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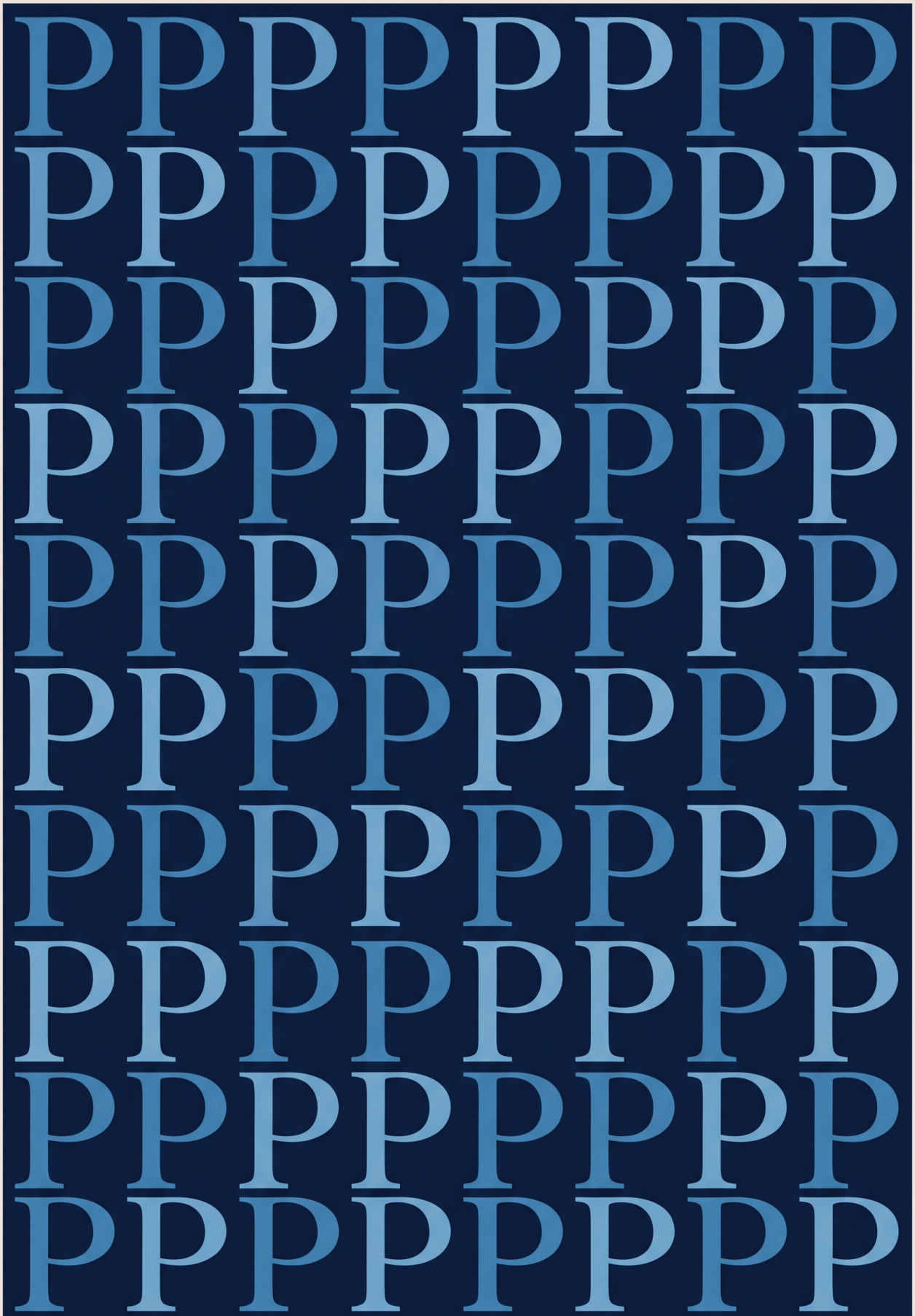
Palladianist
The Future of Drawing
ISSN

Heritage

Universal Knowledge in the Age of AI

Giuseppe Amoruso | Editor

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The Future of Drawing

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Heritage

Universal Knowledge in the Age of AI

Giuseppe Amoruso | Editor

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Palladio. The first algorithm
Rule, dataset and the myth of the humanist origin of design

Giuseppe Amoruso
Politecnico di Milano

ANDREA PALLADIO
GENERATIVE ARTIFICIAL INTELLIGENCE
EPISTEMOLOGY OF DRAWING
ARCHITECTURAL EIDETICS
DIGITAL REPRESENTATION

This essay offers a deliberately provocative reading of Palladio's method as one of the earliest historically documented examples, and certainly the most extensively studied in computational research, of a design system based on explicit production rules, formalized since 1978 as a generative shape grammar. Starting from the structural analogy between treatise and dataset, the essay identifies the point at which the comparison breaks down: licence, understood as a reasoned departure from the rule, which in Palladio's method is always a traceable interpretive act, never a statistical fluctuation without a discernible cause. On this basis, the essay argues that drawing in the humanist tradition functions as an eidetic and heuristic cognitive instrument, irreducible to mere output. It concludes by proposing a critical protocol for using generative systems and a pedagogical reversal, both grounded in the traceability of judgment.

Dedicated to *Universal Knowledge in the Age of AI*, this inaugural issue brings together theoretical, historical, critical, and design contributions that examine Palladio's legacy through the relationships between universal knowledge and local traditions, classical method and technological innovation, and rule and variation, taking drawing, measurement, and representation as critical instruments.

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Introduction

The *Palladianist* project stems from the conviction that the legacy of Vitruvius and Andrea Palladio is not in the past but offers one of the most robust theoretical frameworks for interpreting the present's cultural and technological transformations. In an age dominated by the automation of cognitive processes, the algorithmic production of images and the growing dematerialisation of design experience, the paradigms of architectural knowledge and design culture must be decisively redefined. Vitruvius understood that architecture is a discipline founded on the relationship between technique, knowledge, and civic responsibility. Palladio translated this legacy into a universal method, making drawing an instrument of knowledge, representation a cultural technology, and the dissemination of knowledge an act of social transformation. *I quattro libri dell'architettura* (The Four Books on Architecture) were not merely a treatise, but an intellectual infrastructure for building a new idea of the world.

Today, in the age of artificial intelligence, we face a comparable responsibility. Emerging technologies are radically changing how we produce images, interpret data, transmit knowledge, and conceive design. Faced with this transformation, the risk is not only technical but cultural: reducing critical thinking to a procedure, heritage to information, design to predictive calculation, and the result to mere communication.

This first issue, devoted to the theme *Universal Knowledge in the Age of AI*, brings together theo-

retical, historical, critical and design contributions that question Palladio's legacy in the relationship between universal knowledge and local traditions, between classical method and technological innovation, between rule and variation, taking drawing, measurement and representation as critical tools. This editorial does not seek to summarise them, but to make explicit the framework within which the journal positions itself: to assess generative artificial intelligence not with the enthusiasm or the fear that accompany its spread, but with the same criteria of verifiability, measure and responsibility that the Palladian tradition placed at the foundation of drawing.

The eight contributions in this issue develop this framework along several lines.

The first concerns the genealogy and fortune of Palladio's architectural language. David Hemsoll opens the volume by questioning Palladio "in time", between fictitious pasts and imaginary futures, that is, how each era has constructed its own Palladio. Paolo Clini returns to the basilica of *Fanum Fortunae*, the only building Vitruvius claims to have designed, to trace its descent to Palladio and reconstruct a genealogy of classical architecture. Alberto Sdegno examines the relationship between Palladio and Canaletto in Venice, on the threshold between reality and imagination. Two contributions then widen the view beyond Europe: Amir Abbas Mansoori Mehr follows the translation of architectural knowledge in modern Iran through Beaux-Arts pedagogy, between Palladio and Persepolis; Pedro P. Palazzo compares the ways of representing space in fourteenth- and

fifteenth-century China and Italy. What emerges is a Palladio understood not as a style to be exported, but as a method translated and transformed through contact with other traditions: a concrete case of the relationship between universal knowledge and local cultures at the heart of this issue.

David Moreno-García and Albert Samper use terrestrial laser scanning to compare ideal geometry and built reality in Gothic cathedrals. In both cases, survey makes measurable the distance between model and work, between rule and construction: the very distance that this editorial takes as the place of judgement.

The third line addresses the volume's theme directly. Ricardo Alvarez-Diaz, "between measure and machine", questions the relevance of Palladian methodologies in the age of artificial intelligence, in direct dialogue with the issues discussed in these pages. The issue includes with a contribution on heritage communities:: Viviana Matrangola interprets limits as a principle of care and responsibility. Within the framework of the Faro Convention (Council of Europe, 2005), the contribution assigns heritage communities an active role, as the experiences from Apulia discussed there show. It is a timely reminder for this editorial too: the traceability of judgement is, ultimately, a form of shared responsibility.

Why Palladio, why now

Discussing architectural drawing in the face of generative artificial intelligence today constantly risks sliding into technical territory (which software,

which algorithms, which outputs) that overshadows the real stakes, which are historiographical before they are technological. The question is not whether a machine can produce plausible images of buildings, a question already largely answered in the affirmative, but whether drawing, in the disciplinary tradition that runs from Alberti to Palladio and on to contemporary design culture, has ever been reducible to the production of an image. To treat drawing as a mere executive technique is already to have decided, implicitly, that generative AI can replace it without residue, since what is purely technical is, by definition, automatable.

This essay starts from the opposite hypothesis: that drawing has historically been also, and above all, an instrument of thought, and that it is this dimension, not its visual rendering, that must be critically interrogated in the comparison with generative systems.

Turning to Palladio is motivated by a precise methodological reason. Palladio represents one of the best-documented cases in the discipline's history in which a complete system of rules, measure, proportion, and typology coexists with a declared margin of adaptation to the specific case, without one cancelling the other. This coexistence of rule and variation is exactly what the contemporary debate on generative AI struggles to focus on, oscillating between a purely mechanical algorithm and an artificial creativity indistinguishable from human creativity. The essay proceeds in six steps: it recalls the humanist foundation of drawing as an instrument of measurement and thought (§1); reads Palladio's treatise as an operation of select-

ing and normalising a corpus, analogous to dataset curation (§2); reconstructs the computational formalisation of Palladio's system as a generative grammar and the notion of design space that derives from it (§3); identifies licence as the point at which the analogy ceases to hold (§4); compares this logic with the mediations introduced by digital tools and generative models (§5); and finally proposes a critical protocol and a pedagogical inversion (§6).

1. Drawing as thought: *lineamenta*, measure, projection

Alberti's distinction between *lineamenta* and *materia*, formulated in *De re aedificatoria*, provides the historical foundation for the reading proposed here. For Alberti, a building has a dual nature: a conceptual design, the *lineamenta*, which establishes its form, proportions and arrangement of parts independently of the material, the "transmissible rule", and a material realisation that gives physical substance to that design (Alberti, 1485/1955; 1485/1966).

From the Renaissance onward, the shift from manuscript to print-based architectural culture introduced new conditions for reproducing and transmitting design. The ability to disseminate drawings and texts in identical copies encouraged the systematisation of architectural rules, laying the groundwork for today's interpretations of Palladio's work through formal grammars (Carpo, 2001). In 1519, the *Letter to Leo X*, expressing Raphael's thought and drafted with Baldassare Cas-

tiglione's contribution, clearly distinguishes the architect's drawing from the painter's. The architect represents measurable reality through plans, elevations and sections, preserving actual proportions. The text therefore excludes the foreshortenings and perspective reductions proper to pictorial representation, since no real measurement can be derived from a foreshortened line (Di Teodoro, 2020). Architectural drawing thus emerges as an instrument of knowledge and project transmission, grounded in measurability and verifiability. It is no coincidence that the *Letter* is among the earliest attestations of the term "order" applied to columns: the passage from the Vitruvian *genus* to the *ordo* marks the transformation of the varieties of columns into a codified system of proportions and of compositional and constructional rules (Thoenes, 1998).

Drawing makes visible thought that is not yet formed: this is its eidetic dimension. In a narrower, disciplinary sense, the term denotes drawing's capacity to make visible, and therefore available for analysis, a thought that, before its graphic translation, lacks a definite form. This reading finds a solid theoretical basis in Robin Evans's analysis of projective drawing as an autonomous cognitive device, capable, through its three geometries, of producing spatial relationships that no preliminary verbal description already contained in explicit form: for Evans, drawing does not transmit a spatiality conceived elsewhere, but constitutes it in its own making (Evans, 1995). This eidetic dimension distinguishes architectural drawing from mere technical notation. Closely connected to

the eidetic dimension is the heuristic function of drawing: its capacity to produce discoveries that the designer had not anticipated before drawing. Anyone who surveys an ancient building or graphically studies a façade's proportions often finds that drawing, rather than preliminary observation or theoretical calculation, reveals an unforeseen geometric relationship. This heuristic must not be confused with the random generation of variants: heuristic discovery in manual drawing is always situated within a hypothesis that the designer is testing. Studies of design cognition have described this dynamic as a "reflective conversation" with the situation (Schön, 1983) and as a dialectic between "seeing as" and "seeing that", through which the sketch returns to the designer more information than was deliberately put into it (Goldschmidt, 1991). It is this reciprocity, and not merely the capacity to produce variants, that is the true criterion of comparison with generative systems.

2. What distinguishes a treatise of compositional rules from a model trained on a corpus?

A generative model (whether language- or image-based) produces plausible outputs by sampling from a probability distribution learned from a training corpus; a treatise such as *I quattro libri dell'architettura* produces, through the designer who applies it, typological variations from a finite set of selected rules, proportions and precedents. This resemblance is not an isolated intuition: in 1978 George Stiny and William J. Mitchell took literally Palladio's own statement that variety and novelty must never contradict the precepts of the

art, and translated it into a *shape grammar* capable of generating the plan of the Villa Malcontenta through the recursive application of explicit rules (Stiny & Mitchell, 1978a). The research questions they asked, what makes a villa "Palladian", and to what extent a system of rules can be translated into an architectural type, shift the focus from recognition to operation: a style derives not only from a set of visual features, but also from a set of operations. If a sixteenth-century treatise can be formalised as a generative system of rules, the question this essay asks is no longer merely rhetorical.

A historiographical clarification is nevertheless needed. Palladio is neither the only nor chronologically the first to base design on explicit rules: from the Vitruvian tradition to the *Regola delli cinque ordini d'architettura* (Barozzi da Vignola, 1562), sixteenth-century culture knew modular procedures even more prescriptive, while the *Précis des leçons d'architecture* would turn the combinatorics of elements on a grid into an explicit teaching method (Durand, 1802–1805).

What makes the Palladian case exemplary is not absolute priority, but the coexistence, within a single corpus documented by treatise, drawings and buildings, of typological rule, proportional system and motivated variation: this is why it has become the privileged testing ground of computational design research (Mitchell, 1990). It is in this sense, and only in this sense, that the title speaks of "the first algorithm". Palladio does not invent the rules he transmits: he extracts, selects and systematises them from a pre-existing corpus. Strictly speaking, this operation is dataset curation, and the most

rigorous historiography indirectly confirms it.

Rudolf Wittkower, in his study of proportional relationships in humanist architecture, showed how selective and normative the criteria were by which Palladio harmonised ancient sources into a coherent system, and identified the plan's configuration as the distinctive character of Palladio's villas (Wittkower, 1949). Mario Carpo has reconstructed how the architectural culture of the age of print depended on the possibility of fixing *lineamenta* that were reproducible and identical at a distance, a thesis which, applied to the Palladian case, shows that the treatise does not describe antiquity as it was, but offers an already selected and normalised version of it, just as a training dataset is never a neutral sample of reality (Carpo, 2001, 2011).

Here, however, the analogy shows its first limit. The datasets on which contemporary image models are trained comprise billions of image–text pairs automatically scraped from the web and filtered by statistical criteria rather than authorial judgement: LAION-5B, one of the most widely used, contains about 5.85 billion image–text pairs (Schuhmann et al., 2022). The treatise is a corpus selected by an author who answers for it; the dataset is an aggregated corpus for which no one answers in full. In this sense, the difference in scale is already a difference in kind (Fig. 1).

Palladio inherits and specialises Alberti's conception through a drawing practice that operates on three registers: survey, conjectural reconstruction and the type, abstracted from particular cases and transferable to new programmes. The proportion-

al analysis that Wittkower carried out on this corpus, first in his systematic study of the architectural principles of the humanist age (1949) and later within the activities of the Centro Internazionale di Studi di Architettura Andrea Palladio (CISA), founded in Vicenza in 1958, showed how this threefold operation was guided by harmonic ratios derived from the Pythagorean–Vitruvian tradition and applied consistently across the corpus of villas.

Later studies questioned this thesis, showing a discrepancy between the dimensions stated in the treatise and those of the buildings as built (Howard & Longair, 1982), a discrepancy that, as we shall see, is integral to the argument. *I quattro libri dell'architettura* are often read as a catalogue of typological solutions to be drawn upon for stylistic emulation. This reading obscures their most important component: the treatise does not merely show results, but sets out the procedure that generated them. In chapter XX of the first book ("*De gli abusi*"), Palladio himself claims never to have departed from the universal rules of the art even where he introduced variety and novelty ("*ancora che il variare e trovar cose nuove a tutti debba piacere, non si deve però far ciò contra i precetti dell'arte, e contra quello che la ragione ci dimostra*" [although variation and the invention of new things should please everyone, this must not be done against the precepts of the art and against what reason shows us]; Palladio, 1570, I, XX), a methodological statement that George Stiny and William Mitchell took literally in 1978, turning this very passage into the premise of their *shape grammar*.

3. The *Palladian Grammar*: from described style to generated style

However, Stiny and Mitchell's work matters beyond interpreting Palladio's architecture. The question is broader: if an architectural style can be represented by a finite system of generative rules, then the design knowledge embedded in a historical corpus can be made explicit, formalised, and used not only to analyse existing buildings but also to produce new ones.

This approach belongs to the theory of *shape grammars*, introduced by Stiny and Gips in the early 1970s as a formalism for generating and analysing visual configurations. *Shape Grammars and the Generative Specification of Painting and Sculpture* is the immediate theoretical precedent (Stiny & Gips, 1972); Stiny would later systematise the formalism in *Pictorial and Formal Aspects of Shape and Shape Grammars* (Stiny, 1975) and in *Introduction to Shape and Shape Grammars* (Stiny, 1980), up to the synthesis of *Shape: Talking about Seeing and Doing* (Stiny, 2006). The thesis of this essay is not that Palladio was an algorithm. Rather, it is a matter of recognising what in his method is already procedural and combinatorial, which makes it possible to isolate more precisely what is not: licence, deliberate error, critical judgement. Hence the rereading of Palladio's proportional system as production rules.

The most complete demonstration of this mechanism remains Stiny and Mitchell's shape grammar: a set of parametric rules that directly translates Palladio's explicit compositional canons into a generative procedure capable of reproducing the

main features of most of the plans drawn in the *Quattro libri* (Fig. 2).

The *Palladian Grammar* thus represents the decisive step from the general theory of *shape grammars* to their systematic application to architectural history and design. The fundamental theoretical move in Stiny and Mitchell's work is shifting from a descriptive to a generative conception of style.

A traditional classification might define Palladio's architecture through observable properties: symmetry; centrality; recurrence of specific proportions; presence of loggias and porticoes; hierarchy of rooms; specific dimensional relationships. A *shape grammar* works differently. It does not merely establish that a given configuration has these features; it seeks to specify the operations that generate such configurations. The model can be summarised as: initial shape - application of a rule - new configuration - application of a rule - … - final configuration. The theoretical consequence is significant: style is conceived not as a static repertoire of forms, but as a system of transformations.

In the *Palladian Grammar*, the rules operate mainly on the plan. Through successive transformations, they define the geometric structure, internal subdivisions, relationships between rooms and the main architectural elements. The grammar is parametric, so the rules do not necessarily produce a single configuration but can generate a family of variable configurations. This introduces a fundamental distinction in the history of computational design: the model does not represent a building, but the space of possible configurations

obtainable through a set of rules. The rule in the Palladian villa is therefore a generative structure, expressed through the relationship between order and module and through volumetric variation. Palladio's modular system works as a generative structure in the proper sense: once the module is fixed, it determines or tightly constrains a wide range of dimensional solutions. Stiny and Mitchell's grammar showed that the "open space" of Palladio's system is large but not infinite, and is precisely defined by the structure of the rules applied. Describing Palladio's dimensional module as "classical inspiration" is as imprecise as describing an algorithm as "the programmer's intuition". The same mechanism was reconstructed by Lawrence Sass, first in his doctoral thesis at MIT and then at the 2001 ACADIA conference, by systematically comparing the dimensional ratios of Palladio's rooms with the compositional rules of the plans, to the point of building digital parametric architectural elements directly derived from those proportions (Sass, 2000, 2001).

In a separately published paper, *Counting Palladian Plans*, Stiny and Mitchell applied combinatorics and colour grammars to enumerate the solutions the system can generate: ten distinct solutions for a 3 × 3 grid, two hundred and twenty for a 5 × 3 grid (Stiny & Mitchell, 1978b). Benrós, Duarte and Hanna (2012, p. 525) list the nine villas on which the original grammar is based: Malcontenta, Badoer, Zeno, Pisani, Emo, Saraceno, Ragona and Poiana on a 5 × 3 grid, and Villa Angarano on a 3 × 3 grid. Sass's work extended the same parametric logic to villas on a 5 × 3 grid (Villa Poiana, Villa Zeno, Villa

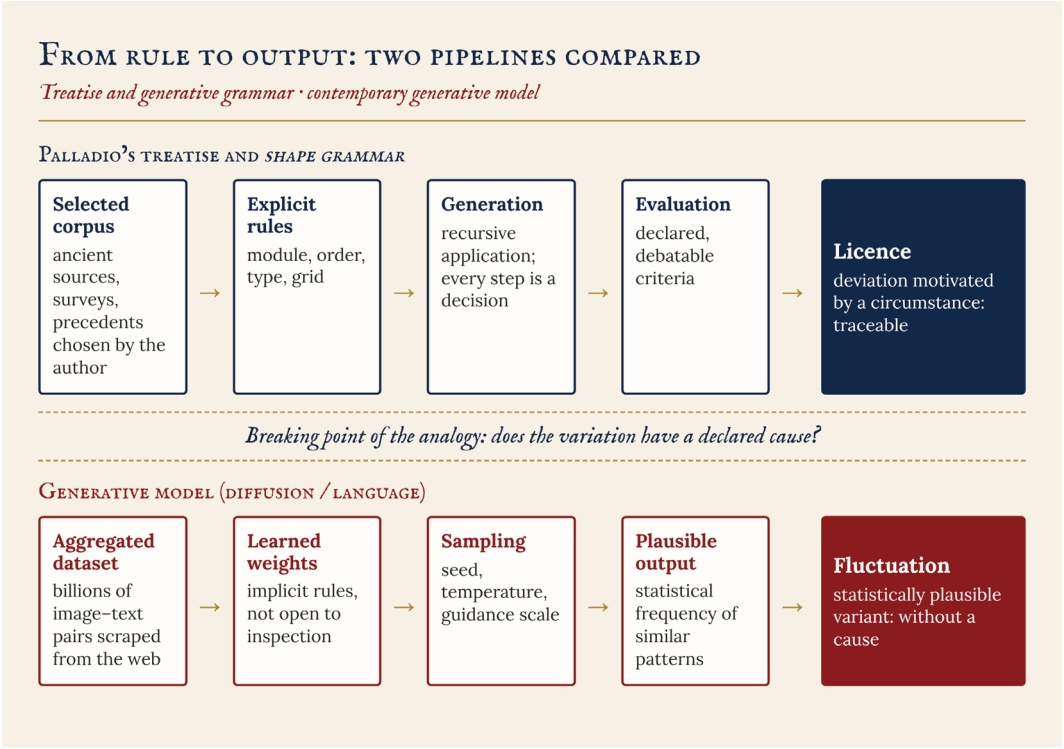


Fig. 1. Treatise and generative model: two pipelines compared. The analogy breaks down at the declared cause of variation. Graphic elaboration by the author.

Thiene at Cicogna), building an experimental tool in which different hypotheses for filling documentary gaps could be tested.

The fact that alternative grammars, such as the subdivision grammar proposed by Deborah Benrós, were developed precisely to test whether different rule systems can generate the same corpus confirms that the space of Palladian possibilities is not arbitrary but measurable (Benrós et al., 2012). Along the same lines, Hersey and Freedman (1992) translated the rules derived from the *Quattro libri* into a computer program, generating "possible" Palladian villas and, instructively, some impossible ones, and showing that the capacity to produce coherent variants does not coincide with the capacity

to recognise their appropriateness. The problem thus shifts from reconstructing a building to the combinatorics of design space. This shift is theoretically significant because it introduces the conception of the project as *design space*. The grammar makes it possible to distinguish at least three levels (Fig. 3):

- *historical corpus*: the buildings actually realised;
- *generative language*: the set of configurations admissible under the rules;
- *design space*: all configurations theoretically obtainable through combinations of the rules.

The relationship between these three levels is one of the most fertile themes of subsequent research. The historical corpus does not necessarily coincide with the full range of the grammar's language: Palladio realised only some of the configurations the system would allow.

Consequently, the grammar implicitly introduces a distinction between what Palladio designed and what Palladio's compositional system could have produced. This step is what makes the *shape grammar* relevant to contemporary generative design. The problem that emerges is immediate: if a grammar can generate many configurations, not all of them are necessarily good architecture. The grammar's generative capacity must therefore be distinguished from the evaluation of the result. Stiny and Gips addressed this issue as early as 1978 in *An Evaluation of Palladian Plans*, proposing aesthetic evaluation criteria applied to the complete

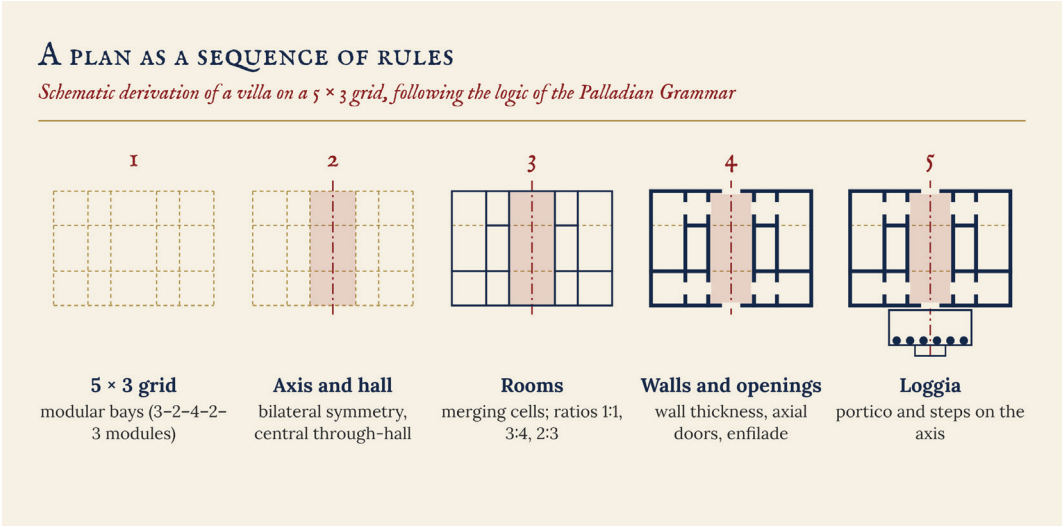


Fig. 2. Schematic derivation of a plan on a 5 × 3 grid following the generative logic of the *Palladian Grammar*. Original teaching diagram by the author.

catalogues of plans that can be generated on 3 × 3 and 5 × 3 grids (Stiny & Gips, 1978). This introduces a conceptual separation that remains fundamental in contemporary research: generation is distinct from evaluation. A grammar defines a space of possibilities; further criteria must establish which solutions are preferable. The *Palladian Grammar* can therefore be considered one of the first examples of a conceptual pipeline that, in modern terms, can be described as: *rules - generation - evaluation - selection*.

4. Error as a critical act: what the algorithm does not do

Palladio's system explicitly admits, in motivated circumstances, deviations from the norm that the treatise itself does not conceal. These licences are presented not as failures of the rule, but as the exercise of a judgement that the rule itself presup-

poses. Later shape grammar studies, such as the one based on an alternative subdivision grammar, had to confront precisely these cases of deviation in order to test whether different grammars could generate the same corpus of solutions (Benrós et al., 2012), a problem that remains unresolved precisely because Palladian licence cannot be codified once and for all. Palladio's system can be described as a combinatorial structure: the shape grammar research community has recognised the Palladian Grammar as the first complete architectural grammar in the history of computational design studies. Hence the deliberately provocative hypothesis of a Palladian "algorithm" *avant la lettre*.

But it is essential not to confuse this structure with the mechanical seriality that the term "algorithm" evokes: through the designer's judgement, Palladio's system selects which variations are relevant to the specific case, a selection that no shape grammar has so far been able to formalise completely.

Sass's study (2001) begins with the observation that Palladio's built architecture differs systematically from the ideal architecture represented in the *Quattro libri* (Fig. 4), differences that scholars have analysed for generations to uncover their causes. In contemporary generative models, by contrast, output variability is governed by stochastic parameters: in language models, the "temperature", which modulates the distribution from which the next token is sampled; in diffusion models, the initial noise (*seed*) and the strength of text guidance (*guidance scale*) (Rombach et al., 2022). Studies documenting the generative use of these systems also systematically record "failed" images, too ab-

stract or too literal, an outcome that depends on the stochastic configuration of sampling, not on an evaluation of the specific circumstance (Tan & Luhrs, 2024).

Intentional error, not the complexity of the rule system, is the true epistemic dividing line. A contemporary generative model introduces variability through a stochastic mechanism: it samples from a learned probability distribution. Palladio's system, even in its most rigorous formalisation as a shape grammar, does not generate variants by random sampling: each rule application presupposes a decision that, in Stiny and Mitchell's grammar, the human operator makes, not a random process internal to the system. The difference is not one of degree but of kind.

5. Drawing as mediation: tools, conventions, protocols

Every drawing tool mediates between thought and representation: projective conventions already did so. Vector CAD and parametric BIM introduce further declared mediations; generative AI introduces a leap of a different kind, positioning itself as a proposing agent rather than a merely executive tool, within what Carpo (2017) has called a second digital turn, founded no longer on notation but on the processing of large quantities of data (cf. Leach, 2022). In *An Algorithmic Approach to Palladio's Design of Stairs* (Giovannini, 2023), Elisabetta Caterina Giovannini translates the indications on staircases in Book I of the *Quattro libri dell'architettura* into geometric rules and algorithms for parametric

HBIM modelling. By analysing texts and drawings, the study reconstructs the proportional relationships between steps, supports, and central voids. The study implements these relationships in Dynamo, the visual programming environment integrated into Revit, which lets users build algorithms by connecting graphical nodes without writing code, automate operations, and generate parametric models governed by geometric rules and proportional relationships. The paper shows the semi-automatic generation of six spiral and oval staircase configurations, adaptable to different dimensions. The research also examines 38 plans from Book II, classifies the staircases they contain, and compares them with the theoretical solutions. The corpus analysed shows no spiral staircases with a central newel, consistent with Palladio's preference for a central void that admits light. The main contribution is to make Palladio's proportional rules explicit, verifiable and reusable, laying the foundations for an HBIM library of architectural elements for research and teaching. The method creates a mediated protocol from the historical source to the HBIM model: the treatise becomes an operational basis for building adaptable, reusable digital elements. Modelling thus also takes on an interpretive function, making the geometric logic of Palladio's staircases legible and verifiable. Generative models, by contrast, lack proportional intentionality. A shape grammar makes every generative step explicit and verifiable; a diffusion model leaves it implicit in the weights of a neural network, inaccessible to inspection of the same kind. The plausibility of a façade generated by a contemporary model derives from the frequency

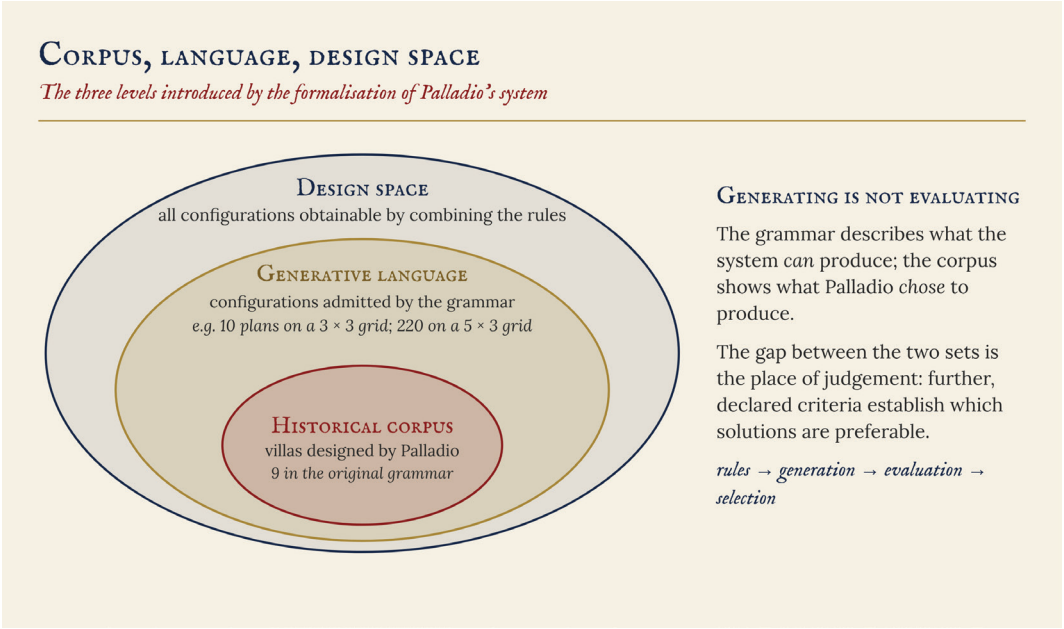


Fig. 3. Historical corpus, generative language and design space. Graphic elaboration by the author based on data from Stiny and Mitchell (1978b) and Benrós et al. (2012).

of similar patterns in the training data, not from an explicit calculation that establishes proportionality. The possible formalisations of a historical corpus are potentially many, but each is declared and refutable; the distribution learned by a model is not. However, recent pipelines tend to reintroduce drawing as a constraint. Conditioning techniques such as ControlNet let us guide a diffusion model with edges, depth maps, or perspective lines (Zhang et al., 2023): geometry returns upstream of generation, and the model acts on rendering, not structure. This development confirms, rather than refutes, the thesis advanced here: traceability is recovered only when drawing precedes the image.

A 2025 experiment that used GPT-4o and Claude 3.5 Sonnet for the three-dimensional synthesis of the Villa Rotonda and Palazzo Porto from the descriptions in the *Quattro libri* shows that both sys-

tems successfully generate the individual parts of the building but struggle to assemble them according to the required spatial relationships (Huang & Haridis, 2025). The finding is telling: what is missing is not combinatorial capacity, but control over relationships, which is precisely what a grammar makes explicit. The dividing line therefore lies elsewhere: in the capacity to motivate a deviation from the rule as a response to a circumstance, making it a traceable act of judgement rather than a statistically plausible event.

Studies of Midjourney's use in design practice, such as Tan and Luhrs (2024), document how the software accelerates ideation and enhances the architect's divergent and convergent thinking. The generative model works as a mirror without heuristics: it returns non-trivial combinations of its training data, but without the question-and-answer relationship that characterises heuristic discovery. The reflection focuses on what we really lose: not the gesture's uniqueness, but the responsibility of judgement. A systematic review published in 2026 on the use of generative AI as a conceptual partner in architecture, conducted according to PRISMA guidelines on forty studies published between 2015 and 2025, identifies a specific risk: not the replacement of the graphic gesture, but the erosion of students' reflective engagement when AI acts as a substitute rather than as a partner in the ideation phase. If it occurs, the loss is epistemic: responsibility for judgement is silently delegated to a process that, by its nature, cannot account for it (Stanimirovic et al., 2026). The problem also has a properly disciplinary dimension. In the culture of heritage sur-


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NON Molto lungi dalle Gambarare ſopra la Brenta è la ſeguente fabrica delli Magnifici Signori Nicolò, e Luigi de' Foſcari. Queſta fabrica è alzata da terra vndeci piedi, e ſotto vi ſono cucine, tinelli, e ſimili luoghi, & è fatta in volto coſi di ſopra come di ſotto. Le ſtanze maggiori hanno i volti alti ſecondo il primo modo delle altezze de' volti. Le quadre hanno i volti a cupola: ſopra i camerini vi ſono mezati: il volto della Sala è à Crociera di mezo cerchio: la ſua impoſta è tanto alta da piano, quanto è larga la ſala: laquale è ſtata ornata di eccellentiſſime pitture da Meſſer Battiſta Venetiano.

Meſſer Battiſta Franco grandiſſimo diſegnatore a noſtri tempi hauea ancor eſſo dato principio a dipingere vna delle ſtanze grandi, ma ſoprauenuto dalla morte ha laſciata l'opera imperfetta. La loggia è di ordine Ionico: La Cornice gira intorno tutta la caſa, e fa frontiſpicio ſopra la loggia, e nella parte oppoſta. Sotto la Gronda vi è vn'altra cornice, che camina ſopra i frontiſpicij: Le camere di ſopra ſono come mezati per la loro baſſezza, perche ſono alte ſolo otto piedi.

Fig. 4. A. Palladio, Villa Foscari ("La Malcontenta"), plan and elevation, *I quattro libri dell'architettura*, Book II, p. 50. Getty Research Institute (public domain).

vey and representation, a drawing's documentary value depends on declaring its sources, methods, and degree of uncertainty, a principle the *London Charter* has placed at the foundation of digital visualisation of cultural heritage (Denard, 2009). A generated image that takes on the appearance of a survey without being one produces evidence without provenance: a risk all the more serious when generative systems are used for conjectural reconstructions.

6. A critical protocol and a pedagogical inversion

What remains after this twofold deconstruction is not a dismissal of the analogy between treatise and algorithm, but a more precise rehabilitation of the Palladian model. Palladio emerges as a historically exemplary case study, in which rule, measure and motivated variation coexist within a single documented corpus, and, today, as one of the most extensively studied cases in computational research and rule-based design. Its value for the present does not lie in any claim to have anticipated artificial intelligence, but in the clarity with which it shows where a system of rules ends and where judgement begins. On this basis, the proposal is to test a critical protocol that evaluates generative systems according to their capacity to accommodate licence and judgement, rather than according to the quantity or novelty of the variants they produce. The question to be asked of a generative tool is therefore not how many plausible solutions it can generate, but whether each solution can be related back to a rule, measured against it, and, where it departs from it, justified by a circumstance. A protocol for the critical use of generative systems should not assess outputs on the basis of their apparent originality, which in a stochastic process may be no more than an effect of sampling. It should assess them on the possibility of reconstructing, after generation, a chain of reasons that justifies their adoption: which data and instructions produced them, which rule they respond to, which deviations they introduce and who takes responsibility for accepting them. This is the same principle of transparency that the systematic review cited above identifies as a necessary condition for AI to function as a gen-

uine critical partner rather than as a substitute for reflection (Stanimirovic et al., 2026). In operational terms, the protocol can be organised into five criteria (Fig. 5):

1. *Provenance*: declaration of the model and its version, of the reference images or data, of the *prompts* and of the generation parameters, so that the process is repeatable. This declaration is now also a legal obligation: the European regulation on artificial intelligence requires that content generated or manipulated by AI be identifiable as such (Regulation (EU) 2024/1689, Art. 50).
2. *Rule*: explicit statement of the compositional or proportional rule (module, order, type, grid) against which the output is evaluated, so that conformity is not judged on appearance.
3. *Measure*: metric and projective verification of the output in plan, elevation and section, according to Raphael's criterion of the unforeshortened line, before any aesthetic evaluation.
4. *Deviation*: documentation of every accepted deviation from the rule, with an indication of the circumstance that motivates it; a deviation that cannot be motivated is an error, not a licence.
5. *Responsibility*: explicit attribution of the final decision to an author, who answers for it as for their own drawing.

The resulting pedagogical inversion reverses the sequence now most common in design studios. Rather than starting with the generated image and then rationalising it, students start with drawing: they survey, redraw, and formalise the rules of a Palladian case (module, order, grid, room proportions)

and then use the generative system to produce variants for verification. What is assessed is not the image, but the judgement dossier that accompanies each accepted or rejected variant. In this sequence, AI does not replace the reflective phase but makes it more demanding, serving as a *sparring partner* rather than a substitute (Stanimirovic et al., 2026). *Palladianist* intends to build its own experimentation on this model.

Conclusions

Generative AI does not threaten the traditional design method: it forces it, for the first time with comparable clarity, to declare what it has always been. The path followed here has gone through a deliberately uncomfortable sequence: recognising in Palladio a system of rules comparable to a curated dataset, already formalised as a generative grammar in 1978; isolating in module and order a mechanism quantifiable within its own combinatorial space; halting the analogy exactly at the point where it ceases to hold, licence: a point that today also finds empirical confirmation, both in the difficulty multimodal models have in governing the spatial relationships of a Palladian building and in the decline of students' reflective engagement when AI replaces, rather than supports, the ideation phase. From Alberti's *lineamenta* to Stiny and Mitchell's computational formalisation of Palladio's rules, through the experiments with multimodal models on the Villa Rotonda and Palazzo Porto, the same confirmation emerges: it is not the complexity of the rule system, but the traceability of motivated deviation, that distinguishes classical

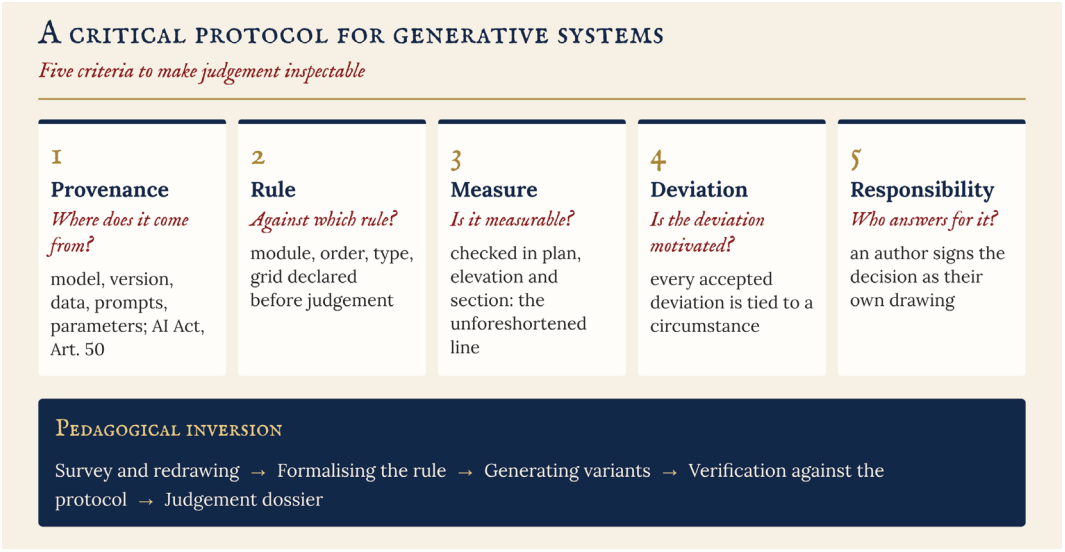


Fig. 5. The five-criterion critical protocol and the sequence of the pedagogical inversion. Graphic elaboration by the author.

method from algorithmic calculation. This traceability is the critical guarantee on which a disenchanted, but not defeatist, use of generative AI in architecture can be built. At a time when access to information is growing faster than the capacity to interpret it, *Palladianist* asserts the role of scientific research, drawing and design culture as essential tools for shaping the future. Digitising heritage or automating processes is not enough: we must build cultural models that can govern technological transformation without renouncing historical depth, the complexity of thought, or the responsibility of design. The contemporary challenge is not to choose between tradition and innovation, but to found a new authority of knowledge in the age of artificial intelligence. From this perspective, Palladianist intends to operate as a critical, editorial, and scientific platform dedicated to building a future of digital awareness, in which technology once again becomes an instrument of culture, not a substitute for thought.

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Palladio in time
Fictitious pasts and imagined futures

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ANDREA PALLADIO
PALLADIAN
THEORY
CLASSICISM
HISTORIOGRAPHY

Andrea Palladio has attracted an unparalleled amount of scholarly attention and has provided, by way of his treatise the *I Quattro libri dell'architettura*, very many architectural practitioners with a fount of inspiration, and a pivotal point of reference between past accomplishments and future endeavours. This article examines the writing on Palladio to determine the extent to which it has arrived at a full and objective understanding of his architecture, and why certain aspects of it have remained underinvestigated. It also explores how it was that the treatise came to have such an influence on the architect's 'Palladian' followers and what they would have understood from it about Palladio's architecture and its relevance to their times. It considers, finally, how in recent writing Palladio has become ever further disconnected from his own time to become conceived as a mythic figure to whom modern architects and their buildings can be regarded as being connected. Throughout is an emphasis on time: on how perceptions of Palladio and his work have changed over time, on how Palladio and his followers saw the best kind of architecture as being rooted in the past but ever relevant to the present and future, and on how Palladio's past architectural achievements are still perceived as providing a model for present and potentially future endeavours.

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Fig. 1. Villa Rotonda, near Vicenza. Photo: the author.

The preeminent Renaissance architect Andrea Palladio (1508-1580) has continued to attract immense, and ever increasing, amounts of scholarly attention. At the same time, he has provided many architectural practitioners with an enduring source of inspiration, and a pivotal point of reference between past accomplishments and future endeavours. As recounted here, these two matters are intimately connected, and what follows will also explore how and why Palladio has come to occupy so important a position in the architectural imagination.

What emerges is that the writing on Palladio does not, in the end, provide an understanding of him and his architecture that is as complete and comprehensive as might be expected. It has established, unquestionably, that he did more than any of his contemporaries in conceiving of a kind of architecture that was directly comparable with antiquity, one which would prove irresistible to architects of later times; but, in being so bound up with the passage of time and the accretion of new perspectives, it has also generated ways of thinking about him and his architecture that he himself could never have anticipated. Almost half a century ago, it was observed that probably more had been written 'about Palladio than about any other great architect' (Howard, 1980, p. 224). This writing was inaugurated by Palladio himself with the publication in 1570 of his treatise *I quattro libri dell'architettura*, which was reissued in various subsequent editions before being partly translated into Spanish (1625), into Dutch (partly in 1646), into French (partly in 1645 and fully in 1650),

partly into German (1698), and, eventually, into English (partly in 1663 and fully in 1715/1720 and 1738) (Howard, 1980). Scholarly enquiry into Palladio himself and his architecture came with his increasing fame and was commenced in the 18th century, which was when a lengthy biography of him, based on then-available documentation, was compiled by Tommaso Temanza (Temanza, 1762), and when his buildings began being scrutinised, in works by Francesco Muttoni and then Ottavio Bertotti Scamozzi, with differences being noted between them and their illustrations in the *Quattro libri* (Muttoni, 1740; Bertotti Scamozzi, 1776-1783).

After a succession of monographs on the architect dating from the mid-19th century onwards, and further studies too of his buildings (Burger, 1909), the high point of Palladio scholarship came at around the midpoint of the following century. This saw the appearance of foundational works on his buildings, now more firmly dated, and his drawings and documented career, by Giangiorgio Zorzi (Zorzi, 1958; 1964; 1966; 1969) and Lionello Puppi (Puppi, 1973), as well as publications resulting from the first major exhibitions on the architect (Cevese, 1973; Burns, 1975), and monographs on individual buildings, beginning with his celebrated Villa Rotonda (1566) near Vicenza (Fig. 1) (Semenzato, 1968). Other studies piloted new approaches such as focusing on the theoretical rationales of his works and their socio-political contexts (Forssman, 1965; Ackerman, 1966), while yet others began to re-examine Palladio's distinctive architectural outlook, his design sources, and the affinities of his works with antiquity, notably



Fig. 2. Vicenza, Palazzo Porto. Photo: the author.

Rudolf Wittkower's which also investigated his conception of dimensions and proportions (Wittkower, 1973). Since that time, new publications on the architect have continued apace and without any sign of abating. They have included substantial and detailed studies on Palladio's buildings in

Venice and on his patrons (Cooper, 2005; Howard, 2011), collaborative ventures coinciding with major exhibitions (Beltramini & Burns, 2008), and a great many more specialised enquiries covering numerous aspects and facets of his life, achievements and works (Mitrović, 2004; Paternò, 2015). Tellingly, however, the last extended account of the architect and his career, one that aims to provide a complete and coherent coverage of his architecture, was published now over three decades ago (Boucher, 1994). It was the first for almost half a century (Dalla Pozza, 1943; Pane, 1948), and none has been attempted since.

Even despite an overall picture of the architect remaining rather elusive, it is the sheer weight of all this past scholarship that has given rise to the modern-day consensual understanding of Palladio. This mainstream view of him has concerned itself with many aspects of his architecture, with recent considerations of constructional materials and techniques becoming particularly prominent, but it has paid curiously little attention to other major priorities of his. Perhaps the most notable and surprising of these omissions pertain to his conception of the architectural orders, which are treated so prominently in the *Quattro libri* (Palladio, 1570, book 1), and to his highly distinctive approach towards dimensions and proportions, as presented in the treatise illustrations of his own designs, which, despite being drawn attention to well over eighty years ago, was never assimilated into the mainstream consensus (Wittkower, 1973). Otherwise, this mainstream accord has very much been generated by past and previous scholarship,



Fig. 3. Piombino Dese, Villa Cornaro. Photo: the author.

while becoming ever-more marginal, fragmented and specialised, and rather lacking in any governing and unifying vision of what Palladio's overall aims as an architect actually were. It has also created a rather distorted portrayal of Palladio as a figure somehow separated from the architectural world around him and as unchanging in his goals. What it has not done is to position him in the developmental flow of the architecture of his day, and to recognise that, although he came to be especially preoccupied with the revival of antiquity, his approach was not at all static – which is how it has come to be regarded – but underwent a very considerable amount of revision and refinement.

A re-examination of Palladio's career reveals that it traversed various easily defined phases and that



Fig. 4. Venice, San Giorgio Maggiore. Photo: the author.

his architecture changed in its character accordingly – despite this being scarcely noted in the literature.[1] After an initial schooling in building construction and architecture, Palladio began his career by following an approach that was similar to those adopted by many of his leading contemporaries, including Raphael, Jacopo Sansovino and, especially, Michele Sanmicheli, with whom he may have been closely acquainted. Such an approach underpins the façade design of Palladio's early Palazzo Porto in Vicenza (ca. 1547), with its rusticated basement and its piano nobile set out with Ionic half-columns (Fig. 2). Palladio then, around 1550, abandoned this outlook and adopted an ap-

proach based on an increased usage of freestanding columns and on principles for column spacing deriving from the ancient treatise of Vitruvius.

This way of designing would be employed for villas Palladio designed for Venetian patrons, such as Villa Cornaro at Piombino Dese (1552), with its double-storey porticoed and pedimented façade (Fig. 3), and Villa Badoer at Fratta Polesine (ca. 1555), with its imposing frontal loggia and colonnaded side wings. Later still, from around 1560 and for the final two decades of his life, Palladio came increasingly to view architecture as being comparable more generally to antiquity, signalling this equivalence through an ever-more assertive usage of the orders. Such an approach was initially manifested in schemes for churches in Venice, such as the façade of San Francesco della Vigna

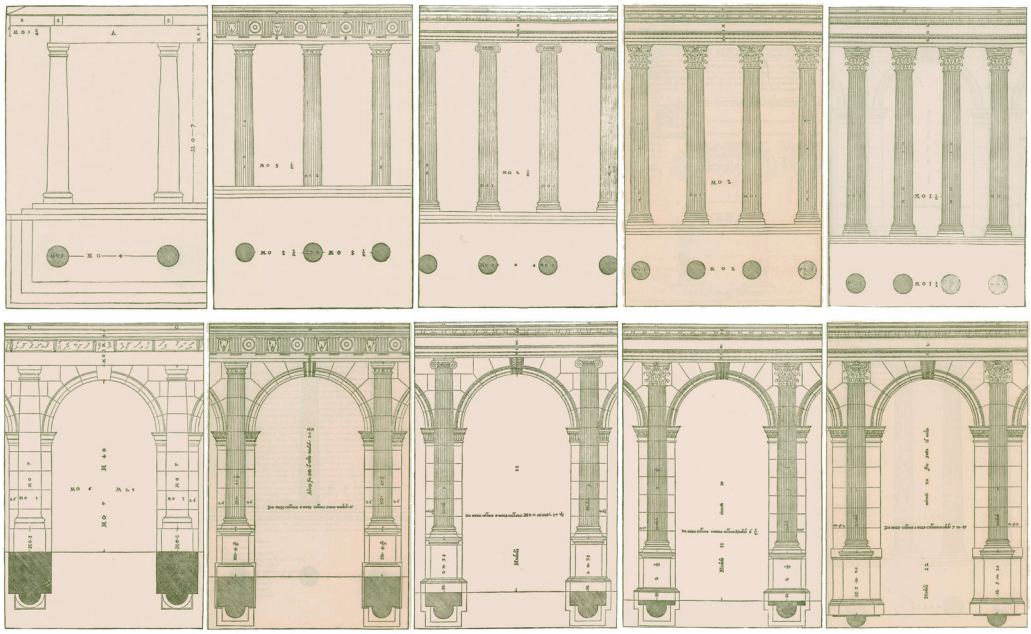


Fig. 5. The architectural orders as presented in the *Quattro libri*.

(1563/64) and the rebuilding (from 1566) of San Giorgio Maggiore (Fig. 4), both with giant-sized and coupled lower-level orders, although it was later extended to buildings of other kinds. It was one that was now very different from the outlooks that were being championed by leading contemporaries, such as Michelangelo and Jacopo Barozzi da Vignola, who were much less concerned with the imitation of antiquity. It was consistent, however, with the view of architecture that was set out in the *Quattro libri*, which Palladio completed and published in 1570, and which was intended to serve as a theoretical justification for his own buildings (in contrast with those of many of his contemporaries) – and for those designed by like-minded architects of the future. For its readers, the *Quattro libri* provided a core theoretical basis for an architecture of the most estimable kind. This it did, its readers were given to understand, by propagating two fundamental messages (Hemsoll, 2025b). One was that Palladio's buildings, especially the many domestic schemes illustrated in the second of the treatise's four books, were closely comparable with the antique; and the other was that this comparability was contingent on the exemplary deployment of the architectural orders, which was why in the treatise's first book the orders were depicted in so commanding a manner (Fig. 5) (Palladio, 1570, book 1, pp. 15-50).

Moreover, in being founded, as Palladio was at pains to emphasise, in the practices and achievements of times long passed, it was the orders above all else that were able to conjure up potent associations both for buildings of his own time and for

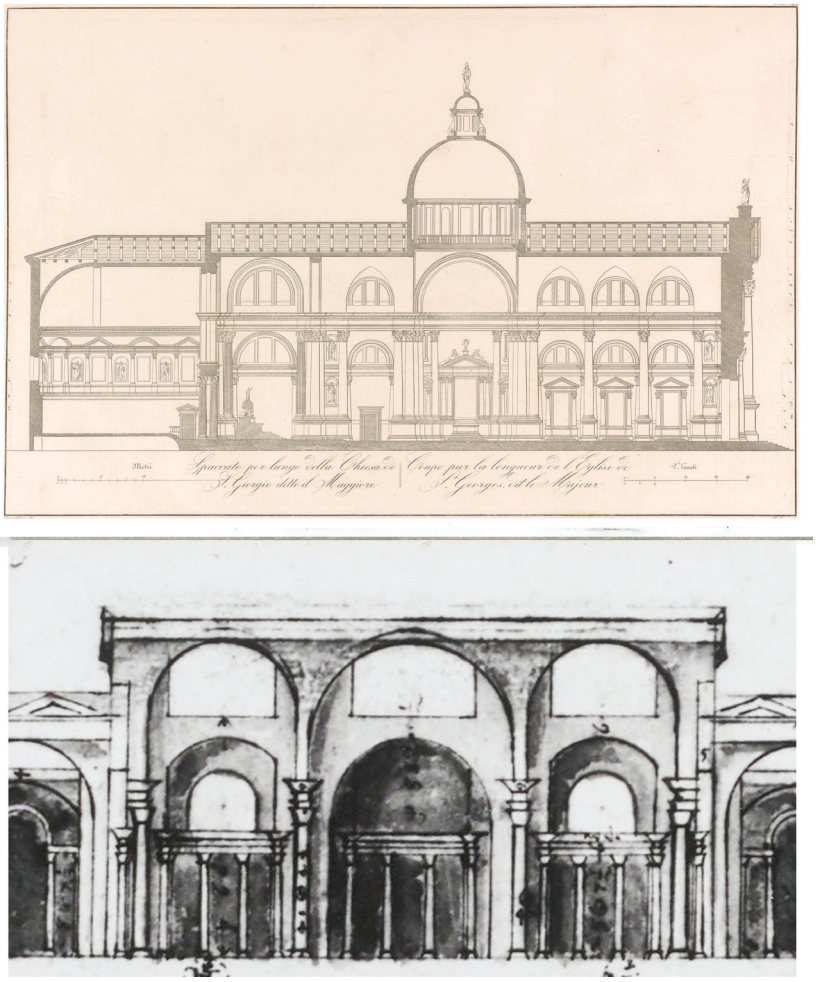


Fig. 6. Top: Section of San Giorgio Maggiore (from Cicognara, Diedo & Selva 1815–1820); and bottom: Longitudinal section of the frigidarium of the Baths of Diocletian (from a drawing by Andrea Palladio: London, R.I.B.A., Palladio V, 2. Source: London, Courtauld Institute).

those of times to come. That he had the future very much in his mind was strongly implied by his remarks that 'those who come after' him would follow his 'example' by directing their own talents at adding the 'true beauty and elegance of the ancients to the magnificence of their buildings' (Palladio, 1570, book 1, p. 3), and by his claim that what he had himself 'put into practice he was now publishing for general use' (Palladio, 1570, book 1, p. 5).

His vision overall was thus that the 'most beautiful architecture' (*bellissima architettura*), as he called it (Palladio, 1570, book 4, p. 3), had originated in antiquity before being brought back to light in his time (Palladio, 1570, book 4, p. 64), so that, on the basis of this and especially of his own efforts and 'example', such architecture could be perpetuated by subsequent practitioners. In this way, he was able to construct and promote a compelling myth

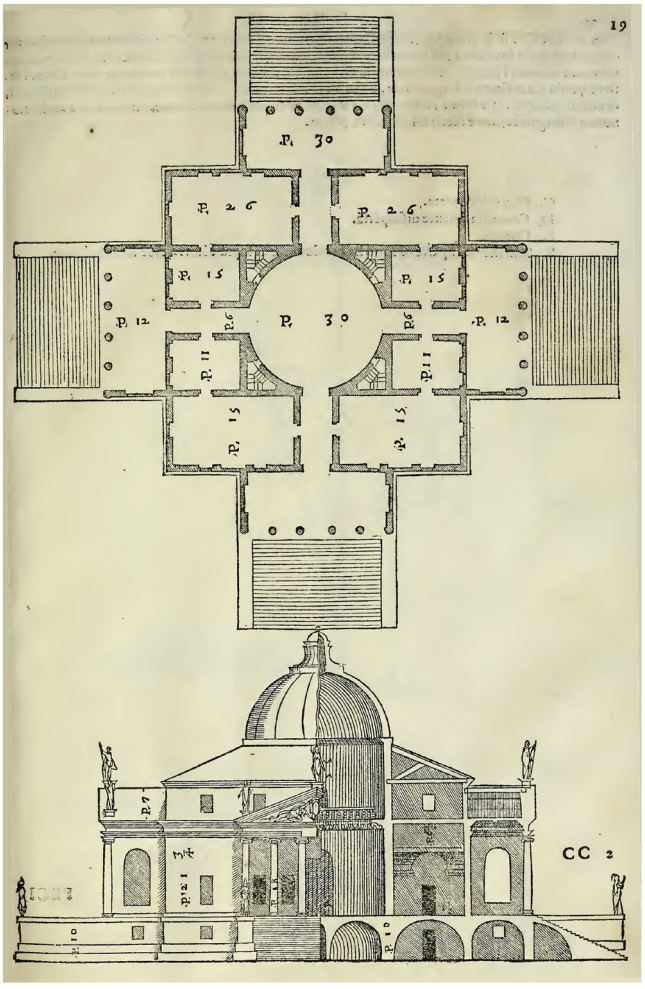


Fig. 7. Villa Rotonda as illustrated in the *Quattro libri, libro II, p. 19*.

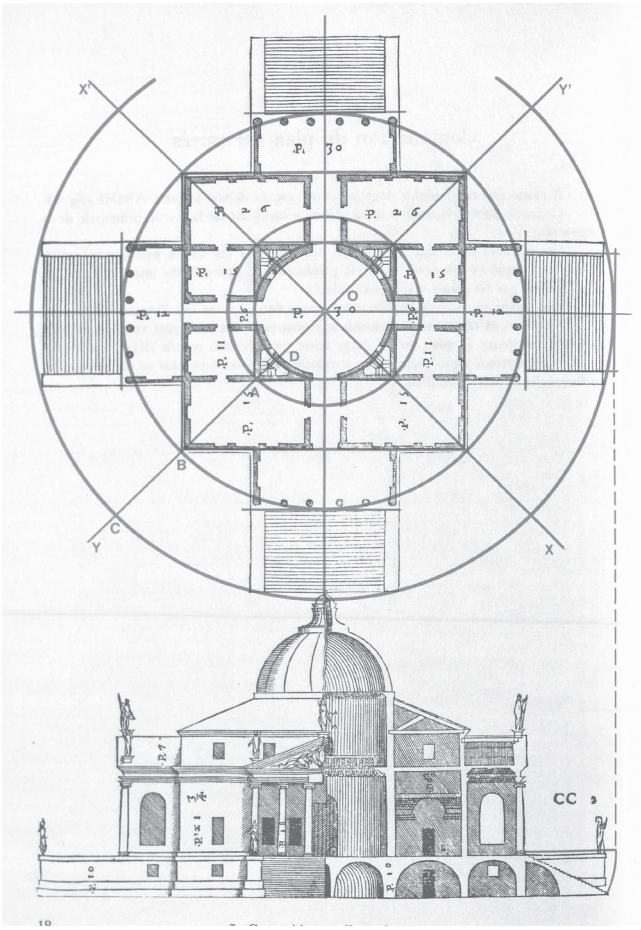


Fig. 8. Analytical diagram of Villa Rotonda by Robert Streitz.

about the 'most beautiful architecture', which could be regarded as being rooted in remote antiquity, as being rational, authoritatively grounded and historically validated, and, thanks to his own efforts, as being of proven validity for both the present and the foreseeable future.

Palladio himself, although eventually committed to an understanding of architecture of this kind, had not always been of such a view but, rather, had arrived at it as a result of the vicissitudes and changing circumstances of his career (Hemsoll, 2025b).

Early on, he had been perfectly content to conform to the approach established by his leading contemporaries, and devise works such as his Palazzo Porto in Vicenza (Fig. 2) that were resolutely modern in being conceived in a discerningly all'antica vocabulary and based on comparable modern works by Bramante and Raphael of acknowledged merit. Later, however, he abandoned this position in good part so he could attract commissions for villas from Venetian patrons. He could, it can be supposed, tempt Venetians to become patrons by playing on their cherished belief that they were like ancient Romans, or even directly descended from ancient Romans, as in the case of the Cornaro family, the patrons of Palladio's Villa Cornaro at Piombino Dese (Fig. 3), who considered themselves to be the progeny of the ancient Cornelii, and thus related to the renowned Roman general Scipio Africanus. The villas he designed for these Venetian patrons were, in consequence, suitably Roman, by being firmly anchored in Vitruvian theory with their freestanding columns and their pediments, which, as explained in the *Quattro libri*, were not only seen in the 'remains of temples and other public buildings' but had probably been also employed by the ancients for their domestic buildings (Palladio, 1570, book 2, p. 69). Such an approach, as it was observed at the time, allowed architecture 'to be seen in its ancient form' (Barbaro, 1556, p. 279). Later still, as Palladio then shifted his position yet further, it seems that he came to think that a kind of architecture that was more generally comparable to antiquity was especially well suited to Venice, in view of the city's supposed foundation by Romans and its subsequently un-

Fig. 9. Harrogate, Victoria Shopping Centre, designed by Cullearn & Phillips, completed 1991. Photo: Derek Harper, CC BY-SA 2.0, via Wikimedia Commons (cropped).





Fig. 10. Zürich, Schulhaus Im Birch, designed by Peter Märkli, 2004. Photo: Tschubby, Wikimedia Commons, File: Schulhaus Im Birch 2019.

interrupted history and seeing that Venice in the *Quattro libri* is described as the 'sole remaining exemplar of the grandeur and magnificence' of the ancient Romans, and as where 'buildings of distinction' were again being realised (Palladio, 1570, book 1, p. 5).

In his mind, therefore, the buildings conceived for this city needed to be especially Roman, as was very much the case with his scheme for the rebuilding of the church of San Giorgio Maggiore, where he turned to the frigidarium of the ancient Baths of Diocletian in Rome as his ultimate point of reference, which similarly had a groin-vaulted interior with arched openings to either side, two levels of windows, and architectural orders of two different sizes (Fig. 6). In the *Quattro libri*, however, such a view of architecture would be stretched, so that it was presented, wilfully and misleadingly, as if it applied to schemes of his from the entirety of his career. It was thus as if not only his late works but also his early works – including Palazzo Porto (Fig. 2) – were all based on the same principles, which were their close comparability with the antique and their exemplary deployments of the architectural orders.

If Palladio had expected the *Quattro libri* to have an impact on future architecture, then he would have hoped its messages would be welcomed, and future circumstances would be such that an architecture rooted in the same principles could be re-created. This, of course, proved to be the case. Those subsequent architects such as Inigo Jones (1573–1652) and, later, Richard Lord Burlington (1694–1753) who gave great attention both to Pal-

ladio's architecture and to his *Quattro libri*, as well as many others including Thomas Jefferson (1743–1826) who said that Palladio was his 'Bible' (Beltramini, 2015, p. 23), all found his architecture and the ideas propagated by the *Quattro libri* – that is an architecture rooted in remote antiquity which was rational, authoritatively grounded and historically validated – to be eminently well suited to the worlds in which they lived. For them, such an architecture could thus signal a reinstatement of fundamental principles that tallied with the fundamentalist outlooks of their nations and societies. Buildings, therefore, such as Jones's Whitehall Banqueting House (1619), Burlington's Chiswick House (1725/26) and Jefferson's Monticello (begun 1768), would not only resemble Palladio's and other works illustrated in his treatise in many ways, but they would rely on his publicised architectural vision and achievement as well. Their designs would, consequently, be indebted to Palladio above all others for formulating ideal rules for the orders, and for revealing how the orders had been discerningly deployed in ancient buildings while demonstrating how they could be judiciously applied likewise to modern ones. They would thus embrace his architectural vision, and attest to his achievement as the instigator of the best kind of architecture imaginable – in the very way that Palladio himself had probably wished. Once such an architecture became established, however, as it did in Britain especially in the 18th century (Worsley, 1995; Brindle, 2023), then the buildings we now call 'Palladian' became ever less attuned to the messages provided by the *Quattro libri* and were ever more the result of the treatise being used simply

as a corpus of design prototypes. Much later, in the 20th century and long after the decline of Palladianism, the *Quattro libri* provided the stimulus for a very different way of thinking about architecture. It arose from the investigation, by Wittkower in his much republished study, of the proportionally related dimensions found on the plans of the Palladio's buildings featured in the treatise illustrations, and from his conclusion that they were akin to musical harmony, and even that they belonged to a preordained harmonic sequence (Wittkower, 1973; Hemsoll, 2025a).

Such a deduction – even though it turns out to have very little basis – was liberating, not least because it allowed Palladio's designs to be examined and analysed without any reference to the architectural orders or to the 'classical' tradition, and in a way that meant that they could be compared to modern buildings, which is what happened, and what conferred on Palladio a new relevance for a new age (Millon, 1972; Payne, 1994).

The crucial step was taken in 1947 in a much vaunted essay by the theorist Colin Rowe (Rowe, 1947), which revolved principally around a supposed proportional comparison between Palladio's Villa Foscari near Venice (ca.1555), as illustrated in the *Quattro libri* (Palladio, 1570, book 2, p. 50), and Le Corbusier's Villa Stein at Garches (1926–28), imagining (mistakenly) that Palladio's building was designed on the basis of a proportioned grid of a kind that had been conjectured previously (Wittkower, 1973). It also saw Palladio's Villa Rotonda (Fig. 1) being likened to Corbusier's Villa Savoye at Poissy (1928) (Marcomini, 2024). Such thinking,

now detached from the historical realities of Palladio's practice, then unleashed numerous hypotheses about possible design methods that Palladio could be imagined as having followed (however implausibly), supposing them to be prerequisites for a fuller understanding of his architecture. They would include the supposed use of the proportions of 1 to √3 and other incommensurable ratios (Mitrović, 1990, 2004), and the conjectured employment of the 'golden proportion';[2] and, especially as regards Villa Rotonda and its depiction in the *Quattro libri* (Fig. 7) (Palladio, 1570, book 2, p. 19), the envisioning of a notional dependency on geometric diagrams (Fig. 8) (Streitz, 1973; García-Salgado, 2009), which may appear to correlate with the building to an extent – but only to an extent and without corresponding with the scheme's given dimensions.

In some investigations, including one on Villa Cornaro and Villa Emo (Mitrović & Wassell, 2006; Fletcher, 2000), the view is taken that it is the building's actual dimensions rather than those recorded in the *Quattro libri* which encapsulate Palladio's design intentions. Another study, by the contemporary architect Peter Eisenman, would analyse Palladio's villas as volumetric constructs, and thereby redefine Villa Rotonda as displaying a conceptual 'instability' and a 'disarticulation' from an ideal (Eisenman with Roman, 2015; Marcomini, 2024). The fundamental problem with all such theories and stances, however, is that they do not match with the likely design methods that Palladio had actually followed or the design objectives he had set himself (Hemsoll, 2025a). The past realities

of the historical Palladio are thus being manipulated to suit the inclinations and speculations of the present and an imagined future.

At the same time, Palladio has become viewed not merely as relevant to the present but, increasingly, as an archetypical architect for the present. Some practitioners of the recent past have looked back to Palladio or Palladianism as a grounding or justification of their own schemes and of their revivalist outlooks (Bak Mortensen, 2015).

Sometimes such schemes quote directly from Palladio, as in Harrogate's Victoria Shopping Centre (Fig. 9), modelled on the Basilica in Vicenza; or else they purport to quote from Palladio's buildings or those by his Palladian successors. Often, however, they have little or nothing in common with Palladio's, visually or formally, and yet are still perceived as having somehow been inspired by Palladio (as with works by contemporary architect Peter Märkli) (Fig. 10); and certain recent writers and commentators have been inclined, in a similar vein, to make connections between modern buildings and Palladio, as if he had provided a touchstone for distinctly modern ways of thinking (Ebert, 2024).

Just why he has come to be regarded with such reverence depends in part on the commanding position he has now come to occupy in the continuum of architectural history, and in part on perspectives on architecture attributable to him, or imagined as being, such as in respect to his architecture's geometric qualities or its supposedly universal language, which can be thought of as

relevant to architecture's current and future directions. With his position in architectural history being such, Palladio has come to assume an unassailably mythic status.

This mythic Palladio, however, is not to be confused with the historical architect, whose remarkable achievements were firmly anchored in – although not subservient to – the ideas and expectations of his time; but the mythic figure still depends on the historical Palladio's unprecedented and unparalleled urge to gain eventual renown by being the author of a treatise that would both publicise very many of his own schemes and also promulgate a kind of architecture – and a way of designing and thinking – which was rooted in the remote past and (aside from use of the architectural orders) dependent on fundamental principles that were incontrovertible.

Yet even Palladio himself could hardly have predicted the influence he would have on later architecture, or have anticipated that he would eventually come to constitute an indispensable link between so many future architects and the architectural past. He could never have foreseen that he would come to be regarded as a fount of inspiration even for architects who have disavowed past traditions and any connection with 'classical' architecture and its antique origins. The mythic Palladio has thus subsumed the historical architect. He has transcended the boundaries of time to become a figure that any architect, of either the present or the future, can aspire to emulate.

Notes

1. Hemsoll 2025b. Puppi noted the three distinct phases of Palladio's career (labelling them *giovinezza, maturità and senilità*): Puppi 1973, pp. 27–38. Beltramini and Mitrović have drawn attention to conceptual changes in Palladio's architecture: Beltramini & Burns (Eds) 2008, pp. 9–10; Mitrović 2004, pp. 112–127.
2. E.g. Fletcher 2000; and, for a contrary position, March 2001.

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From *Fanum Fortunae* to Palladio
Vitruvius's Basilica and the genealogy of classical architecture

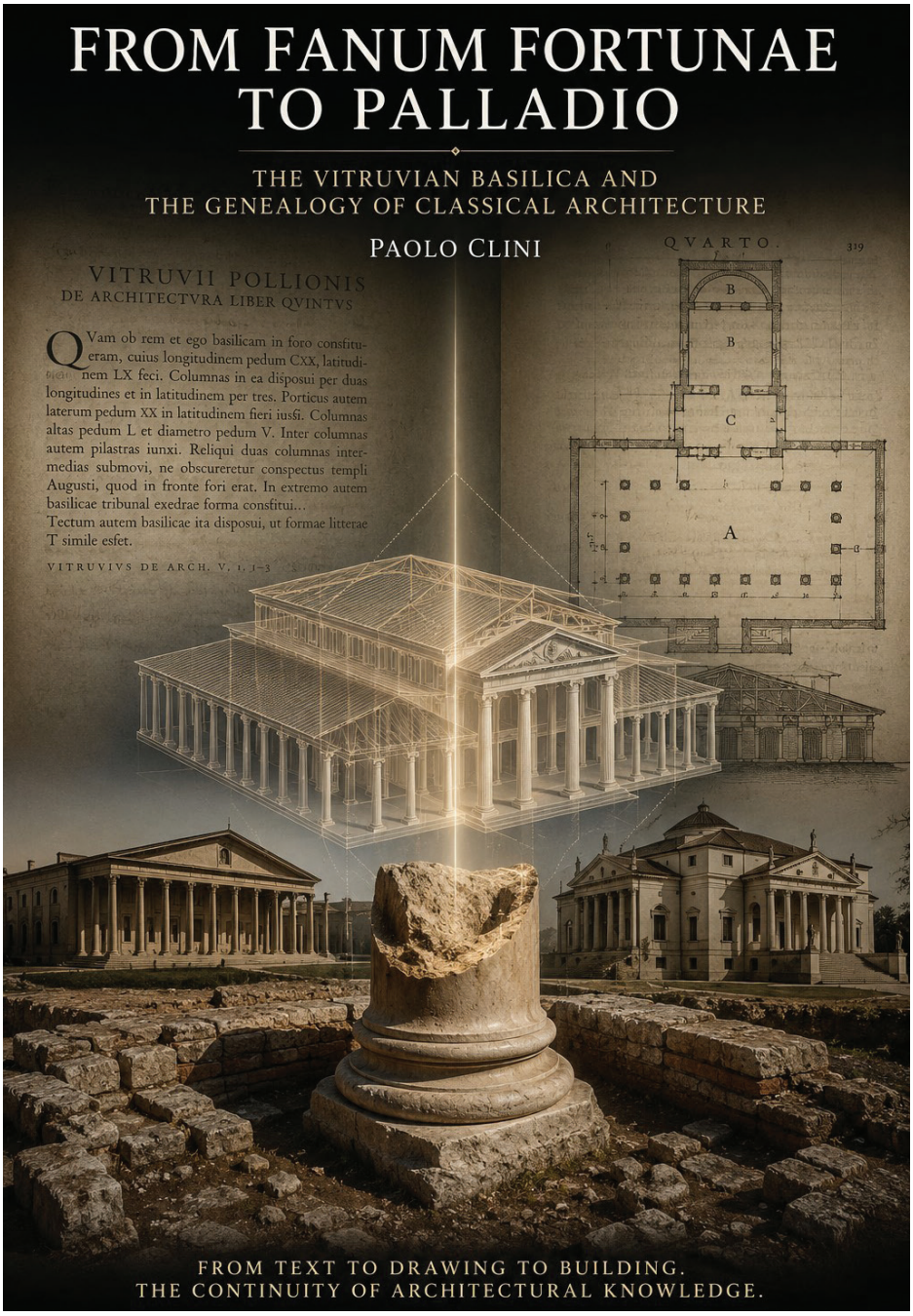
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VITRUVIUS
FANUM FORTUNAE
PALLADIO
VITRUVIUS'S BASILICA AT FANUM FORTUNAE
DIGITAL RECONSTRUCTION

The recent archaeological identification of Vitruvius's basilica at *Fanum Fortunae* (Fano) offers an opportunity to reinterpret the building as both a material and a theoretical nexus in the continuity of classical architecture. Drawing on more than thirty years of research on the Vitruvian text, the history of its graphic interpretations, architectural survey, 3D modelling and digital archaeology, the article traces the shift from a building known for centuries only through *De architectura* and the reconstructions of treatise writers to a new condition in which text, hypotheses and material remains can at last be compared directly.
The basilica emerges not only as a discovery of local significance but as a test case for the Western architectural tradition: in the passage of Book V describing the building he designed and built, Vitruvius brings theory, symmetria, civic function and built form together in a unique instance. This thread leads to Palladio, whose reception of Vitruvius went beyond the adoption of a classical vocabulary to translate Vitruvian principles into a design language that is measurable, transmissible and historically fertile. The article concludes by considering digital survey, three-dimensional reconstruction and AI as critical tools that can make explicit the relationships among sources, models, uncertainties and interpretations.

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Cover image by the author).

Introduction

On 19 January 2026, the official announcement of the discovery of Vitruvius's Basilica at *Fanum Fortunae* (Fano) gave material form to a problem that for centuries had remained suspended between text, drawing, and hypothesis (Fig. 1). The Ministry of Culture presented the building that emerged in Piazza Andrea Costa as the basilica described in De architectura and as the only building that can now be attributed with certainty to the Roman architect (Ministero della Cultura, 2026). Beyond the media attention, the event's value lies in this transition: not a simple archaeological confirmation, but the possibility of materially verifying one of the most decisive passages in ancient architectural theory.

I first encountered Vitruvius's basilica in 1992, at the start of my doctoral research (Clini, 1997), when, in Fano, it survived almost solely as a problem: a few lines in Book V, precise enough to impose a form, yet enigmatic enough to produce divergent readings. For a long time, the basilica existed for me, as it did for generations of scholars, as a text and a constellation of drawings. My research began in this intermediate space, where the architecture was not yet a securely identified material reality, but was no longer merely a literary subject.

In this sense, the basilica became a historiographical and design laboratory. Understanding it meant reconstructing not only a lost building, but also a chain of transmission of architectural knowledge extending from antiquity to the Renaissance and, through the Renaissance, to the modern



Fig. 1. The archaeological excavation complex of the Basilica of Fano as it appears today (photograph by the author).

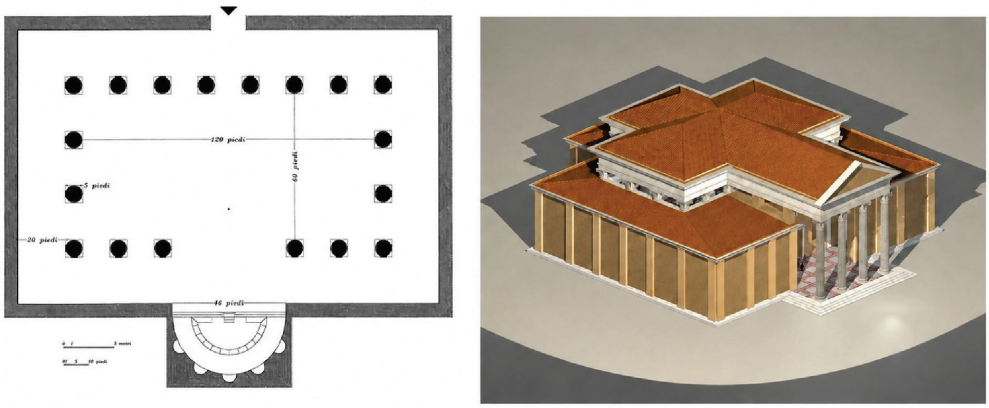


Fig. 2. Plan of the Basilica of Fano and external volumetric elevation, as presented in the first reconstruction developed in the author's doctoral dissertation (reconstruction by the author; 1997 doctoral dissertation, *La Basilica di Fano di Vitruvio, dalla critica storiografica a nuovi rilievi e ipotesi di ricostruzione* [The Basilica of Vitruvius in Fano: From historiographical criticism to new surveys and reconstruction hypotheses]).

culture of survey, representation, and information modelling. The discovery does not erase this long interpretative history: it finally makes it comparable with the stones.

1. Vitruvius and the Basilica at Fanum Fortunae

Vitruvius's passage on the basilica at *Fanum Fortunae* (Vitruvius, ca. 15 B.C.E./1997, 5.1.6–10) is extraordinary for two reasons. The first is evident: Vitruvius states that he is describing a building that he himself sited and caused to be built, interrupting the general prescriptive register to introduce a concrete case. The second is more profound: the building at Fano does not simply correspond to the basilican type just set out in the preceding prescriptions, but modifies it from within, transforming a civic building into a complex apparatus of proportions, structure, light, tribunal, Temple of Augustus, and relationship with the forum. Vitruvius provides exceptionally

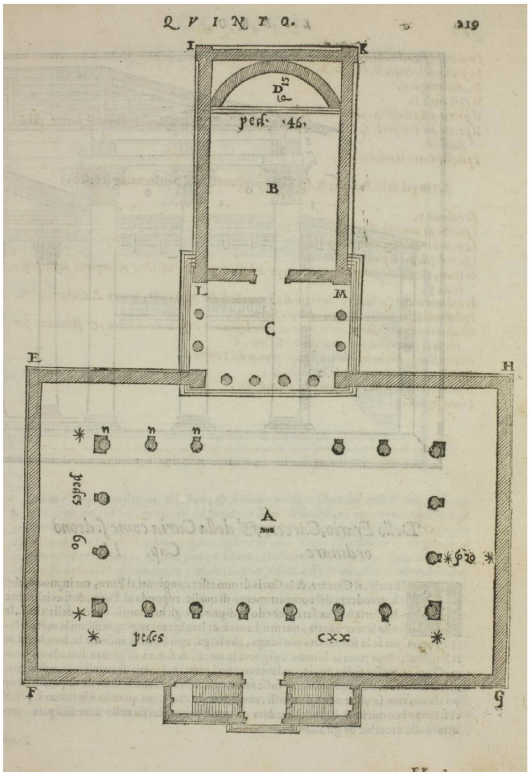
precise data: 120 feet long and 60 wide; lateral porticoes 20 feet wide; columns 50 feet high and 5 feet in diameter; piers attached to the columns; the omission of two central columns on one long side so as not to obstruct the view of the pronaos of the Temple of Augustus; a semicircular tribunal; and a roofing system compared to the shape of the letter T (Fig. 2). The basilica is therefore not a mere administrative container: it is an apparatus for the representation of civic power and, at the same time, a typological experiment.

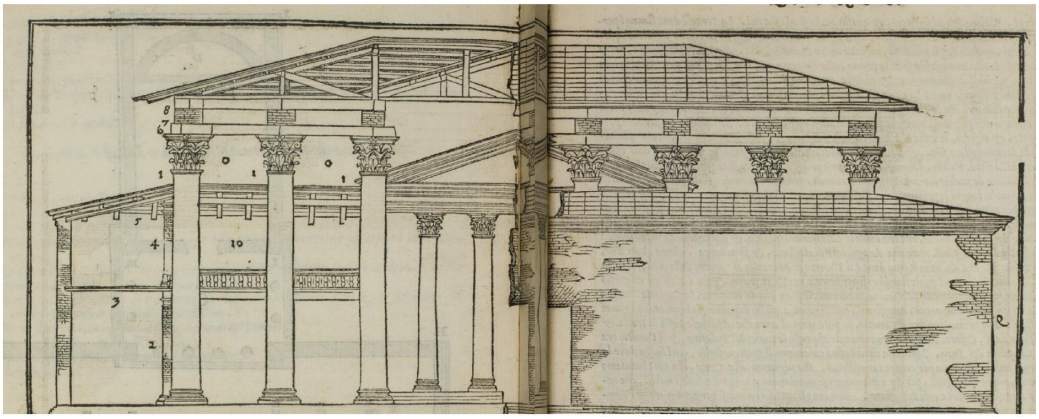
This very density has produced a multiplicity of reconstructions over the centuries. Because the Vitruvian diagrammata were lost and the text reached the Renaissance in a condition that was not always clear, the basilica at Fanum Fortunae became a testing ground for European cultures of interpretation. Fra Giocondo, Sangallo, Barbaro, Palladio (Fig. 3), Perrault, and many others did not merely illustrate a building (Clini, 2003; Salatin, 2012): they took a position on how Vitruvius should be read. Every reconstruction is also a theory of antiquity, of the text, and of design.

Fig. 3. Plan and sectional elevation of the Basilica of Fano in the reconstruction attributed to Andrea Palladio, in M. Vitruvius, I dieci libri dell'architettura [The Ten Books on Architecture], translated and annotated by Daniele Barbaro (Venice: Francesco de' Franceschi Senese and Giovanni Chrieger, 1567), pp. 219–221. Source: e-rara / Stiftung Bibliothek Werner Oechslin, Public Domain.

2. From Words to Stones

When I began working on the basilica, the central problem was how to move from words to possible traces in the urban fabric. My 1997 doctoral thesis (Clini, 1997) addressed this issue explicitly: to document the interpretations of treatise writers and, at the same time, to test on the ground the hypotheses concerning the building's location


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within the historic city of Fano. Even then, the conviction was that the basilica could not be found through a single clue, but only through a disciplinary convergence: text, local memory, archaeological remains, measurement, typological compatibility, urban design, and survey technologies.

In 2013, this convergence took on a precise graphic form: a planimetric reconstruction that placed the

Fig. 4. Reconstruction of the Forum of *Fanum Fortunae*, proposing the location of the Basilica of Vitruvius in present-day Piazza Andrea Costa, 2013 drawing (drawing by the author).

basilica in the area where the structures have now emerged (Fig. 4). Excavations in Piazza Andrea Costa brought to light a rectangular layout with a perimeter colonnade; according to the institutional announcement (Ministero della Cultura, 2026), confirmation came from the test trench that revealed the fifth corner column, confirming the position and orientation of the building (Fig. 5). The columns, approximately five Roman feet in diameter, that is 147-150 cm, and about 15 m high, were set against load-bearing piers and pilasters designed to support an upper level (Fig. 6).

This situation requires a twofold response. On the one hand, the exceptional importance of the event must be acknowledged: for the first time, the problem of the basilica is no longer



Fig. 5. Overlay of the reconstruction of the Basilica of Vitruvius and the current state of the excavations. The correspondences identified to date are highlighted in red (reconstruction by the author, www.maindh.it).



solely historiographical and graphic; it is also archaeological, architectural, engineering, and cultural. On the other hand, the symbolic force of the discovery must not be allowed to simplify the problem. The material evidence does not replace the preceding critical work; it reorganises it. The hypotheses of past centuries, including Palladio's, do not become useless: they become comparable.

3. The Giant Order

The true heart of Vitruvius's Basilica at Fanum Fortunae is the giant order: not simply a 'large' column, but a column that exceeds the ordinary scale of a single storey and unites the lower and upper levels in a single vertical gesture. What historiography would later call the 'giant order' or 'colossal order' is, in fact, an architectural order that extends beyond one storey and may span more than one; its full flowering on facades

Fig. 6. Remains of the large column and pilaster of the giant order of the Basilica of Fano, with sandstone masonry facing and an opus caementicium core (photograph by the author).

belongs to the Italian Renaissance, although the ancient world had already known columns on a monumental scale. Another extraordinary aspect is that Vitruvius does not theorise it as a style: he invents it almost inadvertently, as a builder. The decisive passage lies in the economic paradox. Vitruvius explains that eliminating the upper order, with its architraves, parapets, cornices, and additional columns, reduces labour and expense; yet this very renunciation produces the opposite of poverty. The columns carried '*in altitudine perpetua*' (Vitruvius, ca. 15 B.C.E./1997, 5.1.6), that is, without a break up to the beams of the great roof, increase the magnificence and authority of the work. In other words, economy becomes vision. Technical necessity generates a new monumental language (Fig. 7). For this reason, the giant order at Fano is not a decorative detail, but the basilica's true spatial invention. The column no longer belongs to a single storey: it becomes the measure of the entire building. It connects ground to roof, public life to the representation of power, and the human body to the scale of the city. In this sense, Vitruvius's Basilica can be read as a kind of 'skyscraper of antiquity', in an analogical and perceptual sense: not because it rises through many storeys, but because it transforms the interior into a vertical machine, a space that makes height perceptible as a civic and almost cosmic event.

Here, Fano becomes an exceptional case in the history of architecture. The basilica presents a very rare instance of non-monolithic giant structural columns, built in rubble-core masonry and integrated with engaged piers; among known





Roman civic basilicas, the combination of an internal load-bearing function and uninterrupted vertical development appears especially significant. Fano does not repeat Rome: it interprets it in an experimental direction. The Vitruvian basilica is therefore a unicum within Roman monumental architecture: a fragment of the future embedded in ancient architecture.

From this arises one of Western architecture's most powerful lines. In the Renaissance, the giant order became one of the instruments through which Bramante, Raphael, Michelangelo, and, above all, Palladio transformed antiquity into a modern language of magnificence. For Palladio, the connection with Fano is particularly direct: in his collaboration with Daniele Barbaro on the annotated edition of Vitruvius, Palladio supplied almost all the illustrations (Salatin, 2012; Vitruvius, ca. 15 B.C.E./1556; 2nd ed. 1567), and his reconstruction of the basilica crystallised the motif of the giant order with free-standing columns spanning two storeys.

It is no coincidence that Villa Sarego at Santa Sofia (Fig. 8), one of Palladio's most singular works (Palladio, 1570, Book 2; Palladio Museum, n.d.), is organised around the great void of the courtyard and dominated by giant Ionic columns composed of roughly dressed limestone blocks. Here the echo of Vitruvius is not merely philological: it becomes construction, physical experience, and the energy of matter. The legacy of the giant order would later extend to European and American Palladianism.

Fig. 7. Interior views of the Basilica of Vitruvius, highlighting the giant order extending across both storeys, 2014 (reconstruction by the author, www.maindh.it).



Fig. 8. Andrea Palladio, Villa Sarego, Santa Sofia di Pedemonte (San Pietro in Cariano, Verona), courtyard with the giant Ionic columns of rusticated stone. Photo: Hans A. Rosbach, 2011, CC BY-SA 3.0, via Wikimedia Commons.

Even the White House, in its most recognisable image, preserves this long inheritance: the north and south porticoes, with their monumental columns, and the pilastrade that wraps around the body of the building translate into modern political form the same idea of classical authority founded on the column that dominates several levels. This is not a linear, direct descent from Fano to Washington, but a deep genealogy: Vitruvius invents, out of necessity, what the Renaissance would recognise as grandeur; Palladio turns it into a system; and Palladianism disseminates it as a universal language of civic power (Fig. 9). Vitruvius's Basilica at Fanum Fortunae, then, is not only the sole work that can be attributed with



Fig. 9. The White House complex, designed by James Hoban in 1792 in the Neo-Palladian style. Public domain (work of the U.S. federal government), via Wikimedia Commons

certainty to Vitruvius. It is the place where Western architecture discovers that the column can cease to be one element among others and become the very principle of magnificence. The giant order is born here: from an economy of means, from a constructive intuition, from a column that, instead of stopping at one storey, rises to the roof and transforms public space into vision.

4. A Living Genealogy

The notion of a living genealogy is central because it prevents the relationship between Vitruvius and Palladio from being read as a simple line of influence. For centuries, the basilica at *Fanum*

Fortunae existed simultaneously as an absent and a present building: absent as securely identified material fabric, present as text, drawing, mental image, and urban memory. Each period gave it a form compatible with its own instruments of knowledge.

Humanists interrogated it through philology; treatise writers through engraving; modern archaeology through excavation and survey; and digital scholarship through models and simulation. The implications are both historiographical and operational. Historiographically, the 2026 discovery requires rewriting the dossier on the basilica, no longer as the history of a lost building, but as the history of a building that generated centuries of anticipatory interpretation before being materially recognised. Operationally, it calls for knowledge platforms in which excavation, survey, historical drawings, 3D models, and public interfaces are not separate systems, but interoperable layers of the same information environment. For contemporary practice, the legacy is even clearer. The shared lesson of Vitruvius and Palladio does not lie in the formal repertoire of classicism, but in the close relationship among use, measure, constructive clarity, and aesthetic quality. In this perspective, the classical is not a closed style, but a method of ordering design. The basilica speaks again today not as a relic, but as evidence that architecture becomes universal only when it succeeds in moving critically from words to drawing, from drawing to construction, and from construction to shared knowledge.

5. Method: Survey, Reconstruction, and Digital Models

The method followed over these decades has been founded on the integration of different levels. The first is philological and historical: reading Vitruvius's text, its editions, translations, commentaries, corruptions, and variants. The second is graphic and historiographical: analysing the drawings that, from the early modern period onwards, attempted to reconstruct the basilica. The third is metric and spatial: architectural survey, modelling, proportional verification, and constructive compatibility. The fourth is communicative and epistemic: constructing tools that make it possible not merely to visualise the reconstruction, but to articulate its underlying argument. In 2003, I described a hypertext archive devoted to drawings of the basilica (Clini, 2003), constructed from more than 500 editions, translations, and epitomes of *De architectura*, with 35 original drawings associated with approximately 150 editions.

The aim was not to accumulate images, but to identify the recurring interpretative questions posed by the text: overall form, construction techniques, materials, the location of the tribunal, roof systems, and the relationship between temple and basilica. Three-dimensional modelling entered this research pathway at an early stage. The 1997 thesis already culminated in an initial digital model; subsequent studies developed its role as a virtual space and critical synthesis;

and the 2014 essay introduced structural and lighting simulations (Clini et al., 2014). The model is valuable not as a seductive image, but as an environment for verification: if form, structure, construction techniques, and light do not agree, the reconstruction must be reconsidered. From this perspective, artificial intelligence too can be useful only if it remains a critical tool: pattern recognition, semantic association between data and paradata, uncertainty management, and comparison among reconstruction variants.

Conclusions

The rediscovery of Vitruvius's Basilica at *Fanum Fortunae* does not close a line of research; it reopens it at a higher level. After more than thirty years of work, the deepest significance of this story lies not only in having identified a building, but in having restored a measurable body, open to interrogation and debate, to a foundational text of Western architecture. The discovery shifts the problem: from the question of where the basilica stood to the more complex question of what it now enables us to understand about the relationship among theory, construction, and transmission.

The first outcome concerns Vitruvius. The basilica at *Fanum Fortunae* shows that *De architectura* is not merely a prescriptive repertoire, but also the record of a concrete design experience. At the point where Vitruvius describes his own work, the treatise becomes a building; and the building, in turn, becomes a theoretical argument. The giant

order, born from a constructive and economic solution, thus acquires a value that goes beyond pure technique: it becomes a spatial response to the need to give public form to civic life. Fano therefore allows Vitruvius to be read not only as an author of rules, but as a designer who experiments, adapts, and invents.

The second outcome concerns Palladio. The discovery does not naively confirm Palladio, nor does it project him retrospectively onto antiquity; rather, it makes his role as an interpreter more legible. Through drawing, survey, and proportional clarity, Palladio transforms Vitruvian authority into a grammar of design. *Fanum Fortunae* thus appears as one of the points of origin of a tradition that does not consist in the simple repetition of ancient forms, but in their continuous translation into measurable, communicable, and reusable systems. The third outcome concerns the present. The basilica at Fano requires the construction of a knowledge environment in which excavation, survey, written sources, historical drawings, 3D models, simulations, and artificial intelligence are not separate levels, but parts of the same critical argument. Digital methods must not produce a new definitive image of the basilica; they must make the alternatives legible, declare uncertainties, and show the dependencies between source and model. Only in this way does reconstruction become knowledge rather than illustration.

The genealogy linking *Fanum Fortunae* to Palladio is therefore neither a simple nor a settled line: it

is a continuity made up of losses, interpretations, errors, verifications, and new questions. Precisely for this reason, it is alive. The re-emergent basilica is not merely an exceptional relic; it is the place where the classical once again reveals itself as method: measure, use, construction, beauty, and shared knowledge. From this perspective, Fano represents not only an outcome of research into the past, but the beginning of a new critical responsibility: to preserve, study, and communicate the basilica without reducing it either to a media myth or to a mere artefact, but recognising it as an apparatus still capable of generating design.

Image credits

Fig. 8: Hans A. Rosbach, "VillaSarego20110707-1", 7 July 2011, CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0/). https://commons.wikimedia.org/wiki/File:VillaSarego20110707-1.jpg

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The Limit and the Poetics of Wonder

Heritage communities and the Faro Convention

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HERITAGE COMMUNITIES
FARO CONVENTION
PARTICIPATORY GOVERNANCE
CULTURAL WELFARE
CULTURAL HERITAGE TRANSMISSION

This article reconsiders the notion of limits not as a mere regulatory constraint but as an ethical, cultural and political principle for the protection and enhancement of cultural heritage. In a context shaped by globalisation, digitisation and the growing commodification of cultural assets, the limit is proposed as a means of reconciling conservation, public access and the intergenerational transmission of heritage. Drawing on the Council of Europe's Faro Convention, the study foregrounds heritage communities as active agents in the construction of meaning, in democratic participation and in safeguarding practices. Particular attention is paid to the "poetics of wonder", understood as a cognitive and civic disposition capable of turning heritage from an object of conservation into a shared experience of memory, identity and collective responsibility. The experience of the Apulia Region, and in particular its strategic project *Cura dei Luoghi, delle Arti e dei Saperi identitari della Puglia* (Care of Places, Arts and Identity-Based Knowledge in Apulia), is examined as a case study of participatory governance grounded in collaboration between institutions and local communities. The article concludes that only a culture of limits, participation and sustainability can safeguard cultural heritage as a common good and a generative resource for future generations.

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Fig. 1. Lecce, Basilica of Santa Croce, balustrade detail. The fragility of Lecce stone makes the material limits of heritage visible: protection as intervention. Photo: Bernard Gagnon, CC0, via Wikimedia Commons.

Introduction

In the contemporary debate on protecting and enhancing cultural heritage, the concept of the limit has gained relevance, not merely as a legal or material constraint, but as an authentic ethical, social, and cultural value. In a society shaped by globalisation, the digitisation of knowledge, and the progressive commodification of cultural assets (Montanari, 2022), the limit emerges as a regulatory principle that can ensure balance among conservation, public enjoyment, and the intergenerational transmission of cultural heritage.

At the same time, a new cultural awareness is emerging, grounded in community participation and in the rediscovery of heritage as a shared experience of belonging and memory. Within this perspective, a poetics of wonder takes shape: a way of seeing that recognises heritage not only as an object to be preserved, but as a living, relational, and symbolic reality, able to generate knowledge, responsibility, and social cohesion.

The evolution of European cultural policy, particularly through the Council of Europe and the Faro Convention (Council of Europe, 2005), has placed heritage communities at the centre of reflection, recognising citizens as active bearers of responsibility for safeguarding heritage.

This perspective moves beyond the traditional understanding of heritage as a mere object of state conservation, instead assigning it a participatory, identity-forming, and relational dimension.

Within this framework, the limit does not deny

enhancement; rather, it serves as a necessary condition for enhancement to occur in a sustainable, inclusive, and conscious manner. The poetics of wonder thus becomes the cultural language through which heritage communities reinterpret heritage as a common good and as a living legacy.

1. The Concept of Limit in Cultural Heritage

The term *limit* derives from the Latin *limes*, indicating a boundary, threshold, or margin that defines a space of belonging and responsibility. Applied to cultural heritage, it takes different meanings: a material limit tied to the physical fragility of assets; a legal limit expressed through protective regulations; an ethical limit connected to respect for authenticity and cultural identity; and a social limit concerned with the balanced use of cultural resources (Fig. 1).

The contemporary culture of enhancement often risks transforming heritage into a tourist or economic product, subordinating it to the logic of consumption (Choay, 1992/1995). From this perspective, the limit becomes a principle of balance that can counter overexposure, trivialisation, and the loss of meaning in cultural assets.

Cultural heritage is not an unlimited resource. Using it requires awareness of the vulnerability of historical, artistic, and landscape contexts.

Protection therefore takes the form of a practice of limitation: limiting invasive intervention, limiting improper use, limiting irreversible transformation. Nevertheless, the limit does not imply im-

mobility or closure. It can be reinterpreted as care and collective responsibility, necessary for heritage to continue serving as a space of relationship and shared memory.

2. The Faro Convention and the Dialogue Between Institutions and Heritage Communities

A fundamental milestone in the theoretical evolution of cultural heritage is the Faro Convention, adopted in 2005 by the Council of Europe. It introduced the concept of the *heritage community*, defined as a group of people who value specific aspects of cultural heritage and wish to sustain and transmit them to future generations (Council of Europe, 2005, Art. 2).

The Convention highlights several core principles (Council of Europe, 2005, Arts. 1, 4, 12):

- citizens' right to participate in cultural life;
- shared responsibility in the protection of heritage;
- the value of heritage as an instrument of democracy and social cohesion;
- intergenerational transmission as a collective duty.

Heritage communities are not mere recipients of cultural policies, but active subjects in the production of meaning and in the construction of collective identity. They become places of shared memory, in which heritage is continuously reinterpreted through participatory practices.

However, fully implementing the principles of the Faro Convention requires an essential element:

ongoing dialogue between public institutions and heritage communities. Heritage protection can no longer rest solely on vertical, centralised models; it requires dialogic processes in which public administrations, citizens, associations, universities, cultural operators, and local communities cooperate to define cultural policies.

Dialogue between institutions and heritage communities has fundamental consequences at several levels (Fig. 2).

a) Cultural consequences

Dialogue encourages a plural reading of heritage that can include local memories, popular traditions, and intangible heritage often excluded from official narratives. Communities help restore lived meaning to cultural assets, preventing them from becoming mere museum objects or instruments of tourist consumption.

b) Social consequences

Active participation strengthens belonging and social cohesion. When communities participate in decision-making, heritage becomes a space for active citizenship, inclusion, and shared responsibility. This builds trust in institutions and strengthens the bond between the territory and its residents.

c) Economic consequences

Dialogue between institutions and communities encourages sustainable development models based on local economies, slow tourism, and stronger territorial identities. Conversely, low participation risks economic exploitation of heritage, gentrifica-

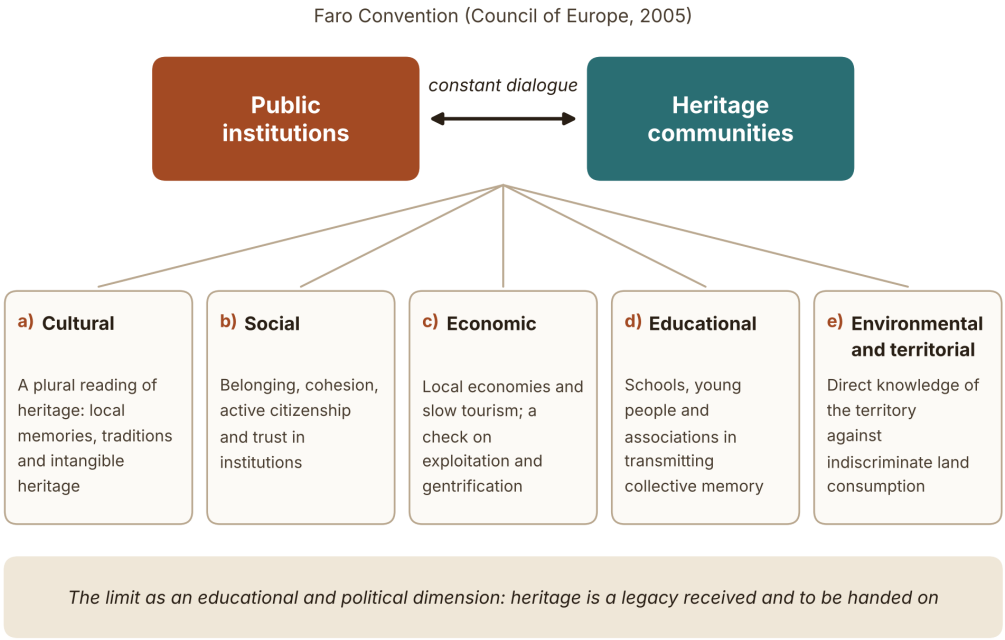


Fig. 2. The outcomes of dialogue between institutions and heritage communities from the perspective of the Faro Convention. Author's elaboration.

tion, and the loss of places' cultural authenticity.

d) Educational consequences

Institutional collaboration with heritage communities enables permanent educational practices that engage schools, young people, and associations in transmitting collective memory. Heritage thus becomes a tool for civic education and democratic awareness.

e) Environmental and territorial consequences

Local communities possess direct knowledge of territories and landscape fragilities. Their involvement in management processes allows more effective strategies of environmental protection and cultural sustainability to be adopted, countering



phenomena of indiscriminate consumption of land and territory. From this perspective, the limit takes on an educational and political dimension: the community is called upon to recognise that heritage does not belong exclusively to the present, but is a legacy received and passed on to the future.

3. The Poetics of Wonder as a Practice of Cultural Citizenship

"Knowledge originates from wonder" (Plato, ca. 369 B.C.E./1921, 155d; Aristotle, ca. 350 B.C.E./1933, 982b). This intuition remains relevant today as we reflect on cultural heritage.

Apulia, a land of cultural stratification and encounters between peoples, offers an emblematic example of this dimension. Its landscapes of stone and light, Frederician castles, rural architecture, popular festivals (Fig. 3), and artisanal knowledge form a widespread heritage that continues to live through local communities' practices.

Here, heritage enhancement is not reduced to mere monumental conservation, but becomes shared experience, civic participation, and collective care. Apulian heritage communities reinterpret the territory as a living space of relationships, where citizens, associations, administrations, and cultural operators collaborate to build new forms of belonging.

Fig. 3. Novoli (Lecce), building the Focara bonfire. Intangible heritage that lives through collective work and hand-to-hand transmission across generations. Photo: Dbuccarella, CC BY-SA 4.0, via Wikimedia Commons.

Experiences such as those of the Heritage Community of the Gargano, the Valle d'Itria, Alberobello, Monte Sant'Angelo, Altamura, Gravina in Puglia, Andria, Brindisi, Taranto, and the Salento,

show how heritage can be reinterpreted through practices of slow tourism, memory workshops, cultural routes, participatory art, and sustainable enhancement of the landscape. In these experiences, wonder does not coincide with superficial aesthetic fascination, but becomes a method of knowledge and a civic practice. It lets one see the ancient with new eyes, recognising in the memory of places a possibility for the future.

4. Frederick II and the Culture of Complexity

Frederick II's figure symbolically represents this open, dialogic vision of cultural heritage (Fig. 4). The Hohenstaufen emperor saw the Mediterranean as a space where different cultures, religions, and forms of knowledge met, promoting a conception of knowledge grounded in curiosity, plurality, and dialogue. His historical experience shows how cultural heritage can become a place of coexistence and a laboratory of intercultural dialogue. In the contemporary world, heritage communities can carry this legacy forward by developing practices that transform cultural diversity into a shared resource. In this sense, the poetics of wonder is intertwined with the principle of limit: recognising the value of the other, the landscape, and memory also means accepting their fragility and need for protection.

5. Limit, Sustainability, and Intergenerational Responsibility

In the contemporary context, marked by overtourism and economic pressure on cultural sites,



Fig. 4. Castel del Monte (Andria), a symbol of Frederick II's legacy and of a culture of knowledge rooted in the encounter of Mediterranean traditions. Photo: ParisTaras, CC BY-SA 4.0, via Wikimedia Commons.

the limit emerges as a fundamental principle of cultural sustainability (UNESCO, 2019). Sustainability implies:

- a balance between accessibility and conservation;
- protection of the authenticity of places;
- respect for local identities;
- participation of resident communities in decision-making processes.

Many European cultural sites today show the consequences of lacking limits on heritage enhancement: overcrowding, the loss of the social function of historic centres, and the transformation of traditions into commercial spectacle (Fig. 5).

Heritage communities, by contrast, can play a decisive role in defining sustainable practices for heritage use and management. Through active participation, they promote cultural models based on care, responsibility, and the conscious transmission of cultural legacy.

Cultural heritage is a form of collective legacy that connects generations through memory and identity. Each generation receives heritage in temporary custody and has a moral duty to transmit it to future generations. This dimension recalls Hans Jonas's principle of responsibility (Jonas, 1979/1990) which holds that human action must account for its long-term consequences. Applied to cultural heritage, this means avoiding irreversible transformations, promoting education, and fostering a culture of shared memory.

6. The Coordination for the Care of Places as a Model of Participatory Governance

A significant example of the concrete application of the principles expressed by the Faro Convention is the strategy promoted by the Apulia Region through Regional Government Resolution No. 655 of 21 May 2025 (Regione Puglia, 2025), concerning the strategic and systemic project *Care of Places, Arts and Identity-Based Knowledge in Apulia*. This initiative introduces an innovative territorial governance model based on coordination among public institutions, cultural bodies, heritage communities, associations, and Third Sector organisations.

The regional strategy explicitly recognises that institutions alone cannot drive cultural heritage

Fig. 5. Alberobello, the Rione Monti trulli district, part of the UNESCO World Heritage site The Trulli of Alberobello. Balancing accessibility and conservation is one of the clearest challenges for historic centres with high tourist appeal. Photo: AXP Photography, via Pexels (Pexels License).



enhancement; it must develop through participatory, shared planning that makes resident communities protagonists in identifying, safeguarding, and transmitting their own cultural legacies.

The project's central element is the Coordination for the Care of Places (*Coordinamento per la Cura dei Luoghi, CCL*) (Fig. 6), a permanent instrument for dialogue and cooperation between public actors and local communities. The Coordination aims to overcome the fragmentation of cultural practices and the disconnect between heritage and citizens, countering the reduction of cultural places to mere "locations" for events or tourist consumption.

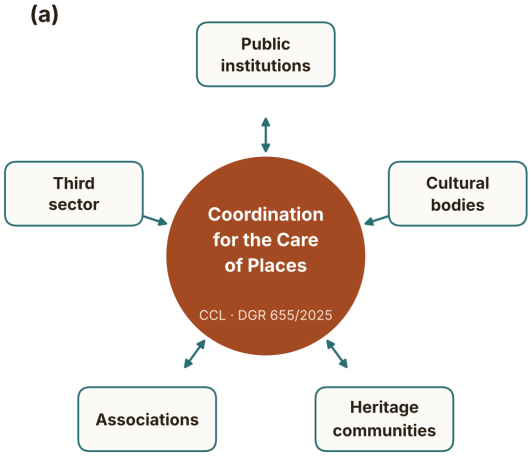
Fig. 6. (a) The Coordination for the Care of Places (Regional Resolution No. 655/2025) as a model of participatory governance. (b) A proposed four-step "pact for the care of places" with annual public review; panel (b) is the author's proposal and not part of the resolution. Author's elaboration.

The regional resolution also highlights the significant social, cultural, and territorial consequences of structured dialogue between institutions and heritage communities. In particular, it:

- strengthens social cohesion and the sense of community belonging;
- encourages practices of active cultural citizenship;
- contributes to the regeneration of fragile territories and inland areas;
- promotes sustainable forms of tourism and local development;
- counters processes of depopulation and marginalisation;
- fosters the intergenerational transmission of identity-based knowledge;
- improves the managerial sustainability of cultural sites through co-planning processes.

The Apulia Region thus proposes a vision of cul-

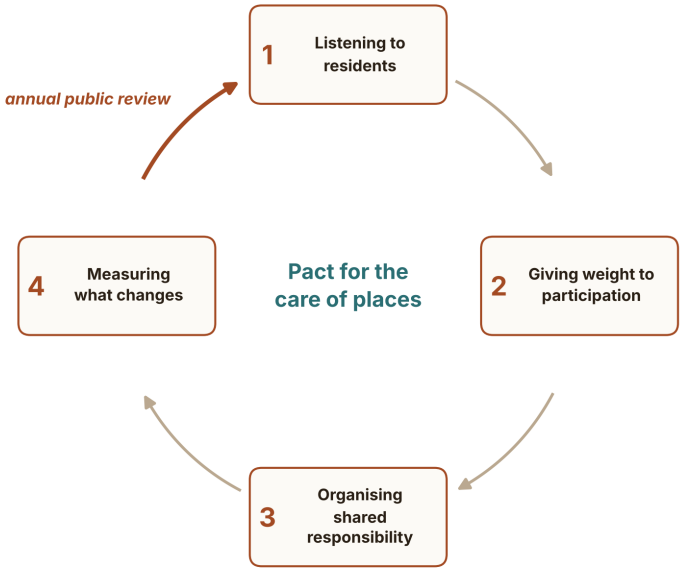
(a)



Outcomes identified by the resolution

- social cohesion and belonging
- active cultural citizenship
- regeneration of fragile and inner areas
- sustainable tourism and local development
- countering depopulation
- intergenerational transmission of knowledge
- sustainable management through co-design

(b)



tural heritage consistent with the principle of the limit understood as care and shared responsibility. Heritage is not a resource to be exploited without restraint, but a fragile cultural ecosystem that requires collaborative relationships, sustainable planning, and broad participation.

From this perspective, the *Care of Places* represents not only a cultural policy, but a civic paradigm founded on the awareness that protecting heritage coincides with protecting the communities that inhabit it and recognise it as part of their collective identity.

Conclusions

We might therefore conclude that the limit, far from being perceived as an obstacle, is essential to protecting and enhancing cultural heritage. It defines the measure within which heritage may be used, transformed, and transmitted without losing authenticity and meaning.

The poetics of wonder completes this perspective, restoring heritage's experiential, symbolic, and relational dimension. Wonder thus becomes a civic and pedagogical force, capable of transforming amazement into responsibility and beauty into a common good.

Heritage communities, recognised by the Faro Convention as protagonists of cultural life (Council of Europe, 2005), are called upon to assume a new awareness: that of being temporary custodians of a shared legacy. However, such responsibility can be fully realised only through continuous

dialogue with institutions, grounded in mutual listening, democratic participation, and the co-design of cultural policy.

Only through a culture of the limit, participation, and wonder can we preserve cultural heritage as living memory, a space of dialogue, and the foundation of future generations' collective identity.

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Between measure and machine
Palladian methodologies in the age of artificial intelligence

Ricardo Álvarez-Díaz
Álvarez-Díaz & Villalón (AD&V)

ARTIFICIAL INTELLIGENCE
ANDREA PALLADIO
ARCHITECTURAL REPRESENTATION
BUILDING INFORMATION MODELING (BIM)
ENVIRONMENTAL SIMULATION

Artificial intelligence is increasingly shaping how buildings are conceived, represented, analyzed and constructed. This paper argues that Andrea Palladio's *I quattro libri dell'architettura* (1570) offers a methodological framework for addressing this challenge, reading his drawings not as stylistic precedents but as structured architectural knowledge that can be reinterpreted through digital technologies.

The argument is tested on Casa Andelani in San Juan, Puerto Rico, through an AI-assisted analytical method combining hand sketching, measured drawing, BIM, multimodal AI, environmental simulation and human judgment. ChatGPT, Microsoft Copilot and Claude were introduced only after the design was complete, as interpretive instruments rather than form generators; every AI-generated proposition was checked against sketches, dimensioned drawings, BIM geometry and Palladian sources. Airflow and seasonal solar simulations provide a separate layer for testing environmental hypotheses in a tropical climate.

Palladian methodology remains relevant as an interpretive system of relationships rather than a historical style. AI's future value in architecture may lie not in replacing human authorship but in expanding the architect's capacity to interpret, evaluate and adapt architectural knowledge.

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Introduction

Artificial intelligence is increasingly influencing how architecture is conceived, represented, analyzed, and constructed (Leach, 2022; Li et al., 2025). While generative systems, machine learning, and computational workflows offer significant analytical capabilities, they also raise concerns about a new algorithmic universalism detached from cultural memory, local identity, human proportions, climatic specificity, and material intelligence. These concerns are compounded by biases embedded in training data, computational models, and the designer's own prompting and selection processes (Kudless, 2023). Architecture therefore confronts a fundamental question: how can computational systems enhance design without eroding the contextual knowledge that gives architecture meaning?

Working within the intellectual and representational context of the Italian Renaissance, Andrea Palladio confronted questions about how architectural knowledge could be represented, transmitted, and adapted. Through *I Quattro Libri dell'Architettura* (1570), he organized architecture through systems of measured representation—plans, sections, elevations, dimensions, and proportion—that could be studied, compared, and adapted rather than merely copied (Palladio, 1570; Wittkower, 1971). His relevance here lies not in stylistic imitation but in method. Architectural representation has historically operated as more than illustration, participating in the development and interpretation of architectural ideas (Evans, 1995;

Pérez-Gómez & Pelletier, 1997). In this study, Palladio's drawings are therefore interpreted as structured forms of architectural knowledge.

Contemporary multimodal AI systems can process combinations of text, drawings, diagrams, and images and propose relationships among them (Caffagni et al., 2024). This paper proposes that the measured representations in *I Quattro Libri* can be digitized and used as a structured architectural knowledge base for computational analysis—not because Palladio anticipated artificial intelligence, but because their measurable and relational content allows them to be examined through contemporary digital tools. The central question is therefore not whether AI can generate architecture, but whether it can assist architects in examining organizational relationships embedded within architectural representation (Leach, 2022; Li et al., 2025).

For the purposes of this study, Palladian methodology does not refer to the reproduction of Palladian style or classical vocabulary. It refers instead to a mode of architectural reasoning organized around measurable proportion, spatial hierarchy, environmental considerations, circulation and sequence, and the adaptation of architectural order to particular circumstances. The focus is therefore on approaching Palladio's work through a methodological lens rather than as a formal template. Among the major theorists of the classical tradition, Palladio is particularly productive here: compared with the predominantly textual presentation of Vitruvius and Alberti, Palladio's treatise places unusual emphasis on the integration of text with measured

plans, elevations, dimensions, and constructional descriptions (Vitruvius, ca. 15 B.C.E./1914; Alberti, 1485/1991). Palladio integrated plans, sections, elevations, proportion, and construction into a unified graphical and textual body of work (Palladio, 1570; Wittkower, 1971). It is this informational character, rather than Palladio's stylistic influence, that this paper examines. The comparison with contemporary digital representation is methodological rather than literal: a BIM model and a Palladian drawing are different artifacts produced under different conditions, yet both communicate architectural relationships through measurable representation (Sacks et al., 2018).

The argument is examined through Casa Andelani, a residence in San Juan, Puerto Rico, designed by the author before the AI-assisted phase of this research. Artificial intelligence did not generate the design; instead, the completed documentation became the basis for exploring an AI-assisted analytical methodology. OpenAI ChatGPT and Microsoft Copilot, with Anthropic Claude also accessed through the Copilot environment, were employed as interpretive rather than generative tools.

This framework also requires acknowledging its limits. Palladio belongs to a particular Western Renaissance tradition and should not be treated as a culturally neutral or universal system. A methodology privileging only canonical Western precedents risks reinforcing rather than challenging established cultural hierarchies (Kudless, 2023). Palladio is therefore used as one test case for the methodology, not as the standard against which

all architectural knowledge should be evaluated. Future research should examine whether similar methods can engage other architectural traditions, climates, and material cultures.

This paper contributes in three ways: it interprets *I Quattro Libri* as structured architectural knowledge rather than solely as a stylistic precedent; through Casa Andelani, it documents an AI-assisted methodology integrating hand drawing, BIM, multimodal AI, environmental simulation, and human judgment; and it proposes that AI's value in architecture may lie less in generating new forms than in expanding the architect's capacity to interrogate, compare, interpret, and adapt architectural knowledge to changing cultural, climatic, and technological conditions.

1. Experimental Workflow: Human Sketch, Artificial Intelligence, and Palladian Intelligence

Casa Andelani in San Juan, Puerto Rico, serves as the experimental case study for the framework proposed above. The research examines whether selected Palladian organizational principles can be computationally interpreted and cross-checked through an integrated workflow combining hand sketching, measured drawing, Building Information Modeling (BIM), multimodal AI, environmental simulation, and human judgment. The methodology does not aim to reproduce Palladian architecture stylistically; rather, it investigates whether relationships of proportion, hierarchy, processional order, and environmental organization can be identified and examined within a con-

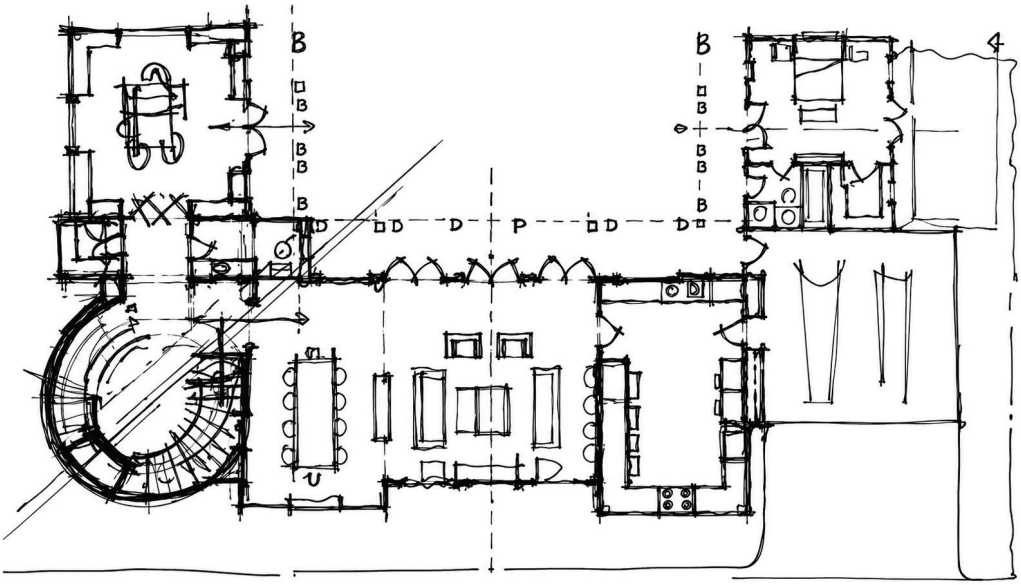
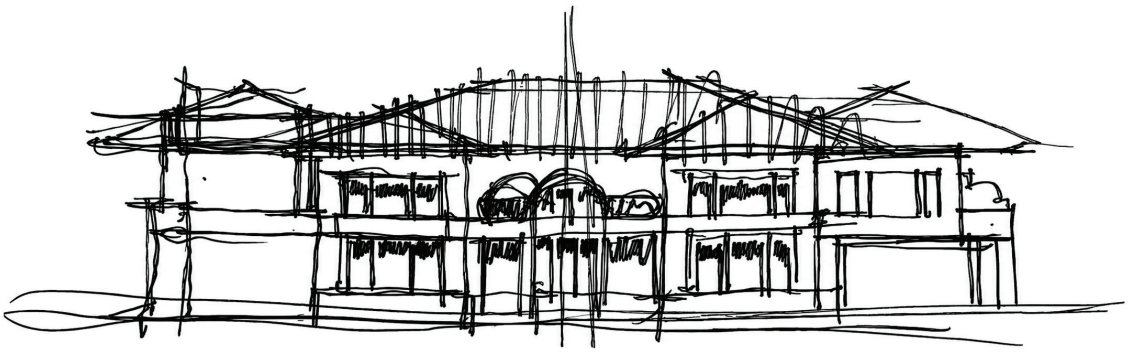


Fig. 1. Casa Andelani—Original Floor Plan Sketch, marker on trace paper. Drawing by Ricardo Álvarez-Díaz.

temporary computational workflow. The architect's hand sketches (Figs. 1–2) record the initial development of spatial hierarchy, proportion, circulation, and environmental organization, functioning as a primary record of architectural intention rather than merely as preliminary illustration (Evans, 1995; Pérez-Gómez & Pelletier, 1997). These sketches were translated into measured drawings and an information-rich BIM model, exported as plans, sections, elevations, and diagrams that served as the principal inputs for AI-assisted analysis. Artificial intelligence was used to analyze the project rather than generate it. Commercially available multimodal platforms—OpenAI ChatGPT and Microsoft Copilot, with Anthropic Claude accessed through the Copilot environment—were directed through structured prompts toward specific analytical categories: proportion, hierarchy, circulation, spatial organization, and environmental relationships. Representative prompts includ-

Fig. 2. Casa Andelani—Original Elevation Sketch, marker on trace paper. Drawing by Ricardo Álvarez-Díaz.

ed: “Analyze the attached floor plan and identify potential relationships involving spatial hierarchy, circulation, proportion, and environmental organization,” and “Compare the organizational logic of Casa Andelani with Palladio’s Palazzo Chiericati, examining potential correspondences in proportional systems, spatial hierarchy, processional sequence, and courtyard organization.” Because these categories were deliberately introduced through the prompts, the resulting outputs are not presented as independent discoveries of Palladian influence. They are treated as analytical propositions produced through a defined interpretive framework and subsequently cross-checked against project documentation, Palladio’s published drawings (Palladio, 1570; Wittkower, 1971), and environmental analysis. No AI-generated architectural form was incorporated into the project; the design had been completed prior to the AI-assisted phase. Unlike generative AI workflows aimed at producing design alternatives, this methodology introduces AI after the design has been developed, using it to examine architectural knowledge already embedded in existing representation. The experiment does not establish that



AI independently understands Palladian architecture or that Palladian principles are universally transferable. Rather, it tests whether multimodal AI can function as an additional interpretive instrument when an explicit historical framework is applied to architectural documentation and its interpretations are cross-checked against geometry, historical sources, environmental analysis, and human judgment. These outputs remain subject to the limitations of the supplied documentation, the categories embedded in the prompts, and the potential biases of the platforms themselves.

The resulting outputs—bubble diagrams, circulation and hierarchy analyses (Figs. 3–4), and a comparative analysis with Palazzo Chiericati (Fig. 5)—were reviewed against the original sketches, drawings, and BIM documentation; interpretations conflicting with measurable architectural information were revised or discarded. The comparison does not establish that Casa Andelani was derived from Palazzo Chiericati or that identified correspondences resulted from direct Palladian influence. Instead, it examines whether Palladian organizational principles provide a productive interpretive lens for a contemporary Caribbean residence outside their original stylistic and historical context.

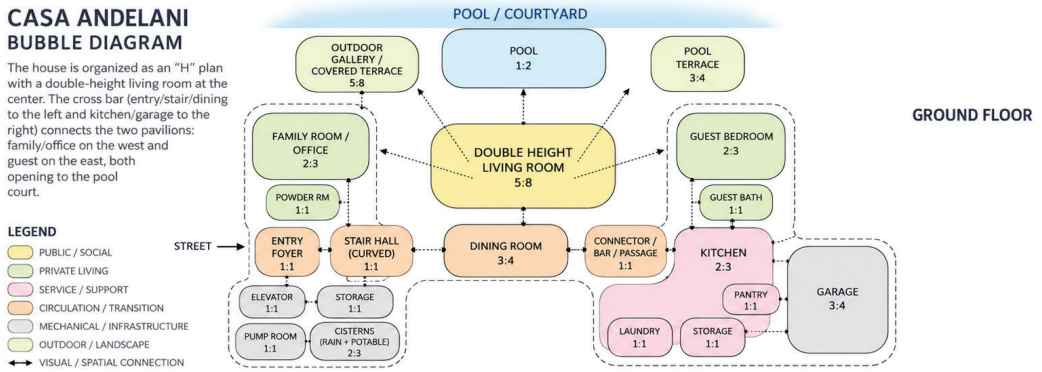
Taken together, these figures document the workflow's principal stages: observation and hand sketching establish intention; measured drawings and BIM translate intention into coordinated information; AI-assisted analysis proposes relationships for examination; comparative analysis considers those relationships against Palladian

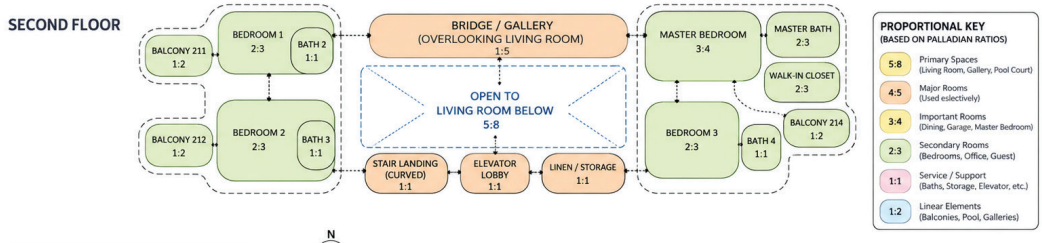
Fig. 3. Casa Andelani—AI-Assisted Bubble Diagram with Proportional Key by Space. AI-assisted analysis using OpenAI ChatGPT and Microsoft Copilot, including Anthropic Claude through the Copilot environment; prompted by Ricardo Álvarez-Díaz.

Fig. 4. Casa Andelani—AI-Assisted Circulation and Hierarchy Analysis. AI-assisted analysis using ChatGPT and Microsoft Copilot, including Claude through the Copilot environment; prompted by Ricardo Álvarez-Díaz; diagrams by AD&V®.

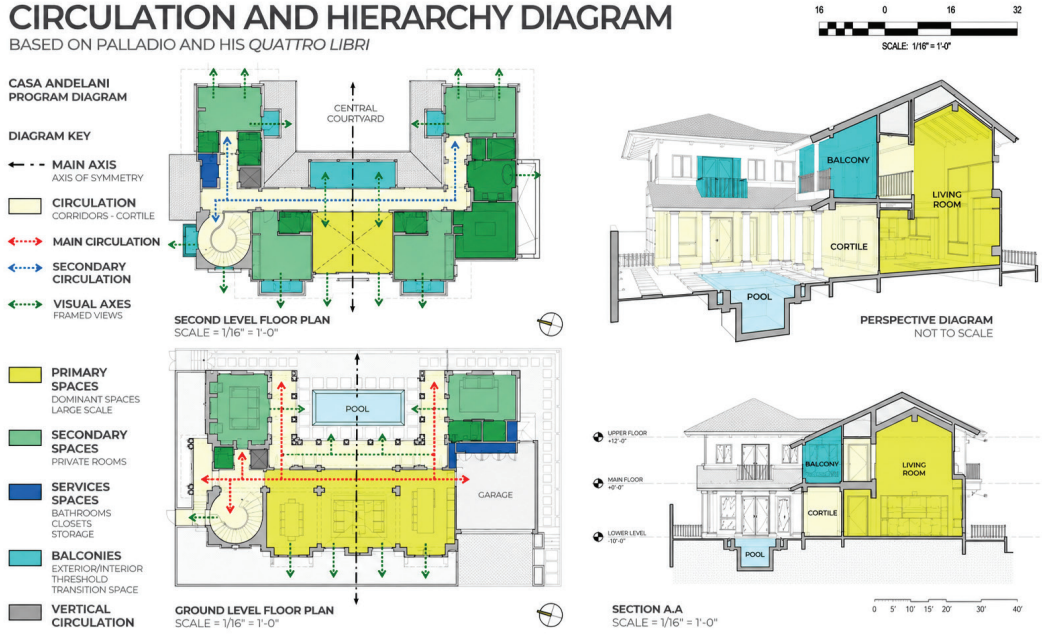
CASA ANDELANI
BUBBLE DIAGRAM

The house is organized as an "H" plan with a double-height living room at the center. The cross bar (entry/stair/dining to the left and kitchen/garage to the right) connects the two pavilions: family/office on the west and guest on the east, both opening to the pool court.





CIRCULATION AND HIERARCHY DIAGRAM
BASED ON PALLADIO AND HIS *QUATTRO LIBRI*



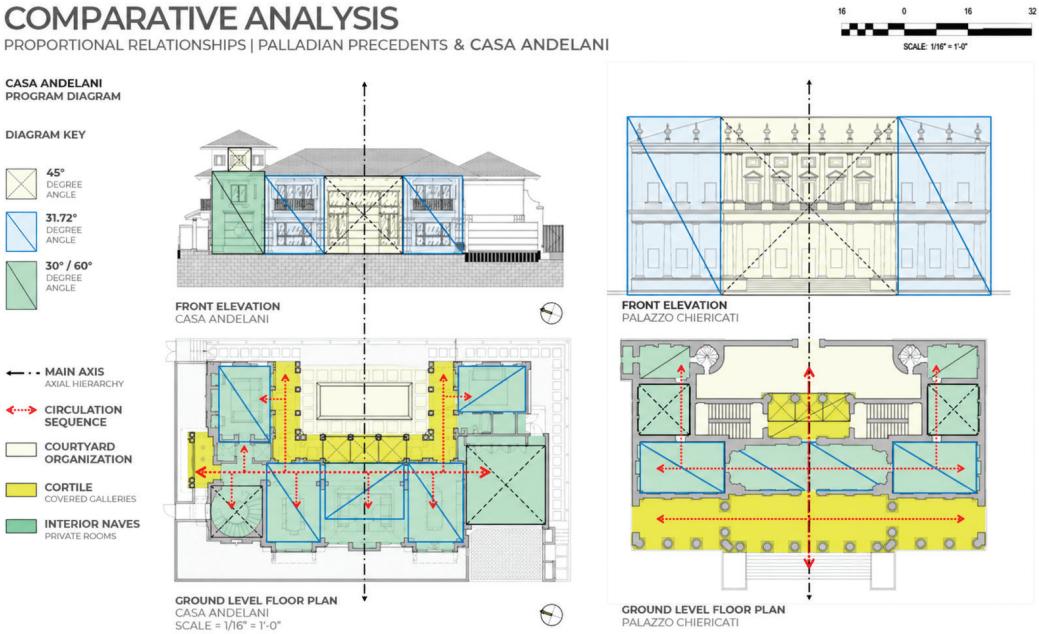
precedent; and the resulting interpretations establish hypotheses that can be examined through environmental simulation. The figures therefore function as part of the evidentiary apparatus of the study, not merely as illustration.

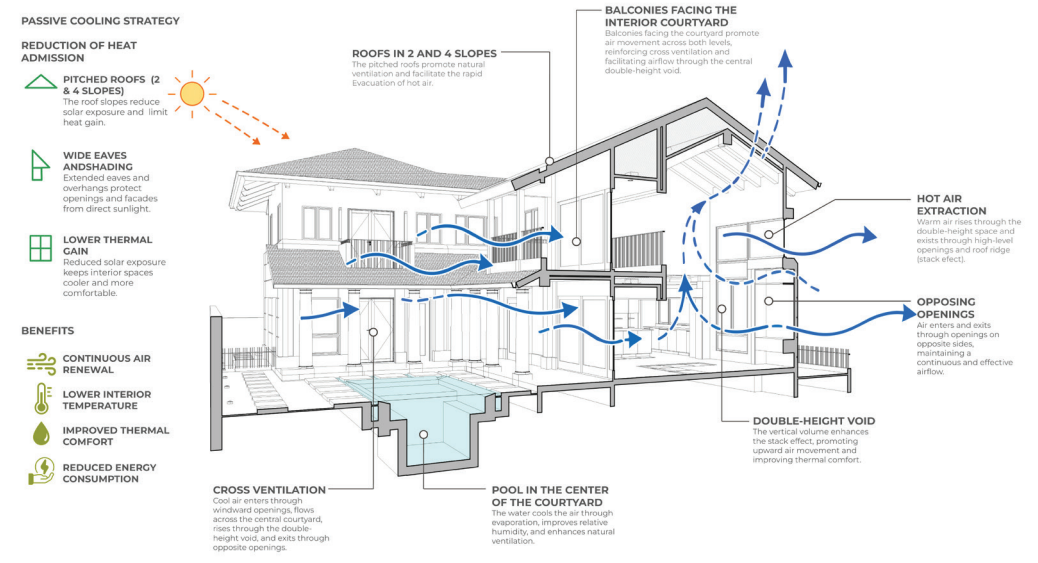
2. Environmental Intelligence: Climate, Infrastructure, and AI-Assisted Simulation

Environmental analysis constitutes a distinct stage within the methodological framework, employing computational simulations to examine how architectural decisions related to orientation, spatial organization, openings, and envelope design interact with the environmental conditions of Puerto Rico's tropical climate. These analyses investigate environmental hypotheses emerging from the architectural and AI-assisted interpretation phases; they do not independently validate Palladian principles nor establish causal relationships between historical precedents and environmental performance. The design incorporates a central courtyard, double-height living hall, aligned and opposing openings, balconies, and sectional voids intended to promote cross-ventilation and vertical air movement (Fig. 6). Deep roof overhangs, pitched roofs, and solar-control strategies respond to seasonal solar exposure while preserving opportunities for daylighting and natural ventilation. These features represent architectural intentions and environmental hypotheses that were subsequently examined through computational analysis; they should not be interpreted as measured post-occupancy performance outcomes. Complementary systems, including rainwater-manage-

Fig. 5. Comparative Analysis of Casa Andelani and Palladio's Palazzo Chiericati. AI-assisted analysis using OpenAI ChatGPT and Microsoft Copilot, including Anthropic Claude through the Copilot environment; prompted by Ricardo Álvarez-Díaz; diagrams by AD&V®.

Fig. 6. Casa Andelani—BIM/AI-Assisted Passive Environmental and Cross-Ventilation Diagram. Diagram by AD&V®.

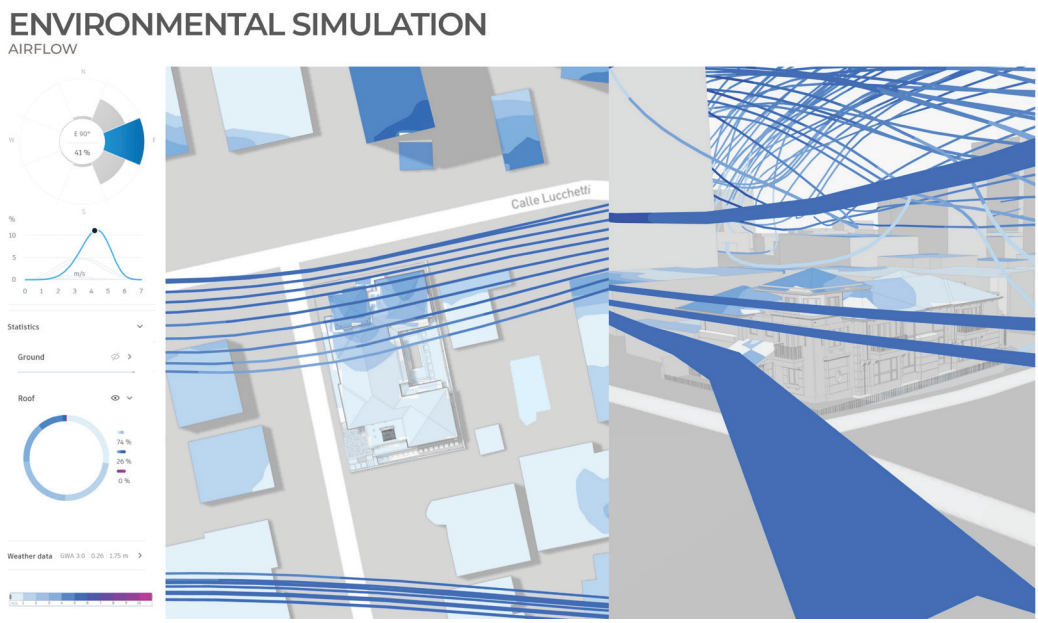

COMPARATIVE ANALYSIS
PROPORTIONAL RELATIONSHIPS | PALLADIAN PRECEDENTS & CASA ANDELANI
16 0 16 32
SCALE: 1/16" = 1'-0"
CASA ANDELANI
PROGRAM DIAGRAM
DIAGRAM KEY
45° DEGREE ANGLE
31.72° DEGREE ANGLE
30° / 60° DEGREE ANGLE
MAIN AXIS
AXIAL HIERARCHY
CIRCULATION SEQUENCE
COURTYARD ORGANIZATION
CORTILE
COVERED GALLERIES
INTERIOR NAVES
PRIVATE ROOMS
FRONT ELEVATION
CASA ANDELANI
GROUND LEVEL FLOOR PLAN
CASA ANDELANI
SCALE = 1/16" = 1'-0"
FRONT ELEVATION
PALAZZO CHIERICATI
GROUND LEVEL FLOOR PLAN
PALAZZO CHIERICATI


CROSS-VENTILATION
PASSIVE COOLING, ALIGNED OPENINGS, AND SECTIONAL VOIDS.
PASSIVE COOLING STRATEGY
REDUCTION OF HEAT ADMISSION
PITCHED ROOFS (2 & 4 SLOPES)
The roof slopes reduce solar exposure and limit heat gain.
WIDE EAVES AND SHADING
Extended eaves and overhangs protect openings and facades from direct sunlight.
LOWER THERMAL GAIN
Reduced solar exposure keeps interior spaces cooler and more comfortable.
BENEFITS
CONTINUOUS AIR RENEWAL
LOWER INTERIOR TEMPERATURE
IMPROVED THERMAL COMFORT
REDUCED ENERGY CONSUMPTION
ROOFS IN 2 AND 4 SLOPES
The pitched roofs promote natural ventilation and facilitate the rapid Evacuation of hot air.
BALCONIES FACING THE INTERIOR COURTYARD
Balconies facing the courtyard promote air movement across both levels, reinforcing cross ventilation and facilitating airflow through the central double-height void.
HOT AIR EXTRACTION
Warm air rises through the double-height space and exists through high-level openings and roof ridge (stack efect).
OPPOSING OPENINGS
Air enters and exits through openings on opposite sides, maintaining a continuous and effective airflow.
DOUBLE-HEIGHT VOID
The vertical volume enhances the stack effect, promoting upward air movement and improving thermal comfort.
CROSS VENTILATION
Cool air enters through windward openings, flows across the central courtyard, rises through the double-height void, and exits through opposite openings.
POOL IN THE CENTER OF THE COURTYARD
The water cools the air through evaporation, improves relative humidity, and enhances natural ventilation.

ment strategies, photovoltaic roof tiles, insulation, and waterproofing, are integrated as part of a coordinated environmental approach in which the building envelope, water management, and building systems operate as interconnected components rather than isolated technical elements. Artificial intelligence neither performed nor independently verified the environmental analyses. Computational environmental studies were conducted by AD&V using Autodesk Forma and evaluated qualitatively as comparative analytical tools rather than predictive performance models. Airflow simulations (Fig. 7) examined patterns of air movement associated with the courtyard, building openings, and interior-exterior spatial relationships. AI-assisted interpretation was subsequently employed to relate observed airflow patterns to architectural features previously identified through the design and comparative analyses. Seasonal solar exposure was examined using the same methodology (Fig. 8), comparing summer-solstice (June 21) and winter-solstice (December 21) conditions between 7:00 a.m. and 7:00 p.m. These studies should be understood as comparative environmental analyses rather than quantitative verification of thermal performance.

They visualize patterns of seasonal solar exposure and support the evaluation of design strategies but do not establish numerical reductions in heat gain, energy consumption, thermal comfort, or overall building performance within the scope of this study. The environmental analyses extend the experimental sequence from observation, measured drawing, BIM, AI-assisted interpretation,

Fig. 7. Casa Andelani—Computational Airflow Simulation and AI-Assisted Interpretation. Environmental analysis by AD&V®.



and historical comparison into the computational examination of selected environmental relationships. The results do not establish that Palladian principles produce measurable environmental benefits under contemporary tropical conditions. Rather, they suggest that a framework concerned with proportion, hierarchy, spatial organization, and environmental response can provide a productive basis for examining relationships between architectural order and climatic conditions.

3. Experimental Methodology: From Observation to Architectural Knowledge

The experimental workflow developed through Casa Andelani proposes a broader framework for architectural knowledge, illustrating how understanding evolves through successive stages of ob-

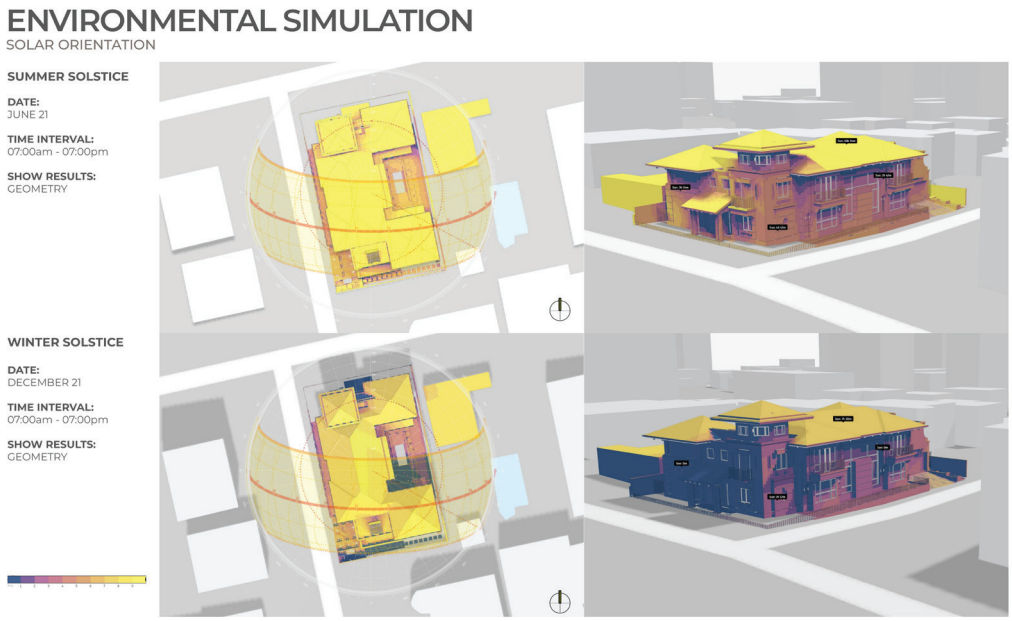


Fig. 8. Casa Andelani—Seasonal Solar Exposure Analysis: Summer and Winter Solstice Conditions. Environmental analysis by AD&V®.

servation, representation, interpretation, analysis, and judgment (Fig. 9). Where implemented, connected systems such as sensors, real-time data, and digital-twin platforms can extend evaluation into a building's operational life.

1. Observation and Sketch — freehand sketching establishes spatial hierarchy, proportion, and conceptual order as an instrument of inquiry.

2. Measured Drawing — the sketch is translated into dimensioned documentation, transforming intention into spatial information.

3. Building Information Modeling — measured drawings are integrated into a coordinated digital model capable of multidisciplinary analysis.

4. AI-Assisted Interpretation — artificial intelligence identifies potential proportional, circula-

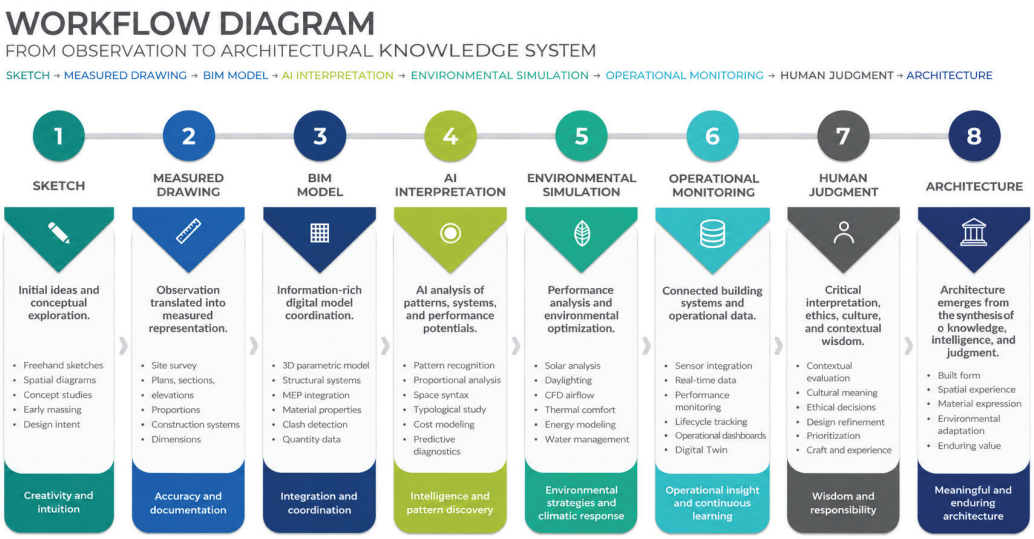


Fig. 9. Casa Andelani—AI-Assisted Workflow: From Observation to Architectural Knowledge. Diagram by AD&V®.

tion, and organizational relationships without altering design authorship.

5. Environmental Analysis — computational simulation examines airflow and solar exposure as an additional analytical layer, not independent verification of performance.

6. Operational Monitoring — connected systems, including sensors, real-time data, and a digital twin, extend evaluation into the building's operational life.

7. Human Judgment — computational analysis informs but cannot determine cultural meaning, experiential quality, or ethical responsibility.

8. Architecture — the synthesis of the preceding stages within a built work integrating environmental performance, cultural context, and human experience.

This sequence extends beyond **Casa Andelani** as

a framework through which architectural knowledge can be interpreted, tested, and refined within AI-assisted practice. Palladio offers a historical point of comparison through his integration of proportion, construction, site, and inhabitation within a broader architectural order (Palladio, 1570). Contemporary computation expands the capacity to examine these relationships but does not replace the architectural reasoning through which they acquire meaning. Palladio's legacy is therefore treated not as a formal language to be replicated, but as a methodological lens through which architecture can continue to integrate knowledge, technology, and place.

Discussion and Conclusion: Between Measure and Machine

These findings carry implications for architectural education as well as practice. As artificial intelligence increasingly influences how architecture is represented, analyzed, and communicated, it also requires a reconsideration of how architects are trained. Historically, drawing functioned as a form of architectural thinking: through sketching, measured drawing, and section, architects developed spatial reasoning and tested relationships among structure, climate, light, and inhabitation rather than merely communicating them (Evans, 1995; Pérez-Gómez & Pelletier, 1997). Contemporary generative systems can produce sophisticated visual results rapidly, potentially bypassing the slower cycles of observation and reflection that have shaped architectural thinking (Leach, 2022; Li et

al., 2025). The risk is not simply that architects will draw less, but that they may lose opportunities to think through drawing. The methodology developed here suggests an alternative educational model, integrating AI within the broader process through which architectural knowledge is generated rather than treating it as an isolated digital skill. Students might begin with observation and freehand sketching, translate ideas into measured drawings and BIM, employ AI to examine proportional and spatial relationships, use environmental simulation to study climatic conditions, and synthesize these forms of knowledge through architectural judgment.

Computation, in this model, has the potential to reinforce rather than replace critical thinking. *I Quattro Libri* offers a useful pedagogical precedent in this respect: Palladio's treatise communicated architecture through relationships among proportion, hierarchy, sequence, and construction rather than through images alone, suggesting the continuing importance of balancing technological literacy with disciplinary knowledge (Palladio, 1570; Wittkower, 1971). This educational challenge also requires critical evaluation of the computational systems themselves. As these systems assume greater analytical capabilities, architects must strengthen their ability to recognize algorithmic bias and interpret computational results critically. Bias can enter through training data, computational models, and human prompting and selection, potentially reproducing existing cultural assumptions rather than challenging them (Kudless, 2023). Using Palladio as a computational reference



therefore requires recognizing that his work belongs to a particular Western architectural tradition rather than treating it as a culturally neutral or universal standard. Addressing this limitation requires testing the methodology against a broader range of architectural traditions, climates, and material cultures, while training architects to question whether AI-generated interpretations arise from the evidence being examined, the analytical framework supplied by the architect, or biases embedded within the computational system.

Fig. 10. Completed Casa Andelani, the built work examined through the methodological framework developed in this study. Aerial photograph by Carlos López.

The title of this paper, *Between Measure and Machine*, reflects its central tension. Measure represents proportion, observation, historical continuity, and critical judgment; machine represents

computation, automation, and accelerated representation. Their relationship need not be understood as a choice between the two, but as an opportunity for computation to extend—rather than replace—the architect's capacity to interpret, adapt, and create. Casa Andelani provides a built case (Fig. 10) through which this relationship can be examined: hand sketching, measured drawing, BIM, AI-assisted interpretation, and environmental simulation contribute different forms of architectural information, with artificial intelligence entering the analytical process only after the design had been developed.

The contribution of this research is therefore methodological rather than stylistic. It proposes a framework through which historical knowledge, computational analysis, environmental examination, and human judgment operate together within a continuous process of architectural inquiry.

The case study does not establish the universal applicability of this framework, nor does it demonstrate that artificial intelligence independently understands Palladian architecture. Further research across other architectural traditions, climates, building types, and post-occupancy conditions is needed to evaluate its broader relevance.

The future relationship between architecture and artificial intelligence will depend not only on what computational systems can produce, but also on the frameworks architects develop for questioning, interpreting, and judging their outputs. Between measure and machine lies not a choice, but a continuing architectural inquiry.

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Palladio and Canaletto in Venice
Between reality and imagination

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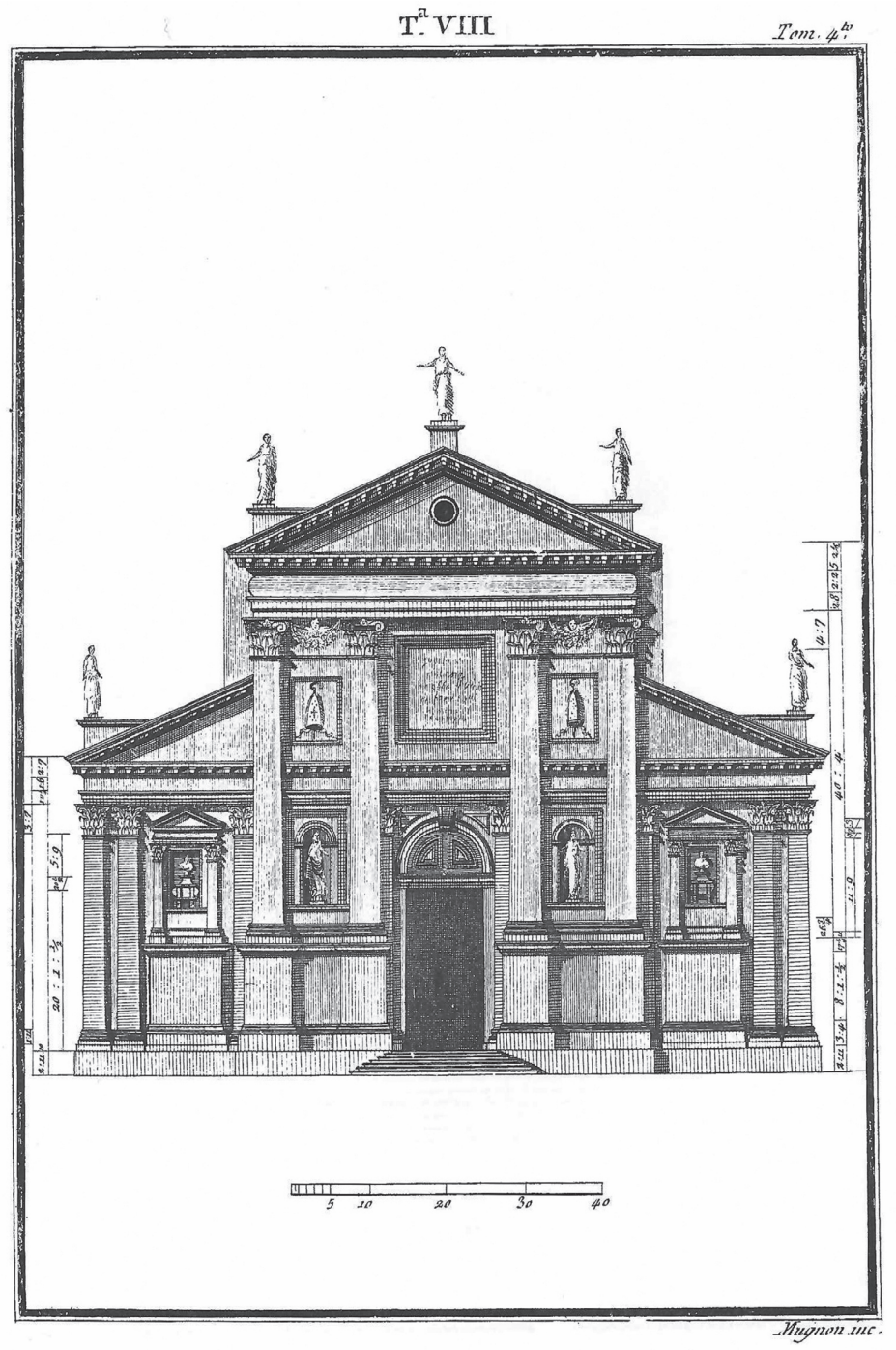
VENICE
ANDREA PALLADIO
CANALETTO
CONVENTO DELLA CARITÀ
DIGITAL MODELLING

This paper examines the relationship between architecture, representation and perception through the peristyle of the Convento della Carità in Venice, designed by Andrea Palladio and later depicted by Antonio Canal, known as Canaletto. It compares three levels of interpretation: the project published in *I quattro libri dell'architettura* (1570), the building as constructed and its transposition in Canaletto's painting. The Carità holds a special place in Palladio's Venetian work, as it reinterprets the Vitruvian Corinthian atrium and transfers models of classical antiquity to the lagoon, although the building phase already departed significantly from the original design.

Through geometric and perspectival analysis of the painting, supported by surveys and digital reconstructions, the study identifies numerous discrepancies among painting, project and existing building. Canaletto's view occupies an intermediate position between a topographical view and an architectural capriccio, presenting an architecture that appears plausible yet does not exist. The comparison between project, construction and representation thus opens a broader reflection on the interpretative nature of every architectural image and on the dialogue between truth and invention that runs through the work of both Palladio and Canaletto.

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Introduction and State of the Art

Andrea Palladio's Venetian works occupy a distinctive position within his architectural production, particularly in the field of religious architecture. The churches of the Redentore and San Giorgio Maggiore (Fig. 1), together with the façade of San Francesco della Vigna, show the central role of the architectural front in his interpretation of the city. The Convento della Carità differs from these examples: it is a religious complex without a comparable monumental façade, yet it is the only Venetian work included in his *I Quattro Libri dell'Architettura* (Palladio, 1570, Book II, pp. 29-30). Its significance therefore lies not only in its surviving fabric but also in the relationship between the published ideal and its incomplete realisation.

Antonio Canal, known as Canaletto, subsequently transformed Venetian architecture into a pictorial subject. His production ranges from views apparently faithful to recognisable sites (Fig. 2) to capricci that combine architectural elements in invented settings (Fig. 3). The distinction between views "taken from nature" and "invented views" appears in the title of his etchings (Canal, 1740-1744). Nevertheless, a precise appearance cannot automatically be equated with a metrically faithful representation. Corboz questioned this assumption, interpreting Canaletto's images through the interaction of observation and invention (Corboz, 1974, 1985). Studies of the painter's drawings and optical procedures have similarly emphasized the complexity of his representational practice (Gioseffi, 1959; Pignatti, 1970; Steadman, 2025).

Fig. 1. O. Bertotti Scamozzi, Elevation of San Giorgio Maggiore. Source: *Le fabbriche e i disegni di Andrea Palladio*, Vol. IV, pl. VIII.



The relationship between Palladio and Canaletto can thus be examined at three levels: architectural conception, constructed reality, and painted image. This comparison is not, in itself, new (Sdegno, 2005). The present study does not claim the first perspective restitution or digital reconstruction of the Carità. Its specific purpose is to organise the geometric discrepancies into a transparent comparative reading, distinguishing changes introduced in construction from those attributable to pictorial composition, and to clarify the supplementary, non-metric role of AI-assisted visualisation.

The historical question is consequently inseparable from a representational one. An architectural drawing can prescribe a possible building, a surviving fragment can attest only to what was exe-

Fig. 2. Canaletto, The Church of San Giorgio Maggiore, Venice, ca. 1730–31, oil on canvas. London, private collection. Public domain.



Fig. 3. Canaletto, Capriccio: The Rialto Bridge and the Church of S. Giorgio Maggiore, ca. 1750, oil on canvas. Raleigh, North Carolina Museum of Art, 52.9.149. Public domain.

cuted, and a painting can combine observed detail with deliberately transformed relationships. Keeping these evidentiary functions separate prevents the visual similarity of the three sources from being mistaken for documentary equivalence. It also explains why the Carità, where an ambitious

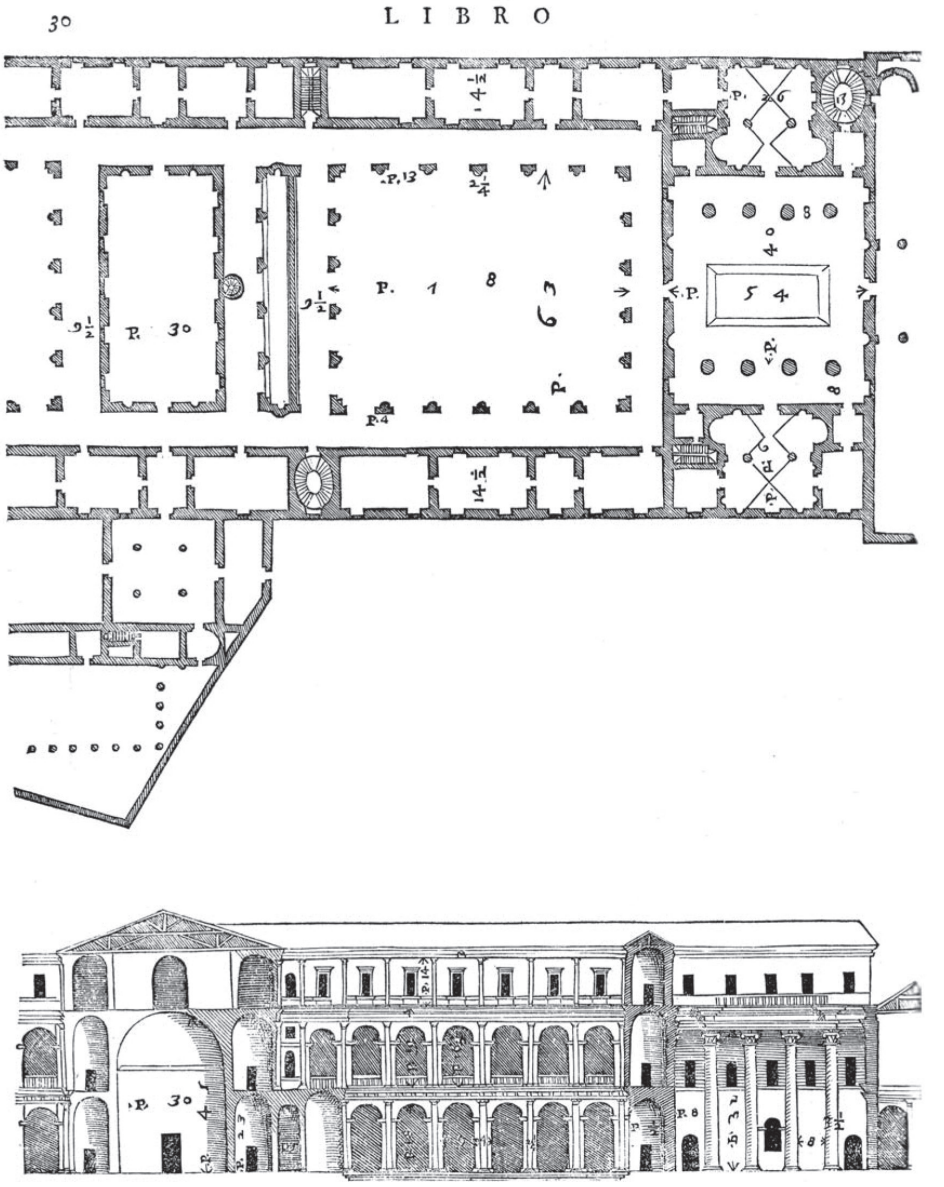
published scheme survives alongside a fragmentary construction and a highly articulated pictorial view, provides an especially useful case for comparative analysis.

1. Research Objectives and Methodology

The investigation addresses three connected questions. First, which features of Palladio's published scheme differ from the surviving cloister? Second, which features of Canaletto's 1744 painting correspond to either configuration, and which are independent inventions? Third, how can descriptive geometry and digital modelling make those transformations intelligible without confusing historical evidence, geometric inference, and visual simulation? The materials compared are Palladio's plan and section in the treatise, the existing façade, and Canaletto's frontal view (Figs. 4, 5, 6).

The three-dimensional reconstruction was developed through geometric modelling operations: Boolean addition and subtraction, linear extrusion, ruled surfaces, and surfaces of revolution. Extrusions define repetitive linear and prismatic components; rotational constructions describe elements such as shafts and mouldings; ruled surfaces and Boolean operations support the articulation of architectural profiles and openings. The published drawings establish the organisation of the ideal project, while the surviving elevation provides a distinct reference for the built configuration. The model is an analytical reconstruction rather than a complete archaeological record: assumptions concerning unbuilt parts must not be

Fig. 4. Palladio, plan and section of the Convento della Carità. Source: Source: Palladio, 1570, Book II, p. 30.



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Fig. 5. The surviving façade of the Carità cloister. Photo: the author.



Fig. 6. Canaletto, *Venice: Caprice View of the Monastery of the Lateran Canons*, c. 1743–44, oil on canvas. Royal Collection, RCIN … © Royal Collection Enterprises Limited 2026 | Royal Collection Trust.

mistaken for surveyed evidence (Fig. 7).

The painting was investigated by traditional descriptive geometry applied to inverse perspective. The procedure begins by identifying horizontal alignments, repeated bays, the principal point and the horizon line. The frontal configuration makes it possible to compare the represented elevation with the project and the surviving façade. Projective relationships are then used to infer planimetric and altimetric arrangements, including the relative depth of the portico. The homological ro-

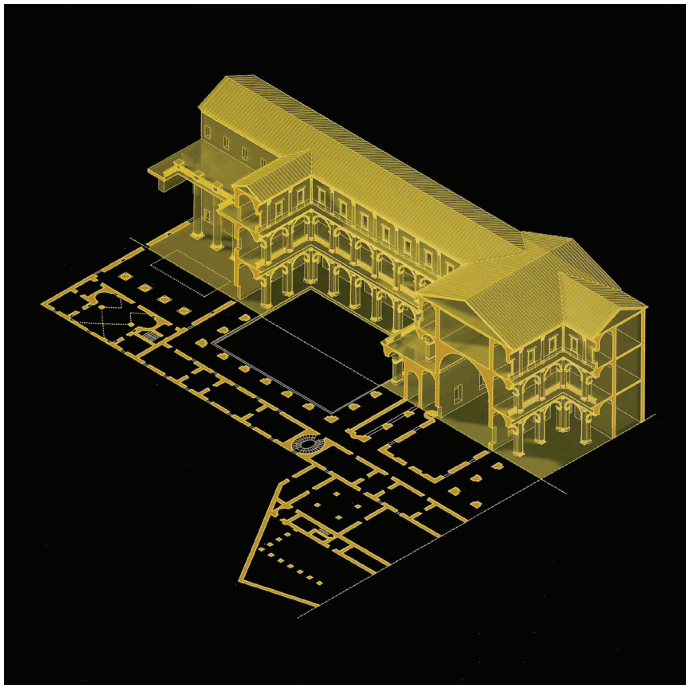


Fig. 7. Digital reconstruction of Palladio's Convento della Carità. Author's elaboration.

tation procedure permits the transfer of selected elements from the perspective image to a reference plane (Fig. 8). Because the painted image is an artistic construction, the resulting restitutions must be interpreted as geometrically reasoned hypotheses rather than direct measurements of a physical object.

The geometric reading proceeds from observable image features toward inferred spatial relationships, rather than the reverse. Repeated verticals and horizontals establish the principal architectural axes; corresponding openings provide a comparative module; the visible recession of the loggia informs hypotheses about depth. The reconstructed elevation and plan are compared with the treatise scheme only after their distinct evidentiary

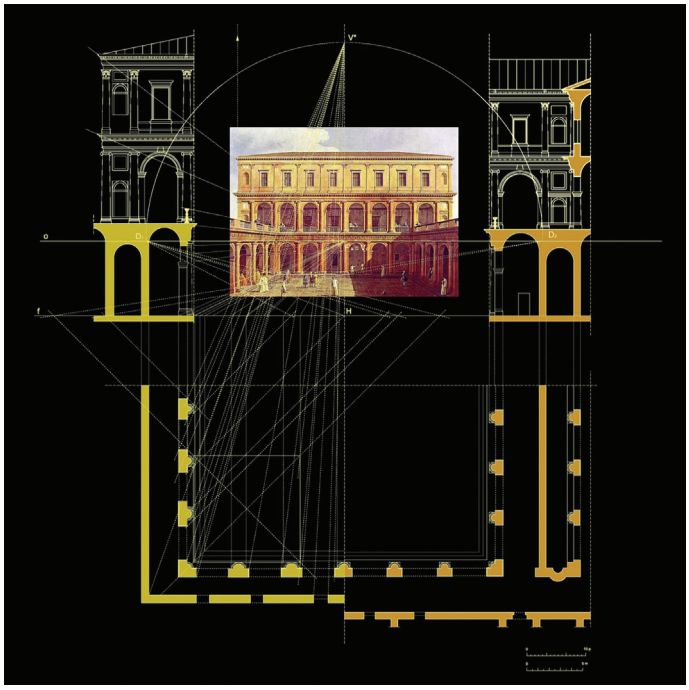


Fig. 8. Perspective restitution of Canaletto's painting and comparison with Palladio's design. Author's elaboration.

status has been identified, so to have a final result in terms of rendering image (Fig. 9). This order of operations is essential: agreement between two drawings is not, by itself, proof that the painted architecture ever existed in that configuration. Likewise, local irregularities in the picture may result from intentional adjustments, pictorial execution, or limitations of the available reproduction.

The analysis is comparative and primarily proportional. The present documentation does not establish the dates and instruments of a dedicated survey campaign, a measurement reference system, numerical control-point coordinates, software versions, or a quantified error budget. No absolute accuracy or statistical uncertainty is therefore asserted. These limits also prevent presenting the





Fig. 9. Perspective view of the digital model of the Carità cloister. Author's elaboration.

restitution as a fully reproducible metric survey; the geometric assumptions and graphic comparisons, however, remain open to examination.

Generative artificial intelligence was employed at a subsequent stage to produce interpretative imagery of the reconstructed spatial configuration (Fig. 10). This operation was used to examine the visual effects of composition, material appearance and illumination, not to derive dimensions or verify perspective. The specific architecture of the generative model is not documented, so the procedure is not identified as convolutional-neural-network processing. The AI-generated image is consequently evidence of a visualization experiment, not independent evidence about Palladio's design or Canaletto's intentions.

2. Palladio's design and the built peristilium

The Convento della Carità was partially built for the Lateran Canons in the 16th century (Bassi, 1971; Modesti, 2005). Palladio placed its description among the examples of ancient domestic arrangements discussed in the second book of his treatise. The guiding ambition was to "make this house resemble those of the Ancients" ("assimigliar questa casa à quelle de gli Antichi") (Palladio, 1570, Book II, p. 29). The project thus adapts the vocabulary of the Roman domus to a Venetian religious institution, transforming an archaeological and theoretical model into an architectural proposal.

Fig. 10. AI-assisted interpretative visualization of Canaletto's Capriccio. Author's elaboration.

Three principal spaces organise the published complex: the Atrium, providing access; the Tab-

linum, placed laterally rather than on the central axis; and the Peristilium, the largest open area, represented as paved rather than planted (Fig. 4). The reference to the Vitruvian Corinthian Atrium helps explain the deliberate dialogue with antiquity. Yet the scheme should not be read as a literal reconstruction of a Roman house: Palladio selectively rearranged ancient components to address a different building type and setting.

The Peristilium presents three superimposed orders. The ground-floor Doric and first-floor Ionic registers comprise arcaded loggias articulated by engaged semicircular columns. The upper register is organised by Corinthian pilasters framing windows. Exposed brick characterises both the walls and much of the architectural articulation; stone is reserved for selected elements including capitals, bases and window surrounds (Fig. 6). These material choices are important to the perception of the façade, because the rhythm of the orders is expressed through both relief and surface.

The treatise drawing, printed in reverse, represents a rectangular cloister with six bays on its longer sides and five on the shorter sides. A terrace appears on one short side opposite the Corinthian Atrium, visible in section rather than plan. Its presence produces an additional upper-level bay and niche along the adjoining long side, establishing an asymmetrical condition. The built fabric differs substantially. Only one long façade survives as a completed architectural front; it contains seven arches with terminal niche-bearing bays on the lower two levels and seven corresponding windows

above. The built elevation therefore tends toward symmetry, whereas the published arrangement retains an asymmetrical terrace condition.

This divergence is fundamental. Before Canaletto intervened pictorially, the architecture had already moved from a theoretical configuration to a modified built one. The surviving façade cannot be used uncritically as a transparent illustration of the treatise, just as the treatise cannot be treated as an exact record of the executed work.

The relationship between plan and section is particularly instructive. In the published representation, the terrace is not equally legible in every drawing, and its consequences for the adjoining elevation become clear only when the graphic sources are read together. The asymmetry is therefore not simply a matter of counting openings: it concerns the articulation of full-height and reduced-height portions of the cloister. In the built elevation, by contrast, the repeated arch-and-niche rhythm establishes a more uniform reading of the long front. The comparison shows how a relatively limited modification in the arrangement of bays can alter the perceived balance of an entire courtyard.

3. Canaletto's Interpretation and Perspective Restitution

Canaletto's Capriccio with the Cloister of the Convento della Carità (1744) adopts a markedly frontal composition (Fig. 6). Unlike the more expansive views often associated with the painter, this image

directs attention toward the repetitive geometry of a single architectural elevation. The principal vanishing point is situated on the vertical axis of the central column, and the horizon lies near the lower intrados of the entablature. This configuration reinforces the apparent stability and symmetry of the scene, while making its architectural transformations especially legible.

At first sight, the painting seems to document a plausible Palladian courtyard. Closer comparison reveals a different organisation. Canaletto introduces two lateral terraces above the ground-floor portico, whereas Palladio's published section indicates a terrace on only one side. The painted full-height façade contains six central arches supplemented by an arch at each end, with lateral niches disposed symmetrically. The upper arrangement follows the same compositional logic through its windows, pilasters and niches. Two rectangular doorways appear at the ends of the lower elevation. These features cannot be explained as a simple transcription of either the published scheme or the existing façade.

The painting appears instead to combine selected aspects of both. The terrace motif recalls Palladio's design, but its duplication transforms the original asymmetry into a bilateral arrangement. The symmetry itself resonates with the built elevation, yet the number and disposition of bays differ. The result is not an arbitrary architectural fantasy: it is a reorganization of identifiable Palladian elements into a new, visually coherent whole.

Inverse perspective analysis provides a means

of testing this interpretation beyond stylistic observation. The first stage establishes the picture's projective framework from architectural lines and repeated features. In a frontal perspective, elements parallel to the picture plane can be compared in elevation, while the recession of the portico requires reconstruction through converging directions. The method of homological rotation supports the transfer of projected relationships into a reconstructed plan. The resulting geometric scheme is then compared with the dimensions and proportions inferred from Palladio's published drawings (Fig. 8). The restitution is especially valuable because it separates architectural syntax from spatial proportion. Orders, arches, niches and entablatures can remain recognizable even when their relative dimensions change. A spectator may therefore accept the scene as architecturally convincing without detecting the displacement of a terrace or the vertical stretching of a register.

This distinction also limits interpretation: the geometric discrepancies demonstrate that the image is not a literal measured elevation, but they do not alone reveal whether Canaletto relied on a drawing, on direct observation, on optical aids, or on a combination of working procedures in this particular painting.

The comparison identifies two principal categories of difference. In plan, the portico appears narrower than its counterpart in the architectural scheme. The engaged columns also display apparent adjustments near the edges of the painted field; these may be read as optical-perceptual cor-

rections, although the painter's precise procedure cannot be demonstrated. In elevation, the represented façade is elongated across its three registers, from the ground-floor arcade to the crowning cornice. Because the view is frontal, these vertical variations are particularly evident. Their cumulative effect is to produce an architecture that is recognisably Palladian but not identical to Palladio's design or to the surviving construction.

The classification of the painting as a capriccio is therefore supported by geometric as well as iconographic considerations. Nevertheless, its relation to the actual site remains essential: the persuasive quality of the image depends on recognizable architectural syntax. Canaletto's invention operates within the constraints of an existing architectural language, not outside it.

4. Results and Discussion

The comparison produces a sequence of three configurations rather than a binary opposition between truth and falsehood. The published project establishes a theoretical arrangement with a unilateral terrace and a six-by-five-bay cloister. The surviving elevation documents a modified and more symmetrical construction with seven arches and terminal niche bays. The painting introduces a further reconfiguration, most visibly through its paired terraces, altered bay distribution and elongated elevation. These observations can be inspected directly against the comparative drawings and perspective restitution (Figs. 4, 6-8).

The digital model makes the spatial consequences

of the original architectural scheme more intelligible (Fig. 9). It also helps distinguish differences of architectural organisation from differences caused by viewpoint and projection. The AI-assisted visualisation offers another, explicitly interpretative layer: the reduced height of the lateral wings in Canaletto's imagined composition opens the courtyard to a different distribution of light (Fig. 10). This observation concerns the visual plausibility of the reconstructed scene; it does not establish the actual lighting conditions of a lost building.

The contribution of the study lies in making the transitions between evidence types explicit. Palladio's treatise records an architectural proposition; the surviving fabric records partial execution and modification; Canaletto's painting records a pictorial reconstruction.

Descriptive geometry allows their compositional differences to be discussed in projective terms, while modelling provides a shared spatial language. These procedures do not, without additional metric documentation, establish new absolute measurements or a statistically validated correction model.

The limits of the available evidence are therefore part of the interpretation. Numerical deviations, survey accuracy, the provenance of all control dimensions and the detailed generative-image workflow would require further documentation before a quantitative or fully replicable claim could be made. The present argument is narrower but defensible: a rigorous distinction between designed, built and painted configurations reveals

how apparent realism can coexist with systematic architectural invention. The figures should be read as complementary rather than interchangeable tests. The photograph documents the material condition of the extant front; the treatise image communicates a design; the perspective restitution exposes a graphic inference; the digital view visualizes a spatial hypothesis; and the AI image explores appearance. No single illustration can establish the entire argument.

Conclusions

The Peristilium of the Convento della Carità offers a particularly revealing example of the relationship between architectural theory, material realization and pictorial representation. Palladio's published project transposed an ancient domestic model into a Venetian convent, but the completed portions already diverged from the ideal scheme. Canaletto subsequently transformed that altered reality into a balanced and convincing architectural image, preserving recognizable forms while modifying their disposition and proportions.

The inverse-perspective reading and digital reconstruction clarify the nature of these transformations. Their value lies not in presenting the painting as a measurable substitute for the building, but in identifying where the three configurations converge and where they separate. AI-assisted imagery extends the visual discussion without replacing geometric evidence. Between Palladio's architectural imagination and Canaletto's pictorial invention, the cloister demonstrates that every

representation is also an interpretation—and that its claims must be assessed according to the kind of evidence from which it is constructed.

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Between Palladio and Persepolis
Beaux-Arts pedagogy and the translation of architectural knowledge in modern Iran

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MOHSEN FOROUGHI
IRANIAN MODERN ARCHITECTURE
ARCHITECTURAL DRAWING AND PEDAGOGY

This article examines modern Iran's relationship with Palladianism as a problem of translating architectural knowledge rather than one of direct influence or stylistic imitation. Iran did not need Europe to discover order, proportion, axiality or hierarchy: its traditions had long developed systems of geometry, courtyard, garden, water, threshold and iwan. The question is how these spatial traditions were recoded within twentieth-century educational, professional and institutional frameworks. Without proposing an unbroken genealogy from Palladio to the École des Beaux-Arts and Iran, the study reconstructs episodes of Palladio's selective reception in French academic culture, notably Blondel's systematisation of Palladian principles and Guadet's use of Palladio, through readings of treatise plates, teaching programmes, student drawings and buildings. It then traces how this pedagogical culture was rebuilt in Iran during the first Pahlavi period (1925–1941), when Mohsen Foroughi, moving between Paris and Tehran, reworked *iwan*, courtyard, garden, portico and tilework through programme, drawing, atelier practice and public commissions. "Between Palladio and Persepolis" thus names an uneven passage between codified knowledge and an ancient past reactivated by modern education, where translation means adapting knowledge to new conditions.

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Introduction

The question of Palladianism in modern Iran becomes meaningful only when distinguished from formal resemblance and direct influence. No evidence indicates that twentieth-century Iranian architecture developed through the imitation of Palladio's villas. Palladio matters here because *I quattro libri dell'architettura* offered an influential model for measuring, comparing, and communicating architecture through drawing. By coordinating plans and elevations with dimensions and text, the treatise made relations between parts and whole available for study beyond their original sites (Palladio, 1738, Book II, p. 40, plate 1; Marcorin, 2024, pp. 100-101, 115-116).

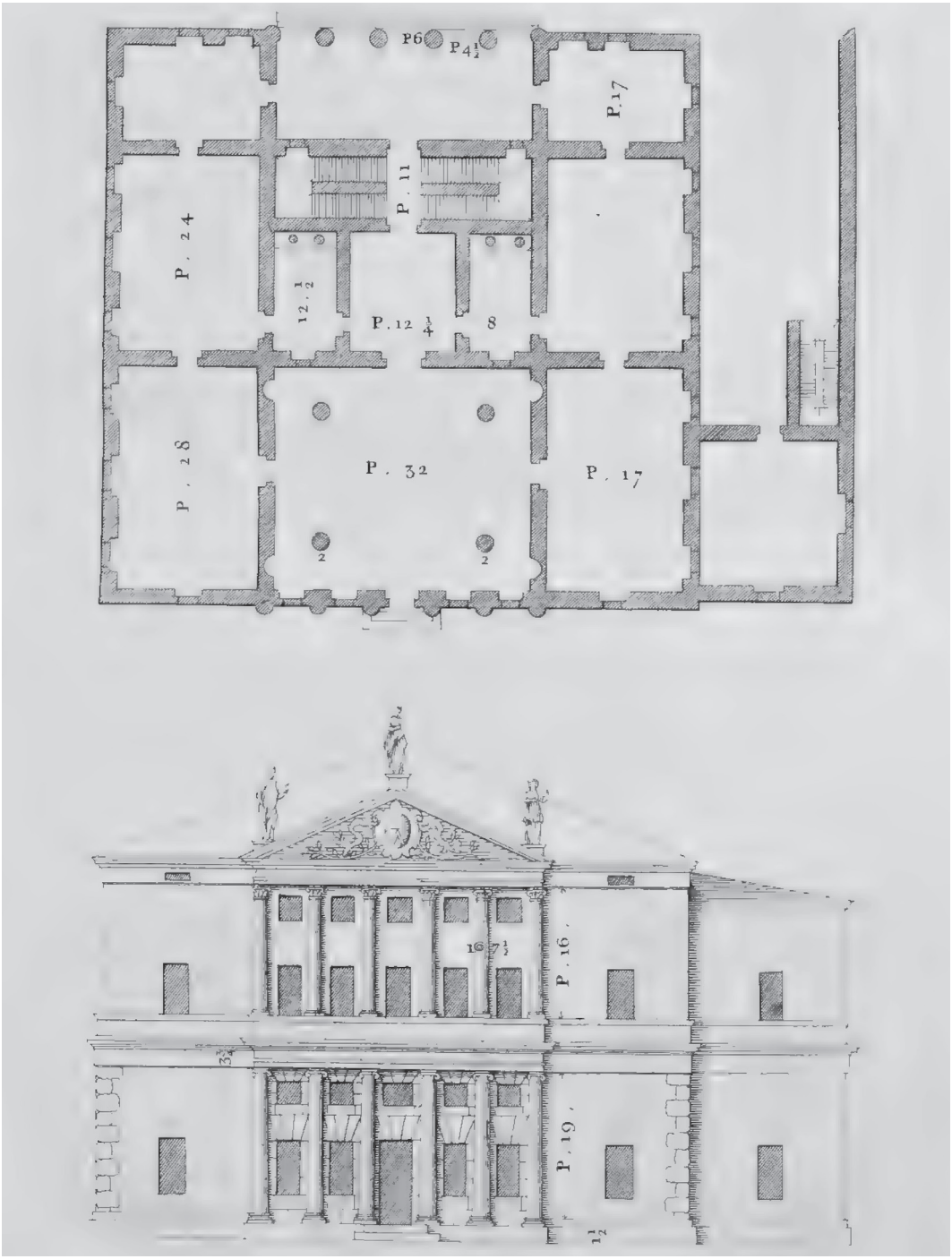
The historical claim is deliberately limited: Palladio did not originate Beaux-Arts pedagogy, nor did his work reach the École through an unbroken line. French academic culture received him selectively. Blondel recast aspects of Palladian doctrine as comparative measures and tables; Julien-David Le Roy's annual programme placed Palladio beside Vitruvius, Scamozzi, and Vignola; and Guadet treated the Basilica at Vicenza as a compositional and proportional precedent (Blondel, 1698, pp. 792-793; Chafee, 1977, p. 74; Guadet, 1909, Vol. 1, pp. 97-98, 428).

These cases establish a history of critical reception, while the École's system of programme, *esquisse*, *atelier*, project, and jury followed its own institutional development (Chafee, 1977, pp. 83-89).

Methodologically, the article combines textual and iconographic analysis. Treatise plates, academic texts and teaching programmes, student drawings, and built projects are examined through common questions: how plan, elevation, and section are coordinated; how axis, proportion, circulation, and hierarchy organise composition; and how historical elements are abstracted and recombined. Formal recurrence is not treated as proof of influence. Here, "translation" means the selective reworking of architectural knowledge as it enters new representational, pedagogical, professional, and institutional conditions.

"Between Palladio and Persepolis" defines the two historical poles of this inquiry. Persepolis condenses the authority acquired by Iran's Achaemenid past during the first Pahlavi period (1925-1941), when archaeology, architectural historiography, state institutions, and university education made antiquity newly operative. At the Faculty of Fine Arts, students drew Achaemenid capitals and produced measured drawings of Iranian monuments (Akhgar & Moulis, 2025, pp. 40-41; Akhgar, 2024, pp. 1120-1122). Mohsen Foroughi stands at the centre of the inquiry.

His student projects and later buildings show how the *iwan*, courtyard, garden, portico, and tilework were reread through drawing, programme, and composition (Marefat, 1988, pp. 110-111; Akhgar & Moulis, 2021, pp. 948-950). The question is how architectural knowledge was selected, recoded, and given new authority as it moved between trea-


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1 1/2

tise, school, and institution.

Palladio, Drawing, and the Codification of Architectural Knowledge

I quattro libri dell'architettura made architectural design available through a close relation between brief description, measurement, and drawing. At the end of Book II, Chapter II, Palladio tells the reader that the plans and elevations to follow will clarify the principles already discussed; Palazzo Antonini opens the next chapter. In its plate, plan and elevation occupy the same representational field (Fig. 1). The plan reduces rooms, passages, walls, and the central axis to a measured order, while the elevation organises the rusticated base, superimposed orders, central bay, and pediment. Read together, they form a graphic argument in which distribution, façade hierarchy, and relations between parts and whole can be examined without visiting the building (Palladio, 1738, Book II, pp. 39-40 and plate 1; Marcorin, 2024, pp. 100-101).



Fig. 1. Andrea Palladio, Palazzo Antonini, Udine: ground-floor plan and principal elevation. From The Four Books of Architecture, Book II, Chapter III, plate 1, trans. Isaac Ware (London: R. Ware, 1738). Source: Getty Research Institute, digitized by Internet Archive, item gri_33125011569684, public domain.

This abstraction should not be mistaken for a neutral record. Palladio's plates often preserve design intentions rather than the final condition of buildings altered during execution; nor can their dimensions be reduced to a single universal formula. The orders instead offered a systematic but selective reworking of Vitruvian and Renaissance authorities (Mitrović, 1999, pp. 110-113; Hemsoll, 2025, pp. 5-6, 9, 18). What became transferable was therefore less a finished style than a means of

making architectural decisions explicit and comparable.

This capacity becomes historically visible in François Blondel's *Cours d'architecture*. Blondel first examined proportional relations in individual buildings by Palladio and then reorganised the five orders as a synoptic table (Fig. 2). Unlike the plate of Palazzo Antonini, the table suppresses the site and the individual building. Its rows and columns compare the heights and diameters of columns, pedestals, entablatures, intercolumniations, and arcades across the Tuscan, Doric, Ionic, Corinthian, and Composite orders (Blondel, 1698, pp. 738-741, 792-793). Palladio thus appears beside Vitruvius, Vignola, and Scamozzi as one authority among several. Blondel's operation was one of selection, abstraction, and criticism. It provides a specific historical link to French academic culture: Palladian material entered it not through a continuous genealogy, but as architectural knowledge that could be compared, corrected, and taught.

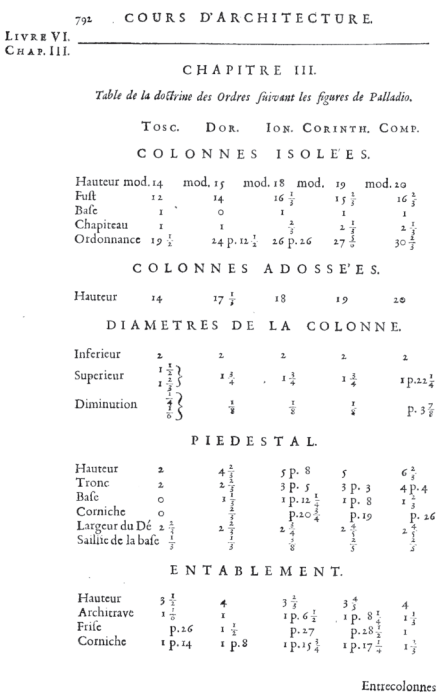
Beaux-Arts Pedagogy: Drawing, Programme, and Composition

The historical bridge from earlier academic reception to the École was not one of doctrinal descent. In the *École spéciale* that preceded the École des Beaux-Arts established in 1819, Julien-David Le Roy's annual programme described a weekly course on architectural history and theory, the orders, ancient buildings, and the works of Vit-

Fig. 2. François Blondel, "Table de la doctrine des Ordres suivant les figures de Palladio," in Cours d'architecture enseigné dans l'Académie royale d'architecture, 2nd ed., Paris, 1698, pp. 792–793. Source: Getty Research Institute/Internet Archive, public domain.

ruvius, Palladio, Scamozzi, and Vignola. Students submitted designs for monthly judgement, while instruction in design remained within the *atelier* (Chafee, 1977, p. 74). During the nineteenth century, programme, *concours*, *esquisse*, *atelier*, and jury organised design as a sequence of interpretation, drawing, and evaluation. The preliminary sketch constrained the developed project, and the jury compared the final drawings both with that sketch and with one another (Chafee, 1977, pp. 83-89).

Julien Guadet's lectures show how Palladio was read within this later pedagogical culture. Guadet placed him among the Renaissance authors who



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LIVRE VI. CHAP. III.

CHAPITRE III.

Table de la doctrine des Ordres suivant les figures de Palladio.

	TOSC.	DOR.	ION.	CORINTH.	COMP.
COLONNES ISOLE'ES.					
Hauteur mod.	14	mod. 15	mod. 18	mod. 19	mod. 20
Fuſt	12	14	16 1/3	17 1/3	16 1/3
Baſe	1	0	1	1	1
Chapiteau	1	1	2/3	1 1/3	2 1/3
Ordonnance	19 1/2	24 p. 12 1/4	26 p. 26	27 2/3	30 2/3
COLONNES ADOSSE'ES.					
Hauteur	14	17 1/3	18	19	20
DIAMETRES DE LA COLONNE.					
Inferieur	2	2	2	2	2
Superieur	1 5/6 / 1 2/3	1 3/4	1 3/4	1 3/4	1 p. 22 1/4
Diminution	1/6 / 1/6	1/8	1/8	1/8	p. 3 7/8
PIEDESTAL.					
Hauteur	2	4 2/3	5 p. 8	5	6 2/3
Tronc	2	2 2/3	3 p. 5	3 p. 3	4 p. 4
Baſe	0	1 1/3	1 p. 12 1/2	1 p. 8	1 1/3
Corniche	0	1/3	p. 20 3/4	p. 19	p. 26
Largeur du Dé	2 1/3	2 2/3	2 5/6	2 5/6	2 5/6
Saillie de la baſe	1/3	1/3	1/8	1/6	1/3
ENTABLEMENT.					
Hauteur	3 1/2	4	3 2/3	3 5/6	4
Architrave	1 1/2	1	1 p. 6 1/2	1 p. 8 1/4	1 1/3
Friſe	p. 26	1 1/2	p. 27	p. 28 1/2	1
Corniche	1 p. 14	1 p. 8	1 p. 15 3/4	1 p. 17 1/4	1 1/3

Entrecolonnes

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LIVRE VI. CHAP. III.

	TOSC.	DOR.	ION.	CORINTH.	COMP.
Entrecolonnes	m. 8	5 1/4	4 1/2	4	3
Milieu des Colones à ux Entrecolonnes	10	7 1/2	6 1/2	6	5
Places des modill.	0	3	6	5	5
Aux Arcs	12 5/6	15	14 7/12	13	14 1/2
Places des modill.	0	6	14	11	14
ARCS AVEC PIEDESTAL.					
Hauteur de la baye	15 1/3	20 1/2	22	22 1/3	24 2/3
Largeur	9 1/10	11 4/10	10 p. 24 1/2	9 7/10	9 7/10
Hauteur ſur l'Arc	2/3	1 1/2	1 4/9	1 2/3	2
Alette	p. 26	p. 26	p. 26 1/2	p. 27	1 p. 12.
Impoſte	1 p. 4 1/4	1 p. 13	1 p. 12 1/2	1 p. 13 3/4	1 p. 15 1/4
Largeur de la pile	3 p. 22	3 p. 22	3 p. 23	3 p. 24	4 p. 24
Epaiſſeur	4	3	1 1/2	0	0
Archivolte	p. 26	p. 26	p. 26 1/2	p. 27	p. 27

PPPPPPPPP

had followed the Vitruvian path of *architecture chiffrée*, but rejected the reduction of architecture to rigid formula: architecture was not a science of numbers, and proportion demanded perception and judgement (Guadet, 1909, Vol. 1, pp. 97-98). Yet this criticism did not remove Palladio from teaching. In a discussion of arcaded porticoes, Guadet presented the Basilica at Vicenza as an example of a subordinate order serving as the pier of an arcade within a *grande ordonnance* (Fig. 3) (Guadet, 1909, Vol. 1, p. 428).

Compared with Palladio's Palazzo Antonini plate, Guadet's image performs a different operation. The plan disappears; the façade is extracted from Palladio's account and inserted among other examples. Attention shifts to the relation between bay, arcade, pier, and the two orders. The Basilica becomes an analytical precedent rather than a model for reproduction. What persists is neither the format of Palladio's plate nor an intact Palladian method, but the practice of abstracting historical examples and submitting them to comparison and judgement.

Guadet's second volume clarifies the larger pedagogical shift. Composition meant combining parts into a whole; its elements included rooms, vestibules, circulation spaces, and stairs. A programme was necessarily incomplete and had to be read, interpreted, and supplemented by architectural knowledge (Guadet, 1910, Vol. 2, pp. 3-4, 15-17). Drawing was the medium in which programme, precedent, and judgement were brought into relation. This historically layered system, rather than

Fig. 3. Andrea Palladio's Basilica at Vicenza, reproduced as "Basilique de Vicence" (fig. 316) in Julien Guadet, Éléments et théorie de l'architecture: Cours professé à l'École nationale et spéciale des beaux-arts, vol. 1, Paris: Librairie de la Construction Moderne, 1909, p. 428. Source: Smithsonian Libraries/Internet Archive, public domain.

lier à toute une façade qui en commandera la décoration. C'est ainsi que dans la cour du Louvre, l'ordonnance du 1er étage ne permettrait pas des colonnes lisses pour l'étage du rez-de-chaussée étudié en portique.

Vous trouverez encore des portiques où un petit ordre sert

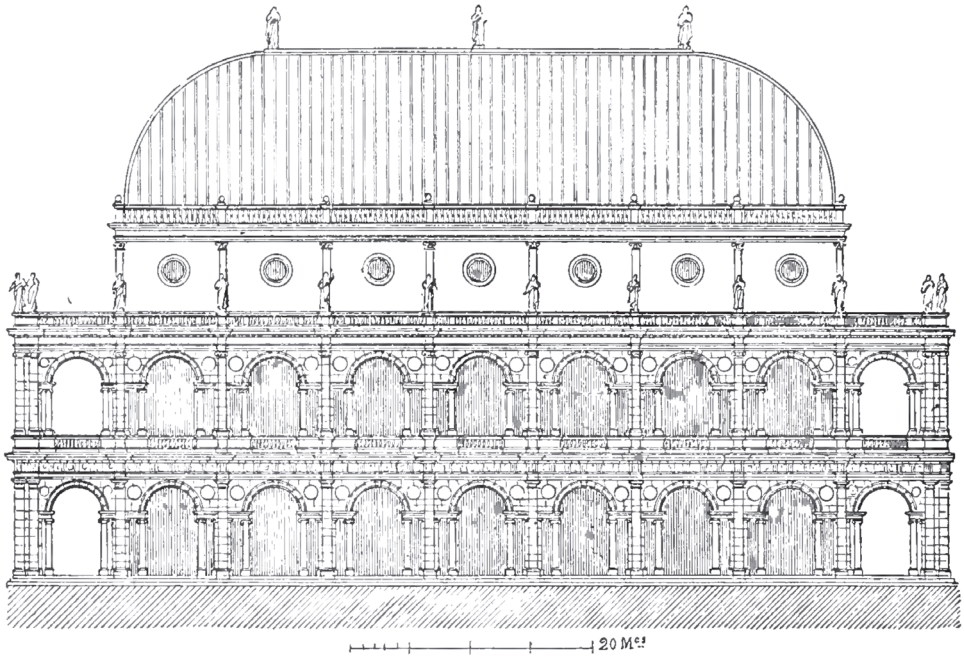


Fig. 316. — Basilique de Vicence.

de piédroit à l'arcade, entre les ordres de la grande ordonnance. Un exemple célèbre de ce motif est la *Basilique* de Vicence, par Palladio, grande salle entourée de portiques (fig. 316), où les travées arrivent à une proportion très large. Dans un parti plus

Palladio as a direct source, was later reworked at the Faculty of Fine Arts in Tehran (Akhgar, 2024, pp. 1116-1120).

Pahlavi Iran and the Institutional Translation of Architecture

The translation of Beaux-Arts pedagogy to Iran took shape as the state, university, profession, and historical imagination were being reconfigured together. During the first Pahlavi period (1925–1941), public building transformed both Tehran and the social position of the architect. This transformation did not erase earlier practices: the *usta-meʿmar* retained knowledge acquired through apprenticeship, construction, material experience, and geometry. What shifted was the distribution of architectural authority, as academic credentials, technical drawings, public commissions, and institutional judgement acquired increasing importance (Marefat, 1988, pp. 108–111; Akhgar, 2024, pp. 1115–1117).

The University of Tehran, founded in 1934, and its Faculty of Fine Arts, established in 1940, gave this reorganisation a durable institutional form. André Godard, Maxime Siroux, Roland Dubrulle, and Mohsen Foroughi worked through the Ministry of Education and the university rather than as autonomous transmitters of a foreign model.

The programme resembled that of the École but was not an exact reproduction: design briefs were

translated from French into Persian by Sadeq Hedayat; the entrance examination and cycles of study were adjusted to university regulations; and the Parisian *esquisse en loge* was omitted (Akhgar, 2024, pp. 1114–1120). Translation can therefore be located in specific institutional operations of retention, omission, and reorganisation.

At the same time, Iran's architectural past was being made newly visible through archaeology, preservation, museums, publications, and state commissions. Persepolis acquired particular authority within this field, not simply as a repertoire of forms but as material evidence in modern accounts of nation and architecture. At the Faculty, students drew Achaemenid capitals, made measured drawings of Iranian mosques and mausoleums, and responded to programmes for bazaars, shrines, and Iranian houses (Akhgar and Moulis, 2025, pp. 40–41; Akhgar, 2024, pp. 1120–1122). Grigor's reconstruction of the earlier "Orient oder Rom?" debate further shows that the historiography of Iranian antiquity had itself been shaped through transnational dispute, rather than formed as a self-contained counterpart to Europe (Grigor, 2007, pp. 562–564).

Beaux-Arts pedagogy did not introduce geometry, proportion, spatial hierarchy, or historical consciousness into an architectural culture that lacked them. It supplied a new institutional procedure through which Iranian knowledge and selected European precedents could be redrawn, compared, evaluated, and incorporated into modern programmes. Mohsen Foroughi's work makes this

process visible.

Mohsen Foroughi: Drawing Iranian Architecture through Beaux-Arts Pedagogy

With Mohsen Foroughi, the argument becomes both historical and architectural. As the first Iranian graduate of the École des Beaux-Arts, he moved between Paris, Tehran University, Iranian architectural memory, and public building. His drawings are read not as the final link in an uninterrupted line from Palladio to Iran, but as evidence of how Beaux-Arts conventions were adjusted to Iranian forms and changing programmes (Akhgar and Moulis, 2021, pp. 948–950).

In *Une École des langues orientales* of 1935, plan, section, and principal elevation share a single sheet (Fig. 4). Together they test the correspondence between circulation, spatial hierarchy, and façade. Palladio's Palazzo Antonini plate coordinates plan and elevation; Guadet extracts the Basilica's façade as an analytical precedent; Foroughi places coordinated views at the service of the *concours*. This is a methodological resemblance, not evidence of direct Palladian transmission. Although asymmetrical as a whole, the project is ordered through local axes. The elongated court, pools, vegetation, and repeated openings establish movement and depth, while the tiled *iwan* concentrates entrance, scale, ornament, and direction. It is therefore not merely an applied emblem of Iranian identity, but an organising element (École nationale supérieure

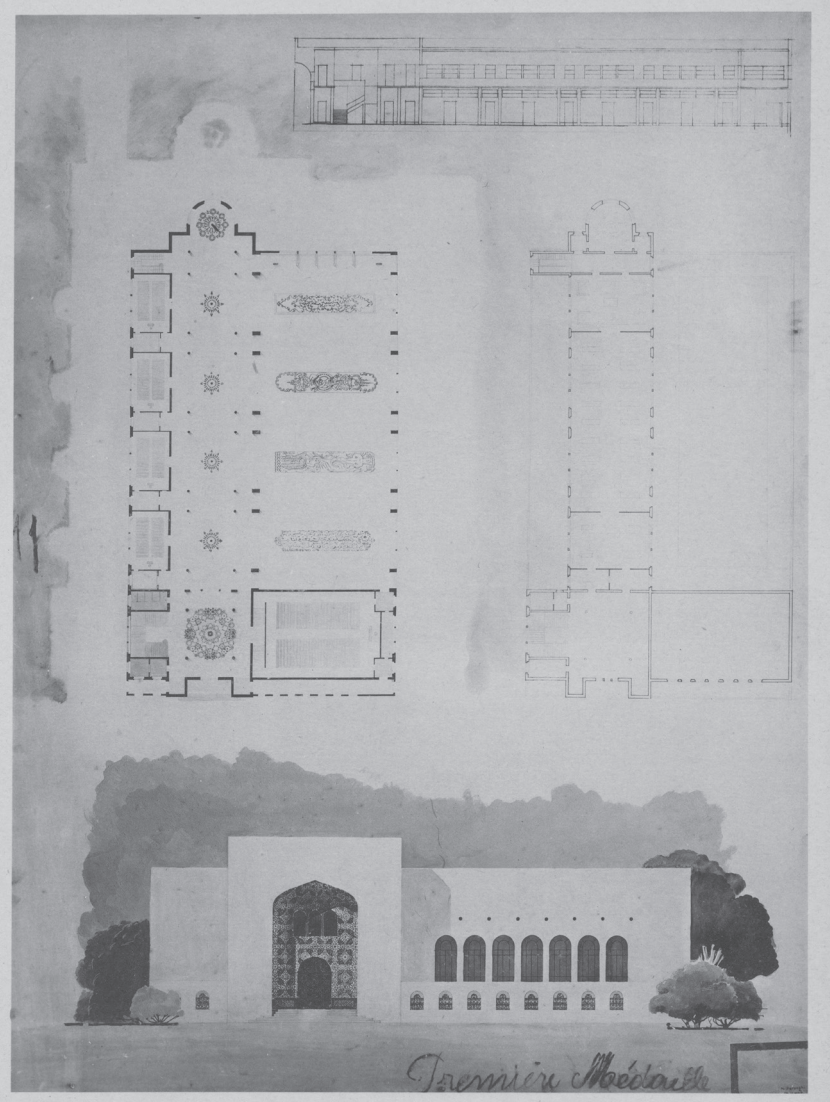
des beaux-arts, 1935, pl. 108; Akhgar and Moulis, 2021, pp. 949–951).

The 1937 diploma project, *Une Résidence d'été en Perse*, carries the experiment further (Fig. 5). Iranian architectural memory is no longer concentrated at the entrance. Courtyards, pools, gardens, *ravaqs*, and rooms are arranged through related but displaced axes. Perspectives present low volumes fitted to the mountain edge, while elevations and sections translate the sequence into differences of height, enclosure, and threshold. Whereas Palladio largely isolates a building as a measured object, Foroughi uses landscape, perspective, and implied movement to qualify the orthogonal drawings. In both cases, coordinated representation makes architectural relations available for examination, but the knowledge organised by the drawings and the setting in which it operates have changed (École nationale supérieure des beaux-arts, 1937, plates 108-109; Akhgar and Moulis, 2021, pp. 949-953).

After Foroughi's return to Iran in 1937, these procedures were tested against public programmes and construction. The Faculty of Law belonged to a university campus whose general disposition, materials, and restrained architectural language had been established under André Godard. Foroughi thus worked within an institutional framework rather than making an unrestricted personal statement. The published plan and exterior view reveal a more emphatic bilateral order than his

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ÉCOLE NATIONALE SUPÉRIEURE DES BEAUX-ARTS
LES CONCOURS D'ARCHITECTURE DE L'ANNÉE SCOLAIRE 1934-1935



26e Année

Vincent, Fréal et Cie, Paris

UNE ÉCOLE DES LANGUES ORIENTALES
M. Foroughi, élève de M. Umbdenstock

Première Médaille

ECOLE NATIONALE SUPERIEURE D'ARCHITECTURE
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Paris projects (Fig. 6). Two elongated wings frame the central composition; a U-shaped portico mediates between court and interior; and the amphitheatre occupies the dominant axis. Tilework and the pointed arch disappear, while the operations earlier concentrated in the *iwan*, including recess, threshold, depth, and axial address, are redistributed through the portico and monumental rectangular frames. This is not the survival of a form, but the recoding of its spatial work (Architecte, 1948, pp. 213–214; Akhgar and Moulis, 2021, pp. 956–958).

Foroughi's Bank Melli branches and the Saʿdi Mausoleum extended this procedure across civic and commemorative programmes. Axiality, shade, columned thresholds, and controlled tilework were recombined in relation to use, climate, and public representation (Akhgar and Moulis, 2021, pp. 958–960).

Fig. 4. Mohsen Foroughi, Une École des langues orientales, project awarded Première Médaille, École nationale supérieure des beaux-arts, 1935, pl. 108; plans, section, and principal elevation. Student of Gustave Umbdenstock. Source: Les concours d'architecture de l'année scolaire 1934–1935: vingt-sixième année; Bibliothèques de l'Université de Strasbourg/Numistral, record coll20/id/3232; public domain.

Foroughi was not simply a product of Beaux-Arts pedagogy. He used its representational and compositional procedures to make Iranian architectural knowledge operative within modern institutions. The comparison with Palladio rests here: not on shared forms, but on drawing's capacity to select, order, and reformulate architecture.

Conclusions: Drawing after Translation

This article has treated Palladianism not as direct influence or formal resemblance, but through the

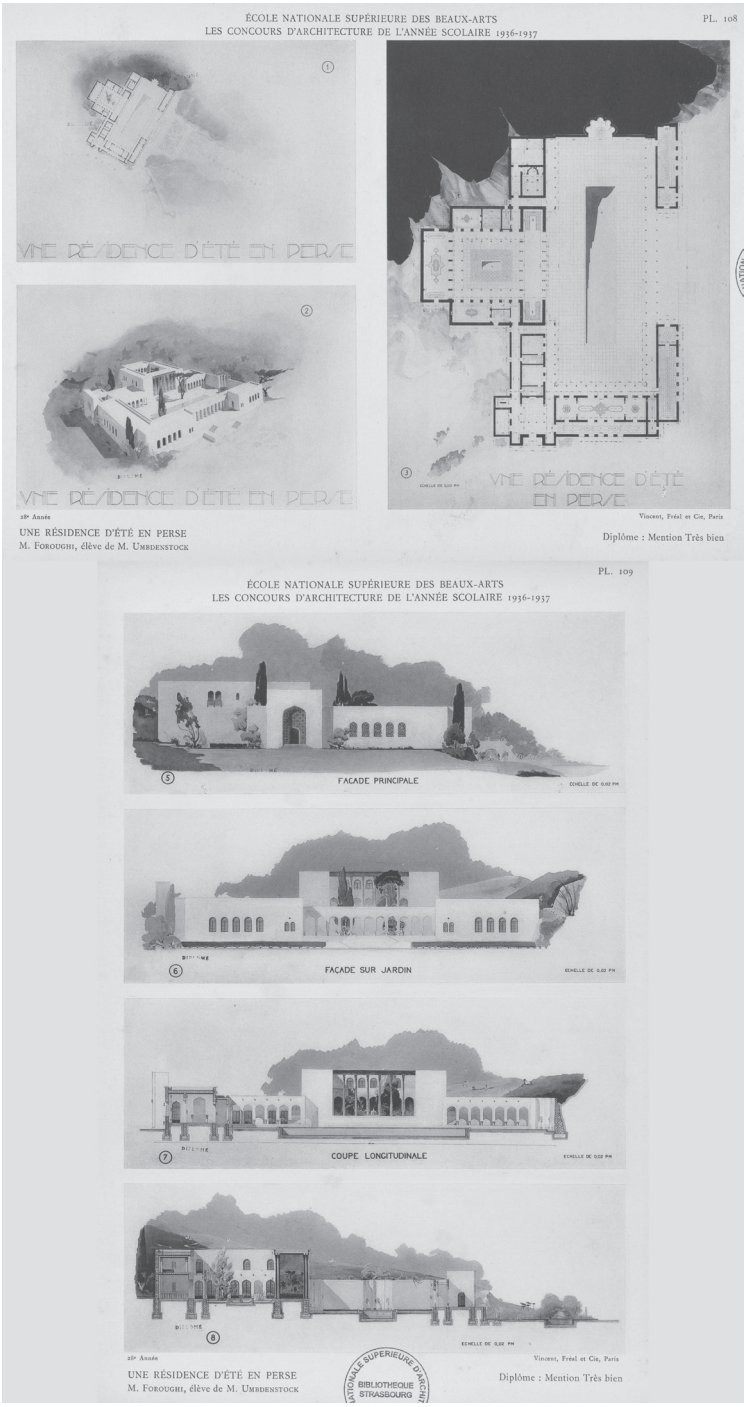
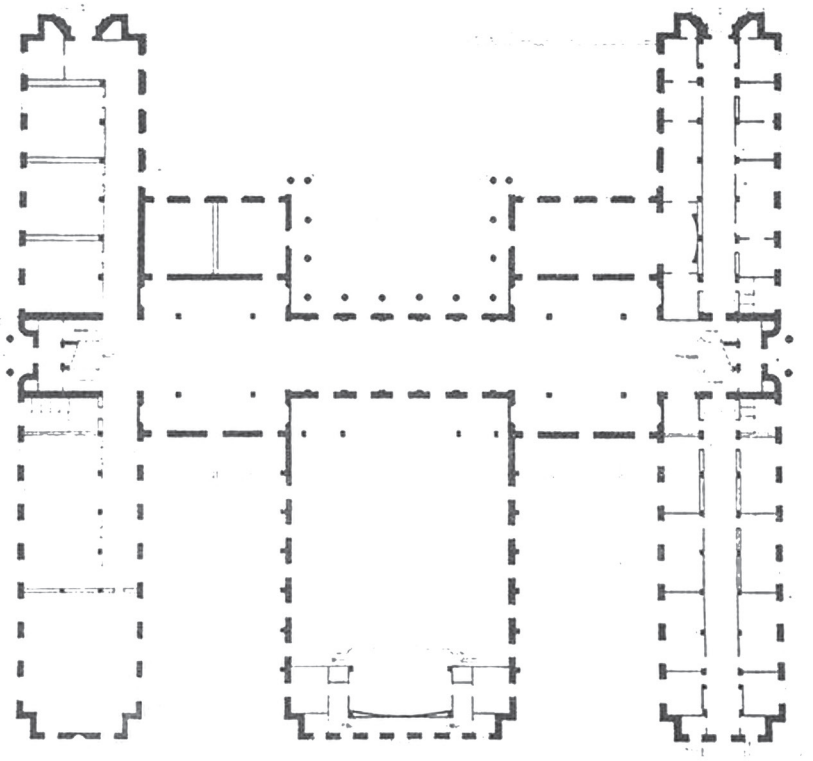


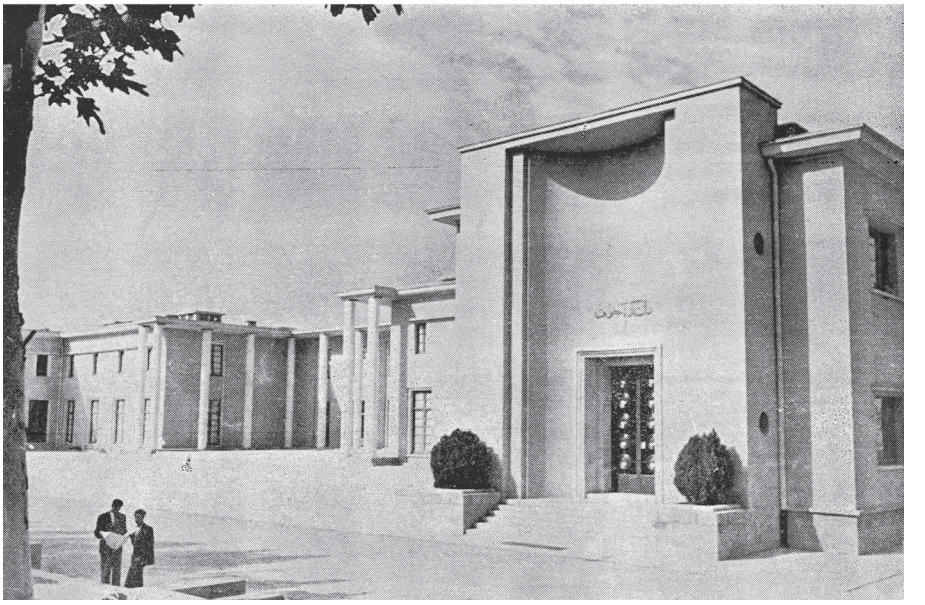
Fig. 5. Mohsen Foroughi, Une Résidence d'été en Perse, diploma project awarded Mention Très bien, École nationale supérieure des beaux-arts, 1937, student of Gustave Umbdenstock. Above: plans, site organisation, and perspectives, pl. 108. Below: principal and garden elevations and longitudinal sections, pl. 109. Source: Les concours d'architecture de l'année scolaire 1936–1937: vingt-huitième année; Bibliothèques de l'Université de Strasbourg/Numistral, records coll20/id/3869 and coll20/id/3871; public domain.

changing transferability of architectural knowledge. Its historical claim is limited but specific: Blondel compared Palladian proportions, Le Roy placed Palladio among several authorities, and Guadet treated his architecture as material for compositional analysis. Together, these cases demonstrate selective reception rather than an uninterrupted genealogy from *I quattro libri* to the École des Beaux-Arts and Iran. The relationship proposed here is a historically documented methodological comparison.

The images reveal the consequences of that distinction. Palladio coordinates plan and elevation as a measured whole; Blondel converts proportion into a comparative table; Guadet isolates a façade as an analytical precedent. Foroughi uses related operations, including coordinated views, hierarchy, axial ordering, and abstraction, but redirects them towards different programmes, landscapes, and traditions. Graphic procedures persist, while the architecture they produce changes.

In Iran, Beaux-Arts pedagogy entered an existing architectural culture. At Tehran University, its procedures were modified through institutional regulations, Persian translation, Iranian historical study, and local building concerns. Foroughi's student projects and the Faculty of Law make this process visible: the *iwan*, courtyard, garden, and portico were neither preserved unchanged nor applied as signs of identity. Their spatial work was reconsidered through sequence, enclosure, shade, landscape, and public programme.





"Between Palladio and Persepolis" therefore names neither an opposition between West and East nor a stylistic passage from one monument to another. Palladio marks one mode of codifying architecture through print and drawing; Persepolis marks an ancient past made newly operative through archaeology, historiography, institutions, and education. Drawing after translation is therefore not the survival of an original model, but the medium through which architectural knowledge is selected, tested, altered, and made operative elsewhere.

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Fig. 6. Mohsen Foroughi, Faculty of Law, University of Tehran. Above: ground-floor plan. Below: exterior view of the principal entrance. Sources: plan from Architecte, no. 6 (June 1948), p. 214, fig. 216; photograph, 1939, photographer unknown, "University of Tehran Faculty of Law 1318.jpg," Wikimedia Commons, public domain in Iran. Composite by the author.

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Ideal geometry and built reality in Gothic cathedrals

A comparative analysis through terrestrial laser scanning

David Moreno-García, Albert Samper
Universitat Rovira i Virgili

GOTHIC ARCHITECTURE
TERRESTRIAL LASER SCANNING (TLS)
ARCHITECTURAL SURVEYING
DIGITAL HERITAGE
GEOMETRIC ANALYSIS

This paper analyses the geometric differences between traditional architectural documentation and terrestrial laser scanning (TLS) surveys of five European Gothic cathedrals: Girona, Mallorca, Narbonne, Laon and Chartres. Whereas historical drawings rely on idealised geometries that synthesise a building's spatial and constructional logic, TLS records deformations, irregularities and construction tolerances that traditional methods rarely capture. The research combines TLS campaigns, CAD redrawing of historical documentation, and alignment and overlay procedures to compare historical plans and sections with point-cloud models. The results reveal a high degree of overall agreement between the two approaches, although significant discrepancies are identified in certain geometric parameters, particularly nave heights, the positions of vault keystones, and specific irregularities arising from medieval construction processes. Narbonne Cathedral exhibits the greatest divergences from the historical documentation, particularly in certain elements of the central nave and the study demonstrates that digital documentation technologies not only improve the metric accuracy of architectural heritage records but also serve as critical tools for reinterpreting the relationship between ideal representation and built reality in Gothic architecture.

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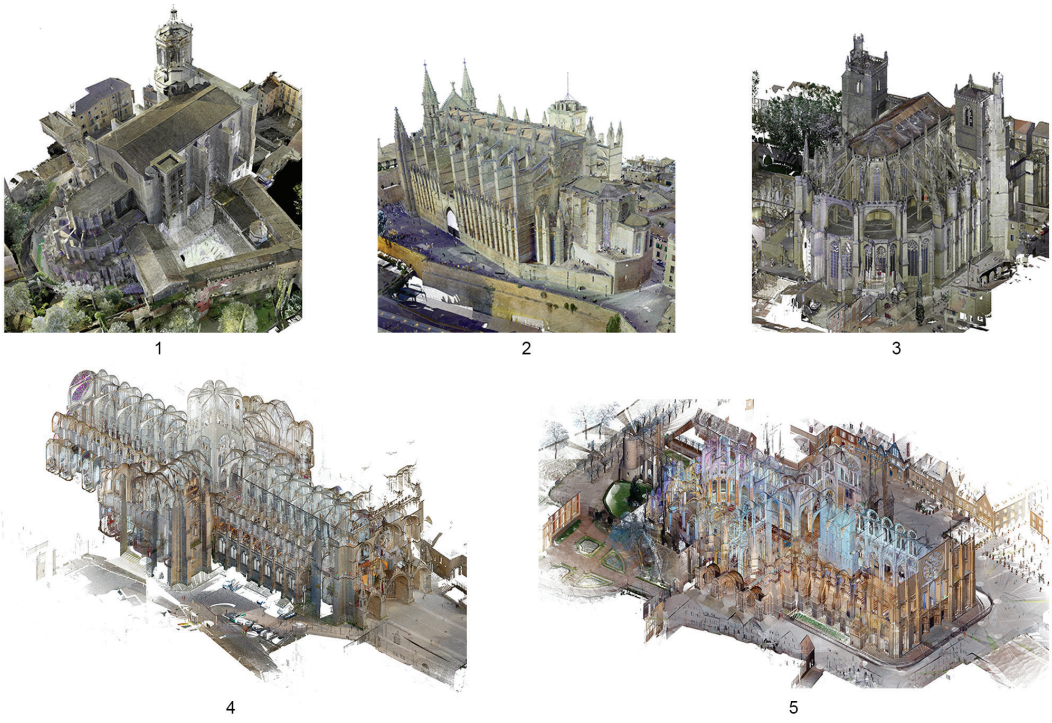


Fig. 1. Models generated from the digitization of the five cathedrals examined in this study: 1) Girona Cathedral, 2) Mallorca Cathedral, 3) Narbonne Cathedral, 4) Laon Cathedral, and 5) Chartres Cathedral. Image produced by the authors.

Introduction

Since the Middle Ages, Gothic cathedrals have been interpreted through geometry and graphic representation, from the drawings of Villard de Honnecourt to modern historiographical studies (Barnes, 2009; Ruskin, 1880). Architectural drawing has historically been a fundamental tool for documenting, analyzing, and communicating knowledge of how these buildings were constructed, providing a spatial synthesis of geometric, structural, and compositional principles.

Subsequent studies have explored both the expressive qualities of Gothic architecture and the geometric characteristics of Catalan and French Gothic architecture (Cirici Pellicer, 1968; Sureda, 2005; Adams, 1980; Berry, 1975; Bouxin, 1890; Plouvier, 1997).

Traditional architectural representation through plans, sections, and elevations has provided a coherent and ordered reading of cathedrals, although often based on idealized geometries. Historical surveys tend to correct deviations, regularize axes, and simplify irregularities resulting from prolonged and complex construction processes (San José Alonso, 2018). Recent research on Girona Cathedral has demonstrated how the successive involvement of different master builders and extended construction periods generated geometric variations that are difficult to accommodate within a single ideal scheme (Rabasa Díaz & Alonso Rodríguez, 2017; Moreno-García 2024).

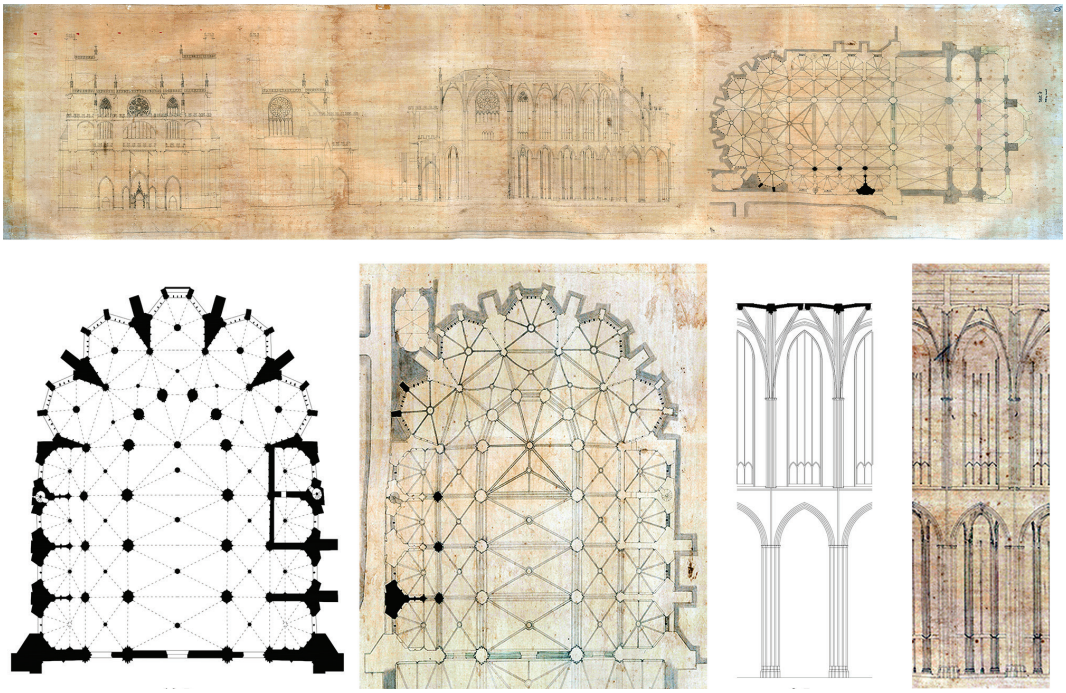
Similarly, specific studies of Chartres and Nar-

bonne have highlighted the formal and symbolic complexity of particular architectural elements, such as triforia and the spatial systems of Gothic naves (Bonjour & Petitdemange, 1996; Bunjes, 1943; Laurent, 1887; Paul, 1991).

In recent decades, the development of terrestrial laser scanning (TLS) and digital documentation techniques has profoundly transformed architectural surveying and the study of historic heritage. These methods enable the generation of highly accurate three-dimensional point clouds capable of recording deformations, construction tolerances, and geometric variations that are difficult to identify using traditional surveying methods (Mataix Sanjuán et al., 2013; San José Alonso, 2018).

Several studies have also demonstrated the potential of TLS for the geometric and structural analysis of Gothic architecture, particularly in the study of vaults, arches, buttresses, and complex spatial systems (Moreno-García et al., 2022; Samper et al., 2022). Despite these advances, the relationship between the idealized geometries conveyed by historical documentation and the built reality recorded using TLS remains underexplored. In this context, this paper analyses the geometric differences between traditional architectural documentation and contemporary terrestrial laser scanning surveys of the cathedrals of Girona, Mallorca, Narbonne, Laon, and Chartres (Fig. 1).

By comparing vectorized historical plans and sections with models derived from point clouds, the study examines how digital technologies enable the ideal geometries conveyed by architectural



historiography to be assessed against the digitally recorded built reality.

The aim is not to establish an opposition between historical representation and digital documentation, but to analyze how the two approaches can complement one another.

While traditional drawings remain fundamental to understanding the design and compositional logic of Gothic architecture, TLS enables the precise recording of deviations, irregularities, and transformations accumulated during construction processes. Combining the two approaches thus provides a more nuanced and accurate reading of historic architectural heritage.

Fig. 2. The upper part shows an original drawing by Viollet-le-Duc depicting the principal architectural drawings of Narbonne Cathedral. The lower part presents the CAD vector reproduction prepared from this historical documentation. Image produced by the authors.

1. Methodology

1.1. Selection and analysis of traditional architectural documentation

The study draws on a selection of traditional architectural documentation from specialist literature and historical archives. For each of the five cathedrals analyzed—Girona, Mallorca, Narbonne, Laon, and Chartres—a representative plan of the entire building and a section or elevation of one of the main bays of the central nave were selected. These documents provide the basis for reconstructing the idealized geometries conveyed by historiography and the tradition of architectural surveying.

For Chartres Cathedral, the sources consulted included studies focusing on the spatial and symbolic interpretation of the building, as well as research on specific architectural elements (Adams, 1980; Bonjour & Petitdemange, 1996, 1996; Bunjes, 1943). For Laon Cathedral, historical and architectural publications addressing both the building and its urban context were used (Berry, 1975; Bouxin, 1890; Plouvier, 1997). For Narbonne, the documentary selection drew on studies of the construction of the east end and the formal analysis of the projecting triforium (Laurent, 1887; Paul, 1991), together with the acquisition of an original drawing by Viollet-le-Duc (Fig. 2).

For Girona Cathedral, recent research focusing on the geometric and constructional analysis of the building was used (Rabasa Díaz & Alonso Rodríguez, 2017; Moreno-García, 2024), while the study

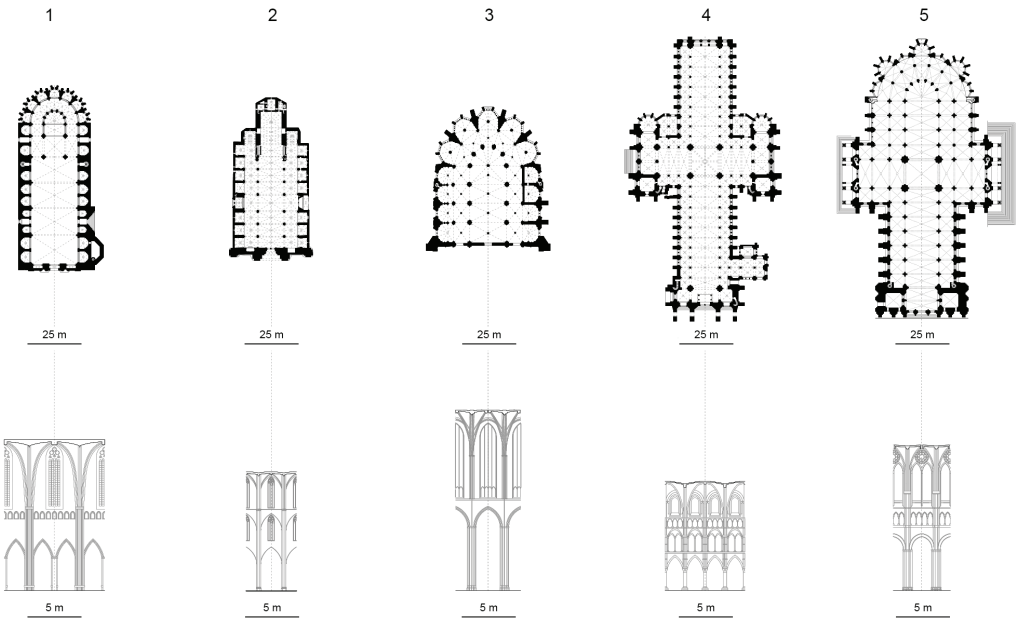


Fig. 3. Plans and sections resulting from the CAD vector reproductions of the historical documentation for the five cathedrals analyzed. Image produced by the authors.

of Mallorca Cathedral drew on historical documentation and architectural surveys commonly used in research on Mediterranean Gothic architecture (Cram, 2015; Sureda, 2005).

All selected documents were redrawn in CAD vector format to standardize scales, graphic conventions, and levels of precision (Fig. 3). This process provided a consistent documentary basis for comparison with the models derived from point clouds acquired through terrestrial laser scanning.

1.2. Digitization campaigns and comparative procedure

The metric basis of the study consists of terrestrial laser scanning (TLS) campaigns carried out at the cathedrals of Girona, Mallorca, Narbonne, Chartres, and Laon between 2019 and 2026 (Table 1). Leica RTC360 and Leica BLK scanners were used

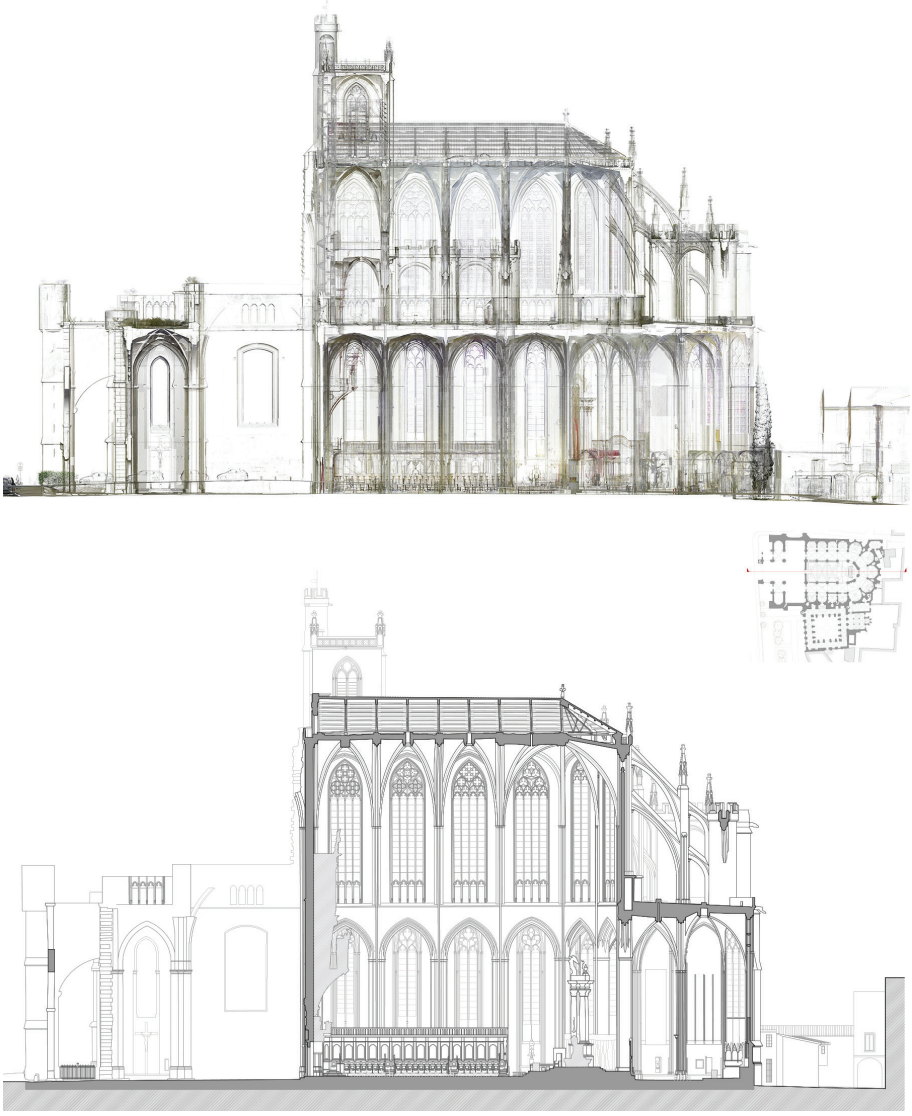
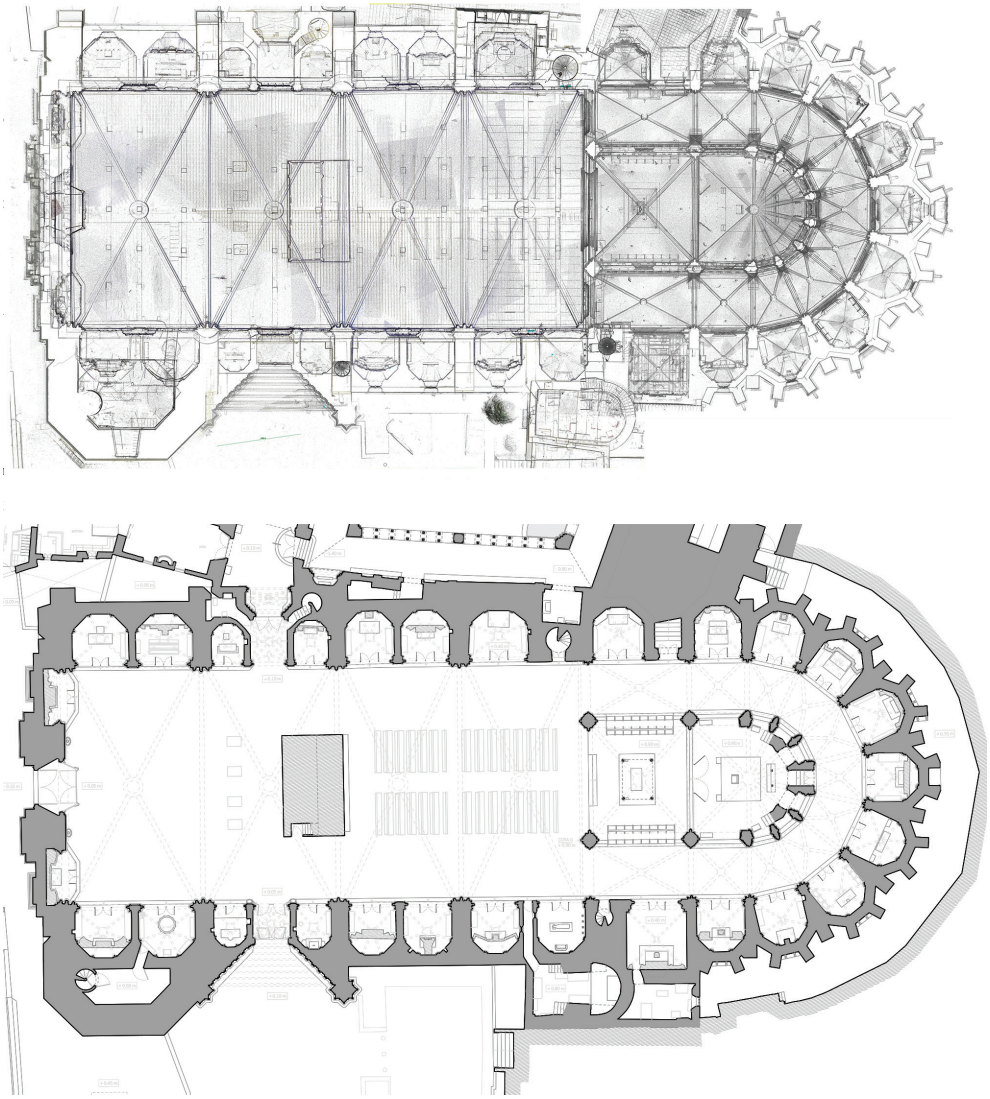


Fig. 4. Longitudinal section of Narbonne Cathedral in vector format and an orthoimage generated from the point cloud acquired through terrestrial laser scanning (TLS). Image produced by the authors.

Fig. 5. Plan of Girona Cathedral in vector format and an orthoimage generated from the point cloud acquired through terrestrial laser scanning (TLS). Image produced by the authors.



across these campaigns to acquire dense point clouds of the interiors and accessible exterior areas, ensuring a level of geometric accuracy suitable for architectural analysis. Girona Cathedral was digitized in 2019, Mallorca in 2021, and Narbonne in 2023 using a Leica RTC360 scanner, while the campaigns at Chartres and Laon were conducted in 2026 using a Leica BLK scanner. The surveys prioritized the documentation of naves, transepts, apses, and other areas of particular geometric complexity, such as vaults and structural junctions. Scans acquired from the different positions were registered to generate unified three-dimensional models, with registration errors of a few millimeters. In some cases, the TLS documentation was supplemented by photogrammetry to facilitate the interpretation of specific architectural elements (Mataix et al. 2013; San José 2018). Horizontal and vertical slices were extracted from the registered three-dimensional point cloud models to obtain plans, sections, and orthoimages corresponding to the traditional architectural documentation. These documents were subsequently vectorized in CAD format to standardize scales, graphic conventions, and levels of precision (Figs. 4–7). The historical documentation and the TLS-derived models were compared through geometric alignment and overlay procedures within a common reference system. In plan, alignment was based on the principal axes of the piers and the longitudinal axis of the nave, while floor lines, imposts, arch springing, and vault keystones were used as references in section. This procedure enabled the idealized geometries conveyed by historical drawings to be assessed against the built

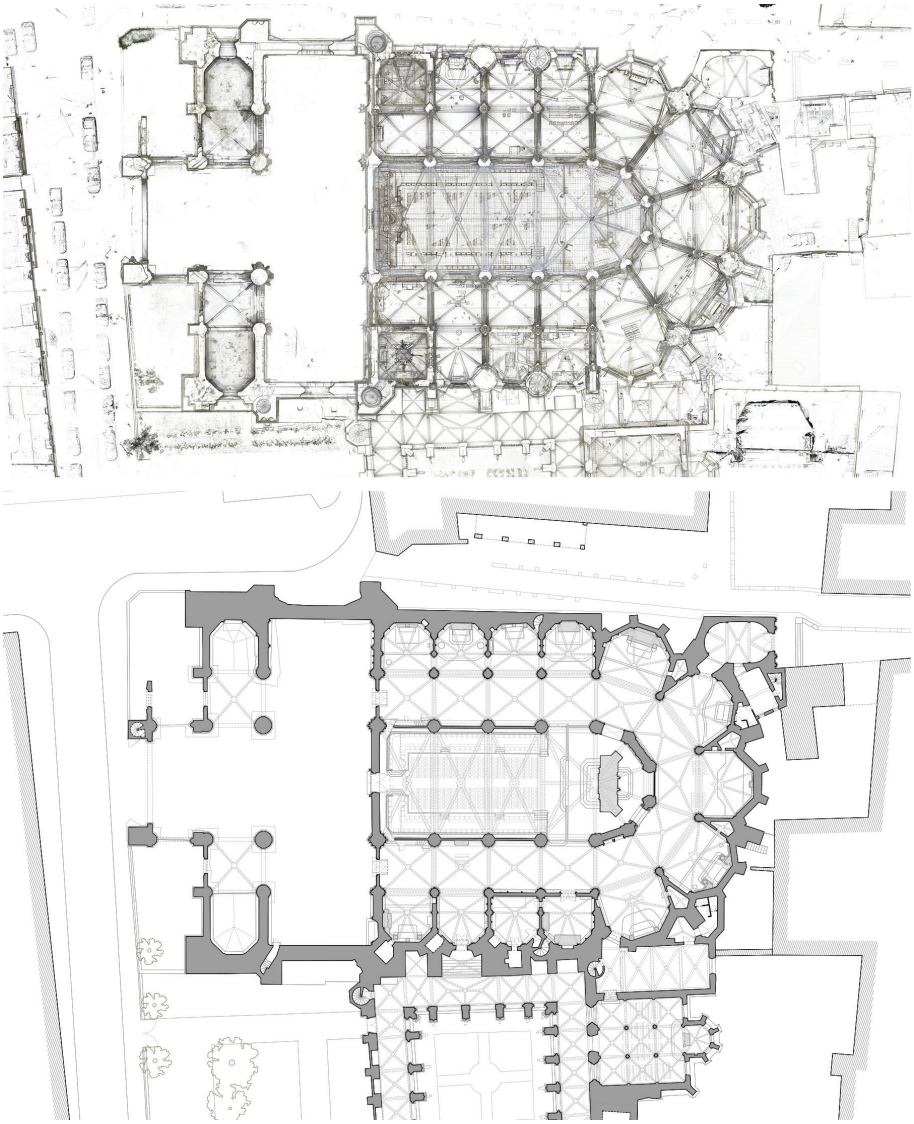
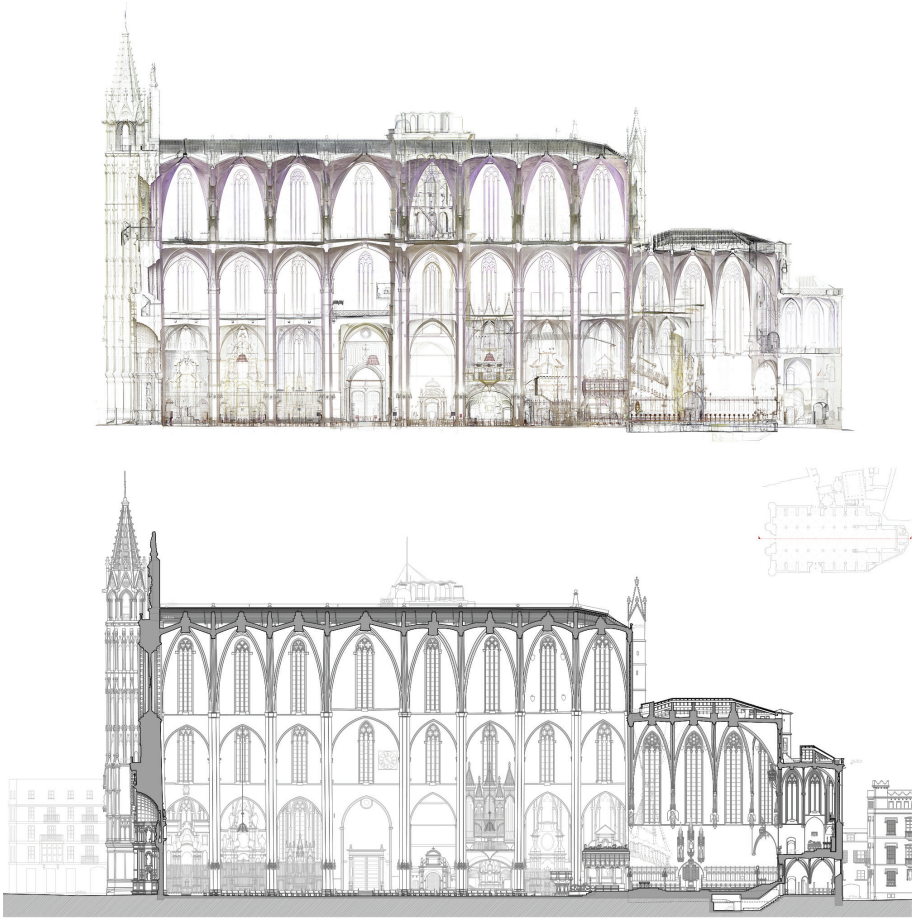


Fig. 6. Plan of Narbonne Cathedral in vector format and an orthoimage generated from the point cloud acquired through TLS. Image produced by the authors.

reality recorded using TLS, revealing deviations in alignment, variations in structural bay spacing, and geometric differences accumulated during medieval construction processes.

Cathedral	Girona	Mallorca	Narbonne	Laon	Chartres
Scanning days	3	7	3	1	1
Scan positions	838	1250	613	236	260
Registration links	891	1491	734	278	327
Number of points	18M	21M	12M	32M	22M
Mean error	2 mm	4 mm	3 mm	4 mm	5 mm

Table 1. Parameters of the digitization campaigns for the five cathedrals.



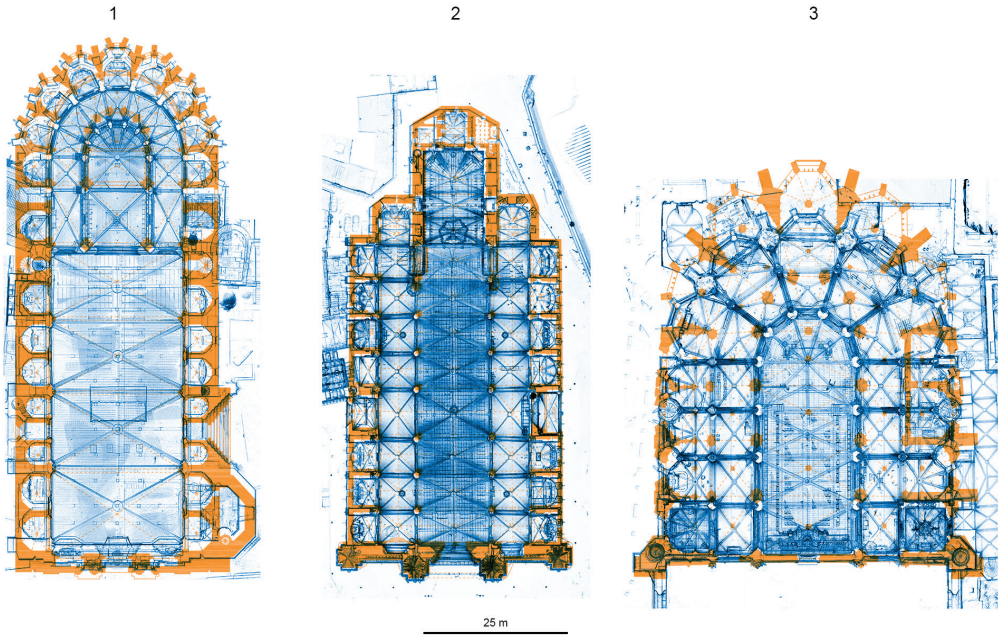
Results and conclusions

Following the application of the methodology described above and the overlay of the vectorized historical documentation and the models obtained through terrestrial laser scanning (TLS), subtle but significant geometric discrepancies can be observed between traditional representations and the built reality recorded in the point clouds (Figs. 8–10).

The differences identified were partly foreseeable, since the historical surveys were carried out using manual methods and served primarily representational and interpretative purposes rather than strictly metric ones. Nevertheless, the comparative analysis reveals geometric variations that become particularly relevant when assessed against highly accurate digital models. To ensure comparability between documents, alignment and scaling were performed using key architectural elements of each building as references. In plan, alignment was based on the width of the central nave and the principal axes of the piers, while in section, the structural bay spacing and the positions of the main load-bearing elements were used. This procedure minimized differences arising from the methods of representation and focused the analysis on actual geometric variations.

Fig. 7. Section of Mallorca Cathedral in vector format and an orthoimage generated from the point cloud acquired through terrestrial laser scanning (TLS). Image produced by the authors.

The results of the plan comparisons show a high degree of overall agreement between the historical documentation and the TLS-derived models (Figs. 8–9). The discrepancies identified primarily involve slight deviations in pier alignment, small variations in the spacing of certain bays, and mi-



nor differences in the geometry of some enclosing walls and side chapels. In most cases, these variations can be considered consistent with both the tolerances inherent in medieval construction processes and the limitations of traditional architectural surveying methods.

Narbonne Cathedral exhibits the most evident divergences. In this case, the geometric differences observed in both plan and section are greater than those identified in the other buildings analyzed, particularly in certain elements of the central nave and the east end.

The differences are even more evident in the section comparisons (Fig. 10). The greatest discrepancies occur precisely in those parameters that are most difficult to determine using traditional tech-

Fig. 8. Plan overlays of the vectorized historical documents (shown in orange) and the models obtained through terrestrial laser scanning (TLS), shown in blue, for the cathedrals of Girona, Mallorca, and Narbonne. Image produced by the authors.

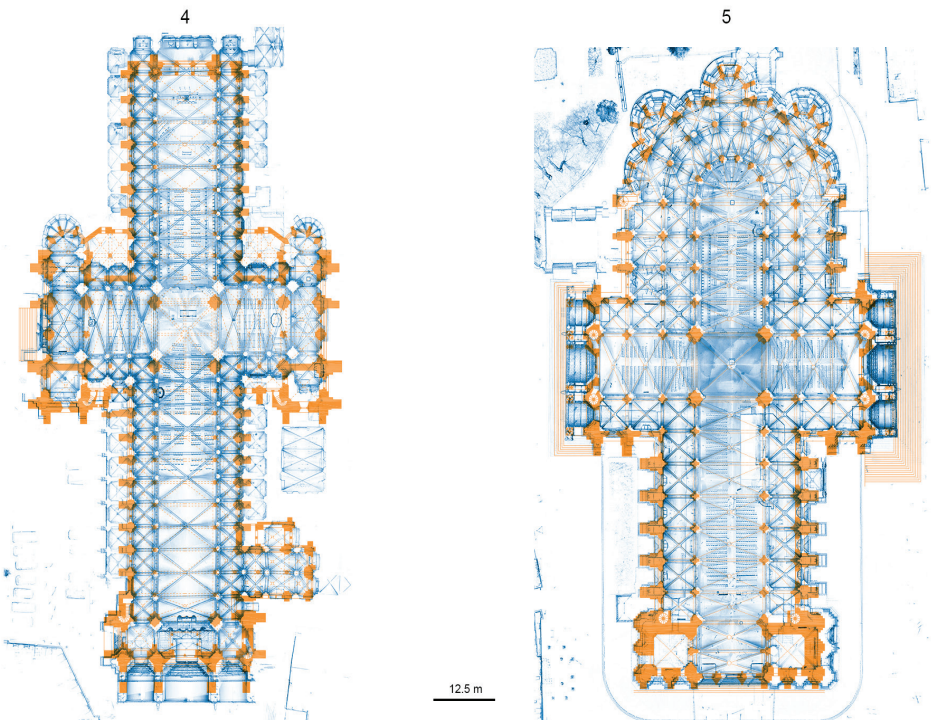


Fig. 9. Plan overlays of the vectorized historical documents (shown in orange) and the models obtained through terrestrial laser scanning (TLS), shown in blue, for the cathedrals of Laon and Chartres. Image produced by the authors.

niques, such as nave heights, the exact positions of vault keystones, and the actual curvature of certain arches. In this respect, Narbonne is again the most significant case and is also the building with the tallest central nave among the examples analyzed.

Beyond the metric comparison, the study invites reflection on the nature of architectural representation itself. Historical documents should be understood not only as exact reproductions of built reality, but also as graphic interpretations intended to synthesize compositional, spatial, and geometric principles.

By contrast, terrestrial laser scanning introduces a form of representation based on the precise cap-

ture of large volumes of data, capable of recording deformations, asymmetries, and deviations accumulated during the construction process.

The results show that the two approaches should be regarded as complementary rather than opposing. While traditional representation remains fundamental to understanding the design logic of Gothic architecture, TLS technologies allow these geometries to be assessed against the physical reality of the building as constructed.

Combining the two approaches thus provides a more nuanced and accurate reading of historic architectural heritage and opens new avenues of research into the geometry and construction of Gothic architecture.

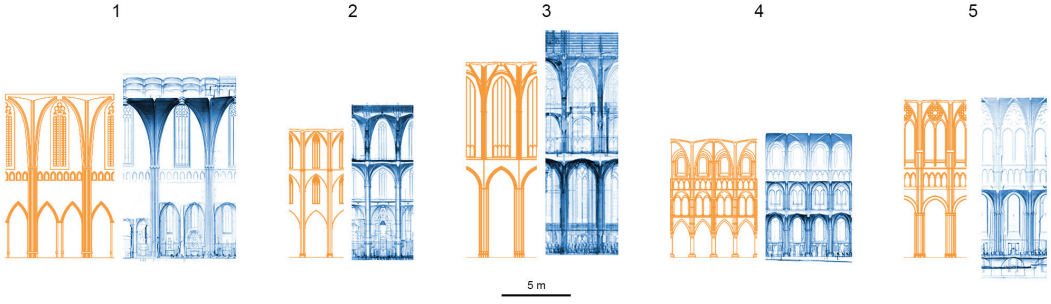


Fig. 10. Section comparisons between the vectorized historical documents (shown in orange) and the models obtained through terrestrial laser scanning (TLS), shown in blue. Image produced by the authors.

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Space in classical Chinese and Italian painting

Late Renaissance conceptual and geometric devices

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ARCHITECTURAL SPACE
PERSPECTIVE
CULTURAL HISTORY
CHINA
ITALY

This article offers a comparative view of the development of representations of architectural and open spaces in Chinese and Italian paintings and drawings. Architectural historians have long discussed the concept of space within theories of aesthetic perception and cognition. Their works, however, have bound the study of spatial conception to extraneous notions such as artistic freedom, and to a teleological view of Modernism as the end(s) of all spatial development in architecture and its artistic representation. Examining the representation of space in premodern art makes it possible to understand spatial articulation in architecture, urban and landscape design in terms of the cultures that produced it, free from the assumptions of modern theory. Chinese and Italian art of the fourteenth and fifteenth centuries, as seen through the eyes of sixteenth-century critics, is particularly relevant to such a study: both traditions reckoned with their past in light of contemporary efforts to assert new systems of territorial governance and to define the relationship between technical and gentlemanly approaches to art and architecture. Through a study of a few canonical works of two-dimensional spatial representation, the article explores concepts such as void and form, depth and shallowness, and their political and cultural significance in both societies.

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Introduction

The comparative study of art and architecture helps clarify the particular features that set cultures and historical periods apart from one another. Although most scholarship in recent decades has specialized in detailed study within specific cultural boundaries or, at most, in cultural exchanges documented with textual sources, cross-cultural comparison of artistic methods can enhance our awareness of preferences and techniques employed in different contexts. Such is the case when investigating how Chinese and Italian art in the fourteenth and fifteenth centuries approached the problem of showing three-dimensional space on the two-dimensional surface of representational drawings and paintings. The dialogues on *Raffaello and Zhang Zeduan* promoted by the Pinacoteca di Brera in 2020 (Bradburne, 2020) set a valuable precedent for such an approach.

This study explores the construction of space in Chinese and Italian paintings, starting out from the writings of two later artists, critics and historians: Dong Qichang and Giorgio Vasari (Vasari, 1568/1991; see Cahill, 1978, for Dong). It investigates the different representational devices that came to be regarded in these critics' time as the hallmarks of these artistic cultures, namely, the manipulation of empty space on the Chinese picture plane and the construction of geometric perspective in Italian scenes. Deploying these devices in painting, however, entailed pictorial and conceptual contradictions inherent in their principles. The way artists and critics in China and Italy ac-

knowledged and worked with these contradictions gives insights into the rising status of art as an intellectual pursuit and of the artist's craft as a body of theoretical knowledge in the sixteenth and seventeenth centuries.

The depiction of space in paintings and drawings was a major concern among formalist schools of art historiography. Even though (more or less) deterministic approaches such as Wölfflin (1950)'s have been discredited or rendered moot, a few texts from the early- to mid-twentieth century still bear, if surreptitiously, upon our understanding of architectural space and its significance for art history. Among these are Panofsky (1997)'s interpretation of the representation of space in linear perspective as bearer of symbolic meaning, and especially Schmarsow's theory (Schwarzer & Schmarsow, 1991), later developed by Bruno Zevi and Argan (1961/1973), that the evolution of spatial awareness is the marker of historical change in architecture.

This study proceeds, as per Kita (1999)'s definition, by anthology, or, as in Gombrich (1996)'s terms, by collecting symptoms of a cultural syndrome rather than looking for a deterministic relationship between cause and effect. This is because the argument of this article hinges on explorations with methods of spatial representation that, as Scott (1914) once warned regarding interpretations of Renaissance architecture, cannot be thought of as a teleological search for a preordained solution. Moreover, Evans (1995) reminds us that the seem-

ing unity of classical compositions is a brilliant but contrived achievement made up of contradictory applications of an underlying principle. It is this tension between intellectual pursuits that are widespread in a given historical period and cultural context, on the one hand, and the need to account for technical or conceptual difficulties that arise from the actualization of those pursuits, on the other, that give its defining character to Chinese and Italian representations of space from the fourteenth to the sixteenth century.

1. Intellectual space

The development of distinct methods for depicting or projecting space on the picture plane, and even the rise and fall of interest in the search for such methods, remain relevant in the comparative study of art history. Even more so, the reciprocal influence of spatial articulation in pictorial art and in architecture (including landscape design) makes technical challenges and intellectual interests visible through the works. This relevance was constructed by the retrospective gaze of writers of art history and theory in later periods of Chinese and Italian art, namely the late Ming-dynasty (1368–1644) painter Dong Qichang (1555–1636, Fig. 1) and the Florentine painter and architect Giorgio Vasari (1511–1574, fig. 2), both of whom established a canon of interests in subjects and methods of depiction. Dong's history and theory of landscape painting, concerned with the role of intuition in the appreciation and representation of landscapes since the Song dynasty (960–1279), became known



Fig. 1. Attributed to Jacopo Zucchi, *Portrait of Giorgio Vasari* (formerly considered a self-portrait), 1571–74, oil on canvas. Florence, Gallerie degli Uffizi, [inv. 00021975]. Courtesy of the Ministero della Cultura – Gallerie degli Uffizi.

to Western readers in part thanks to Cahill (1978). Vasari, likewise, was interested in the evolution of artistic technique in Italy since the Gothic period (late thirteenth century) up to his own time, the mid-sixteenth century.

In both Vasari's and Dong's writings, the interest in the works of earlier artists was linked to their concern for the current state of art. It was with this in mind that Dong grouped Song dynasty landscape painting into two "schools," the Northern and the Southern. The distinction was not geographic but hinged on different modes of depicting spatial depth in the landscape. This, in turn, was based on an analogy with the Northern and Southern Chan (Zen) philosophical schools.

This seemingly technical distinction was a political argument as well. Like many of his contemporaries in the late Ming dynasty, Dong looked to the Song dynasty as a golden age of culture and society, and to its art as the classical model to be followed by contemporary artists. Moreover, Dong's art historical categories also celebrated the rise of the *literati*, who were ethnic Han gentleman artists such as himself, at the expense of court painters, who in hindsight came to be associated with professional service to the later Yuan (Mongol) dynasty. This narrative provided a foil to Dong's own turbulent times, when the Ming dynasty was under mounting pressure both from another foreign power, the Manchus who would eventually overrun China starting in 1644, as well as from the failings of the Ming's own administration, to which Dong belonged. His narrative about an earlier age of artistic brilliance overshadowed by imminent collapse was therefore a model for his own time, and not only in the aesthetic sense.

Therefore, to grasp Dong's awareness that he lived in a "late" period of art and history as opposed to the "high" age of classical painting, we must understand the pictorial space of this classical age was, to him, more of a philosophical concept than a geometric device. The depiction of space in landscape paintings was the core of Dong's definition of the Northern and Southern schools of painting. Accordingly, Dong characterized the Northern school as that which represented space with a gradual buildup of layers from the foreground to the middle ground and background, as in Juran's (fl. ca. 960–980) hanging scroll *Seeking the Tao in*



Fig. 2. Xu Zhang (1694–1749), posthumous portrait of Dong Qichang, from the album *Songjiang bangyan huaxiang (Portraits of Eminent Men of Songjiang)*, 18th century, ink and colour on paper. Nanjing Museum.

Autumn Mountains (Fig. 3). This resembled the rolling landscape of north–central China but, more crucially, the Northern Chan school's gradual approach to achieving Buddhist enlightenment. Southern school paintings such as Guo Xi's (ca. 1020–ca. 1090) *Early Spring* (Fig. 4), on the other hand, are characterized by a sudden jump from a small foreground to towering mountains in the background, separating both planes with a mist-filled gap. The resemblance with the eroded peaks typical of some Southern Chinese landscapes is less important than the analogy to the Southern



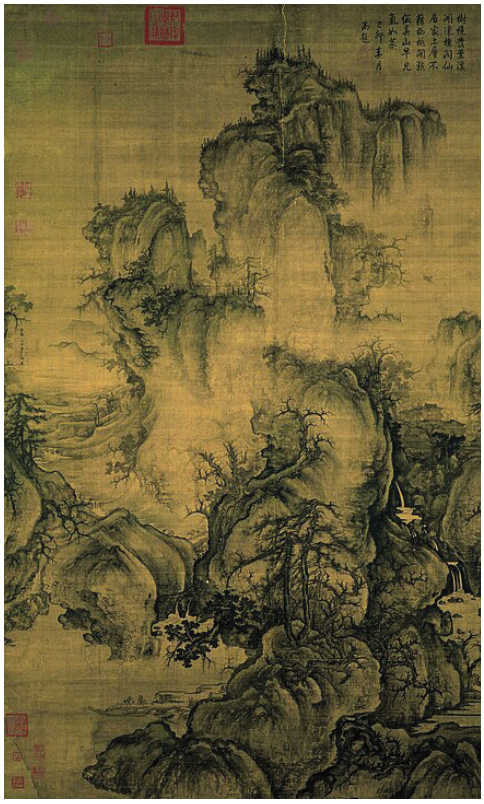


Fig. 3. Attributed to Juran, *Seeking the Tao in Autumn Mountains*, Five Dynasties–Northern Song, late 10th century, hanging scroll, ink on silk, 156.2 × 77.2 cm. Taipei, National Palace Museum, inv. Guhua 000021. Open Data, CC BY 4.0.

Fig. 4. Guo Xi, *Early Spring*, 1072, hanging scroll, ink and light colour on silk, 158.3 × 108.1 cm. Taipei, National Palace Museum, inv. Guhua 000053. Open Data, CC BY 4.0.

Chan's intuitive approach to enlightenment, said to come from a sudden awakening rather than gradual understanding.

Dong held the Southern school to be superior, as the similarity he perceived with intuitive enlightenment formed a convenient parallel to his ideal of the gentleman artist achieving aesthetic perfection through cultivated sensitivity rather than technical effort. At any rate, both Northern and Southern school paintings were named after the physical objects that appeared in them: mountains, streams, and so on. Yet, their most distinctive feature, that which Dong used to set both schools apart from each other, was not the depiction of things, but the character of the empty space between things. Moreover, as the Song-dynasty order broke down and the Yuan dynasty sidelined the ethnic Han ruling class, Han scholars retreated into intellectual and artistic pursuits. Ma Lin's (c. 1185–after 1260) *Scholar Reclining and Watching Rising Clouds* (Fig. 5) exemplifies what Lee & Ho (1964) argue was the lyrical and introspective response to the ongoing breakdown of classical Chinese society.

The contemplation of empty space through paintings thus gained even more prestige as an expression of cultivated, free-thinking minds spurred by the increasing popularity of Chan Buddhism (Ortiz, 1999, p. 7). The parallel is hard to miss between, on the one hand, Dong Qichang's ideal of the seemingly effortless intuition of the gentleman artist contemplating and expressing space, and, on the other, the ideal of gentlemanly *sprezzatura* put forward by Baldassare Castiglione, the famous

Renaissance courtier, a friend and collaborator of Raphael. The artistic equivalent of *sprezzatura* in demeanor was the idea of static balance Wölfflin (1888) saw in High Renaissance painting, even though its subject matter might seem to be at odds with balance or repose. Evans (1995) argued that, in the pictorial space of Raphael's fresco *Disputation of the Holy Sacrament*, completed in 1510 (Fig. 6), the appearance of effortless pictorial stability in reconciling contradictory perspective constructions and competing centers of interest was the key to the fresco's compositional strategy.

The Italian Renaissance artist strove to achieve a gentlemanly character of effortless repose through the studied contrivance of contradictory viewpoints in the pictorial space. Likewise, the Chi-



Fig. 5. Ma Lin, Scholar Reclining and Watching Rising Clouds (poem by Wang Wei), c. 1256, album leaf, ink on silk, 25.1 × 25.3 cm. Cleveland Museum of Art, 1961.421, John L. Severance Fund. Public domain (CC0).



Fig. 6. Raphael, Disputation of the Holy Sacrament (Disputa del Sacramento), 1509–10, fresco. Vatican City, Apostolic Palace, Stanza della Segnatura. Photo © Governatorato SCV – Direzione dei Musei.

nese gentleman claimed the highest artistic status by affirming that the appearance of effortless intuition was the greatest achievement of painting. Moreover, in both cases, the intellectual concept of space had to do with a change in the spiritual state of the observer through the contemplation of the painting: from material reality to immaterial introspection or spiritual contemplation.

2. Geometric space

The development of geometric techniques for depicting space on the picture plane involved, in China as in Italy, trade-offs between represen-



tational possibilities gained and lost. The emergence of articulated space in Chinese painting can be traced back to the rock-cut reliefs and paintings of the Han dynasty (206 B.C.E.–220 C.E) tombs (Soullière, 2018) (earlier paintings were often made on soft supports, such as ink paintings on cloth or wood, or were mural paintings in palaces since destroyed, and thus have not survived).

Fig. 7. Attributed to Zhou Wenju, *United by Music*, Ming dynasty (15th–16th century). Art Institute of Chicago, 1950.1370 (CC0). Below, detail.

In these early scenes (X. Liu, 2002, p. 48), architecture figured prominently as a means of organizing the placement and importance of characters and episodes within a broader narrative scene. Later developments clarified the spatial structure. Tang-dynasty (618–907) court painters such as Zhou Wenju (917–975) (Fig. 7) used architecture, now represented in cavalier projection, as a spatial and symbolic framework to separate character groups and narrative episodes more effectively. Empty space in these pictorial tales increasingly acquired definite shape, bounded by buildings and figure groupings.

The contemporary theoretical framework in which this geometric technique developed is one of the thorniest subjects in the scholarship of Chinese art (see Bush, 2012b for a literature review of this controversy). What is of interest here is to note, following Bush (2012b, p. 10), that "the nonformal and even nontechnical aspects of this art" were given early on precedence over the geometric construction of drawings. Buildings were thus cursorily dismissed in an early treatise, Gu Kaizhi's *Essay on Painting* of the late fourth century, as unchallenging tasks that merely required time to complete (cited by Bush, 2012a, p. 24).

This precedence of nongeometric expression over geometric form continued to bear upon Dong's later interpretation of Chinese painting, and helps explain why we have no extant writings discussing cavalier perspective as opposed to the large body of European texts discussing linear perspective.

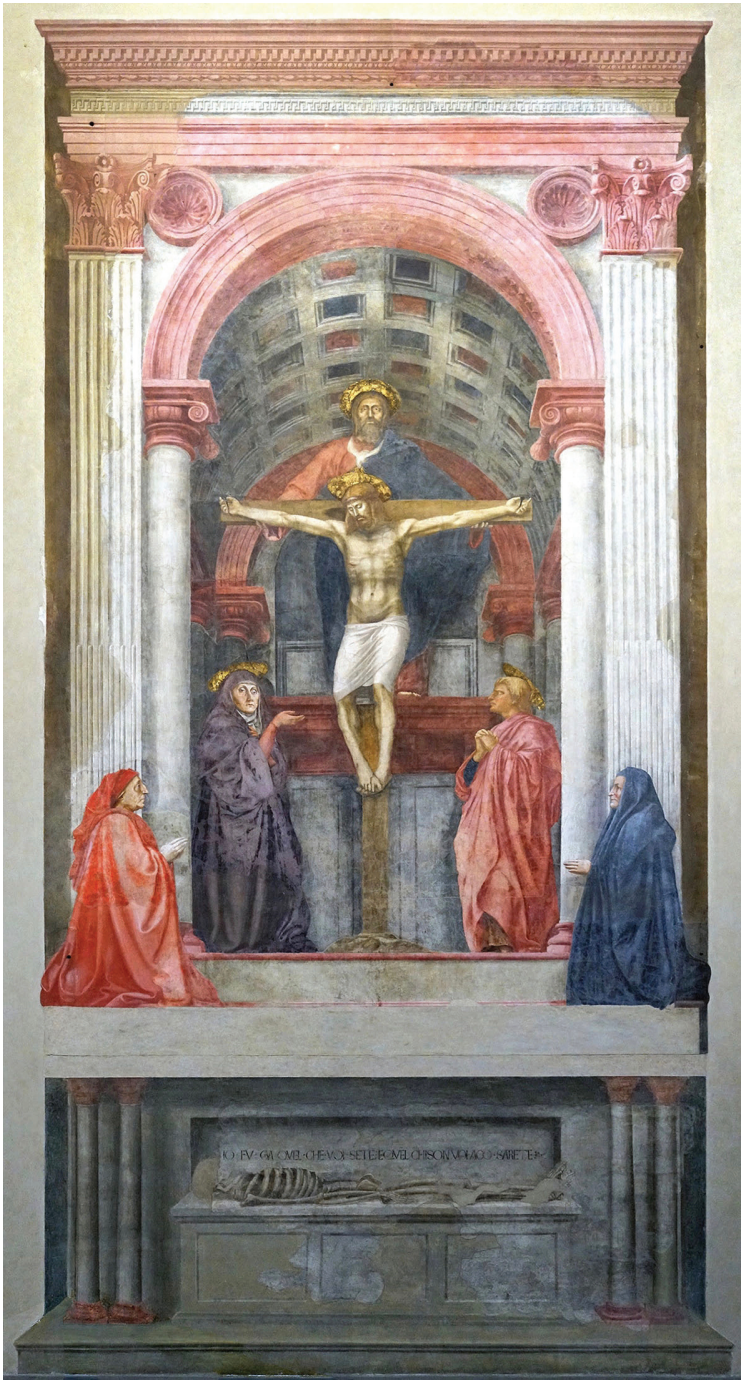
It was, then, during the process of development of Chinese landscape painting during the Song and Yuan dynasties and its revival under the Ming that the nonformal theory of art became canonical. Throughout these periods, artistic skill hinged on the tasteful manipulation of the space left as a blank expanse of mist on the scroll, and the geometric proficiency displayed by professional court painters, capable of constructing cavalier projections of great complexity and clarity, came to be regarded as a minor skill.

In Italian painting, from the fourteenth to the sixteenth century, on the other hand, there emerged steadily a body of techniques to portray the geometry of space from a given point of view, and this came to be regarded as one of the highest achievements in art. Italian authors from Alberti to Vasari, however, seem to have been oblivious to the fact that it was space itself that linear perspective enabled artists to portray, stressing instead the geometric structure of physical objects contemplated individually (Elkins, 1992).

Especially in the case of fresco painting, the geometric incongruity between the architectural space within which the viewer's position changes continually and the multiple perspective constructs of the painting creates a tension that developing techniques of geometric projection sought to address during this period, for example in Masaccio's (1401–1428) *Holy Trinity* (Fig. 8).

Fig. 8. Masaccio, *Holy Trinity*, c. 1425–1427. Fresco, 667 × 317 cm. Florence, Santa Maria Novella. Public domain via Wikimedia Commons.

This tension is often masked by the clarity with



which Renaissance artists manipulated architectural and pictorial space, endowing it with an overbearing appearance of unity. This was in part the result of technical choices that enforced an increasingly strict separation between incompatible points of view.

The articulation in Raphael's generation of a theory of architectural plans, elevations, and perspectives was thus not an incidental reading of Vitruvius, but a technical necessity to endow each kind of drawing with its own geometric coherence, hiding from direct scrutiny problems such as where lies the actual center of a centralized church (Evans, 1995). This imperfect conceptual articulation disguised as formal perfection is, as Scott (1914) perceived, the nature of Humanistic architecture, rather than a race to a definite goal of classical perfection. Still, in the necessary incompleteness of this system lies the nature of space as Renaissance artists understood it.

Our idealistic concept of architectural space as an awareness developing gradually throughout history, inherited from Schmarsow and even more explicitly from Zevi, is at odds with it, and this is why we have difficulty perceiving the original tension. Indeed, our modern (Pérez-Gómez, 1983) concept of space is the infinite, homeotropic expanse inherited from the Cartesian *res extensa*. In this kind of space, the task of architecture is to lay out objects such as the structural grid, partitions, and furniture to organize the preexisting reality of spatial expanse. More explicitly, modernist archi-

Fig. 9. Zhang Zeduan, *Along the River During the Qingming Festival*, Northern Song dynasty, early 12th century, detail. Handscroll, ink and colours on silk, 24.8 × 528.7 cm. Palace Museum, Beijing. Public domain (PD-Art), via Wikimedia Commons.

tectural theories and designs have stressed that the purpose of modern architecture is to enhance the perception of this spatial continuity, and to avoid disturbing it with preconceived geometric shapes, as Argan (1961/1973) stated. Renaissance space, on the other hand, has the nature of a heterotropic place brought into existence by the act of architectural *disegno*. Architect and theorist Krier (1988) went so far as to claim that having a definite shape that sets it apart from formless void is architecture's very reason for being.

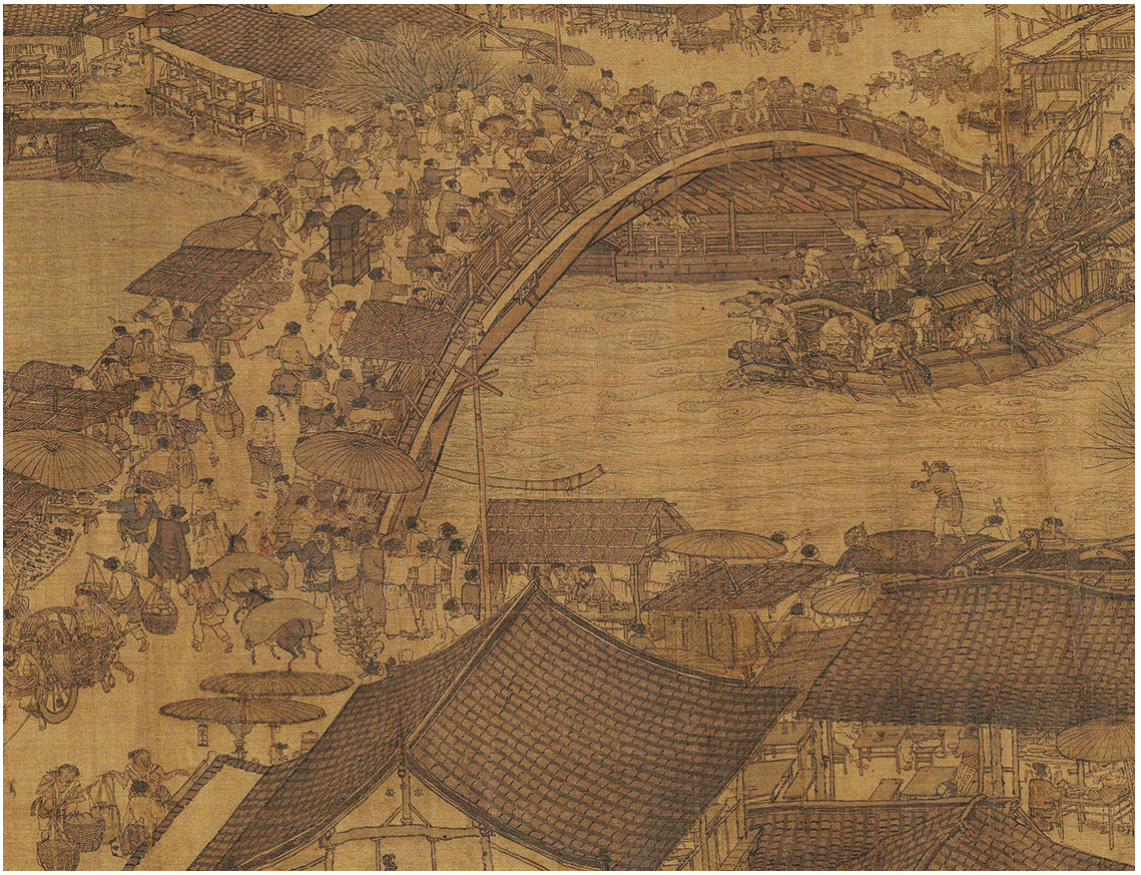




Fig. 10. Ambrogio Lorenzetti, *Effects of Good Government in the City and Countryside*, 1338–1339, detail of the city. Fresco. Siena, Palazzo Pubblico, Sala dei Nove. Courtesy of Comune di Siena – Museo Civico. Public domain (Google Art Project, via Wikimedia Commons).

4. Form and formlessness

After the Tang dynasty, courtly narrative painting as a technical endeavor gradually lost favor in China to landscape painting as a scholarly pursuit (J. Liu, 2003). Still, it was the ensuing Song dynasty that produced the masterwork of Chinese narrative painting, Zhang Zeduan's (1085–1145) *Along the River During the Qingming Festival* (Fig. 9). This painting was so famous that copies of it were commissioned under the ensuing Ming and Qing (1644–1912) dynasties.

Here, courtly painting appeared under a new guise, that of the virtuous ruler portrayed not directly, but through the representation of society as a whole, functioning in orderly fashion (The word *Qingming* may either refer to a specific holiday, its season in general, or to the concepts of purity and

clarity, prized by Chinese rulers), with the new taste for broad landscapes as the backdrop. It is useful to draw a parallel between the *Qingming* scroll and Ambrogio Lorenzetti's (fl. 1317–1348) allegories of good and bad government in the Palazzo Pubblico in Siena (Fig. 10). In the Sienese frescoes, too, space is put to narrative use, and as in the *Qingming* scroll, it must organize a myriad separate episodes on an unbroken visual sequence. Gothic painting affords a different take on spatial significance than Panofsky's view of linear perspective as "symbolic form." The spatial articulation of a Gothic narrative picture also departs from his argument that Gothic architecture parallels the organization of scholastic discourse.

Trachtenberg (2010) showed how this architecture can be interpreted not quite as a closed rhetorical argument made up of definite parts, but rather as an open-ended formal operation regulated by a proportional method.

Likewise, grand narrative paintings such as the Siena frescoes were structured in such a way as to allow for an open-ended narrative stream. What tied this sort of composition together, then, was its flexible spatial framework. Unlike Chinese courtly painting, which unified an episodic composition by means of the geometric regularity of cavalier projection, Italian Gothic painting did away with any conspicuous and deterministic spatial geometry. The piecemeal development of vanishing-point perspective throughout the fifteenth century, however, achieved a unified representation of



Fig. 11. Fra Angelico, *Annunciation*, c. 1440–1445. Fresco, 230 × 321 cm. Florence, Museo di San Marco, north corridor. By permission of the Ministero della Cultura – Direzione regionale Musei nazionali Toscana. Public domain, via Wikimedia Commons.

space and the objects within it. It did so, however, at the cost of forsaking the possibility of a narrative painting made up of chained episodes. To overcome this limitation, artists such as Fra Angelico (Fig. 11) and Piero della Francesca (Fig. 12) invented a pictorial device to separate moments or scenes within their compositions, which Schumacher (1987) called the deep space–shallow space division.

In contrast, explorations with spatial articulation in Chinese painting moved away from the rigor of a geometric projection, even if the cavalier projec-

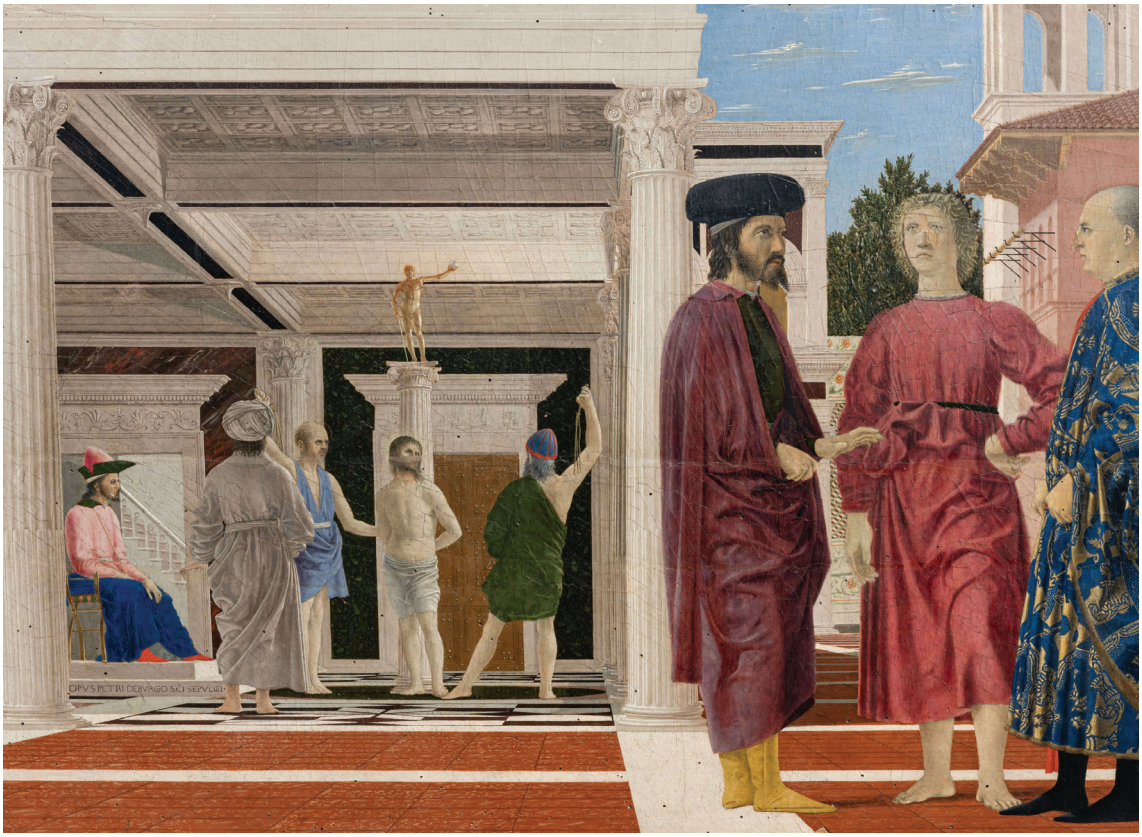


Fig. 12. Piero della Francesca, *The Flagellation of Christ*, c. 1459–1460. Tempera on poplar panel, 58.4 × 81.5 cm. Urbino, Galleria Nazionale delle Marche (Palazzo Ducale), inv. DE 229. By permission of the Ministero della Cultura – Galleria Nazionale delle Marche. Public domain, via Wikimedia Commons.

tion afforded greater narrative flexibility than linear perspective. During the thirteenth and fourteenth centuries, large, vertical landscape paintings showing monumental sceneries gave way to small, roughly square paintings giving glimpses of places or, to put it more accurately, suggesting aesthetic experiences, partly or even mostly clouded by mist. This tendency paralleled the growing emphasis on the unified experience of viewing landscapes, making pictures of landscapes, viewing pictures, and writing (poetry) about the pictures, as the ultimate display of cultivation and sensitivity on the part of well-to-do *literati*.

Conclusions

In the artistic cultures of China and Italy, the concept of space remained implicit in theoretical and critical writings. Nevertheless, we have seen how changing ways of showing space in pictorial compositions shed light on the explicit concerns of the later critics, Dong Qichang and Giorgio Vasari. We explored two major strains in this change. On the one hand, an intellectual understanding of space privileged, in China as in Italy, the use of artworks as supports for the contemplation of immaterial things—a philosophical or spiritual understanding of Nature beyond the material objects that occupy space. On the other hand, the geometric ability to place things in space was a narrative device that eventually turned, beginning in fifteenth-century Italy, into a concept of Nature itself as created through geometry. This concept, filtered through the theological doctrine of a Universe having a geometric center, influenced the effort to reconcile the individual point of view of linear perspective with the divinely ordained center. From the Gothic period to the Renaissance, architectural theory and practice in Italy thus grappled with the implications of the newly contrived concern with centrality in church buildings, much in the same way Renaissance painting increasingly strove to display geometric control of a single point of view through vanishing point perspective. In Song, Yuan, and Ming China, on the other hand, the individual point of view was not a geometric construction but a personal reaction to the landscape and its representation. Its pictorial paragon was not the contrived perfection of the architectural

interior, but the artfully controlled lines of sight across the classical garden of gentlemen's villas. The concept of space Chinese painting contrived from Buddhist and Taoist doctrines of reality was thus not about outward geometry, but a political argument asserting that the highest achievement consisted in grasping the essence of Nature intuitively through its expression in art. In both Italy and China, the history of how art came to portray space was integral to the criticism of contemporary artworks. By setting out to look at the emergence of spatial representation in paintings, Vasari and Dong did more than trace a history of this endeavor through the work of their predecessors. They also framed this history as a narrative that came full circle in their own age, when artists imitating one another's manners became the leading theme of art. This way of telling the history of pictorial space highlighted social and cultural parallels between the beginning and end points of the narrative. However, the development of pictorial space is more than a construct of the art historians' narratives. From Gothic painting to Renaissance perspective in Italy, and from illustrated tales of courtly life to introspective landscape paintings in China, artists strove for methods of representing the space between objects. These efforts were not concerted movements towards preordained goals, but individual explorations that happened to show common experiences among artists. Still, the results of these explorations left diverse lessons in technique and worldview to artists and architects of all ages. Moreover, they show ways of reckoning with a cultural past perceived as ideal during times of political and social upheaval.

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