



Authorship, co-Authorship, and creativity in architecture. Drawing, notation and representation

Autoría, coautoría y creatividad en arquitectura. Dibujo, notación y representación

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ABSTRACT The notion of authorship in architecture has been connected to the prominence of drawing as an autographic record of the design process since the Renaissance. The conditions and limits considering the co-authorship of a work are analyzed and a classification is proposed in relation to the different ways of considering authorship within the complex process of architectural production when several actors are involved. The role of creativity in this process is also studied regarding the context of the disciplinary past. Finally, we analyze the progressive fading of authorship concerning this graphic record of the process with the emergence of new technologies or the progressive transdisciplinary specialization that spurs the consideration of other kinds of non-graphic relationships between author and work.

KEYWORDS authorship, co-authorship, creativity, notation, architecture

RESUMEN La noción de autoría en la arquitectura ha estado ligada al protagonismo del dibujo como registro autógráfico del proceso de proyecto desde el Renacimiento. Se analizan las condiciones y los límites para valorar la coautoría de una obra y se propone una clasificación en relación con los diferentes modos de consideración de la autoría en el complejo proceso de producción arquitectónica en el caso de varios actores. También se estudia cuál es el papel de la creatividad en este proceso dentro del contexto del pasado disciplinar. Finalmente, se esboza el progresivo desvanecimiento de la autoría en relación con el registro gráfico del proceso y la aparición de las nuevas tecnologías o la progresiva especialización transdisciplinar que conduce a considerar otro tipo de relaciones no gráficas entre el autor y la obra.

PALABRAS CLAVE autoría, coautoría, creatividad, notación, arquitectura

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1. Introduction

In creative disciplines, there exists a necessity for innovation, which is often achieved through building upon precedents; even the most creative individuals incur a debt to their predecessors (Ricoeur, 2003). The idea of authorship, however, is firmly established and is usually associated with the notion of creativity. In various cases of co-authorship, different challenges arise regarding the consideration of authorship and creativity. In architecture, in addition to aesthetic considerations, there are technical aspects susceptible to innovation, which affect the tectonic character and involve the topological relationships between material and space.

From this perspective, analysing the problem of co-authorship raises questions that directly affect how notions of authorship and creativity have evolved throughout history, and what happens when authorship is shared or diluted in a transdisciplinary context (Avermaete, Davidovici, Grafe, & Patteeuw, 2023). It is important to determine to what extent co-authorship is hierarchical, symmetrical, specialized, or transdisciplinary. That is, when the architect's role as the creator of the construction sees their design work reinforced by those who enable them to overcome their limitations.

The role of new technologies and augmented creativity beyond human capacity —computational design and complexity levels associated with big data— or the increasing influence of transdisciplinarity, contribute to fading the notion of authorship traditionally linked to autographic drawing. Therefore, it is worth reflecting on non-graphic modes of authorship in our context.

1.1. Some clarifications on the terms: *creativity, authorship, and design*

In antiquity, the concept of creation simply did not exist, neither under another name nor a similar idea. As Lucretius said: *ex nihilo nihil*. For medieval scholasticism, creation is an exclusively divine attribute. In the origins of the Modern Era, a transition began towards a new sense of the term "create": to make something new from pre-existing objects, expanding the original notion of creation from the transition from non-being to being to that of transformation. A primitive theory of creativity emerges from the concept of novelty, a concept completely discredited in the static vision dominant in the aristocratic society of antiquity, thus beginning to consider creative activity as a positive trait.

The idea of artistic creation has a shorter history than is commonly believed. Tatarkiewicz establishes its appearance in the 18th century when the word "creativity" is first used in relation to art, but it wasn't until the 19th century that creation became exclusively associated with artistic practice. The 20th century extends the concept of creativity to all human activities. Tatarkiewicz writes that, according to Heidegger: "Man is condemned to creativity" (2015, p. 296); to

conclude, summarizing, that there are two extremes in the understanding of art: art-as-perfection and art-as-creativity.

Art as perfection does not deviate from mimesis: "Since art is perfect when it seems to act as nature does, and nature, in turn, achieves success when it hides art within itself" (Assunto, 1989, p. 61). The late publication of Hegel's theories (1985 [1835]) will shift the focus of aesthetics from natural beauty to artificial artistic beauty (in Scruton, 2017). Baumgarten's vision of art understood as *perfectio repraesentationum sensitivarum*, ("perfection of sensitive representations") where beauty and perfection are identified, was challenged by Winckelmann from Kant's theory of the beautiful. Art as perfection sanctions not only the achievement of "perfect and marvellous works" (Vasari, 2019 [1550]), but also the typology, disciplinary study, and refinement of architectural types.

The concept of art as creation constitutes a hegemonic argument, but it is worth remembering that such argument lacked all authority until its connection with the notion of originality, and with this, the idea of original genius through Kant. Adorno asserts: "The concept of originality [...] does not refer to something ancient, but to something that has not yet been in the works, the utopian trace within them" (2004, p. 231).

Authorship, on the contrary, represents an age-old assertion by creators who demand, through it, all the prerogatives and honors it entails, including fame, a concept first conceptualized by Virgil. Vasari, renowned as the inaugural art historian, presents Brunelleschi as the foremost architect, a designation not exempt from controversy regarding the authorship of the dome of the Florentine duomo. This marks the inception of both the role of the architect and the onset of disputes over authorship. According to Kostof (1984), it was Manetti, Brunelleschi's biographer, and Ghiberti, in his autobiography, who asserted their primary roles as authors. However, it is inaccurate to assert that Brunelleschi conceived and executed the dome in isolation. Numerous constraints faced the architect, including reliance on the patron's directives, lack of support from defunct guilds, and scepticism from builders towards an intellectualized activity disconnected from requisite skills and on-site practice. Brunelleschi endeavoured to assert his intellectual authorship over the completion of the duomo and his leadership throughout the process, notwithstanding the collaborative efforts with others and the active involvement of guilds in decision-making. Yet, he lacked a refined notation system capable of leaving a graphic record and substantiating his authorship. Additionally, as reported by Vasari, Brunelleschi admitted that his reluctance to disclose his project to the assembly of master builders stemmed from the fear that "if he did, you would build it without me" (Carpo, 2011, p. 75). The architect's newly attained revolutionary status segregated him as an intellectual within collegiate production structures (Tafari, 1982 [1976]). The

architect's autonomy would subsequently flourish alongside the artist's, achieved with arduous endeavour from the Renaissance to the 19th century.

The word "design," "*dessein*" in French, or design in English, is translated into other languages with regards to the intent of shaping or giving form to an object as a result of the action of designing. The original word, "*disegnare*," is an Italian term which, as a verb, literally means to draw, and as a noun, "*disegno*," still means drawing today. In architecture, the term "*progetto*" is preferably used to refer to the result of the action of planning or designing, and even "design" is used to refer to the design of an object. In other languages, the concept of designing is common; it refers to the task of creating a project through drawing that will be materialized later. The etymology of the word takes us back to the Latin verb "*designare*," which encompasses the meanings of marking, drawing, or designating. Both marking and designating imply something intrinsic to any drawing, understood as the construction of lines or figures that represent or refer to another reality, the referent (Boudon and Pousin, 2012). The question arises as to why in other languages, "design" —or "design," now that English has supplanted Latin as the lingua franca in research and part of culture— has acquired a connotation that intertwines designing and drawing. This transcends the architectural realm to encompass engineering or industrial design. There must be a valid reason for this, and indeed, there is. Drawing itself has been the true lingua franca for architects, engineers, and cartographers since records began (Silva Suárez, 2004).

In an academic context, "*rappresentazione*" —representation— is employed to denote the subjective reality associated with various graphic manifestations such as plans, elevations, analytical or project drawings where there exists a relationship between representation and referent (Ugo, 2008). Drawing proves far more efficient than words in analogically portraying reality, succinctly describing it with utmost precision through the projective nature of drawing.¹ However, foremost, the individual who drafts the conceptual drawing is indisputably the author of the original idea.

2. Methodology

Firstly, a chronological review of the emergence of specific concepts in history, art theory, and aesthetics is conducted. These concepts include: creativity, authorship, and drawing. The analysis of the latter, in its graphical sense, is undertaken in light of its development as a projective, normative, and notational system, as well as its association with the act of designing, and its utilization in the fine arts, particularly among architects. The study delves into the evolution, persistence, hegemony, and variations that the trio of authorship-creativity-drawing undergoes, showcasing the enduring and robust nature of their connections and relationships up to the present day. The study is further illustrated by the selection of paradigmatic cases of architects with universally recognized works, where the relationships have taken on new dimensions.

3. Results and analysis

3.1. From the master builder to the architect as intellectual author

Vitruvius explicitly mentions several types of plans that were already used to provide graphical information prior to the construction of buildings (Gentil Baldrich, 2011). During the Middle Ages, master builders combined stonemasonry work and the difficult stone cutting, heavily linked to geometry, with site supervision. The development of what is known as execution drawings since antiquity, especially during the Gothic period, ultimately evolved during the empirical period "under the support of a *geometria fabrorum*, a 'practical geometry' used in trades," with the first writings appearing at the end of the Middle Ages; procedures that remained concealed under the protection of guild secrecy (Ruiz de la Rosa, 2018, p. 11)². Traditionally, it has been considered that the status of master builders did not differ much from that of other stonemasons, although they were the ones directing the execution of the works. The master builders should be regarded as the designers of the cathedrals: based on drafts and templates, they defined the geometries and intersections of the structures to be carved. Only in recent years has the anonymity of these master builders and their role as true authors of the structures they were entrusted with begun to be questioned. Probably,

¹ To each point in geometry corresponds a point on paper, hence their similarity and dimensional accuracy.

² Drafts and templates found in many historical buildings constitute a graphical testimony in stone of that practical drawing linked to the material execution of the work, at a 1:1 scale, and to the actual work of stone cutting.

the early investigations considered it easy to contrast the emerging figure of the Renaissance architect with a supposed collective guild art with the consequent dilution of authorship (Calvo López and Taín, 2018).

This issue may be related to the existence of a largely illiterate society, where many matters were not documented due to technical and material difficulties (illiteracy, lack of suitable supports such as paper, ink, graphite, etc.). The names of great architects from the past such as Phidias (Acropolis, 5th century BC), Apollodorus of Damascus, or Isidore of Miletus (Hagia Sophia, 532) are known, so the lack of consideration of the author's name may be a consequence of the decline of the ancient world, especially in architecture—this anonymity does not extend to literature or philosophy of the period—, of how poorly documented medieval history is, and how biased it still remains. According to Kostof (1984), Vasari mentions the names of known architects from early dates, such as Buschetto Greco da Dulichio, architect of the Pisa Cathedral (1016).

In reality, the role of the architect, as we know it today, and the intellectualization of their creative work, is attributed to Alberti, who introduced a decisive dichotomy: the separation between designing and building, between the drawing or project and the actual work itself (Carpo, 2011). This is the precise moment when the figure of the architect emerges, who is granted the status of intellectual author of architecture (Kostof, 1984). However, Alberti encourages architects to use drawing—and models—as both a thinking tool and a design vehicle during the project process, as well as a notational system aimed at third parties to carry out the work. He acknowledges being persuaded of the goodness of an idea that, when drawn, appeared erroneous (Alberti, 1991). And he adds that the reflective work of the architect through drawing as a record of the intellectual process should involve successive deliberations and revisions “not two, but three, four, seven or ten” so that it can only be considered finished when “any addition, subtraction, or modification could only make it worse” (Carpo, 2011, p. 21).

3.2. The convergence of creativity, authorship, and drawing

During the Renaissance, drawing emerged as the intellectual cornerstone of creative endeavours shared across the fine arts following the establishment in 1563 of the Accademia del Disegno. This institution acknowledged “*disegno*” (drawing) as a unifying force embodying the intellectual essence of artists' activities, distinguishing them from mere craftsmen (Vasari, 2019 [1550]). Michelangelo Buonarroti epitomized the fusion of creativity as inventive prowess with the acknowledgment of authorship, epitomizing aspirations for creative autonomy liberated, at least in part, from patronage and recognized by both intellectual elites and the general populace. The Academy served as a bastion for preserving the memory of his vast oeuvre and commanding personality, while also venerating the art of drawing (Martínez Mindeguía, 2007). It's possible

that Kant was inspired by figures like Michelangelo when, in his Critique of Judgment (2013), he proposed transcending subjectivity in aesthetic judgments by attributing to genius the innate ability to assimilate the rules of art as a natural gift. Genius, by its very nature, is original. Enlightenment-era architects, notably Boullée (1972 [1793]), formulated architectural theories centred around representation, a tradition continued by figures like Rafael Moneo Vallés (1986), wherein the architect's drawings serve as repositories of creative thought and affirm their authorship. Consequently, architects, freed from the constraints of manual labour, project their creative prowess onto their drawings, establishing their identity as creators. This forms the foundation of the study we are presenting here.

3.3. Allographic and autographic arts: the notational and the creative

It is from here where this whole network of relationships between words and drawings becomes highly relevant to our research. Because the designer has been resorting to drawing for centuries as a quest for intelligence (Siza, 2014), as a representation instrument, and as a documentary basis for project development. Alberti decisively contributed to defining the set of plans that constitutes the project, which must serve for others to materialize it (Carpo, 2011). The letter that Castiglione (1978) addressed to Pope Leo X at the request of Raphael already established the three types of canonical projections: plan, section, and elevation. Thus, plans and drawings ended up becoming the result of intellectual work and the true hallmark of authorship attributable to architects. From then on, designing consisted of projecting, of anticipating the built work through its faithful representation based on a notational system, precise and capable of conveying to others what and how it should be built.

In relation to creativity, it's important to note a significant issue regarding the project and the development of a notational symbolic system. Goodman (2010), in his theory of symbolic systems, distinguishes between autographic and allographic arts. The former are those in which the distinction between the original and the copy is significant. An original by Velázquez possesses an incomparable value compared to a copy of it, precisely because it is unique and because authorship—until the arrival of conceptual art—is intimately linked to this unique character. Music, on the other hand, is contained in the scores written by the composer. Two different scores of the same musical work still contain—represent or prefigure—the same piece⁶⁴. The creative work of the musician lies in the composition itself. In no case is the authorship of a symphony by Beethoven disputed regardless of the conductor and the orchestra that performs it. Thus, Goodman (2010), who wisely chooses musical notation as a paradigm of notational systems, also considers architectural drawings, and more specifically project plans, as constitutive of a refined notational system intended for the execution of the work by third parties.

⁶⁴ While it's true that the performer adds a creative nuance when executing the score with their instrument, and that's why we say that interpretation is a recreation.

Although Goodman establishes the conditions for notational systems by proposing scores and plans as examples, he barely suggests substantial differences between both symbolic languages. While scores use a series of symbols that could be equivalent to those of an alphabet, where each figure in the score corresponds to a note—a specific sound of the scale, its duration, intensity, attack form, etc.—architectural drawings analogically correspond to the reality they represent, not only in symbolic terms. There is a univocal correspondence between three-dimensional reality and its two-dimensional projective reduction. That's why architects, engineers, and designers use drawing as a lingua franca for design.

A plan can be drawn by the architect or a draftsman, but what defines authorship is giving shape to what doesn't have it, i.e., sketching and drawing plans that lead to defining the geometry of the project in which the idea is embodied. Jorge Sainz delves into this reflection on the craftsmanship of drawing versus its authorship, relegating to the former the work of draftsmen and engravers as translators of an original, but clarifying that "knowing the authorship of the final result is not of great significance, but rather that of the original" (Sainz, 1990, p. 189). However, the distinction between autographic and allographic arts established by Goodman has another dimension in relation to authorship that is worth highlighting. Notation requires a coded and universal language—precise and objective—within a field of knowledge as the basis for that allographic condition; a clarity and disambiguation in the representation of the reality it refers to that allows it to be interpreted unequivocally by others. In autographic nature, on the other hand, the author's action on the work and, with it, their undeniable stamp of authorship and subjectivity are subsumed. Thus, the role of reproductions can also be of great importance in the dissemination of architecture, and that is why the use of notational systems that guarantee its understanding is so important. It is not possible to study the history of drawing or architecture without resorting, in addition to autographic drawings—guarantors of authorial work and often difficult to consult if not lost—to reproductions (Sainz, 1990). In fact, the dissemination of architecture was revolutionized with the appearance of the printing press and the development of engraving techniques for its reproduction (Carpo, 2001).

As pointed out by Sonit Bafna (2008), in architecture there are two distinct types of drawings: plans, which have an allographic and notational nature, and ideation or "imaginative" drawings, sketched by the architect in the early stages of the project. It is precisely these latter drawings that can most clearly and distinctly establish the authorship of a design, as the project's idea is synthesized in them. Their autographic nature accredits the authorship of the project without any room for doubt (Figure 1).

3.4. Autographic drawing, authorship, and thought

Borromini, hailed as a disciple of Michelangelo, was intimately familiar with his work, his approach to the creative process, and the challenges it presented to the master. Yet, he wrote, "I did not enter this profession to merely mimic others, though I understand that the fruits of innovation are often slow to ripen..." (Borromini, 1725, p. 5). He stands as the architect whose collection of autographic drawings on his own work is the most comprehensive from the past (Portoghesi, 1967). These drawings, meticulously preserved during his lifetime and kept from public view despite repeated requests from influential admirers (Connors, 1999), underscore his meticulousness and dedication to his craft. It's known that he purposefully destroyed all sketches of unrealized projects before his passing, safeguarding against potential misattributions by third parties. Hopkins (2012, p. 632) reminds us that Borromini viewed his drawings as his "little children," unwilling to see them "begging for attention" alongside others' works. He adamantly declined participation in the 1664 competition to design the east facade of the Louvre, despite Spada's earnest entreaties. Instead, he guarded his drawings, meticulously crafted with mathematical precision and delineated with graphite, as manifestations of his intellectual labour. Recognizing their intrinsic value, he prepared them for posthumous dissemination, personally overseeing their reproduction. Notably, Borromini's archive contains few drawings by collaborators, as he attended to each commission personally, underscoring the reverence he held for his craft and his works.

Borromini employed a high level of codification of graphic variables in his drawings, which was based on three unique characteristics: clear notation in the graphic representation maintained throughout his professional life—conventional in today's architectural drawings—geometric projectivity in the drawings, and a high graphic precision typical of a geometer, without schematics or vagueness. These characteristics of his drawings allowed him to translate decisions made in the studio to the actual construction site, anticipating the direction of works from the project stage, and impacting the duality between drawing and construction, as highlighted by the Albertina, by transferring the resolution of the construction problem to its graphic dimension. This process, referred to as *translation* by Evans (2005 [1995]), reinforces the role of drawing as abstract intellectual work as opposed to problem-solving based solely on practical application.

A comparison of Borromini's use of drawing with that of his contemporary Bernini is enough to grasp the revolutionary change Borromini brought about. Bernini was an exceptional and prolific draughtsman (Gobbi and Jatta, 2015). However, when it comes to architectural works, scholars like Borsi (1998) attribute only the initial sketches and presentation drawings to him as autographs. Bernini would create quick sketches, mere scratches without scale, aimed at capturing "the

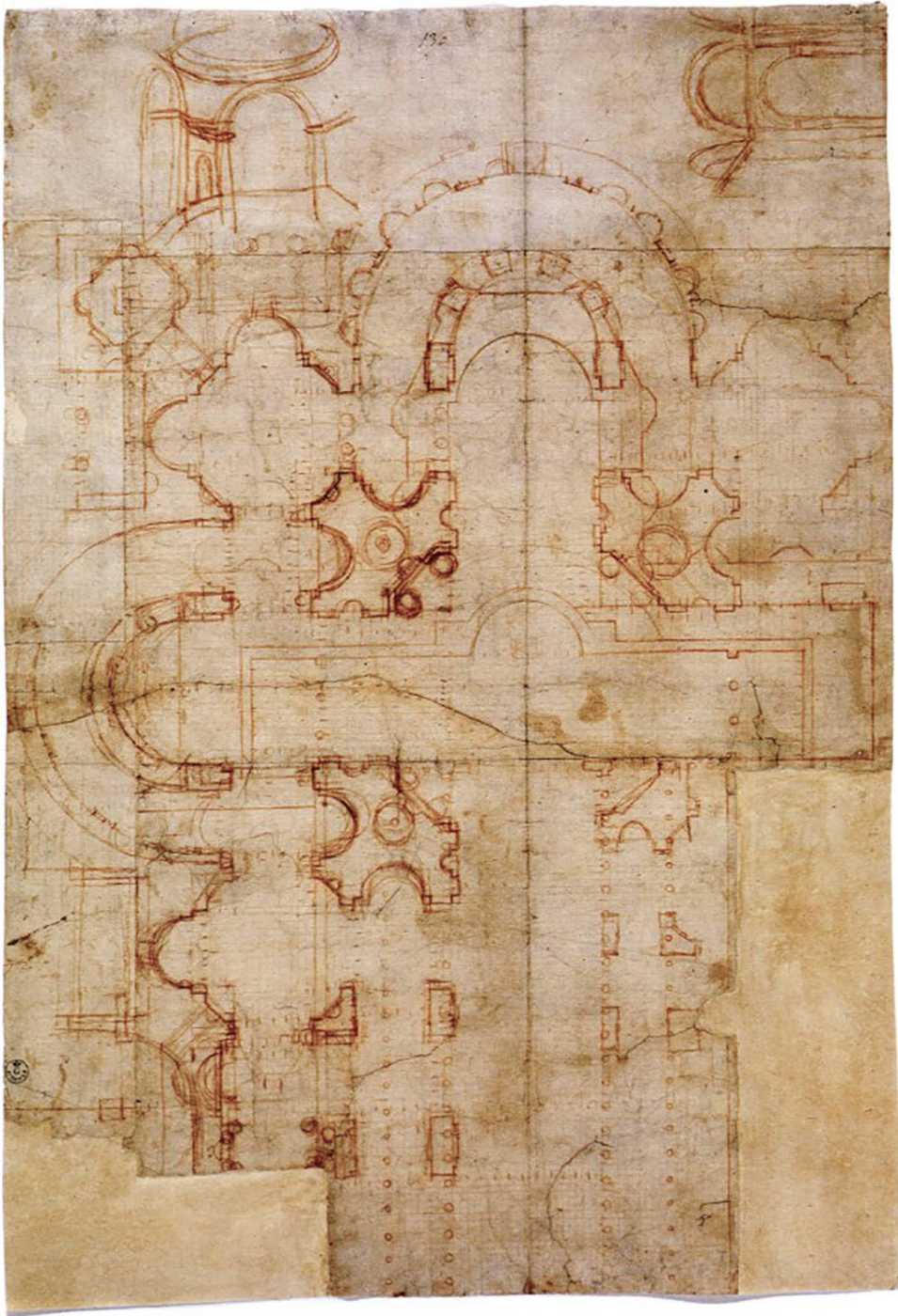


Figure 1: Bramante. Initial sketch of the plan of St. Peter's Basilica, Rome, c.1506. Borsi (1989, p. 75)

architectural idea” that would later be developed by a collaborator in his workshop, “in a process, in some way, by delegation” (Borsi, 1998, p. 270), where the level of involvement depended on the degree of commitment to the commission (Wittkower, 2007). This is akin to what happens today with Gehry and his initial sketches, which are surprisingly not very different, in terms of gestural expression, from Bernini’s autographic sketches (Guilfoyle, Pollack, 2006) (Figure 2).

Borromini worked under Bernini’s orders at the Vatican. They collaborated on the Barberini Palace. They competed for the patronage of the Pamphili family to work on the palace and the fountain in Piazza Navona. The conflicts of authorship between them did not become apparent because the hierarchical position was always clear. We are unaware of the degree of authorship of each of them when they worked together, and the doubt is often resolved through the study of drawings. In the case of the baldachin, it will be Borromini’s autographic drawings of the interior of the Vatican Basilica that grant him an unknown role (Figure 3). The drawings resolved the commission of the fountain in Piazza Navona in favour of Bernini.

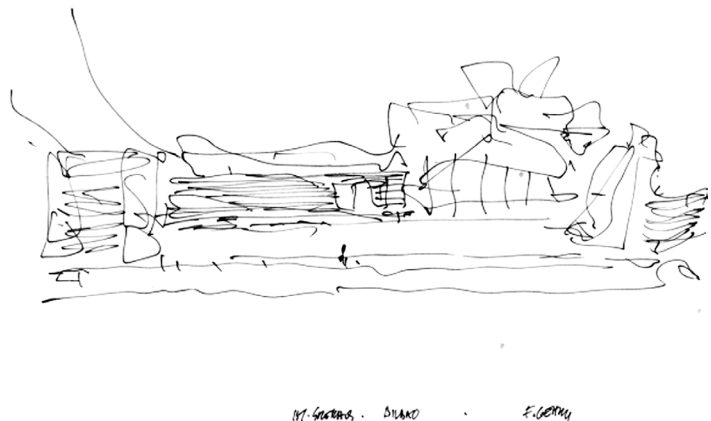
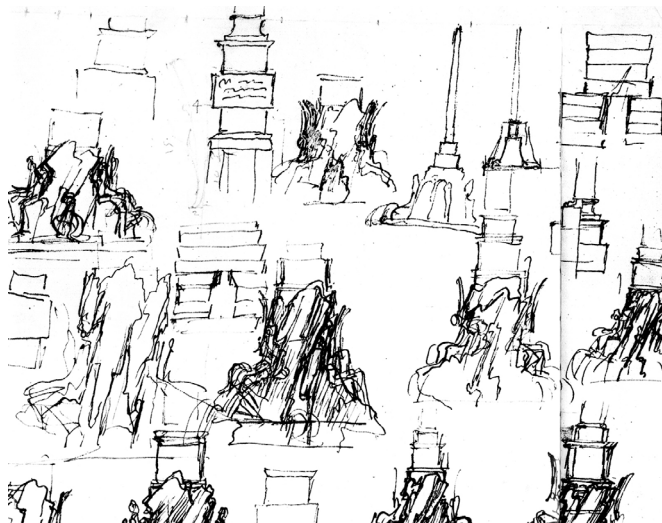
3.5. Modernity, postmodernity, transdisciplinarity, and co-authorship

The progressive specialization of architecture since the Industrial Revolution, and especially the advancement of structural calculation throughout the 19th century, contributed to the rupture of the tectonic model sponsored by modernity, fostering collaborations between colleagues with a more artistic profile and another more technical one, generally with differentiated formations that followed the model of *Beaux-Arts* or *L’Ecole Polytechnique*, respectively.

The collaboration between Le Corbusier and Pierre Jeanneret follows this specialization and internal organization of work in the studio. Alfred Roth, a collaborator of the atelier on *rue de Sèvres*, describes how Jeanneret remained in the studio all day supervising technical aspects, plans, or visiting works alongside Le Corbusier, while the latter only dropped by in the afternoons (Velásquez, 2014)■. Observing the innovation in projects from the early years of their collaboration—the legendary villas of the 1920s and significant projects during the 1930s—and those of the second stage of their collaboration—the Chandigarh period—one might wonder to what extent this collaboration, specialized in the most technical aspects, especially regarding construction and structure, does not make Jeanneret a full-fledged

■ Jeanneret had studied architecture and possessed greater technical knowledge.

Figure 2: Left: G.L. Bernini. Autographic drawing with study for the base of the obelisk of the Fountain of the Four Rivers in Piazza Navona, Rome. Museum of Fine Arts, Leipzig. Borsi (1980, p.144) Right: Frank Gehry, Autographic sketch for the Guggenheim Museum Bilbao, Spain. “Sketch”, 1991, courtesy of Frank O. Gehry



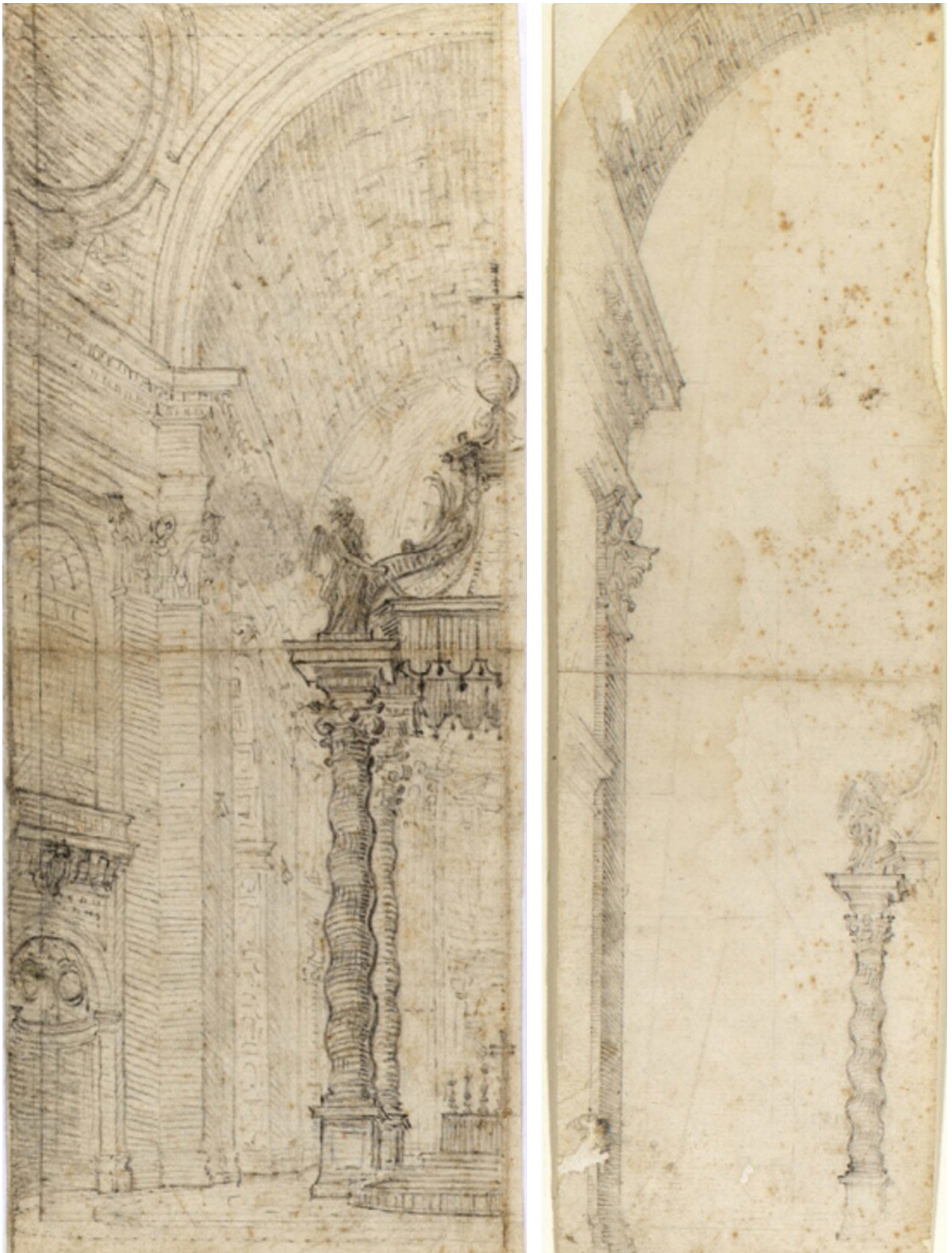


Figure 3: Borromini's drawings of the interior of St. Peter's Basilica in the Vatican. Study of the insertion of the baldachin in the centre of the church. (n.d.)
Albertina Library, Vienna. AZRom 762r, 763r, and 764r

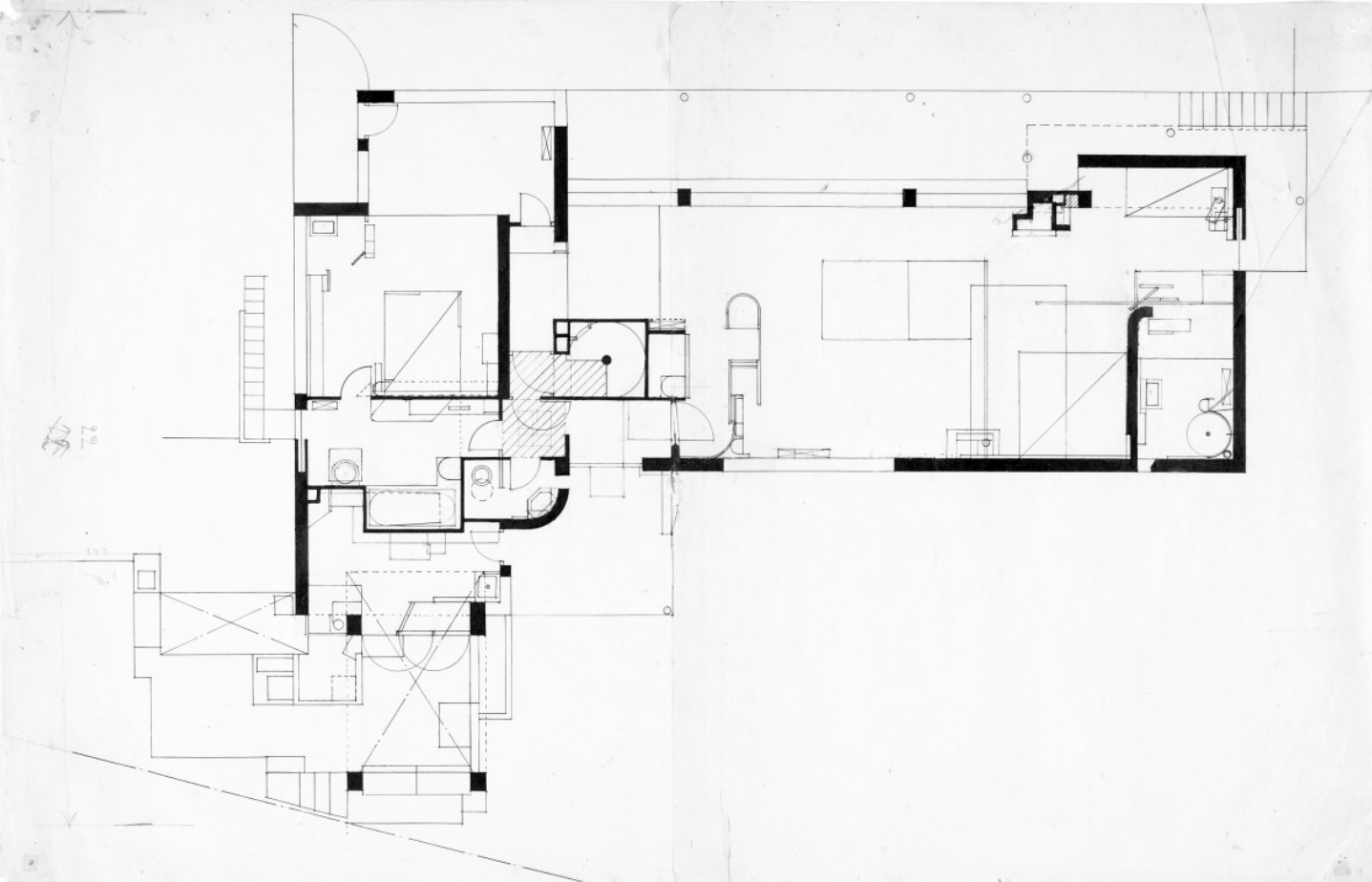


Figure 4: Eileen Gray, Floor plan of the E.1027 house. House by the Sea (1926-1929). National Museum of Ireland NMIEG 2000.250 (photograph by María Pura Moreno)

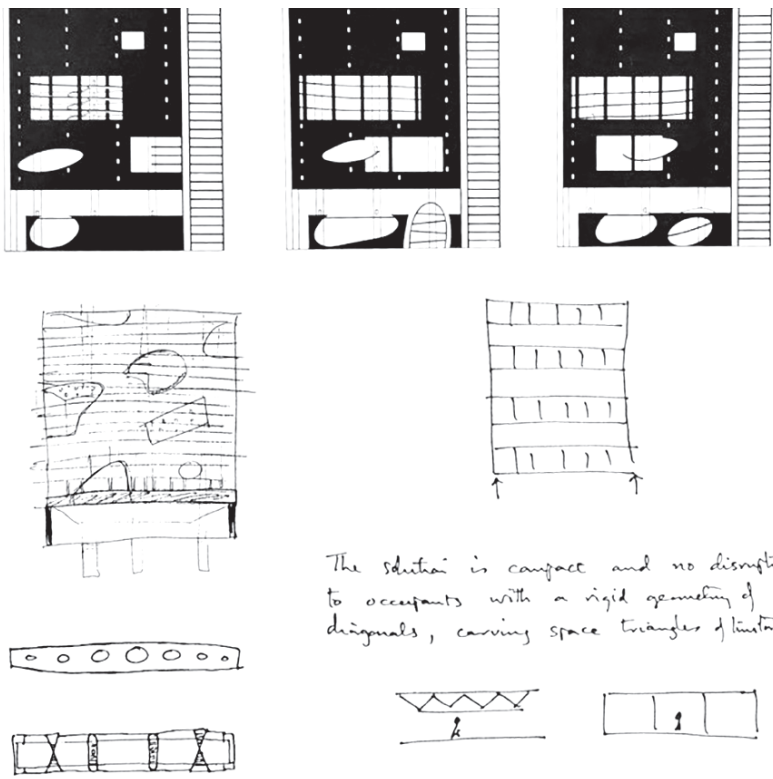
co-author of Le Corbusier's work. It is an example of *authorship hierarchized* by the prominence of the Swiss master who, nevertheless, stated: "My architectural work exists only through teamwork between Pierre Jeanneret and me. It is a joint work until the moment when life circumstances (and good friends) separated us..." (Barbey, 1968, p. 390).

Other co-authorships have been even more contested, and in some cases, Le Corbusier himself contributed to their silencing. Eileen Gray and Jean Badovici jointly designed the villa E1027, which was surrounded by controversy after Le Corbusier painted frescoes in it (Maggio, 2011). Upon the publication of these frescoes in his complete works, Le Corbusier avoided mentioning Gray, something he repeated in a monographic issue dedicated to his work in *L'Architecture d'Aujourd'hui*, adding derogatory comments towards the original design (Constant, 1994)⁵⁴. In 1929, an equal relationship was difficult to accept, especially between an interior decorator and an architect. Recent studies regarding authorship suggest leadership in formal aspects, design, interior decoration, and furniture by Gray, and technical advice and critical refinement by Badovici, which is consistent with the order of the authors the first time the work was published in the legendary magazine, *L'Architecture Vivant*, which was edited by Badovici. A drafted plan does not credit authorship with the same

effectiveness or intensity as a hand-drawn autographic drawing, although the plan published in the magazine was drawn by Gray (Figure 4), which seems to indicate this asymmetrical authorship in terms of creativity.

This increasing specialization in architecture and the division between architectural design aspects and those of a constructive nature have led to a division in some countries between the figures of architect and construction engineer. Collaborations between notable figures from both professional fields can yield exceptional results when complicity manages to bring out the best in each of these collaborating co-authors; it becomes difficult to distinguish between their roles, and perhaps one could speak here of a transdisciplinary authorship. Cecil Balmond has contributed to illuminating some of the most radical projects concerning structural aspects with various architects such as Koolhaas, Libeskind, Toyo Ito, UNStudio, or Siza, to name a few. For example, OMA's radical project for the National Library of France—a large cube measuring 100 meters on each side with thin-walled beams—allows for perforating the structure to accommodate the five thematic libraries inside like bubbles floating within the cube, a structural feat that would have been impossible without his collaboration (Figure 5).

⁵⁴ Among other actions widely criticized by critics in recent decades.



The solution is compact and no disruption to occupants with a rigid geometry of diagonals, carving space triangles of limitation.

Figure 5: OMA, project for the National Library of France, 1989 (Koolhaas, conceptual drawing; Cecil Balmond, beam diagrams). Koolhaas and Mau (2010, pp. 673, 669, 681, 677)

Koolhaas himself has acknowledged his fundamental role in projects such as the Jussieu library or the one in Seattle. Toyo Ito also recognized how his relationship with Balmond in the design of the Serpentine Pavilion had transcended the natural division between architect and engineer, considering him a partner, which brings him much closer to the figure of co-authorship than anything else (Balmond and Ito, 2004), at least in terms of specialized or transdisciplinary authorship. In fact, Balmond's figure, and that "innovative and transgressive character beyond the scope of his specialization, combined with his transdisciplinary attitude, has been compared to figures such as Leonardo, Copernicus, Kepler, or Hooke" (Kemp, 2014, p. 251).

Other collaborations between the creative and technical aspects inherent in both disciplines can result from the creativity of architectural design applied to the utilization of a prefabricated system devised by an engineer, as is the case with the Kohn Ratinoff house, designed by Myriam Ratinoff using the modular prefabricated concrete block system 'Multibloc', developed by her husband, engineer Sergio Kohn (García de Cortázar, 2023).

We can even find examples where the role of design is reversed, and an external agent to the profession gives birth to the original idea, while an architectural firm refines the design to make it technically viable, as happened with the *Toneelshuur* theatre, whose initial design was authored by the comic artist Swarte, while Mecanoo was commissioned to turn it into an architectural project for construction. However, Swarte continues to be recognized as the primary author of the work (Lus Arana and Ruiz-Morote Tramblin, 2023).

3.6. Koolhaas and non-graphic authorship

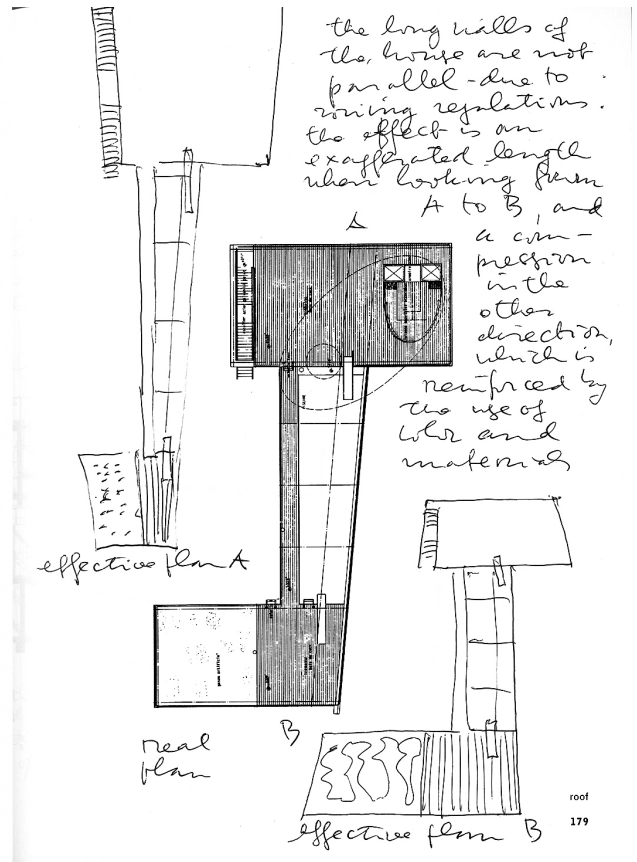
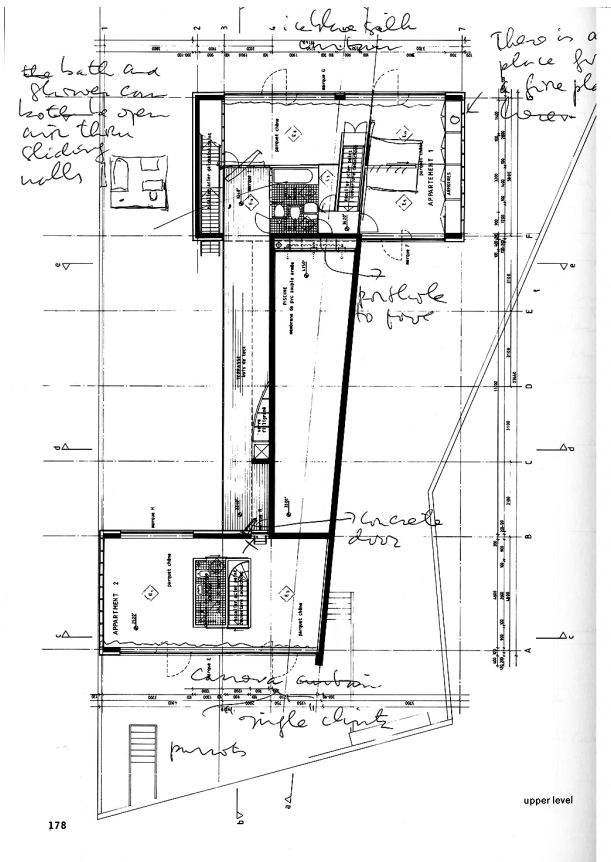
The case of Koolhaas-OMA is quite revealing; he does not explicitly explain the configuration process followed to reach the final project closure form. He does not explain how it occurs, breaking the relationship between the value of the object and the production process from which it results. When giving lectures about his work, he barely shows process drawings; at most, he provides some models whose role in formal definition tasks is not identified: we do not know if they are germinal or related to the final design stages. The explanation of the procedure is narrated, never shown. We could define it as a Marxist process of fetishization rather than an explanation (Marx, 2017). In such a complex architectural work, and one to which he dedicates so much time—2 years at Villa Dall’Ava (1991)—it seems to be done without sketches or trials. He shows very little, only autograph corrections annotating more than drawing quick sketches on impersonal drawings (Figure 6).

Regardless of his willingness to work within the atelier format and the supposed anonymity that such a structure offers, his individuality is not completely concealed. The truth is that none of the founders of OMA in 1975 remains in it, and yet, in his S, M, L, XL,

the only member of the team who has participated in all projects is Rem Koolhaas, as is made explicit again through a text or a table of authorial relationships and collaborations (Figure 7).

Koolhaas is an architect who fundamentally grounds his work through verbal discourse. He is an intellectual in his classical format, perhaps the most intellectual of all currently active architects. Koolhaas is a writer. More than a writer, he is a critic of his own work. He always maintains an insurmountable separation between the work—as creation—and his persona—the critic. But the reason why writing is important is explained when he asserts that: “It is increasingly fundamental. It is the sum of the statements that one can make for oneself, for which one is solely responsible, and that are written in solitude. And this is very important” (Koolhaas and Colomina, 2007, p. 384). If we add to this the fact that Koolhaas is convinced that the presence of “images devalues the text,” we have a clear explanation: Koolhaas reserves a function whose intellectual authorship he claims as an individual and personal activity, as he writes the texts alone. His non-graphic verbalization contrasts with that of contemporaries like Foster, whose latest comprehensive exhibition of his production proudly displays his ideation drawings, accrediting his authorship with them. The prevalence of text over drawing, and to some extent, regarding images in Koolhaas’s atelier, is also made explicit in the

Figure 6: Reproduction from the book S, M, L, XL. Corrections by Koolhaas on the plans of Villa Dall’Ava (1984) Author: Rem Koolhaas. Koolhaas and Mau (2010, pp.178-179)



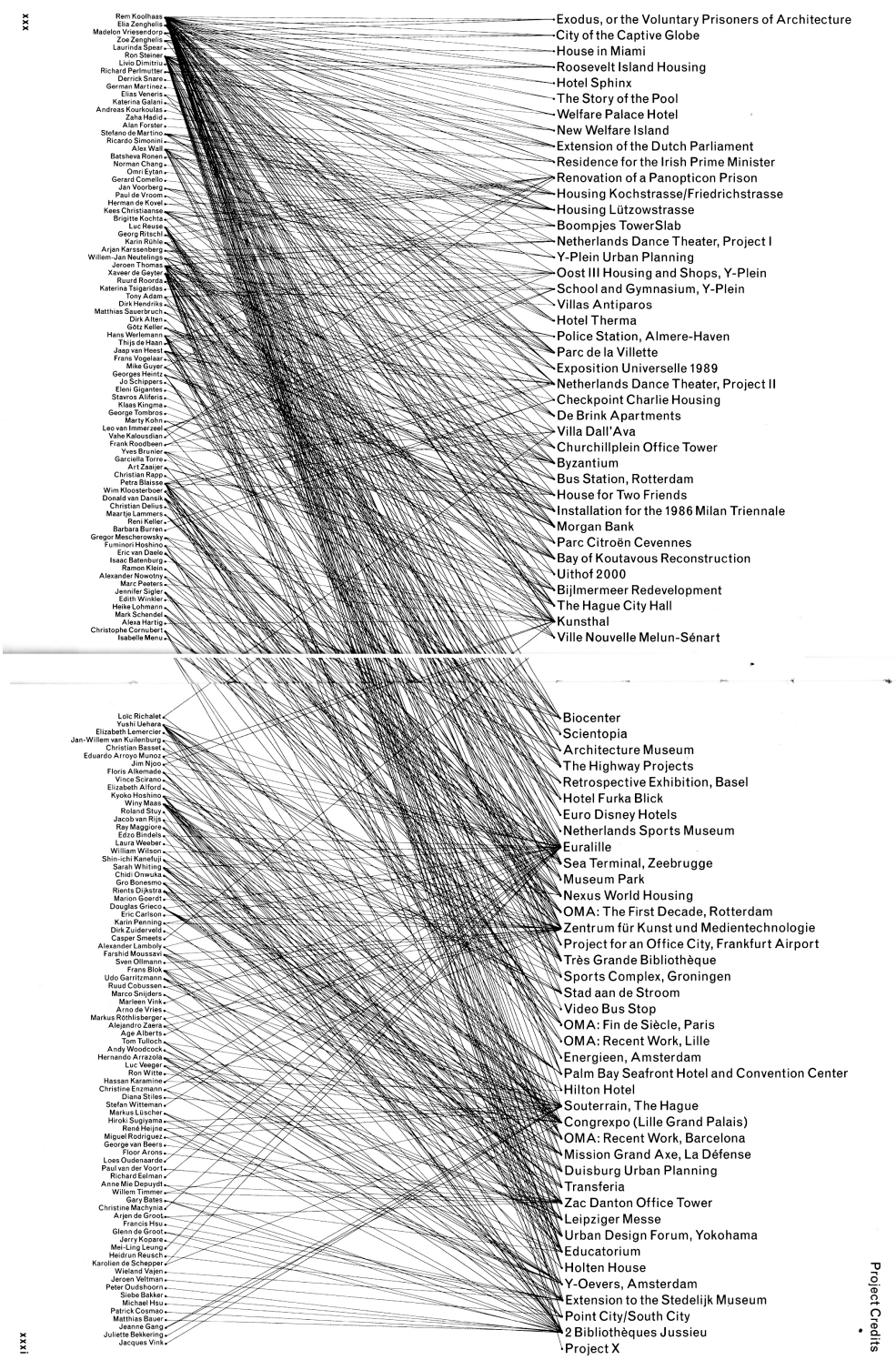


Figure 7: Reproduction of the book S, M, L, XL Authorial Relationships and Collaborations by Project. Koolhaas (1997, pp. 30-31)

format of his S, M, L, XL. On the back cover, it reads: "This voluminous book is a novel about architecture... it combines essays, manifestos, diaries, tales, travelogues, a cycle of reflections on the contemporary city, and the work produced by Koolhaas's Office for Metropolitan Architecture over the past 20 years" (Koolhaas, Mau 2010).

We are facing a new intellectual transfer that, by sidelining drawing as a space of creativity, shifts intellectual work to text, to criticism; just as Alberti transferred the creative core from the work to the drawing and Duchamp from the object to the idea (Goldsmith, 1983); precisely when new technologies displace the value of drawing as authorial testimony. Therefore, we are facing a new claim of authorship that demands such recognition.

3.7. Authorial role and new technologies

The development of digital tools reinforces the impersonal nature of computerized drawing, which has contributed to diluting the link between authorship and this type of drawing. Its "unlimited editability" (Carpo, 2017, p. 136) and the collaborative nature of some digital design processes, especially with BIM systems, seem to further blur the "notion of authorship and direct it towards a realm of co-authorship" (Carpo, 2017, p. 6). Thus, BIM models, besides being three-dimensional models, incorporate data associated with each of the model's elements in what could be called a three-dimensional digital data model, undoubtedly favouring transdisciplinary and collaborative project production (Harty, Koudier, Paterson, 2016). Perhaps even more significant is the introduction of computational design (Terzidis, 2006), the notion of open form, or the introduction of big data into the project, something Mario Carpo has referred to as digital turns (2017), as in the case of data extraction from present or future users, as practiced by Jeanne Gang or Bjarke Ingels. In reality, there has been a true digital culture in architecture for at least three decades, which has introduced substantial changes in the way the architect's authorial relationship with the project is conceived (Picon, 2010). A first issue that requires reflection is the definition of form in architecture not based on visual and therefore analogical thinking (Aicher, 2001), as has been done through drawing throughout history, but, in the case of parametric or algorithmic designs, digital coding and, through scripts, the definition of formal structures rather than geometries.

The complex and highly hyperstatic structure of the project by Jacques Herzog and Pierre de Meuron for the Beijing Olympic Stadium could not have been calculated without the use of software applied to finite element analysis. The collaboration between both architects serves as an example of complicity, collaboration, and symmetrical co-authorship, although the structural part was carried out in collaboration with Ove Arup (Burrows, Parrish et al., 2009). But even behind this powerful firm, we always identify a specific engineer,

the intellectual author of the structural innovation and the holder of that transdisciplinary authorship we refer to here. Such are the cases of collaboration of Utzon with the founder Ove Arup, of Piano, Rogers, and Foster with Peter Rice, or the aforementioned collaboration of Koolhaas with Cecil Balmond, the latter also hand-drawing the diagrams and schematics that help him to conceptualize his structures (Figure 8).

Terzidis (2006) has tackled the issue of creativity in computational design, arguing that it implies a paradigm shift whereby architectural design becomes disconnected from both formalism and rationalism and aligns with an intelligent form and a creativity that we are capable of tracking. The incorporation of form-finding strategies—referred to by Carpo (2017) as form-searching, not without some reason—has completely changed the relationship between the author and the work, emphasizing "material efficiency over appearance and processes over representation" (Leach, 2009, p. 34).

The convergence between CAD and CAM has led to the recovery of control over the production processes of architecture through digital fabrication by architects, thus reclaiming the tradition of medieval master builders (Kolarevic, 2009). Despite the progressive blurring of authorship within increasingly complex interdisciplinary teams, we can discern a reassertion of authorship, of a coral and shared nature, "from the conception to the materialization of the project in the built work" (Avermaete, Davidovici, Grafe, & Patteeuw, 2023, p. 1).

However, the difference regarding the relationship between authorship and creativity brought about by the digital revolution has more to do with the role of computers and the tools themselves beyond their mere instrumentality than with the refinement or improvement of design possibilities introduced by them. As Rivka and Robert Oxman point out, this transformation "is producing a digital connection between form generation and form finding based on efficiency," or what amounts to "the importance of digital design informed by performance" (Oxman, Oxman 2014, p. 7). Architects no longer produce plans or models to shape their projects as suggested by Alberti, but instead write scripts and define algorithms that optimize geometry based on parameters and boundary conditions. This represents a substantial change in defining the geometry of the project beyond form to shape architecture based on logical criteria and the optimization of geometry itself through simulation tools that can anticipate the structural or energetic behaviour of a given design. The very materiality of the work can now be explored and designed using strategies that converge between CAD and CAM to the point of proposing a new materiality linked to digital culture in architecture (Picon, 2009).

4. Discussion and conclusions

The concept of authorship or co-authorship in architecture is indeed closely tied to creativity. During the Renaissance, the notion of authorship in architecture emerged with the figure of the architect, marking a distinction between the intellectual labour involved in the process of ideation and representation of architecture in the project, and the actual construction of the building. This separation became possible thanks to the development of representation systems based on projectivity and the refinement of a precise notation system capable of conveying the necessary information to third parties to translate these plans into built architecture.

Indeed, drawing, as a vehicle for thought in graphic form and as an indispensable tool in the notational representation of architecture, has been for centuries the hallmark of authorship due to its autographic nature during the creative phase of the project. Since then, no one disputes that the author of the architectural work is the one whose graphic record remains, through their drawings understood as a documentary record of their design process and, along with it, their authorship.

It is especially during the 20th century when the primacy of the architect as an autonomous agent begins to be questioned and co-authorships and collaborations proliferate. The increasing complexity, inexorably linked to a progressive specialization in project tasks, fosters the emergence of transdisciplinary practices in which co-authorship seems to be the standard, despite the nuances that this may entail.

The emergence of new technologies and the primacy of computerized drawing in architectural production, with the consequent impersonal nature or, at least, a lack of evident distinctive features in its execution, has gradually diminished the authorial weight previously attributed to autographic drawings as an unequivocal record of the project and, therefore, of the design authorship.

The case of Koolhaas is particularly notable regarding non-graphic authorship, despite not belonging to the generation of architects in which new technologies have left a greater imprint. His influence through his texts and in his own relationship with his collaborators have fostered an authorial role that challenges the primacy of drawing as a record of that role in the achievement of architecture produced by OMA. It's a collaborative work, somewhat devoid of personal traits from the conventional standpoint of architecture, yet the prominent and authorial role of Koolhaas is explicitly expressed in his texts.

It won't be until the arrival of the so-called digital turns with the development of transdisciplinary teams capable of tackling an increasingly complex issue in all phases of architecture and the CAD-CAM convergence, that the tradition of master builders will be resumed in the sense of a certain unified choral work in the integral process of digital design and manufacturing.

Indeed, there's a resurgence of guild collaboration—specialized—to achieve a common goal. However, akin to the past, a leadership figure persists, overseeing and harmonizing all those wills and skills, as was the role of master builders. Even in cases of shared or more diffuse authorship among collaborators and in the transdisciplinary approach to the project, the central figure endures. It's this individual to whom authorship of the work inevitably gets ascribed, albeit supported by collaborators increasingly acknowledged in project credits in specialized journals. Ultimately, the acknowledgment of authorship entails, alongside fame and compensation, the attribution of responsibility for the design, which undoubtedly contributes to its endurance. As a consequence, there are the corresponding copyright rights, particularly in architecture, recognized through the existence of the project—the document legally attesting to the design's authorship.

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