908): A Forerunner of Generative Shape Grammars

263 BENAY GÜRSOY, MINE ÖZKAR. *Material Shapes* and How to Compute with Them

269 MANUELA BASSETTA. Form–Formal making of Traditional Chinese Architecture

Thursday, 14 June 2018
Ph.D. Day

277 PAOLO BORIN. Geometry, Science and Meaning in the Work of Guarino Guarini

281 CRISTIAN BOSCARO. *La Manière Universelle* of Girard Desargues for the Understanding of Stereotomic Structures

285 ALEXANDRA CASTRO. The Curve in the Architecture of Herzog & de Meuron

289 RAFFAELLA DE MARCO. Shapes and Models: The Survey for the Study of Structures in Historic Buildings

293 PAOLO DI PIETRO MARTINELLI. The Control of Illusory Space: The Contribution of Jacopo Barozzi da Vignola and the Anteroom of the Council in Palazzo Farnese at Caprarola

297 MARYAM DOROUDIAN, MOHAMAD REZA BEMANIAN, MOHAMAD JAVAD MAHDAVINEJAD. Exploring of Topological Architecture: a Review of Topology Influence on Architecture

301 WILLEM GYTHIEL, MATTIAS SCHEVENELS, DIRK HUYLEBROUCK. Generating Geodesic Grid Structures by Equally Subdividing Spherical Arc Segments

305 DIOGO PEREIRA HENRIQUES. Envisioning Future Public Spaces: Experiments in Co-Creation and Evaluation of Urban Visions

309 STEFANIA LANDI, ORIOL DOMÍNGUEZ MARTÍNEZ. Modularity in Ancient Grain Storage Systems: Historical Overview and In-Depth Analysis of Moroccan Fortified Granaries

313 ELISABETTA POZZOBON. Religious Architectural Heritage Losing Its Functions: Strategies to Mitigate the Problem and Provide New Value through Geographical Context Analysis

317 MAYCON SEDREZ. Complex or Complications? Fractal Geometry in Architecture and Urban Design

321 JAKUB ŚWIERZAWSKI. Curvilinearity in Architecture: Historical and Contemporary Ideas and Examples

325 VERA VIANA. Architectonic Tessellations as Constructive Modules

Regola and *Licentia* in the *Extraordinario Libro* by Sebastiano Serlio

Roberta Spallone,[1] ***Marco Vitali***[2]

Introduction

The *Extraordinario Libro* by Sebastiano Serlio, published in Lyon in 1551, is an interesting field of experimentation for the dialectical relationship, central to the Mannerist period, between *Regola* (Rule) and *Licentia* (License). This volume is composed of copper plates engraved with rich captions: "there are thirty doors of rustic work mixed with different orders: and twenty of delicate work of various species" (Serlio 1551: Frontispice).

The book, not foreseen in the original editorial plan for drafting an architectural treatise, is tied with Book IV, concerning architectural orders, which was the first to be published in 1537. Indeed, in the monumental door, or portal, the architraved or arched entrance combines with the order to form an architectural element with a specific functional, formal, and decorative character (Chitham 1985: 99-101).

In the twentieth century, the *Extraordinario Libro* was the object of some historical-critical studies that highlighted the character of "strange collection of portals and capricious cartouches" (Rykwert, in Carpo 1993: 7). However, there are no studies that analyze the geometric structure of the Serlian models, linking them to the modularity of the orders and to the unit of measurement of the period.

The authors of this paper have undertaken this path with the aim not only, as in Fiore's auspices, "to reproduce, following the text, the proposed graphic examples" (Fiore, in Serlio 2001: 17), but also to interpret, represent, and finally relate the proportional criteria underlying the iconographic *corpus* of the book. The geometric-modular relationships that rule the composition of the fifty portals are investigated using graphical analysis, which involves recognition, de-composition and re-composition of the elements, and philological reconstruction, aiming at:

- comparing and classifying Serlian models;
- identifying variants and invariants between proportions of 'rustic' doors and 'delicate' doors;
- establishing connections to the rules of orders stated by Serlio in Book IV;
- highlighting recurrent and exceptional compositional criteria.

The Research

> *Now that I have given vent to the oddities of mixed and licentious things, it is quite right that I treat likewise the regular ones* —Serlio 1551: *Dilicate* I.

Although Serlio uses this premise to describe the 'delicate' doors, the 'licentious' works are distributed throughout the whole volume.

The 'rustic' work is found in the application of ashlar-work, sometimes banded, while the 'delicate' work is deprived, but this does not imply a strict correspondence with

[1] Dipartimento di Architettura e Design, Politecnico di Torino, Italy, roberta.spallone@polito.it.

[2] Dipartimento di Architettura e Design, Politecnico di Torino, Italy, marco.vitali@polito.it.

'*Licentia*' and '*Regola*' respectively. Indeed, variations in the application of order elements, decoration, and inscription also characterize a good part of the 'delicate' doors. In Book IV, the Rule presents a series of transgressions of Vitruvius's instructions, motivated by direct reference to Roman antiquities. The Rule identifies as a module the column diameter repeated a certain number of times at the 'constructive level', which using the successive partition method, allows for proportioning the elements at the 'functional level' (Migliari 1991: 49-66).
In the *Extraordinario Libro*, in addition to the use of different order elements in the same portal, the License is manifested in the interruption of architrave, frieze, or cornice by breaking of the pediment to place a plaque or a coat of arms in the application of the ashlar-work to columns, pillars, and architraves. Such Licenses must also be contextualized within the pedagogical intent of an architect who declares himself a 'professor' and proposes a series of 'inventions' destined to remain on paper (Thoenes 1989: 12).
In the dedication to the readers (*A gli lettori*), Serlio provides general indications on how to use dimensions: "And because with regard to describing the dimensions I have been very brief, the diligent architect will find them minutely in this way. He will imagine how many feet the door should have to measure, making one of those feet twelve inches (*once*), and one inch (*oncia*) six parts called minutes... With this rule he will find all the dimensions from one side to the other" (Serlio 1551: *A gli lettori*). The reader is warned about the terms of use of the treatise, in which he will find some of the fundamental dimensions, while he will independently have to find those dimensions not specifically indicated: "which dimensions you will find if you are diligent in dividing and measuring" (Serlio 1551: *Rustiche* V).
A description of dimensional/modular references is only made for doors I, II, III, III, V, VII, VIII ('rustic' doors), V, XV, XVI, XVIII, XX ('delicate' doors).
The graphical analysis began from these models, through the connection between drawings and texts, in search of an analysis protocol for the definition of the compositional hierarchy and sequence, the testing the correspondence between modules and dimensions, and the identification of hidden geometries. This protocol was subsequently extended to other models.
Regarding the drafting of this protocol, it is necessary to point out that the dimensions indicated by Serlio always follow the general logic and the sequence stated in the dedication to the readers:

- the dimensions in feet (width and height), of the opening;
- the value of the module, in feet (corresponding to the base diameter of the column shaft);
- the height of the column (including base and capital) and of other elements related to the 'constructive level'.

The reader is left with the task of finding from the drawing the dimensions necessary for the subdivisions of the 'functional level' into base, shaft, and capital (for the column); base, die and cap (for pedestal); architrave, frieze and cornice (for the entablature).
Sometimes the height and width of the elements placed above the entablature are indicated, and more often the dimensions of the lateral bands and the intercolumniation are provided. However, the overall dimensions of the portal and

the related proportional criteria—which are the subject of attention in Book I, on geometry (1545)—are missing. Therefore, modular and dimensional indications freely alternate; the latter are then subdivided, almost always, with a modular criterion, which derives from the division of elements into fractions of the whole.

In relation to the inequality of the information in the captions, Serlio often refers to the 'diligent architect' who is able to integrate the text through the reading of the drawing and to vary the size of the module in order to obtain scalar variations: "To make the measure of the whole, it is possible to imagine how many feet the door has to be wide, dividing one foot in twelve parts: with it, the dimension of everything will be found" (Serlio 1551: *Rustiche* XX). In the same incipit, Serlio specifies: "And so, using the small compass for the small work, and the large compass for the large one, [the architect] will translate the small thing in great shape without fail" (Serlio 1551: *A gli lettori*).

As noted, the doors' theme is recurrent in the books by Serlio: in chronological order, it appears in Book IV (1537), dedicated to the five architectural orders, in Book III (1540), which contains Roman antiquities surveys, in Book I (1545), where the principles of geometry are exposed and, finally, in the *Extraordinario Libro* (1551). The analysis of the theme, according to this sequence, could reveal the progressive maturation of a compositional method, fully applied in the *Extraordinario Libro*.

In the concluding part of Book I, Serlio illustrates some applications of geometry, among which the *ad quadratum* method used to proportion the main door of a temple. The general dimensions of the door are ruled by the width of the central nave, through the construction of a square where the diagonals and the inscribed isosceles triangle define the two dimensions of the opening and the proportional relations between its width and the cornice, and between its width and the height of the tympanum. Wittkower highlights an essential aspect of this Serlio's geometric layout: the graphic construction leads to finite subdivisions of the square that rules the composition of the door, which does not require a drawing, and concludes that it "follows, rather than precedes, the relationships chosen for the portal "(Wittkower 1994: 123). In Book I another significant passage for this research is related to seven main quadrangular proportions that identify the ratio between the two sides of a rectangle, inspired in part by musical harmonies.

Conclusion

In the incipit of Book I, devoted to geometry, Serlio states: "Whatever is necessary for any person the very art of Geometry can testify to all those who have worked without it, and then have come to some cognition of such art: those who truly confess that all the things they were thinking of and done without Geometry were without any art, adventurously and casually" (Serlio 1545: Dedication to the reader).

This contribution, and in light of the central role that Serlio attributes to geometry in architecture, offers an original analysis that works with the same tools.

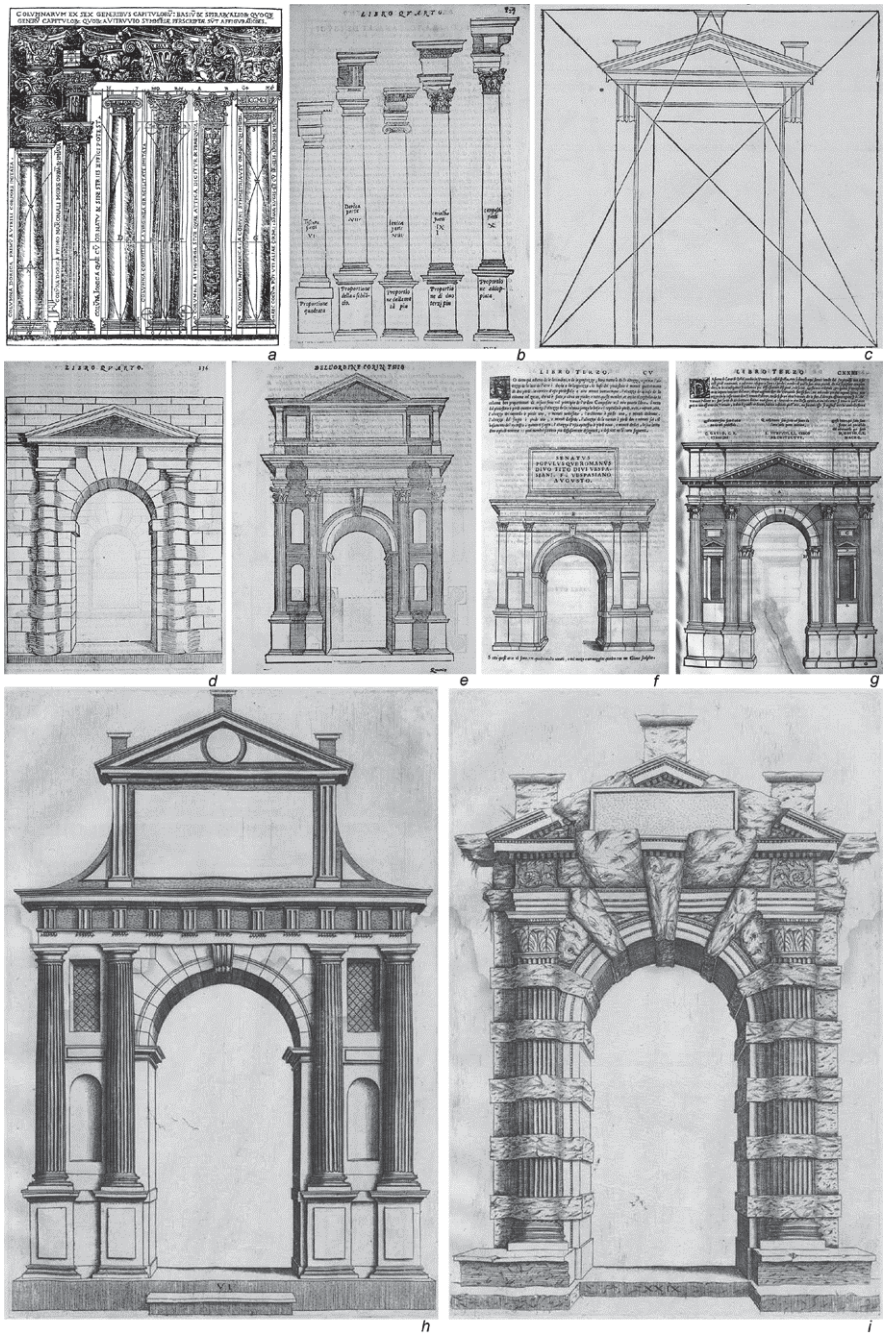


Fig. 1. a) Cesariano, edition of *De architectura* by Vitruvius (1521), synoptic table of the orders; b) Serlio, Book IV (1537), synoptic table of the orders; c) Serlio, Book I (1545), geometric proportion of a portal; d), e) Serlio, Book IV, architectural orders applied to the portals; f), g) Serlio, Book III (1540), surveys of Roman arches; h) Serlio, *Extraordinario Libro* (1551), 'delicate' door; i) Serlio, *Extraordinario Libro* (1551) 'rustic' door

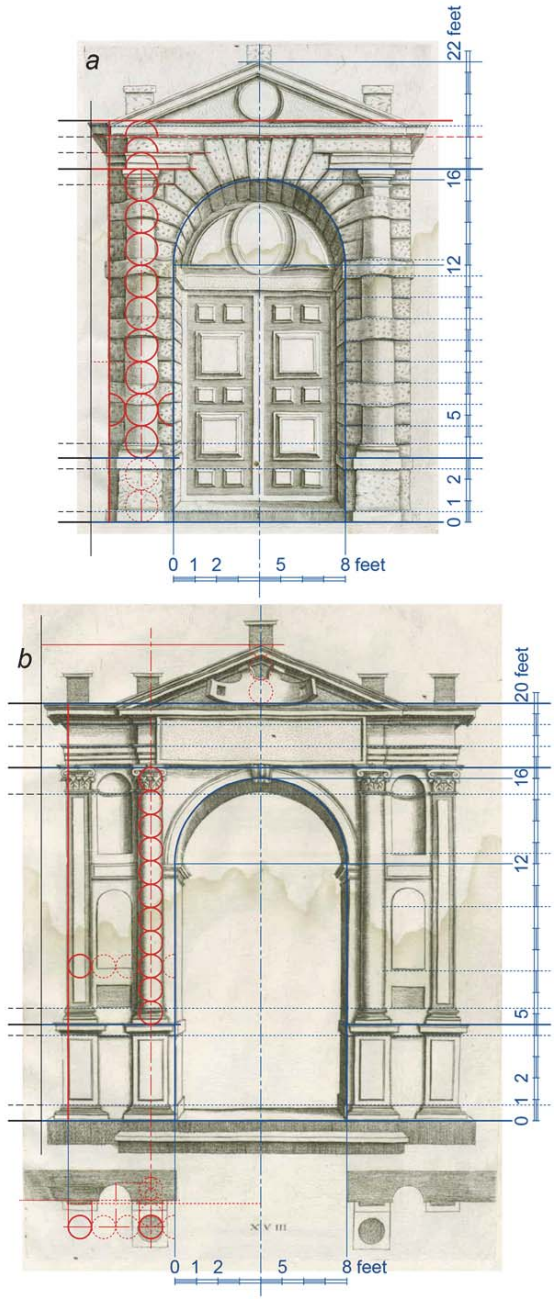


Fig. 2. Graphical analysis applied to the doors 'rustic' I (a) and 'delicate' XVIII (b). The analysis is aimed at comparing text and images of the treatise: it highlights the relationships between the proportional criteria of subsequent partitions of the module and that which refers to dimensions. On the left of the plates the partition into the 'constructive level' (with a black heavy line) and the 'functional level' (with a black thin hidden line). The elements proportioned on the unit of measurement (feet) are in blue and those proportioned on the module are in red. With a heavy line the elements proportioned and described by Serlio in the text, with a dotted line the interpretations on the proportionality made by the authors

Graphical analysis confirms the consistency between text and drawings: it is used as a mediation tool between two proportional criteria: that of subsequent partitions of the module, and that which refers to dimensions. Moreover, the analysis highlights punctual correspondence of the dimensions with the exact fraction of the module.

Wittkower's remarks, together with the fact that in the *Extaordinario Libro* Serlio does not explain the role of geometry as a compositional criterion, but refers to it by establishing additional geometric relations between the parts - for example between height and width of the openings that is a double square- supports the choice to carry out the graphical analysis through both the combination of the metric and modular data reported in the text and the *a posteriori* geometric reading, comparing the results.

In the *Extraordinario Libro* the relationship established between module and unit of measurement make more complex the integration of the two criteria, geometric and modular: in some cases, the *ad quadratum* method is identifiable in determining the openings width, or the keystones height, or the entablatures height, but it seems to lose its value of regulatory criterion of the whole composition.

The interpretative tools based on drawing and geometry confirm, in our opinion, how the creative process adopted by Serlio constantly takes into account the Vitruvian lesson: even when the license is privileged, it produces controlled results, derived from an overall organization that is not evident in the text. Therefore, re-drawing is a heuristic tool that critically goes back to the compositional process of the models and highlights its logic, tracing sequences, structures, and hierarchies through the selection of information and graphical synthesis.

References

Carpo, M. 1993. *La maschera e il modello: teoria architettonica ed evangelismo nell'Extraordinario Libro di Sebastiano Serlio (1551)*. Milan: Jaca Book.

Chitham, R. 1985. *The Classical Orders of Architecture*. Milan: Rizzoli.

De Fusco, R. 1968. *Il Codice dell'Architettura. Antologia di Trattatisti*. Naples: Edizioni Scientifiche Italiane.

Migliari, R. 1991. Il disegno degli ordini e il rilievo dell'architettura classica: Cinque Pezzi Facili. *Disegnare. Idee. Immagini*. **2**: 49-66.

Rosci, M. 1966. *Il trattato di architettura di Sebastiano Serlio*. Milan: I.T.E.C.

Serlio, S. 1551. *Extraordinario Libro di Architettura*. Lyon: Per Giovan de Tournes.

Serlio, S. 2001. *L'architettura: i libri I-VII e Extraordinario nelle prime edizioni*. Fiore, F. P. (ed.). Milan: Il Polifilo.

Tafuri, M. 1966. *L'architettura del Manierismo nel Cinquecento europeo*. Rome: Officina.

Thoenes, C. (ed.). 1989. *Sebastiano Serlio. Sesto seminario internazionale di storia dell'architettura* (Conference proceedings, Vicenza, 31 agosto–4 settembre 1987). Milan: Electa.

Wittkower, R. 1949. *Architectural Principles in the Age of Humanism*. London: Warburg Institute (Italian transl. 1994. *Principi architettonici nell'età dell'Umanesimo*. Turin: Einaudi).