When decorations have a function. Technology and aesthetics in contemporary facades

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Abstract

This paper, starting from a reflection on the role of decoration and ornament in history, their evolution in the cultural debate, and some significant case studies, discusses the relation between function and decoration in the artistic and architectural discussion from the 20th century until nowadays. The representational function of architecture has always been based on the ornamental and decorative elements, which allow the readability of the building and the transmission of meanings and information. This function is even paradoxically performed in works conceived as manifestos of anti-decorativism. In light of the most recent trends, architecture reclaims this communicative function, manifesting the tendency to be an image, primarily through the design of the external surfaces and envelopes on which the semantics and iconicity of the new languages of contemporary architecture are based. The architectural object becomes an image –an image of itself, its design, the context and the culture that generated it – precisely thanks to its ornamental and decorative dimension, which is discussed and analysed in this article.

Keywords: Facades, Architecture, Decoration, Ornament, Pattern

1. Introduction

Buildings are complex systems of representation [1]. They can be considered systems of signs in which it is possible to recognise meanings that can have precise functions if interpreted in the light of specific codes [2]. Therefore, through this approach, architecture entirely would fall within the field of mass media and could be considered a form of mass communication [3]. Thinking of architecture as mass media implies focusing on the interface between the built object and the public area on the architectural envelope that becomes the perceived image of architecture. The façades, as the elements closest to the public space and therefore most visible, constitute the readable pages of this media whose readability is based on the reading of codes and languages that transform in time and space.

Until the twentieth century, the reading of architecture was based on the interpretation of decorative features and ornamental elements that, composed in the surfaces of façades, constituted a form of visual narratives capable of communicating social, cultural, and functional information. However, unlike in art history, historiography and the most significant essays on architecture have often neglected and perhaps despised the use of ornaments, relegating them to an ancillary and non-essential role in the conception and execution of the architectural work. This approach, intrinsic to the debate on decoration, has deep roots in ancient rhetoric. From Plato's famous condemnation of *mimesis*, which fits into the truth-imitation dialectic in the problem of figuration, through Vitruvius' *De Architectura* [4], where the *decorum* and, therefore, the decorative principle must pass through the purpose for which the building is intended, to Leon Battista Alberti's *Re Aedificatoria* [5], where the emphasis is placed in relationship between pulchritude –linked to the architectural structure and therefore to the truth – and ornament – an accessory and therefore non-essential element. However, the essay with the most influential opinions on the subject is Adolf Loos's *Ornament und Verbrechen* (Ornament and Crime) [6], a cultural precursor of European modernism where ornament is associated with crime because it is superfluous in the conception of architectural form.

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2. The tradition of decorated façades

However, before the stigma of modernism, the history of architecture has provided famous examples in which the use of wall textures and motifs conferred iconicity on buildings, conveying profound meanings that lie beyond the superficial gaze of the wall surfaces of their façades. A notable example of this is Venetian Gothic-Byzantine architecture, which has specific characteristics compared to the rest of European Gothic. One of its main characteristics is, in fact, the use of two-colour decorations involving the use of different marbles, usually *biancone* and *rosa Verona*, which draw a characteristic contrasting colour effect. Two-colour decorations were mainly used on friezes, column capitals, cornices and window arches, but in some cases, they were used to design decorative motifs on façades. Particularly noteworthy is the two-colour wall motif on the main façade on Piazzetta San Marco of the Doge's Palace (Fig. 1), which contributes to a chromatic contrast that makes the palace's façade unique. The geometric motif covers the last band of the façade, the one that is higher and less "pierced", and through the use of two different materials reproduces a two-dimensional wall decoration typical of certain orientalism in Venetian architecture, also traceable in Islamic culture, from Spain to Indonesia, and rooted in iconoclastic religious ideology.

Similarly, although with very different formal results, mention may be made of the Palazzo dei Diamanti in Ferrara (Fig. 2) or the Chiesa del Gesù Nuovo in Naples (Fig. 3). Although there are slight variations, in both cases, the façades feature ashlar as a wall motif that makes it iconic and recognisable. The diamond-shaped rustication - a small pyramid with a square base - is precisely and rigorously arranged, creating a three-dimensional pattern capable of creating light and shadow effects that give the façades particular colour effects throughout the day.

Beyond construction authenticity, the cases above show how wall motifs, obtained through ashlars, colours and texture joints, contribute to the aesthetic conformation and iconicity of buildings expressed through the design of façade surfaces [7].

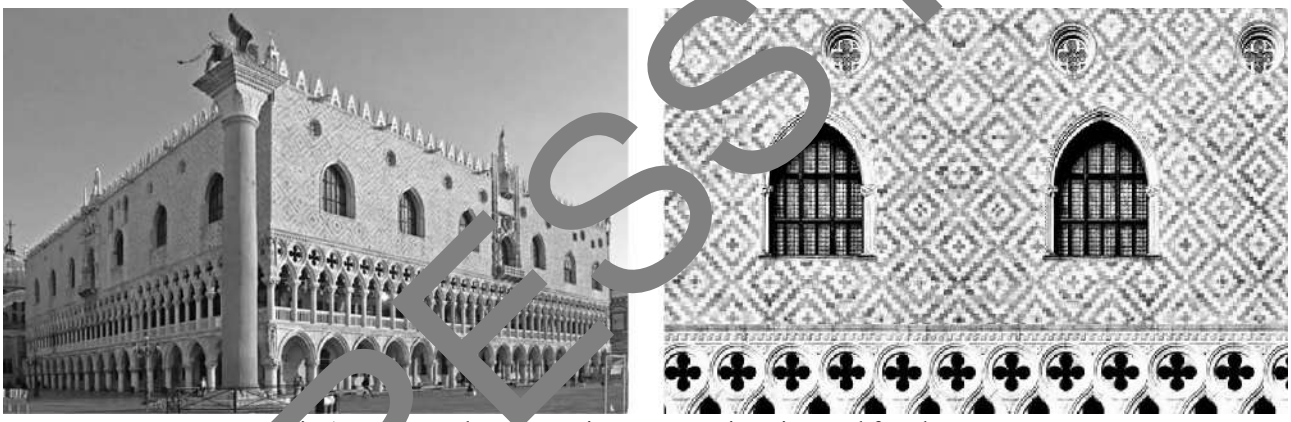

Fig.1_Doge's Palace in Venice - perspective view and façade pattern

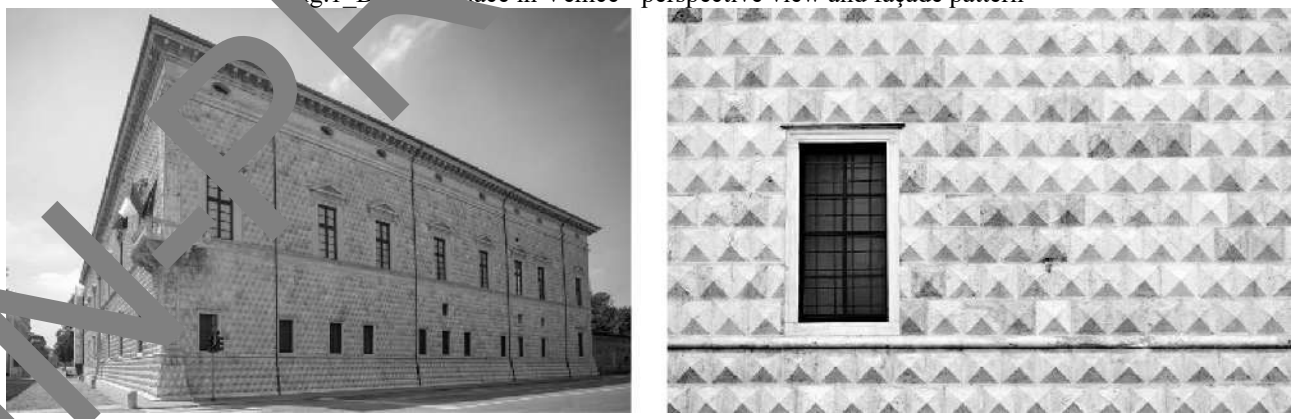

Fig. 2_Palazzo dei Diamanti in Ferrara - perspective view and façade pattern

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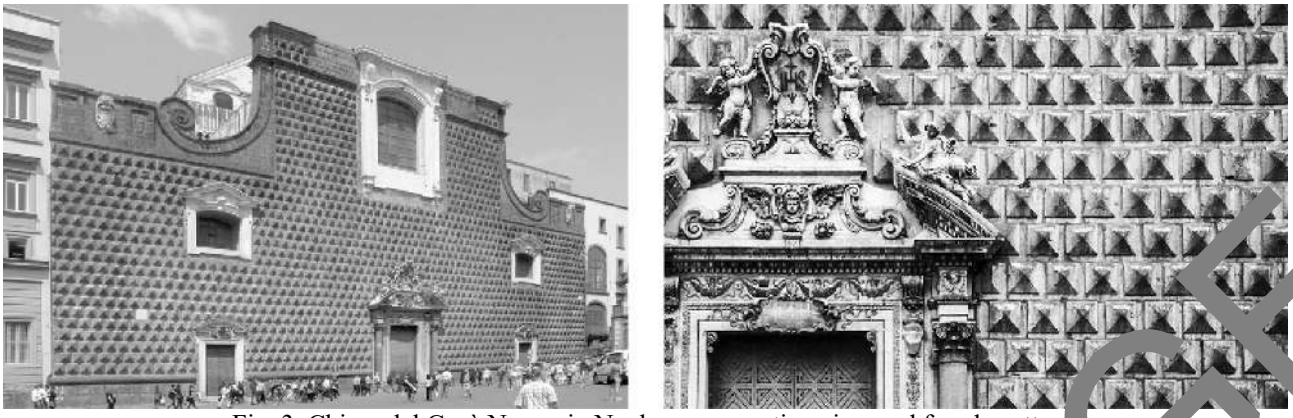

Fig. 3_Chiesa del Gesù Nuovo in Naples - perspective view and façade pattern

3. Historical functions of decoration in architectural façades

Hence, throughout history, the design of architectural façades has always been inextricably linked to the theme of decoration. It is no coincidence that Gottfried Semper, one of the most significant theorists of decoration, studied architectural surfaces in relation to textures. Gottfried Semper's nineteenth-century treatises on decoration, as well as those of Owen Jones [8], profoundly influenced the works of architects and those of Louis Sullivan (Fig. 4) and Frank Lloyd Wright (Fig. 5), who used the metaphor of textiles in the design of their buildings and in particular their facades. Wright referred to himself as "the weaver" for his method of construction based on the composition of textured blocks forming enveloping membranes [9].

According to the traditional conception, decoration is not a functionless element but has the function of attracting the eye and giving visual and aesthetic pleasure. From this point of view, the decoration is designed to attract and capture the eye, transforming objects into images [10]. In order to do this, decoration relies mainly on pure form, favouring abstraction and stylisation, almost forcing the eye to enjoy the pure harmony of signs rather than the meanings conveyed by images of a figurative nature.

However, decoration is not only aimed at the gratification of visual pleasure. Historically, the representative function of architecture has been based on it. Traditionally, decoration also plays a political role, distinguishing the social status of the owners of the objects on which it was applied, them being tools, objects, furniture, clothing, accessories, spaces or buildings. In pre-modern buildings, façade decoration provided social, cultural, functional, and economic information, making the built form legible and interpretable object. The ornamentation of the building provided information about its function, its role in society and the people who had built and inhabited it [11]. This social and representative function was emphasised as early as the 16th century by Sebastiano Serlio, who, in volume VI of *I sette libri dell'architettura* (The Seven Books of Architecture) [12], explicitly attributes a social function to decoration in that it allows the building to adapt to the class to which the individual inhabiting it belongs, a conception that was to remain unchanged until the early decades of the 20th century when the spread of Art Nouveau and Art Deco stylistic elements in the façades of bourgeois houses became a symbol of the affirmation of social status.

Fig. 4_Guaranty Building in Buffalo, designed by Louis Sullivan - perspective view and façade pattern

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Fig. 5 Ennis House in Los Angeles, designed by Frank Lloyd Wright - perspective view and façade pattern

4. The crisis of the decorated façade

This conception of "ornament as style", advocated by Owen Jones, Alois Riegl and Wilhelm Worringer [13] and sedimented over time until the early 20th century, contrasts with the concept of "ornament as crime" advocated by Adolf Loos, who put ornament on trial in his 1908 *Ornament and Crime*, calling it a crime against human civilisation. Adolf Loos' position is at the origin of a kind of *ornamentoclastia* understood as a new form of iconoclasm [14] that relegates decoration to a testimony of an obsolete past and a symbol of cultural backwardness. The crisis of decoration originated from a rekindling of the debate on what is valuable and necessary in what is useless and superfluous, on what is functional and structural and what is additional and extrinsic that originated in the treatises on rhetoric. From this context, ornamentation takes on negative connotations. The rhetorical *ornatus*, referred to in the visual arts, is seen as additional and extrinsic, distracting and distancing from the argument's substance and the discourse's simplicity. The principle of *decorum*, of "appropriateness", as conceived by Vitruvius, is also found in Leon Battista Alberti's *De Re Aedificatoria*, according to which ornament complements the work closer to beauty. However, to do this, it must respect a severe demeanour not to harm the harmony of the whole and, above all, not to transcend into luxury and pomp. Therefore, ornaments would not have a negative connotation, but only concerning their use. Leon Battista Alberti condemns ornamental elements only when they are reduced to external trappings that impede their vision and understanding instead of emphasising the beauty of the form.

According to this point of view, ornament and structure can and must coexist, as in the column case, which, although born to satisfy structural needs, is appreciated for its aesthetic qualities, so much so that it becomes the most ornamental architectural element. The column is thus configured as a significant example of functional ornamentation [15]. The exact synergy between form and function emerges in the writings of Sullivan, who associates the beauty of ornament with its being part of the material from which the building is constructed, with its being part of the tectonics of architecture. Construction and ornament, in his view, benefit from this harmony, in which each enhances the value of the other [16].

The loss of this unity between tectonics and the image of the built object will sanction the 20th-century crisis of decoration. The twentieth-century idea of decoration and ornament results from this disconnection between form and function, between tectonics and decoration, in which decoration is no longer constitutive of the conception and structure of the work but is entirely separable from the functional form of the object [17].

Ornament, once synonymous with the pursuit of beauty, harmony, and aesthetic pleasure, is thus, for a long time, removed from the surface design of objects and buildings. Among the greatest interpreters of this new purist aesthetic is Le Corbusier [18], according to whom the true intent of decorative art must be to produce objects of perfect utility, whose authentic luxury emanates not from decoration but from the elegance of its conception, the simplicity of its execution and the effectiveness of its performance. A new aesthetic paradigm is thus affirmed based on the concepts of smooth, white, clean, and transparent [19]. Smooth as unadorned, white as neutral, clean as pure, transparent as immaterial. A paradigm, this one that will profoundly influence the design of 20th-century architectural facades.

5. The revival of decorated façades

The paradigm of modernism was questioned seventy years later by the writings of Robert Venturi and Denise Scott Brown [20], who denounced its limitations and instead proposed to replace the smooth, white, and transparent with the drawn surface. For them, the architectural design of façades favours the integration of buildings in the urban context and allows the construction of meanings. The predominance of functional aspects was replaced by semantic and

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representational aspects, favouring the search for architectural expressiveness capable of communicating with the post-modern public and dialoguing with contemporary socio-cultural dynamics.

In the early 1980s, a critical-cultural debate developed on the revival of decoration. The positions of Gillo Dorfles [21], who, coming somewhat close to the thought of Ernst H. Gombrich [22], criticises a certain anti-ornamental puritanism of the historical avant-gardes of the 20th century [23], are of considerable importance. His position becomes even more apparent in his book *Elogio della disarmonia* (In Praise of Disharmony). Dorfles now declares the positions of Adolf Loos and the Modern Movement historicised and affirms the intrinsic necessity of ornament. These were the years in which art, as in architecture, was the first opening of criticism towards "anti-modern" and post-modern positions. These were the same years in which the Venice Architecture Biennial was entrusted first to Paolo Portoghesi – *Architettura dei Paesi Islamici* (Architecture of Islamic Countries) 1982-1983 – and then to Aldo Rossi – *Progetto Venezia* (Venice Project) 1985 –; two of the greatest exponents of that Postmodernism in architecture characterised by the return of ornament and stylistic citations as a response to the formalism of the Modern Movement and the International Style.

Almost a century after the moment of maximum splendour and the beginning of the decline of the so-called "decorative arts", decoration thus returned to be the protagonist of industrial production in different fields such as design, fashion and architecture, reappearing even in specialist and scientific magazines as to certify the definitive overcoming of the reluctance of that modernism that had caused its estrangement from both the world of production and that of culture. After having been repudiated in the early years of the 20th century as an expression of the elite and thus having been elected as a symbol of the degeneration of culture, after having been relegated to the role of "minor" art compared to the nobler figurative arts, after having risen to the symbol of kitsch and sour taste, decoration is today being revalued and is regaining its central role in the cultural debate.

6. Contemporary functions of decoration in architectural façades

This revival is partly linked to the new dynamics of the mediatisation of architecture [24] but also, above all, to the effects of the use of digital technologies that favour innovation in the design and application of decorative patterns on surfaces through practical technological solutions and new designs based on previously unimaginable complex geometries, now made possible by the widespread diffusion of new technologies in the field of digital design and fabrication that greatly facilitate the experimentation and production of elaborate forms and surface finishes [25]. The production of new types of ornaments has also been influenced by the availability of materials and devices that can respond to changing information from the environment through digital sensors [26].

Today, the focus is increasingly on the surface of buildings, expressing a new taste for ornamentation and decoration. The design and finish of surfaces, their colour and their aesthetic-decorative effects are all elements that contribute to the architectural quality and legibility of the building [27]. The image created by the decoration covers the entire external skin of the building and becomes a qualifying element of the architecture. The images created by sensors make façades responsive to environmental comfort or communication needs. Sensors that have been incorporated into buildings to play a pragmatic role could also play an aesthetic role by becoming a "dynamic ornament" that responds responsively to the qualities of the environment [28]. The façade, more than any other building element, nowadays becomes an iconic and symbolic element of the building and its designer, conveying a specific image and acting as a vehicle for self-representation.

7. The actuality of decorated facades

In the following years, the revival of the decorative architectural tradition led to experiences of synthesis between modern and post-modern culture and the tradition of masonry patterns in masonry buildings mentioned above. Among these, the Institut du Monde Arabe in Paris, designed by Jean Nouvel, should undoubtedly be mentioned (Fig. 6). The building's façade is a contemporary take on the wall decorations of Islamic architecture, a perfect synthesis of Western curtain wall schemes and Eastern culture of masonry patterns. Experiences are consolidated in the works of architects Jacques Herzog and Pierre de Meuron. From the Ricola factory and warehouse in Mulhouse (Fig. 7) to the headquarters of the Brandenburg University of Technology in Cottbus (Fig. 8), the skin and façade of the Swiss architects' buildings often coincide with surfaces that conceal the structural elements and achieve an aesthetic and decorative definition through processes borrowed from the artistic sphere.

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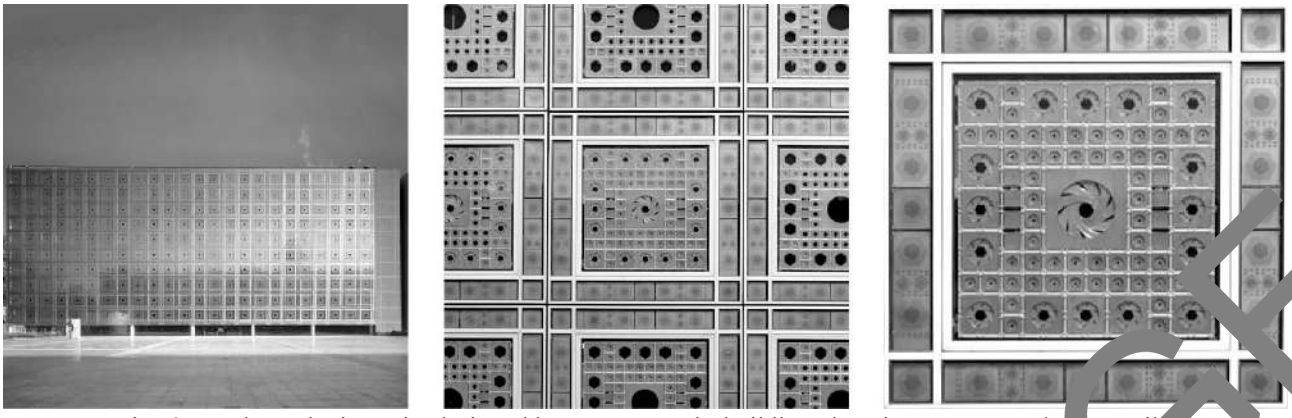

Fig. 6 Monde Arabe in Paris, designed by Jean Nouvel - building elevation, texture and texture tile

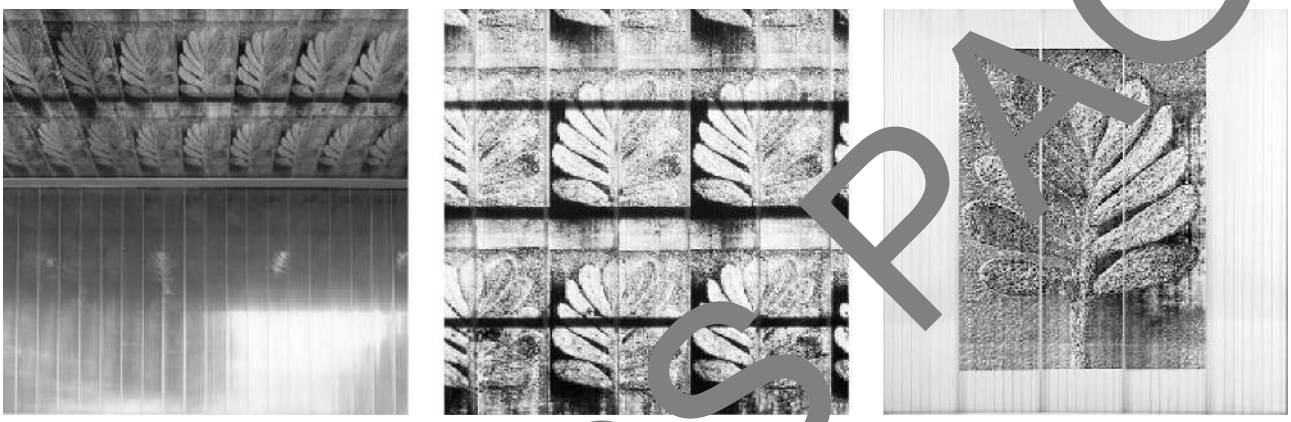

Fig. 7 Ricola factory and warehouse in Mulhouse, designed by Jacques Herzog and Pierre de Meuron - building elevation, texture and texture tile

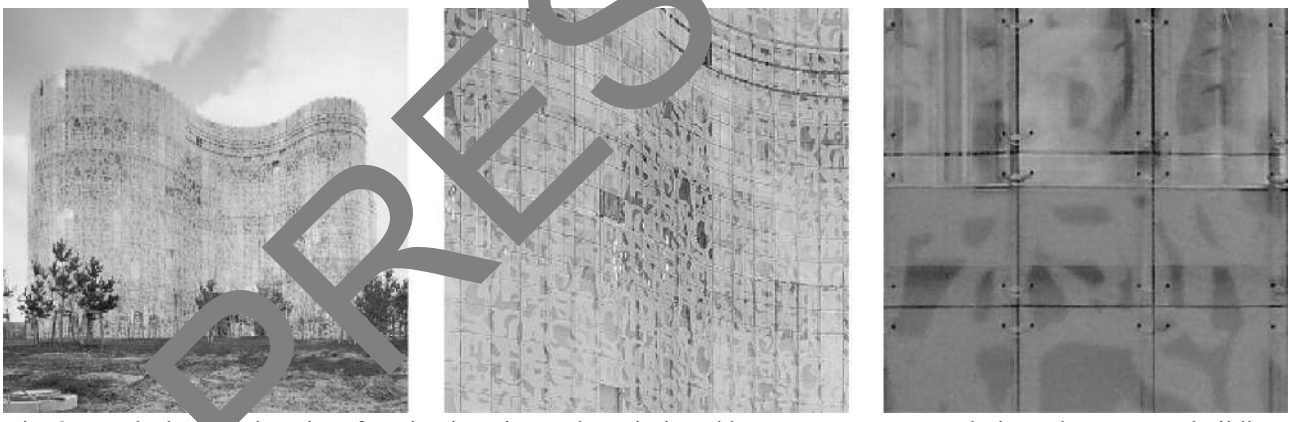

Fig. 8 Brandenburg University of Technology in Cottbus, designed by Jacques Herzog and Pierre de Meuron - building elevation, texture and texture tile

Architectural experiences in which geometric patterns are used in the design of façades gradually consolidated, culminating in compositional exercises with great formal results that use parametric modelling software and generative algorithms in the creation of patterns. Unlike traditional modelling, architectural projects using parametric modelling are based on a numerical construction approach consisting of a set of constraints and a sequence of elements characterised by a hierarchical structure.

As Patrik Schumacher reminds us in the essay *Parametric Patterns* [29], geometric patterns have covered architectural surfaces since time immemorial and, in their evolution, have taken on different meanings and purposes: "decorative enhancement, feature accentuation, camouflaging, totemic identification, semiotic differentiation, or any combination of those" [29, p. 30]. Nowadays, their applications extend to many areas of design, from landscape to urban planning, from design objects to architectural envelopes. This now-established practice is due not only to formal research but is fostered mainly by the development of various software and applications commonly used in the various areas of design.

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One of the most popular parametric tools is the Grasshopper plugin of the 3D modelling software Rhinoceros. Unlike other CAD software, this is based on a Visual Programming Language (VPL) capable of combining graphical manipulation of elements with a written syntax that structures an ordered sequence of instructions that are conditioned by specific parameters [30]. Although within set ranges, the parameters constraining the figures' geometries allow many variable solutions to be generated with extreme simplicity. With this language, a cause-and-effect system is established between the figure, its variation and its combination, which allows different formal and functional solutions to be determined. The final existences of these graphic-design processes, determined through the combinatorial possibilities introduced by software through the established constraints, manifest themselves as multiple formal facade outcomes, where the aesthetic component often combines with a technological one.

Recent examples of this are the parametric brick façade of the Revolving Bricks Serai office complex in Arak (Iran) by Farhad Mirzaie, the metal honeycomb façade of the Netzwerk Campus pavilion in Töging (Germany) by Format E Architekten and that of The Broad Museum in Los Angeles (California) by Diller Scofidio (Fig. 9). A further evolutionary step is the geometric patterns that allow the design and construction of parametric responsive façades. These include the Al Bahar Tower in Abu Dhabi by Aedas Architects (Fig. 10). The single element, designed based on the equilateral triangle, is composed of the curved facades of the towers, simulating the typical perforated wooden frames of the Arab Emirates tradition. The entire façade changes as the environmental and climatic conditions change, and a series of sensors regulate the light and the resulting heat inside the building.

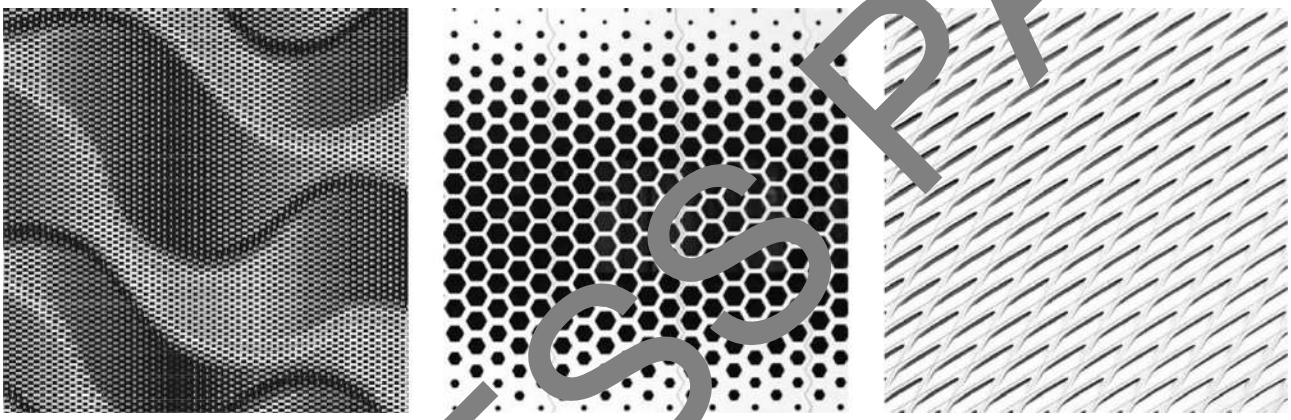

Fig. 9 Comparisons of the masonry patterns of the facades of the Revolving Bricks Serai, the Netzwerk Campus pavilion and The Broad Museum

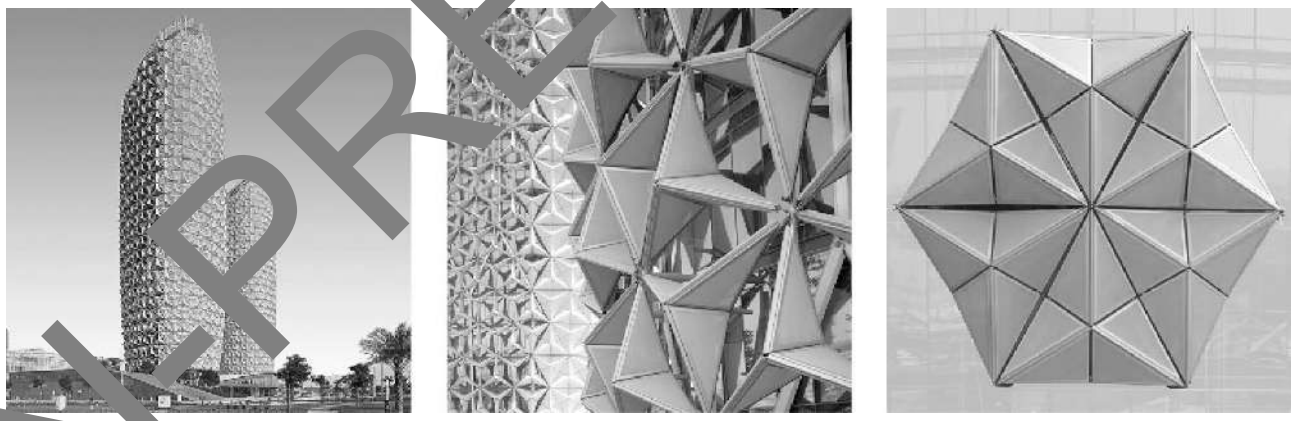

Fig. 10 Al Bahar Tower in Abu Dhabi, designed by Aedas Architects - building elevation, texture and texture tile

Many contemporary buildings force a rethinking of the elements that make up their tectonics. Indeed, especially for many of the architectures designed with parametric approaches, it is difficult to clearly identify the components of the façade separately from those of any roof. In these cases, it would be more appropriate to speak of the building envelope in a generic way where the issues discussed above are applied to the entire skin of the building. Examples of this are many of the buildings designed by Zaha Hadid, including the façade for the Civil Courts of Justice building in Madrid, composed of metal panels that modify the basic rhombic geometry to adapt to sun exposure or the composition of the skin of the Jumeirah Nanjing Hotel that adapts the basic geometry of the square to achieve different textures for different parts of the façade (Fig. 11).

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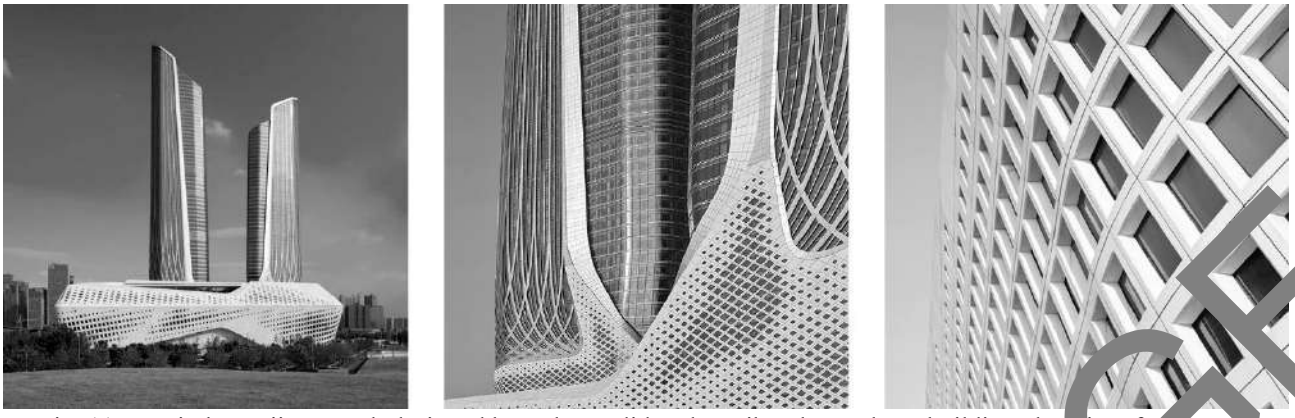

Fig. 11 Jumeirah Nanjing Hotel, designed by Zaha Hadid and Patrik Schumacher - building elevation, façade and texture

8. Conclusions

The contemporary debate is putting the theme of decoration in architecture back at the centre as the characterisation of architectural surfaces today lends itself strongly to experimentation. If, on the one hand, façade surfaces continue to play the historically sedimented role of legible pages communicating messages and information through their visual elements, on the other hand, they lend themselves to hosting new technological solutions aimed at optimising the environmental comfort and energy efficiency of buildings.

Regarding the strictly semantic and media aspect, the characterisation of façades today responds to the need to stand out and differentiate within the immense quantity of images disseminated through the new digital channels. The building must acquire an iconic character and be representative and recognisable by differentiating itself from others.

Experimentation with the perceptual and visual characteristics of façades often goes hand in hand with experimentation not only with graphic solutions but also with those related to materials, construction technologies, and responsive dynamisms that bring decoration back to that conceptual ideal unity between form and function sought throughout history, from classical antiquity to modernist polemics. Decoration, and more generally the design of surfaces, thus assumes the function of characterising architecture to allow it to be recognisable, iconic, and at the same time, becomes a constitutive part of the construction process and of the technologies that allow the building to function and interact with the environment and with users.

9. References

1. Colomina B (1994) Privacy and Publicity - Modern Architecture as Mass Media - MIT Press, Cambridge
2. Eco U (2002) La struttura assente. La ricerca semiotica e il metodo strutturale - Bompiani, Milano
3. De Fusco R (2005) Architettura come mass-medium - Edizioni Dedalo, Bari
4. Vitruvius P (1486-87) De Architectura – Eucharius Silber, Roma; Vitruvius P (1997) De Architectura - Einaudi, Torino
5. Alberti LB (1485) De re aedificatoria - Impressum Nicolai Laurentii, Florentiae; Alberti LB (1995) L'architettura - Il Polifilo, Milano
6. Loos A (1908) Ornamento e delitto. In: Parole nel vuoto - Adelphi, Milano, pp. 217-228
7. Rossi M (1995) L'ornamento laterizio e la memoria della pietra. In: Mandelli E (a cura di) Il disegno luogo della memoria - Alinea, Firenze, pp. 206-213
8. Semper G (2004) Style in the technical and tectonic arts, or, Practical aesthetics - Getty Publications, Los Angeles; Jones O (1856) The grammar of Ornament - Day and Son, London
9. Frampton K (2005) Tettonica e architettura. Poetica della forma architettonica nel XIX e XX secolo - Skira, Milano
10. Dorfles G (1986) Elogio della disarmonia. Arte e vita tra logico e mito - Garzanti, Milano
11. Kohane P, Hill M (2001) The Eclipse of a Commonplace Idea: Decorum in Architectural Theory in arq 5(1): 63-77
12. Serlio S (1600) Tvtte L'opere D'architettvra Et Prrospetiva - Giacomo de' Franceschi, Venetia; Serlio S (1987) I sette libri dell'architettura - Arnaldo Forni Editore, Sala Bolognese
13. Semper G (2004) Style in the technical and tectonic arts, or, Practical aesthetics - Getty Publications, Los Angeles; Jones O (1856) The grammar of Ornament - Day and Son, London; Worringer W (2008) Astrazione ed empatia. Un contributo alla psicologia dello stile - Einaudi, Torino

10.30682/tema100005

14. Bloch E (2012) Ornamenti. Arte, filosofia e letteratura - Armando Editore, Milano
15. Di Stefano E (2006) Estetiche dell'ornamento - Mimesis, Sesto San Giovanni
16. Sullivan LH (1947) Kindergarten Chats and Other Writings - Courier Corporation, North Chelmsford
17. Trilling J (2001) The Language of Ornament - Thames & Hudson, London
18. Le Corbusier (1973) Arte decorativa e design - Laterza, Bari
19. Davoli EM (2021) Da Corinto ad Avalon. Storie di decorazione e arte Occidentale - CLEUP, Padova
20. Venturi R, Scott Brown D (1972) Learning from Las Vegas - MIT Press, Cambridge
21. Dorfles G (1982). Riscoperta dell'ornamento in Rivista si Estetica / Università Di Torino Dipartimento Di Discipline Filosofiche 22.1982 12: 10-15.
22. Gombrich EH (1979) The Sense of Order. A Study in the Psychology of Decorative Art - Phaidon Press London
23. Fameli P (2019) Pattern and Decoration. Viaggio al termine del modernismo in ZoneModa Journal, 9(1): 145-159.
24. Schittich C (2016) Between fashionable packaging and responsive skin: trends in modern facade design. In: Architectural Details 2003 - Routledge, London, pp. 18-21.
25. Picon A (2013) Ornament: The Politics of Architecture and Subjectivity - Wiley; Haken; Loveridge R, Strehlke K (2006) The Digital Ornament Using CAAD/CAAM Technologies in International Journal of Architectural Computing 4(1): 33-49
26. Heidari Matin N, Eydgahi A (2020) Factors affecting the design and development of responsive facades: a historical evolution in Intelligent buildings international 12(4): 257-270
27. Meagher M (2015) Designing for change: The poetic potential of responsive architecture in Frontiers of architectural Research 4(2): 159-165.
28. Meagher M., Van der Maas D, Abegg C, Huang J (2009) Dynamic ornament: Climatically responsive surfaces in architectural design. In:13th International CAAD Futures Conference: Joining Languages, Cultures and Visions - Les Presses de l'Université de Montréal, Montréal, pp. 353-366
29. Schumacher P (2009) Parametric patterns in Architectural Design, 79(6): 28-41.
30. Calvano M (2019) Disegno digitale esplicito. Rappresentazioni responsive dell'architettura e della città - Aracne, Roma

10.30682/tema100005