

'Two-Dimensional' Models. The Maquette in the Design of Architectural Façades

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Abstract

Since the 15th century, the model was used for the representation of design proposals to be submitted to the client, presented at competitions, and exhibited to the citizens to inform them of future urban transformations. We therefore find, alongside models of entire buildings, models related to individual portions object of the competition, such as domes, architectural details, façades. Representation by model allowed clients to express themselves after a critical-comparative reading facilitated by a greater familiarity with reality. The article contextualizes in the historical period and analyses examples of design models of architectural façades, a particular typology defined in the title as 'two-dimensional' since the possibility of relating the representation of the façade to the internal or otherwise overall spatiality of the building, which normally characterizes the model, is denied. However, they are certainly classifiable as models, both for the materials used and for the three-dimensionality of the detailed elements and the consequent effects of light and shadow that can be perceived, as well as for the modality of use that is not constrained to a single point of view as occurs in the elevation drawings, and therefore allows showing the corner solution. The analysis is carried out through the presentation of emblematic examples and their comparison with the corresponding drawings.

Keywords: façade models, prospects, design competitions, wooden model, Renaissance representation.

Introduction

The idea of using a material model as a vehicle for transmitting ideas has ancient origins. Indeed, Aristotle discusses this technique in his political work *The Constitution of the Athenians* [Aristotele 1999], as does Appian of Alexandria in his *Roman History* [Appiano 1972]. In his work on architecture Sebastiano Serlio also mentions the use of this mode of expression in antiquity: "The use of models is very ancient, as mentioned by Vitruvius in several places, and Cicero writing to Marcus Caecilius who wrote to Antonius" [Serlio 1584, p. 51].

With the fall of the Roman Empire came a new historical era for the European populations, terminating at the end of the medieval period, during which daily uncertainty dimmed the light of reason and sentiment. Little is known

about the representation of architectural projects in this period; indeed, we can only sense an underlying continuity with the earlier expressive system given that written evidence on this subject and on the model only returns in the second half of the 14th century. It is particularly interesting to note that this occurs in detailed form during the construction of Santa Maria del Fiore in Florence [Pacciani 1987], a concurrence that the spirit of observation almost inevitably associates with the return of masonry vaults in the roofing of large buildings, in place of timber trusses [Metz 1938]. Therefore, continuing in the logic of this discussion, we may presume that the return to the model as part of a process of research and project delineation is, fundamentally, due to its specific formal and



Fig. 1: Cutaway model of the dome of Sant'Ignazio of Loyola, Rome. Author's photograph.

Fig. 2: Model of the Basilica Minor of Santa Maria Addolorata of Castelpetrosa, Isernia. Author's photograph.

spatial particularities that facilitate the understanding of construction solutions. As regards when it became part of the dialogue between architect and patron/client we suggest that it was due to a change in the latter's attitude: at first work on such commissions could take a great deal of time, even lasting beyond the lifetime of the individual client, therefore it was impersonal on many levels, while from the Renaissance onwards the client wished to add a personal touch to the commissioned building, and was increasingly interested in being able to view the building 'in advance'; for the latter, drawings were still a sort of shorthand composition.

Pausing to observe the models of the great ecclesiastical buildings, housed in museums of the Italian Renaissance, it is evident that this mode of expression was used in a wide field of application. Filippo Brunelleschi, perhaps in order

to keep control over his work, used plain, simple models [Manetti 1976], Antonio da Sangallo the Younger and Antonio Manetti Chiacchieri distinguished themselves for the completeness and large scale of their representations in some of their projects, while the models made in the Baroque period to give form to project proposals were distinguished by the importance given to details as well as the building as a whole.

In addition to direct experience, the opinions of other architects who worked in this historical context can be learned from reading archive documents and the treatises on architecture, which from the Renaissance onwards began to be written again, for example: Filarete held models to be useful in the dialogue with clients [Averlino 1972]; Philibert de l'Orme urged the making of partial models of an architectural work [de l'Orme 1567]; Leon

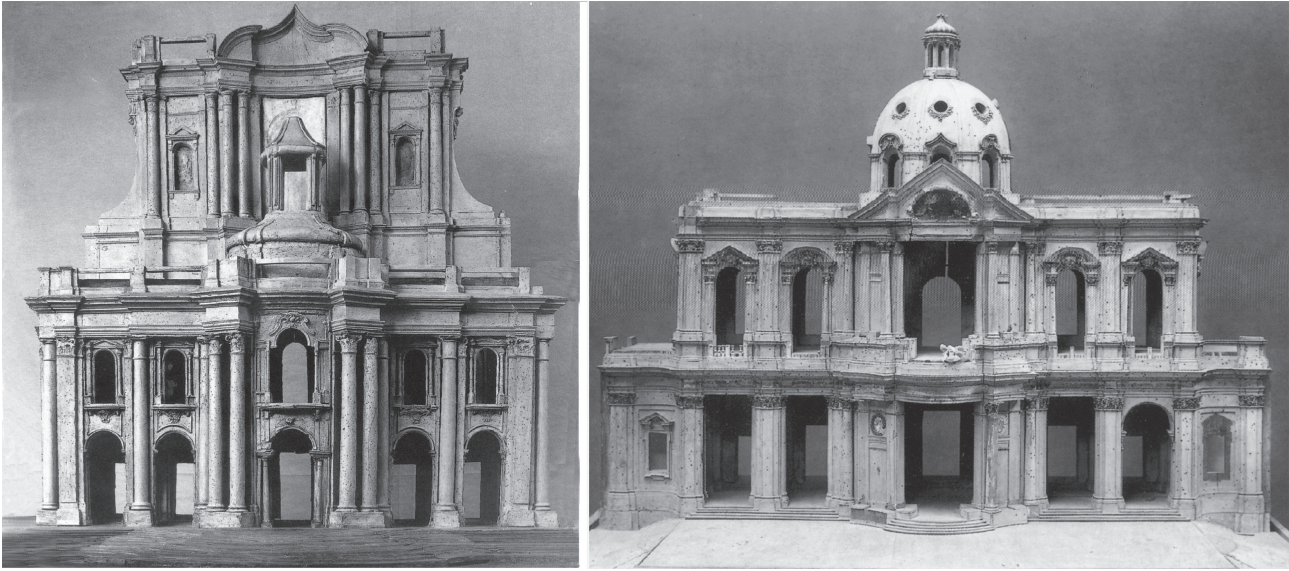


Fig. 3: Model of the façade of the church of San Giovanni in Rome: a) L. Rusconi Sassi 1732; b) G.A. Bianchi 1732 [Contardi, Curcio 1991, pp. 17, 98].

Battista Alberti better than any other author illustrated the utility of models in the education of young architects [Alberti 1989].

Bearing in mind the various points of view of the Renaissance architects and continuing with the concept that sees the reasons for which graphic representation was flanked by the plastic expressive synthesis as the only parameter of judgement, it is possible to observe various typologies of model each with their own physical characteristics and different roles in the designer's creative journey. They are isomorphic miniatures, with regard to the reality they aim to represent [Maldonado 1987], made not only for the visual and formal control of the architectural appearance or for showing the clients the results of a conceptually completed design procedure, but also for studying the most complicated building solutions [Ackerman 2005] (fig. 1). Furthermore, due to the model's appeal to the average person and the fact that its image can be contained within the visual field and, therefore, more easily explored than the actual built structures [Arnheim 1981] –in this case as Claude Lévi-Strauss observed, “knowledge of the whole precedes that of the

parts” [Lévi-Strauss 2003, p. 36] overturning the process of learning— models were also commissioned as educational tools, in situations in which the active participation of the population was required during the development phases of the structure, and publicly displayed near the building site (fig. 2).

The material model as a tool for comparing design proposals

Among the patrons and those responsible for the most important communal and ecclesiastical projects in the Italian peninsula during the 15th, 16th and 17th centuries, it was traditional practice to evaluate the design solutions necessitated by the dynamics of the construction site by comparing models representing the ideas, presented by architects, painters and sculptors, either by invitation or spontaneously [Goldthwaite 1984].

In these three-dimensional representations we find the expressive power of detail that often produces a surprising and pleasant ‘Gulliver’ effect, an optical illusion

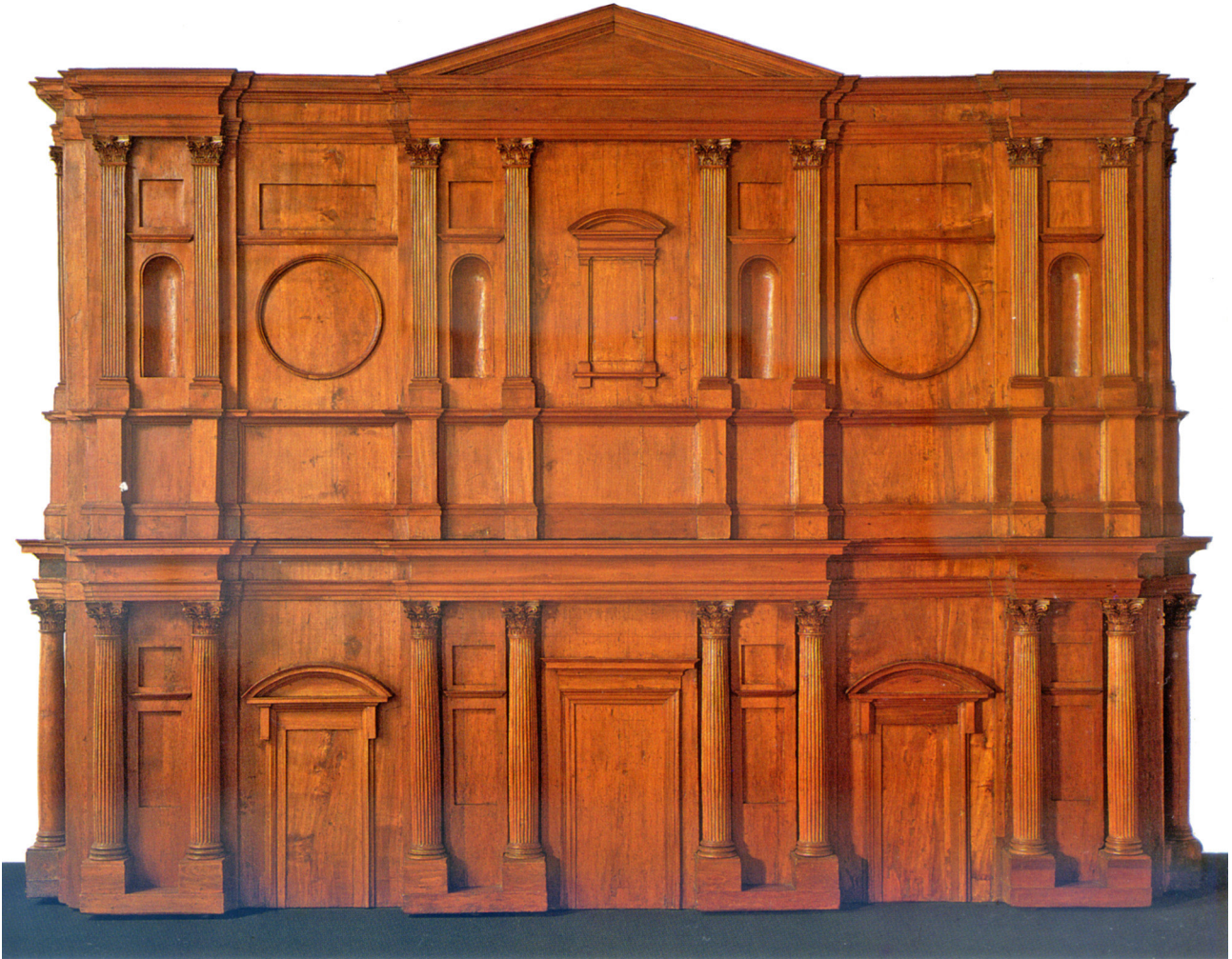


Fig. 4. Michelangelo Buonarroti, wooden model of the façade of San Lorenzo in Florence, 1518. Author's photograph.

produced by the dimensional disparity between observer and model. In our suggested classification such objects find a place alongside teaching models despite being partial expressions of the architectural organism; Philibert de l'Orme, as we have seen above, was a staunch supporter of this *modus operandi* [de l'Orme 1567].

Such models were almost always made of wood and were large-scale in order to show the smallest architectural details, including the artistic apparatus where planned, and in some cases even the polychrome designs for the wall decoration. Such expressive characteristics gave the chosen models normative value for the foremen working on the construction site because, as their exterior showed all the design information that was latent or hidden in the iconographic folds of the design proposal, these simulacrum of architecture *in nuce* meant that there were less details to be decided and fewer elements to study and model at life-size. Additionally, they met the needs of the citizens who were called upon to supervise the construction, but were not always capable of recognizing its actual significance just from the drawings.

As is known, drawing is the most ancient and valid mode of expression that Man has for communicating. Drawing can express thoughts and images in an instinctive or coded manner; independently of whether belonging to the real world or an imaginary one. Indeed, the line is that which joins and separates, it is the mark *par excellence*. With its variations in direction, the line can transform itself, without a break in continuity, from an outline into the image of a concrete object, narrow or defined by numerous graphic marks to then return to being an outline, shadow, fissure, or whatever else fantasy and technique permit, but all of this is only possible on a flat surface.

For people who were not educated in the reading of a project drawing, the lines positioned with erudition and dedication by the architect still represented an incoherent fabric, without logic or form. On the contrary, the model being a three-dimensional form allowed them to observe the project proposal from many angles on different eye-lines, requiring less technical competence for understanding the artistic thought. Therefore, the primary task of the models, presented in order to facilitate comparison between design proposals, was that of persuading and seducing the interlocutors, as does a teaching model. Before them, the patrons and members of the selection committees were called on to express their opinions in a phase when it was still possible to make



Fig. 5. Michelangelo Buonarroti, elevation of the façade of San Lorenzo in Florence, 1517 [Millon, Smyth 1988, p. 43].



Fig. 6. Model of the façade of Florence Cathedral: a) G.A. Dosio (1580-1590); b) Don Giovanni de' Medici (1580-1590). Author's photograph.

changes at the actual construction site. In addition, these three-dimensional models were sometimes used for estimating construction costs, as indicated by Alberti [Alberti 1989] and as a guide in the stipulation of contracts.

The models commissioned by the Comitato di Santo Spirito as aids in solving the problem of the entrances into the Florentine church of the same name, designed by Brunelleschi, are an example of this working practice [Goldthwaite 1984]. So too are the examples illustrating the proposed designs for the façade of Florence cathedral [Millon 1994], Michelangelo's 1:1 scale model made to show Pope Paul III the cornice for Palazzo Farnese in Rome [Gotti 1875, pp. 309, 310] and those commissioned by the Senate of Bologna in order to decide on the form of the vaults to cover the central nave in the church of San Petronio in that city [Millon 1994].

With the affirmation of the Schools of Arts and Crafts,

during the 16th and 17th centuries designers continued to make models in order to give a form to the plasticity of their architectural ideas. Indeed, we may even suppose that in architectural competitions the use of this mode of communicating ideas even became essential, as can be deduced from the detailed account written by Francesco Velasio regarding the competition for the façade of the Basilica of San Giovanni in Laterano in Rome (fig. 1), dated Monday 14th July 1732; "This morning, the commission appointed to choose the designs for the façade of San Giovanni Laterano is to be held, and as a letter came from the Palazzo (the Vatican) stating that Galilei's drawing was to be chosen unanimously, absolutely. The experts were 6, that is two painters Concia and Ricciolini, two sculptors Rusconi and Maini, two architects Antonio Valeri and a Frenchman. They asserted to have picked Vanvitelli's drawing as their first choice, and in second



Fig. 7. Giambologna (1586-1589), model of the façade of the Florence Cathedral. Author's photograph.



Fig. 8. Model of the façade of the Florence Cathedral: a) B. Buontalenti (1587-1589); b) B. Buontalenti, small model (1596). Author's photograph.



Fig. 9. Model of the façade of Florence Cathedral: a) Academy of Art design (1633-1635); b) G. Silvani (1635). Author's photograph.

place that of Galilei, which was most plain and ordinary. Because of all this, the commission resolved that Vanvitelli should make a model with some alterations, thus remitting the outcome to the Pope's will" [Velasio 1916, p. 338].

The models of architectural facades

The typology of the façade model fits into the broader theme of models made for architectural competitions, of which it represents a specific case. Its origins are to be found in the Renaissance, in response to the need for "a language that, at its various levels, both client and craftsman could understand. In Florence, it consisted of models and drawings" [Goldthwaite 1984, p. 515]. It is from Florence, therefore, that we must start to analyse

the examples that have been preserved and today constitute, together with archive documents, a precious testimony of the role they played in the design process, in the presentation to the client, in the dialogue with the craftsmen who executed them.

Michelangelo's model for the façade of the church of San Lorenzo in Florence is emblematic in this regard. In 1516, Michelangelo was commissioned by Pope Leo X to design the façade of the church. The pontiff expressly requested the execution of twin models: one of which would be used on the building site in Florence and the other sent to Rome to allow the client to understand the details of the work, make an estimate of costs and follow the progress of the building site [Barocchi, Ristori 1965]. The pope's request was in line with his education in Lorenzo il Magnifico's architectural tradition founded on the use of models. On the other hand, for Michelangelo the model was a more suitable representational

tool than a two-dimensional drawing to convey the plastic effects of his composition. On 19 January 1518, the contract was signed in front of the model for the execution of the sculptures and carvings according to a composition "ordinata et seguita ad exemplo et proportione del modello di legname" [Bardeschi Ciulich 2005, p. 129]. It was a wooden model that included figurative and decorative wax reliefs, probably smaller than the only model that has survived, currently in the Museum of Casa Buonarroti (fig. 4). The latter, made of poplar wood and other species, has imposing dimensions: 216 x 283 x 50 cm, corresponding to a scale of 1:12 [Mussolin 2006].

It is interesting to reflect on the relationship between drawing and model. After several failures to produce a model to send to clients, Michelangelo drew executives in full-scale orthogonal projections, including the profile of a column intended for turning [Hirst 1993]. These were therefore drawings that had no specific relation or utility with respect to the realization of the architectural work but were exclusively addressed to the craftsmen for the execution of the model. The latter would then assume the role of the main executive tool for the construction of the final work. The façade was never realized, so the model, the only evidence of Michelangelo's project, was drawn in successive periods by various architects, including Giovanni Battista Nelli in 1687 and Giuseppe Ignazio Rossi between 1724 and 1730, following the custom of studying architecture through drawing and survey. Michelangelo also produced a series of sketches of the marble blocks required for the façade, complete with dimensional indications, which can be considered executive to the point of enabling James Sloss Ackerman to make a comparison between the dimensions that the façade would have had and those of the wooden model [Ackerman 1961]. As for the complete façade, a drawing by Michelangelo of the final project has reached us (fig. 5), from which the large wooden model was probably made [Millon, Smyth 1988]. Even from this comparison it is evident how the role of executive representation was delegated to the model. The drawing is in fact a perspective sketch, lacking metric indications, which seems to refer more to a design study phase than to an executive drawing. Further confirmation comes from the support, a sheet of paper with an underlying drawing and other sketches for studies of anatomical parts [de Tolnay 1975], which does not suggest a representation to be presented to the client or used on the building site. Lastly, about

the effectiveness of the representation, the superiority of the model over the drawing should be noted, not only due to the clients' lack of education in reading the work in orthogonal projection and the better perceptive effect of the plastic aspects of the decorations, although not present in the preserved model, but also due to the inclusion of the corner solution. The models of the architectural façades, defined in the title as two-dimensional due to the prevalence of plane dimensions over thickness, are in fact three-dimensional models. In particular, the model of the façade of San Lorenzo is thicker than other examples, making it possible to show the side portion used as a connection with the church behind it [Ackerman 1961], the existence of which can only be perceived from the profile of the column in the drawing. It therefore allows a reading and understanding of the work unconstrained by the frontal viewpoint of the elevation drawing, which reveals the relationship with the side portions that in orthogonal projection would have required further drawings.

The importance of the design theme of the architectural façade in the 16th century debate on the aesthetic categories of religious buildings becomes most evident in the episode of the new façade for the Florence cathedral, which was a battleground between "rulers and archbishops, architects and courtiers, administrators, theorists, academics, and an embryonic 'public opinion', all naturally sensitive to the final and most representative element of the city's greatest sacred monument" [Bevilacqua 2015, p. X]. Here too, the use of the model to represent the façade played a central role, as demonstrated by the seven large wooden models now on display in the Opera Museum, which were used to present the same number of design proposals between 1587 and 1635 [Morrogh 1994]. The reason for which such models, although ephemeral because they were destined to be evaluated by the client, have survived until today, is in the length of time in which the debate and the consequent comparison of proposals remained open, without finally leading to the realisation of the proposals submitted. Leaving aside for reasons of space the well-known story of the demolition of Arnolfo di Cambio's unfinished façade [Pomarici 2004] and the projects and provisional façades that followed until the realisation of Emilio De Fabris's project in the 19th century [Zuffanelli, Faglia 1887], the focus here is on models as tools for representing design proposals. Specifically, the attribution,



Fig. 10. B. del Bianco, Prospect and painting of the façade of Florence Cathedral (1635). Author's photograph.

date and size of the seven models on display (figs. 6-9) is as follows: Giovanni Antonio Dosio (1580-1590) 258.3 x 242.5 x 41.5 cm; Don Giovanni de' Medici (1580-1590) 234 x 248 x 37.5 cm; Giambologna (1586-1589) 147.5 x 135 x 32 cm; Bernardo Buontalenti (1587-1589) 238 x 241.5 x 36.5 cm; Bernardo Buontalenti (1596) 113 x 95.5 x 19 cm; Accademia delle Arti del disegno (1633-1635) 256.5 x 241.5 x 38 cm; Gherardo Silvani (1635) 248.8 x 219 x 23 cm [Opera di Santa Maria del Fiore]. As can be seen from the dimensions shown, three of the 16th century models and the two 17th century ones are about the same size as Michelangelo's for San Lorenzo, while the other two 16th century ones are realised in a smaller scale. The level of detail is almost always very high, including the meticulous modelling of decorative motifs and in some cases the chromatic aspects obtained through painting. For all these models, the role of executive representation of the project to be submitted to the clients is evident, a role that assumed even greater strength than in the example previously treated due to the long period over which the debate lasted, the alternation of clients with different tastes, the intervention of public opinion in the debate, and the possibility of comparing the projects through the same type of complete, detailed and immediately comprehensible representation for all. They therefore stand as evidence of a design practice that assigned a primary role to the three-dimensional model over the graphic work.

The comparison with the 16th century drawings shows a clear superiority of the model as level of definition and attention to details, leaving no doubt about its function as final elaboration. Regarding the corner solution, among the models made for the Cathedral, Giambologna's provides the most information. In fact, the thickness is the greatest in proportion to the size of the façade, allowing the sides of the church to be shown to analyze the relationship with the existing side façade, which was lacking in previous projects. His design included three connections: "between the upper entablature of the model and the cornice of the nave; between the cornice of the main entablature and the balcony; between the collar of the capital below and the denticulated stringcourse" [Morrogh 1994, p. 583]. Once again, it would not have been possible to represent this information in a single drawing in orthogonal projection, and the reading on different drawings would have been difficult to interpret by clients and citizens.

The connection with the side façade is also analyzed by the model of the Academy of Art design project, which also has a suitable thickness to show the sides. Of this project, we also have two graphic works (fig. 10): a drawing and a painting from 1635, attributed to Baccio del Bianco [Opera di Santa Maria del Fiore]. We can see how in this case the elevation drawing an orthogonal projection is rigorously drawn to scale with an abundance of detail. To indicate the dimensions of the overhangs, it was necessary to add a view from above with the representation of the front steps and the profile of the façade, an elaboration that was probably difficult for the clients to interpret. On the other hand, there is no indication of the connection with the side façade. This is shown instead in the painting, executed with a central perspective that leaves the main façade undistorted on the plane, but allows the depiction of the depth of the decorative motifs also thanks to the shadows and above all supports a perspective view of the side part that, although not very detailed compared to the main façade, enables to read the continuity in the steps and in the ground connection, and above in the balustrade flap. The inclusion of the characters and the hint of the urban context lend realism to the representation, making it suitable for public understanding. Strangely, the painting does not dwell on the chromatic aspects of the façade, which are instead present in the model through painting. In the comparison of the three works, the model is still the most accurate description of the project, also due to its much larger size.

The last example presented here confirms how the practice of using the model for the representation of the façade was consolidated to the point of continuing into the 18th century, a period in which there was greater graphic competence, both in the execution of the designs and in the education in reading. The model of the Trevi fountain (fig. 11) illustrates Nicola Salvi's design that won the competition in 1732 for the southern façade of the Palazzo Poli [Schiavo 1956]. The model is an exact reproduction of the graphic drawings, executive drawings in orthogonal projection, to scale and complete with every detail. In particular, the water-colored elevation also shows the chromatic aspects and the perceptive effects of the shadows. The model, on a scale of 1:15 with dimensions 339 x 184 x 67 cm, originally included the sketches of the statues and sculptures. It can once again be considered the most

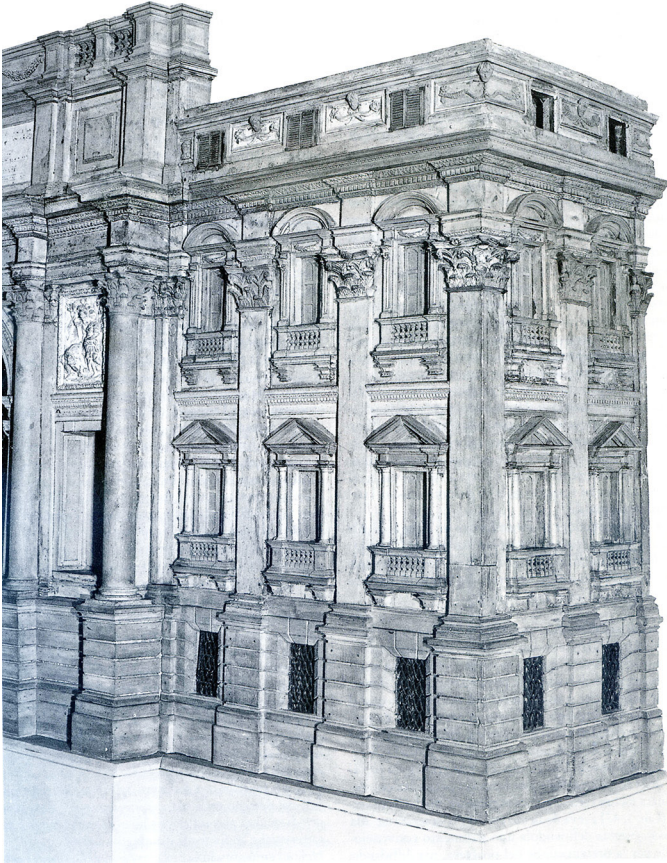


Fig. 11. a) Model of N. Salvi's design for the Trevi fountain, 1732. Detail of the corner solution. [Contardi, Curcio 1991, p. 75]; b) Solution realised without flap. Author's photograph.



Fig. 12.J. Barbault, View of the Trevi fountain, 1763. Bibliothèque nationale de France.

effective representation of the project, as “by developing three-dimensionally, the model shows an important aspect of Salvi’s project that the two-dimensional drawing cannot reveal, namely the continuation of the façade beyond the corners, in two side wings formed by two spans that develop in depth” [Pinto 1991, p. 70]. It is interesting to note that, although the side wings were not realized, they are present in several 18th century engravings (fig. 12), which evidently used the model and not the building as source.

Conclusion

The theme of visual representation as an expression of the design process is a structured argument in which most of the reflections written in the West found their inspiration in Renaissance documents.

Indeed, from this historical period onwards a vast literature has discussed orthogonal projections and the alternation between parallel projections and central projections in the design process. However, less attention has been paid to representation in the form of three-dimensional models [Scolari 2005], although it was already clear to the ancients that the volumes represented by

drawn marks or by models are not the same given that the variations in the direction of the light offer different levels of resolution, or better: in one case movement is irrelevant, in the other the light models the volumes by highlighting solids and voids, the protrusions and recesses, through shadow play. It is precisely this effect and the abstraction of a whole series of qualities belonging to the actual phenomenon that facilitate the task of those who observes in order to understand.

The great architects we have mentioned above knew that the fruit of their labors would become a construction of enormous dimensions, seen and used by small individuals, and the model offered them an extraordinary opportunity for visual verification of the mental images given that, due to the qualities shared with the construction site, it objectively defined what on paper was only the design intention. Therefore, the making of the model represented a phase of experimentation and reflection on the design project, while for the patron, the citizen, and today the scholar who is about to analyze that extraordinary architecture, the model is the best expression for understanding the design intentions for its development on the three Cartesian axes that is closer than other methods of representation to the usual manner of perceiving reality.

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