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The Symbiosis of the Arts in the Technological Elements of Building Facades

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Abstract

This contribution analyses the existing correlations between the formal aspects and the technological and structural elements by operating a "synthesis of the Arts", herein intended as an absolute fusion following the cultural climate in the 1950s in Italy. In this context the main references are two examples of architectural facades built in Messina in that period. These works were selected because of interpretations appropriately identified and assumed according to the specific peculiarities of the external configuration, namely for the characterisations deriving from using specific materials on the facade and the geometries underlying the definition of the shape. The survey activity allows to clarify the representativeness of the meanings inherent in the selected works, highlighting the articulation of the external configurations as "spaces" of emotional relationship between the architecture and the context.

Keywords: Modernism architecture, Technological elements, Architectural survey, LiDAR system, Formal expression

1. Introduction

«Today, I think we can say that an architecture closely connected with the latest *avant-garde* movements in painting and sculpture can be called "in development". I do not mean to refer to the various attempts […] to introduce the painter's work into architecture […], but to an increasingly significant aspiration to tend towards a universal masterpiece, where architecture, painting, sculpture are no longer distinguishable as juxtaposed elements, superimposed, added together, but where they materialize in a unitary expression. » [1].
Considering a period of about two centuries as a limit, it is legitimate to state that the debate on the role of the front in buildings highlights the multiple relationships connecting them. Also, it is worth mentioning that the first cognitive approach to building facades starts with reading the primary or prevailing attributes of the envelope. The complex relationships of a structural, compositional, distributive, formal order, etc., lead to transdisciplinary reasoning and approaches involving aspects related to representation, history, composition and building technology.
«In the first decades of the twentieth century, with the figure of Theo van Doesburg and with the experience of Gropius's Bauhaus, the breaking of the old concept of the front is violently operated together with the birth of a "new architecture". By now, a close fusion between exterior and interior is achieved, and there is a tendency to demolish the hegemony of the front. All modern and contemporary architecture is now linked to the concept of absolute harmony and completeness of the parts, for which the concept of the facade has remained a negative term, and this problem was merged into the general one of the exteriors» [2].
In the second half of the 20th century, the tendency to consider the facade as an independent element summarizing the symbolic characteristics of the entire building began to lose effectiveness, and new meanings linked to the functional aspect of the building and its relationships with the surroundings were assumed. In the same period, the outcome of the cultural, social and material transformations allowed for the affirmation of the structural frame as a figurative archetype of the New Architecture. This frame becomes a visual element characterising the elevation, overhanging the apparatus masonry, and free from those stylistic elements which previously hid its view. However, the frame on the front becomes a decorative expedient, which does not always constitute an externalisation of the load-bearing structure of the building. In Italy, in line with the classical tradition favoring the opacity and solidity of the external envelope, this new constructive approach is used in various configurations as cantilevered, aligned with or set back from the edge of the building, and as an overlapping

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element independent from the load-bearing structure of the building, assuming an autonomous value from a formal point of view. Saverio Muratori supported that position in "Taste and Style in Modern Architecture" [3], stating that architecture, in the context of the Modern Movement, had rediscovered a new interest in form, thus motivating «the typically pictorial tendency of those years to thin the supports, to eliminate the stratification of the orders and sublimate the matter in the light» [4]. This approximation of architecture to painting was particularly explicit in some examples that referred to Neoplasticism, in which the decomposition of volumes into their main constituent elements and the free arrangement of two-dimensional surfaces in space increased the level of abstraction of the architecture itself. Of course, this shift is connected with the progress of new construction techniques promoted by Le Corbusier in formulating his "five points" of architecture.

This contribution presents two examples of architectural facades built in Messina in the 1950s as the main reference. The first is a shopping center, ex cinema Odeon, built along the city's main commercial road, while the second is a residential building along the harbour curtain. These works were selected because of interpretations appropriately identified and assumed according to the specific peculiarities of the external configuration, such as the use of specific materials on the facade and the geometries underlying the definition of the shape. Through the survey activity using a Terrestrial Laser Scanner (TLS) and the research activity carried out in the archives, it was aimed to identify how the techno-morphological elements of the front of the second half of the 20th century contribute to creating "spaces of emotional relationship between architecture and context, becoming geometric-figurative elements in the spatiality of the "canvas wall".

2. Methods

A preliminary analysis of the fronts of the buildings investigated was carried out by studying the documents found in the archives of the "Technical Office of Urban Planning of Messina" and the contacts with the companies in charge of the buildings' maintenance. The aim of this research was recognizing the primary and prevailing identifying attributes that transform the fronts as a spatial canvas where the architect gives shape, image, volume and color through techno-morphological elements.

The actual state of the facades has also been recorded through the acquisition of point clouds carried out with a Leica BLK360 3D laser scanner of the Lab6R of the Engineering Department (University of Messina). This small instrument (weighing 1 kg and measuring 160 mm in height) emits a laser beam (out of visible spectrum) sent to the surfaces surrounding the station point by rotating a mirror. The laser scanner acquires the point clouds using a LiDAR system (Light Detention and Ranging) [5] and can achieve a maximum of 360.000 points per second with millimeter point positioning accuracy. In the best scanning configuration, the point positioning accuracy is 4 mm at 10 m and 7 mm at 20 m. Two types of images can be obtained thanks to the three integrated HDR cameras and thermal imaging: a) panoramic images and b) spherical images. The laser scanner first performs a photographic overview and then starts acquiring the 3D points through the emission of the laser beam. Suppose a transitory element (pedestrian or vehicle) or a permanent element (a tree or an electrification element of the tram network or public lighting) is in the signal trajectory; the laser measures the distance from the first element reached, generating a shadow transferred through the obstacle on the surface under investigation. The laser beam is comparable to a light source placed at a distance from an object, which projects its shadow in the area behind called "occlusion spaces" or "grey areas" [6]. The position of the instrument (station point) with respect to the object necessarily determines the shadow areas, which are eventually compensated with other scans from different station points. In some cases, it is necessary to use point clouds obtained from photogrammetric programs exploiting a series of images appropriately taken by a low altitude-flying drone [7].

In fact, several station points are also necessary to be placed at different heights if the architecture has several levels and/or overhangs to have complete spatial information on the object to be scanned. When merged, multiple acquisitions from this process give a complete 3D point cloud describing the whole architectural object. The position of the points scanned in the 3D space is related to the characteristics of the instrument (calibration of the system, principles of measurement, etc.), but also to the resistance of the surfaces hit by the laser and to the properties of the laser light. The editing work on the raw clouds is carried out in the laboratory using the Leica Geosystem software: Register 360, Cyclone and Cyclone 3dr). The operator must intervene in the alignment and cleaning of the raw clouds imported by the instrument and subsequently extract through appropriate section planes, the relevant projections of the architectural object [8].

2.1 Ex Cinema Odeon

The building is located along the main commercial road of the city, St. Martino Avenue, on the corner of the block 136, characterized by mixed residential and commercial constructions. Compared to the adjacent buildings, it stands out for the marked personality of the front as an element with a strong urban connotation, acting as a visual reference in the area. Designed by the German architect Rudolph Gunter in the second half of the 1950s, it can be included in the group of cinema-buildings designed in Messina in this same period with explicit references to rationalist architecture. The greatest exponent of this movement in the city was the architect Filippo Rovigo, who designed the building adjacent to the cinema. In 1959, a variant designed by the engineer Giovanni Lo Jacono was approved, which proposed the introduction of a large,

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cantilevered glass area on the main façade with elements that could be opened to hide all the small compartments of the cabin, services and foyer. Since the 1990s, the property has lost its original purpose and was converted to commercial use. Fortunately, the consequent renovation works have not substantially altered the compositional structure of the facade.
Compared to the buildings constructed in the previous decades with the same purpose and characterised by an essential and rigorous layout of the volumes, the original conformation of the Odeon cinema was an expression of the phenomenon of the importation in Italy of American films and the consequent diffusion of new architectural models. This is evident both in the distribution and technological system and in the figurative aspects on the front, and it is designed as an element of visual attraction from the outside using the lighted sign created according to modern and attractive graphics.
The current main facade is articulated on four levels with different but mutually relatable distributive and dimensional characteristics. The first one is marked by five pillars covered in dark marble, whose development is interrupted by a projecting canopy to the edge of the building and then continues to the next level in correspondence with the four openings which are also a continuation of the division of the lower level. Continuing upwards, a large bow window with a thin metal frame protrudes from the main line of the front and, at the end, there is a band characterized by eight French windows along a balcony separated by seven small pillars covered with wisteria-colored mosaic tiles, placed alternately in correspondence with those on the ground floor or aligned with the openings.
The main body of the building is adjacent to a volume standing out in height, distinguishing itself from the large, glazed spaces of the first part of the front for the opacity of the materials and the glass mosaic panel, which enriches the surface, marking further verticality. The masterpiece, created by Felice Canonico, is a clear demonstration of the union between the arts, a tendency dominating the architectural culture of the second half of the 20th century, that found in the MAC (Movement for Concrete Art) the opportunity to create «new urban signs, the taste for design as a synthesis of technological as well as formal aspects, the pleasure of design as a vehicle of art and the creation of cultural places.» [9]. In this case, the theme of the composition is undoubtedly linked to the original destination of the building: clear references to the film projection process are represented by the wolf's mouth slits reproduced both frontally and laterally. The rigorous geometry determined by the design of the structural elements on the surface of the main volume is contrasted without placing itself in antagonism but rather in terms of complementarity. The free composition represented in the mosaic impresses dynamism from a chromatic point of view without losing sight of the common thread of the whole, which is that of the use of basic elements, such as the line and the right angle.
Overall, it is a multilevel surface, both from a structural point of view and for the reading of its various meanings, a space where artistic expressions and technological elements are not only juxtaposed or approachable but interpenetrating and coexisting.
In the digital survey of the ex Odeon cinema, the laser scanner was positioned in such a way as to scan the elevation on San Martino Avenue (length 15.70 m, height at the axis 16.60 m, and height at the stairwell of 19.10 m) and the side elevation on Luciano Manara Street (length 39.90 m, height varying between 19.10 m, 13.70 m at the centreline and 11.90 m at the end). Five station points were then identified varying distances from each other: four for the main elevation and one for the side elevation. From the first station point, scanning operations were repeated for passing vehicles during point acquisition. The setups were linked together (7 links), and the overall cloud obtained has a maximum error of 7 mm, an overlap between the clouds of the five setups of 4% and a robustness of 74%. Approximately 187 million points were digitized. All scans were carried out at maximum resolution by means of recordings lasting six minutes each (Fig. 1, Fig. 2).

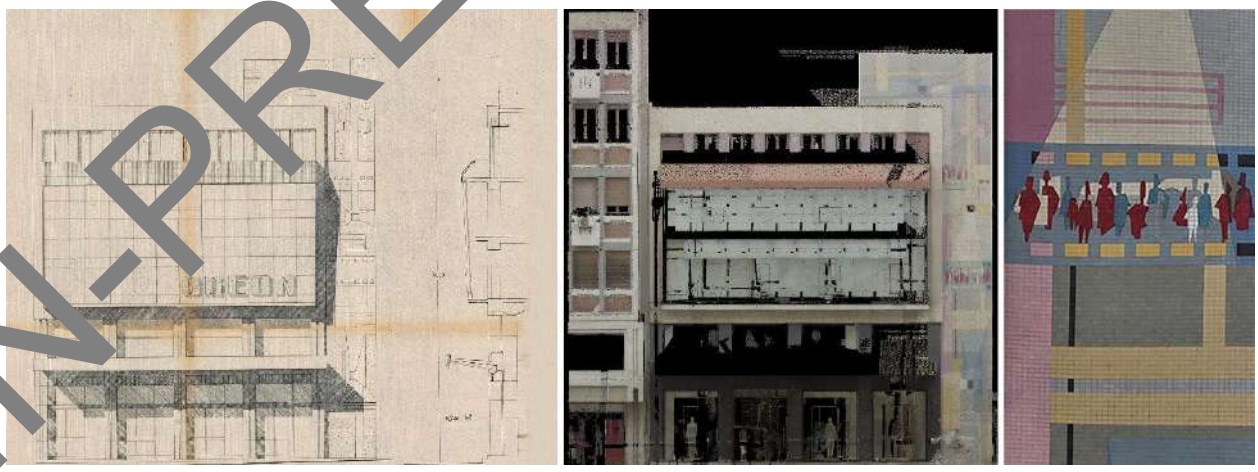

Fig. 1. G. Lo Jacono. The Odeon cinema in Messina. Main elevation and section, 1959 and the current facade rendered through the orthophoto points cloud. Detail of the decorative mosaic
(left: Archive of the Messina town planning office; center and right: elaborations by the authors, 2023)

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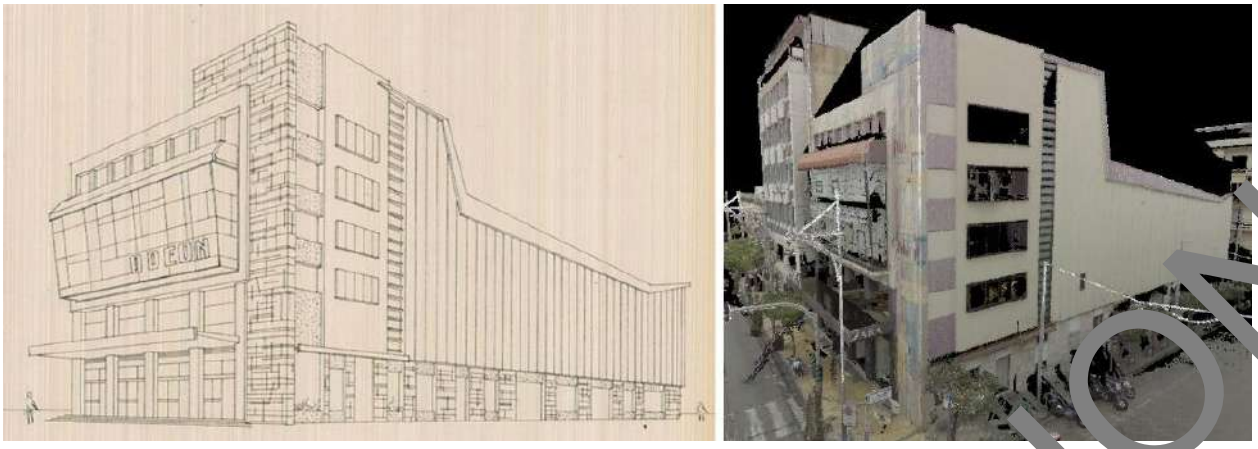

Fig. 2. G. Lo Jacono. The Odeon cinema in Messina. Perspective view, 1959 (archive of the Messina town planning office) and a current view rendered through the points cloud (left: Archive of the Messina town planning office; right: elaborations by the authors, 2023)

2.2 The Cortina del Porto in Messina: Block VI

The second selected case study is Block VI, representative in terms of formal and technical characteristics of the eleven blocks built between 1936 and 1958, following the award to Camillo Autore, Raffaele Leone, Giuseppe Samonà and Guido Viola in 1931 context, for the design of the new Cortina of Messina [1-11]. In the façade, the rhythm obtained from the non-obsessive alternation of elements that favour a dynamic reading of horizontal and vertical parties is one of the peculiarities convincing the jury to award the prize. The reading and comparison between the archival documents and the copies deposited in the Municipality of Messina highlight continuous changes to the winning project, concerning not so much the distribution aspect but the decorative apparatus leaving mouldings, pilasters and frames, present in the winning project, in favour of a new coding of the frame as a figurative archetype. Also, Block VI was intended as a mono-volume conformation consisting of four levels for hosting shops on the ground floor and dwellings on the subsequent floors. The design variations made by Samonà between 1953 and 1954 mainly concern the facade. Compared to the project dated 26-06-1953, signed by Aldo Indelicato, for example the travertine plinth on the ground floor present in some of the public buildings of the Curtain of Port disappears [12-13] together with the cladding in travertine of the concrete uprights connecting the balconies. The position of the balconies and openings undergoes a profound transformation, not affecting the internal spaces' distribution but exclusively the elevations. The concrete shelter flush aligned to the facade is replaced with a crowning overhanging parapet delimited by uprights and metal mesh. The absence of projecting elements, except for the balconies, is replaced with uprights and transverses of the frame placed on different wings, creating *chiaroscuro* effects.

The current envelope is made up of a "grid" in which all those techno-morphological elements are arranged on different levels and contribute to the definition of the elevation by eliminating the hierarchy between "figure" and "background" in favour of an egalitarian examination. The "figure" is obtained through orthogonal lines that divide the wall surface into pieces that make up rectangles and squares in a well-calculated asymmetrical balance of shapes and colours, in the same way as Mondrian's colours (black, red, grey, yellow and blue) gave shape to his paintings [14]. Samonà intercepts the possibility of making the wall surface a canvas and, therefore, a grid, in which inserrting surfaces with projections, namely elements such as doors, windows, balconies, parapets, uprights, transoms, etc., set on the wall background, alternating solids and voids in an orderly harmonious non-random system.

Regardless of the importance and dimensions of the environment, as an overall image, the building envelope is partially a decoder of the functions of the internal space. On the long sides, the night and day areas are positioned on the two elevations, while the services are on the short one or overlooking the internal cloisters; the two entrances are positioned on one of the long sides and follow the same design philosophy of the entire building, not representing a "sign" of attraction, they have the same dimensions as the entrance to the shops, merging with them. The facade of Block VI appears as an overlapping of planes constituted by opaque surfaces, transparent surfaces, structural frames, pilasters, balconies and corbels. This analysis allows to identify compositional rules defining the formal language of the multifamily residential of the Cortina del Porto through the rhythm, the geometries, and the exceptions and deviations.

Although the original elevation may have changed due to different needs and contingencies, the general rules regarding size, position and finishings of the techno-morphological elements have remained the same over time. The beams are set back compared to the pillars, gradually moving from 70 cm on the ground floor to 26 cm on the third floor; the pilasters are instead coplanar to the beams and smaller than the pillars to underline the different role in structural terms; the smaller windows and balconies are never in the middle of the span, only the closing windows of the facade and balconies doors with a larger dimension are aligned; the roller shutters masked by a veil of white mosaic tiles contribute to defining the

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colour of the facade, by reuse of metal parapet colours (white and yellow) of the balconies. The pillars, the pilasters [15] and the beams originally had a surface treatment made with cement and sand plaster, subsequently hammered to create a rougher surface with a grey colour. Maintenance interventions have almost entirely erased this finishing which appears to be completely smooth. Often, the individual condominium in balconies maintenance operations has protected the finishing plaster with paints, which over time have proved inadequate, showing new surface degradations.

The balconies are inserted in the uniform rhythm of each bay and with such a depth as to allow only the view (balcony overhanging). Their use becomes an expedient with which Samonà creates *chiaroscuro* effects (considering its small size) on a surface with plaster of assorted grain size [16-17]. The light that strikes the elements on the floors, which are differently staggered, creates a play of varied shadows capable of giving dynamism and verticality to a building with a predom[illegible] horizontal development [18].

During the digital survey of Block VI, the laser scanner was positioned appropriately to scan the two side ele[illegible] (leng[illegible] 17.80 m and average height 15.25 m in axis with the elevation at the intrados of the roof slab) and th[illegible] main elev[illegible]tion overlooking the Ionian Sea (length 73.25 m and average height 15.45 m). Six station points were then id[illegible]ntified, var[illegible]ing distances: one for the left-side elevation, three for the main elevation and two for the right-side elev[illegible]ion. [illegible]he setups [illegible]ere linked together (5 links), and the overall cloud obtained has a maximum error of 3 mm, an overlap be[illegible]ween [illegible]uds of the six setups of 30% and a robustness of 68%. Approximately 150 million points were digi[illegible]sed. All s[illegible]s were carried out at maximum resolution by means of recordings lasting six minutes each (Fig. 3, Fig. 4).

Fig. 3. Above: A. Indelicato. Cortina del Porto in Messina Block VI. Main elevation, 1953. In the middle: G. Samonà. [illegible] of Messina Port block VI. Main elevation, 1954 (archive of Messina town planning office). At bottom: the current façade rendered through the orthoimage points cloud (top and center: Archive of the Messina town planning office; bottom: elaborations by the authors, 2023)

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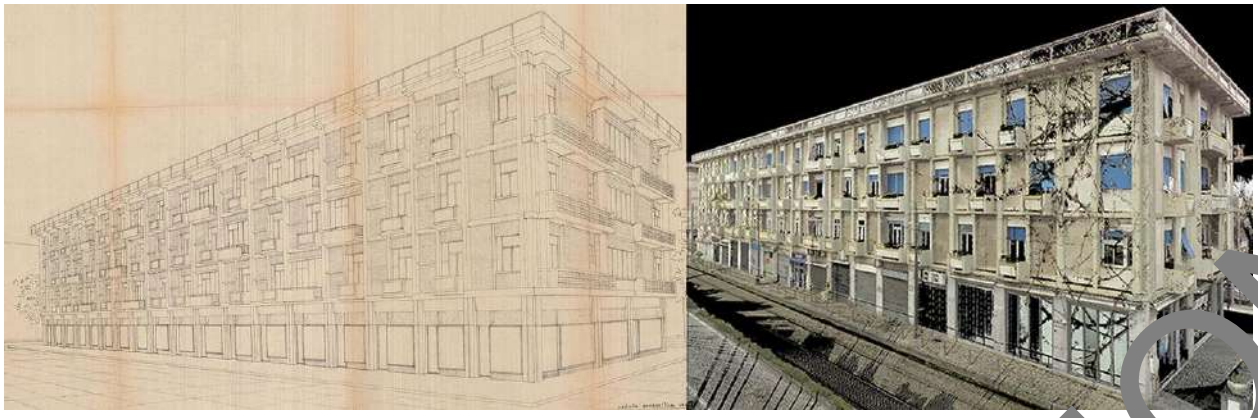

Fig. 4. G. Samonà. Cortina del Porto in Messina Block VI. Perspective view, 1954 (archive of Messina town planning office) and a current view rendered through the points cloud (left: Archive of the Messina town planning office, right: elaborations by the authors, 2023)

3. Results

The need to merge art and architecture and to transfuse the characteristics of one into the other arose as an opportunity for the perceptive transformation of spaces starting from the 1930s and continuing after the Second World War. During this period, architects and artists belonging to the *avant-garde* movements supported the ability of each of the arts to control space. Contrary to the strict functionalism that abolished any decorative form superimposed on architecture, the designers ventured into new formal solutions inspired by the world of painting and sculpture, especially on the facades of buildings. In the case of the two buildings herein studied, the analytical reading was made possible thanks to the graphic renderings obtained from the laser scanner survey and subsequent reprocessing. This allowed the identification of modules and partitions composed according to a rhythm (ABBCC as illustrated in Fig. 5) that identifies the main constituent elements, whether of a structural or technological nature, in a calibrated alternation of full and empty spaces. By assigning a colour to each of the typologies identified (yellow for windows, red for ribs, cyan for full, grey for ground floor openings, black for vertical structural elements, and white for horizontal structural elements), modularity is perceived in the facade that recalls the rigorous geometric compositions of Mondrian inspiration [20]. Based on the principle of absolute rationality, the Dutch painter's works, ascribed to the Neoplasticism movement, are characterized by the exclusive use of pure colours and right angles.

In the same way as these paintings where the square is the constant element in its continuous becoming, also in the two facades examined, it is the same geometric figure marking the rhythm, determining a rigorous composition that leaves no room for solutions of continuity in its doubling or halving. The facade is no longer perceived as a single object but as an *ensemble* of elements united by the same characteristics. In particular, in the facade of Block VI, the search for a precise rule in the layout work is evident and is reflected by the use of the golden section to define the proportions of the balconies. However, this rule is disregarded in the two lateral heads for which the theme of insertion between two structural elements is maintained, but the dimensions and, in general, the rhythm pursued in the main facade change (Fig. 5, Fig. 7).

Fig. 5. Cortina del Porto in Messina Block VI. Compositional genesis and identification of architectural partitions (elaborations by the authors, 2023)

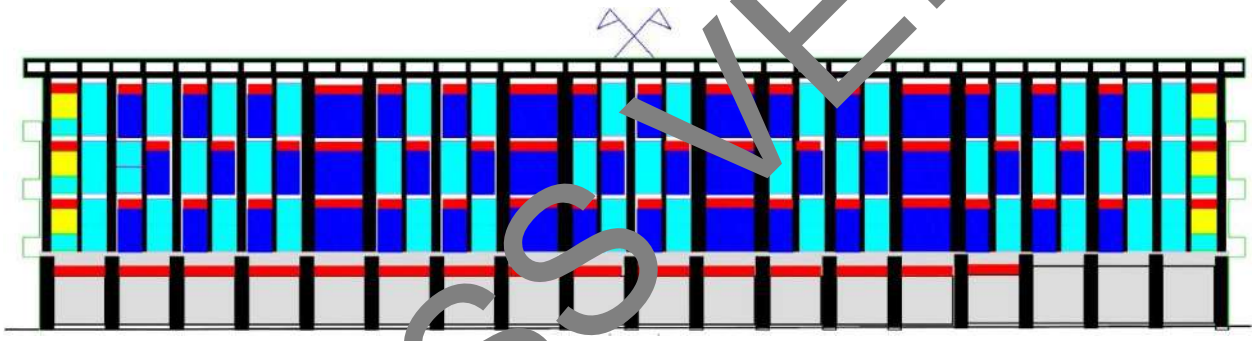

Fig. 6. Cortina del Porto in Messina Block VI. Identification of compositional elements by colours assignment (elaborations by the authors, 2023)

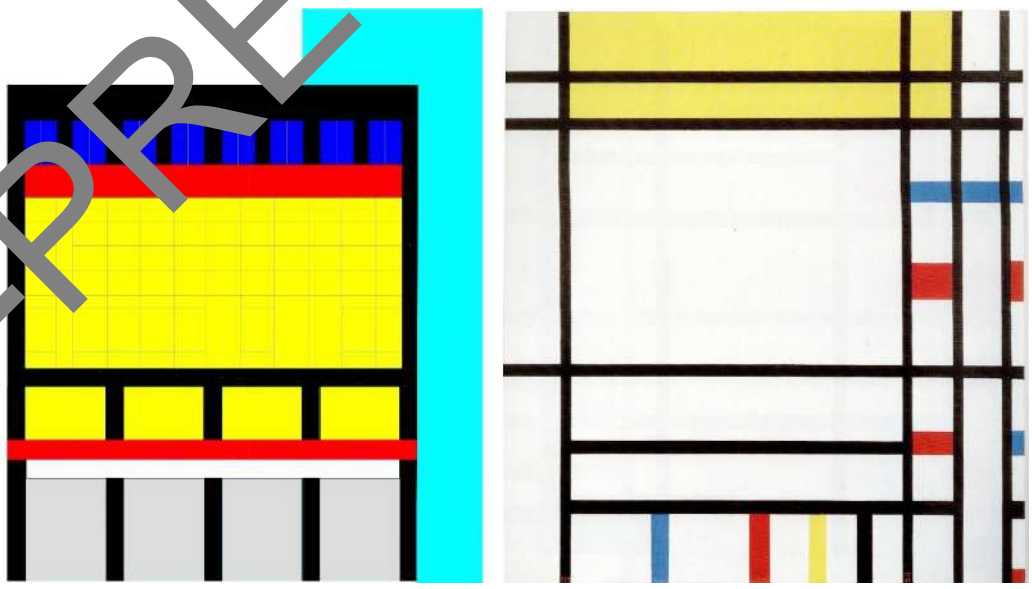

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Fig. 7. Ex cinema Odeon. Identification of compositional elements by colours assignment, comparison with Mondrian's Place de la Concorde, 1938-1943, oil painting on canvas, Dallas Museum of Art (left: elaborations and photo by the authors, 2023)

4. Conclusions and Future Developments

The analysis has demonstrated the complete adherence of the two case studies to the formal and structural rules characterising the late Rationalism, a specific architectural historical phase in Italy. The methodology adopted, consisting of archival research and survey activity performed with the laser scanner, further confirmed what was stated at the beginning and highlighted the close relationships between the formal aspects and the technological elements of the two facades through the irreplaceable tool of design drawing. In both cases, the objective was to demonstrate how the formal aspects were correlated with the technological and structural elements, operating an absolute fusion or "symbiosis of the Arts" following the cultural climate of that period in Italy. This aspect was confirmed by its most paradigmatic example in "Casa del Fascio," which was designed by Terragni. In this building, in addition to the expressive autonomy conquered by the loom, a further element of synthesis between architecture and decorative art is highlighted in the photomechanical panels by Marcello Nizzoli (arranged but never placed) for the facade or in the paintings by Mario Radice for the interiors. Another reference links Block VI of the Cortina del Porto in Messina with the request developed in the context of Neoplasticism. As previously mentioned, this movement proposes the use of the essential elements of geometry, such as the line and the right angle, as the basic inspiring principles of his poetics. In that specific period, further implications of a figurative nature are determined by the technological development that allows a different way of designing and gives rise to innovative formal solutions, including significant representativeness to the facade. Referring to the examples under study, it could be synthetically asserted how, in one case, the designer "gives the art" to his facade (or at least a part), which becomes itself a work of art, according to his interpretation, and/or, in the second case, how the structural layout of an elevation reaches an aesthetic level, as a result of rigorous compositional research determining the coincidence between shape and structure. Other similar experiences can be found in other European contexts, demonstrating the spread of this trend towards the fusion of art and architecture.

An emblematic example in this sense is the work of architect Rafael Tamarit (Valencia, 1939), a designer collaborating with Enrique Hervás of the Lladró family ateliers reviewed by the Docomomo institution, which deals with modern architectural heritage (including the Lladró Museum & Galleries in New York and the shops in London, Los Angeles and Tokyo built between 1997 and 2001). In 1965, he embellished the facade of the Hermanos Lladró building (Fig. 8), located in Tabernes Balnques near Valencia, with a Nolla mosaic cladding. Nolla was the factory producing the colored tiles used on many facades of Spanish buildings, such as Casa Batlló in Barcelona, until 1970. This is similar to the decorative *motif* characterizing the blind part of the facade of the ex Odeon cinema, which reproduces elements related to the building's intended use by framing it. In the facade of Tamarit, the tiles identify the factory's production in the typical blue and white colours and frame the perforations' geometries [19]. This building represents a compositional system of noteworthy elevations, especially for the free aspect of the main facade, which renounces rigid academic principles and patterns of reiteration. The openings in different positions give rise to a uniform alignment, and there is a symmetrical hierarchy, resulting in an attractive, friendly, and undoubtedly Mediterranean reading. The lightness of the metal of the upper floor creates a differentiating element that further emphasizes the massive element in front of the main facade plane, as in the case of Block VI. This deliberately disordered hierarchy of openings responds to the postulates of modern architecture as a building of reference in a time and place, like the building studied above. At the same time, this modulation responds to a multifunctional building in which the materials are defined according to their use.

Fig. 8. Rafael Tamarit Pitarch, José Hervàs. Hermanos Lladró Building, 1965 (© Historical Archive of the Territorial College of Architects of Valencia. Legacy Rafael Tamarit Pitarch. Pictures by: Alejandro Gómez Vives).

facade, also in social terms, by considering the impact of this part of the building in the urban context as an element of mediation between inside and outside. In some cases, the artistic element transforms the facade of the building into sculpture, determining the beauty of the artefact through an intervention of juxtaposition or insertion. Alternatively, through a precise drawing and a specific treatment of the surfaces, new formal solutions are tested, combining the need to respond to the new energy requirements with a free articulation of the composition. This is the case of the new building for the Parliament in Malta, designed by RPBW Architects. The facade protects and shields the building from solar radiation through sophisticated mechanisms for constructing and assembling the *brise soleil*. At the same time, these technological elements, made of a particular local stone, achieve an effective aesthetic result thanks to their apparently random arrangement to simulate weather erosion and harmoniously converse with the context they are confronted with, reproducing the natural material's chromaticism and the re-proposition of its grain. In both cases, the procedures pursued also achieved significant results in expressive terms by interacting with the context in which they are located [21] (Fig. 9).

Fig. 9. Renzo Piano. RPBW. Malta's New Parliament, 2015 (© Renzo Piano Foundation).

References

1. Perogalli C (1958) Relazione introduttiva al convegno sull'Architettura e le Arti visive tenutosi a Roma il 22 marzo 1958

2. Rossi GM (1968) Facciata (voce). In: Portoghesi P (a cura di). Dizionario Enciclopedico di Architettura e Urbanistica. Istituto Editoriale Romano, Roma, vol. II, p. 309

3. Muratori S (1980) Civiltà e stile nell'architettura moderna. In: Marinucci G (a cura di). Storia e critica dell'architettura contemporanea. Centro Studi di Storia Urbanistica, Roma, p. 239

4. Capuano V (1995) Tipologia della facciata nell'architettura italiana. La ricerca teorico-compositiva dal trattato di Vitruvio alla manualistica razionale. Quaderni del Dottorato di Ricerca in Composizione Architettonica, Università degli Studi di Roma "La Sapienza" 8: 39

5. Remondino F (2011) Heritage Recording and 3D Modeling with Photogrammetry and 3D Scanning. In Remote Sens 3, pp. 1104-1138

6. D'Amico A, Currà E (2017) From TSL survey to HBIM, issues on survey and information modeling implementation for the built heritage. The case study of the Temple di Bacco Ravello. eCAADe 35 - Digit Herit Shoc. Sh. Comput Knowledge! - Proc. 35th eCAADe Conf. vol. 2, Sapienza Univ., Rome, Italy, 20-22 Sept. 2017, vol. 2, no. October, pp. 39-48

7. Remondino F, El-Hakim S (2006) Image-based 3D modelling: a review. In Photogramm Rec 21(115), pp. 269-291

8. Bertocci S, Bini M (2016) Manuale di rilievo architettonico e urbano. Città Studi edizioni, Torino, pp. 207-211

9. Sartori C (2002) Il M.A.C. In Sartori C (a cura di). Architettura e design nell'area dello Stretto: spunti di ricerca: l'esperienza del M.A.C. Il concorso per il logo. Samperi, Messina, p. 12

10. Cortese G, Corvino T, Kim I (2002) Giuseppe e Alberto Samonà 1923-1993: inventario analitico dei fondi

documentari conservati presso l'Archivio Progetti. Il Poligrafo, Padova

11. AA.VV. (1975) Giuseppe Samonà. 1923-1975 Cinquant'anni di architetture. Officina Edizioni, Roma
12. Poretti S (2008) Modernismi italiani. Architettura e costruzione nel Novecento. Gangemi Editore, Roma
13. Tentori F (1959) Giuseppe Samonà e la palazzata di Messina. In Casabella 227: 29-36
14. Porreca P, Laganà A (2022) Traccia di una fortuna italiana. Quodlibet, Roma
15. Cardullo F (2006) Giuseppe e Alberto Samonà e la Metropoli dello Stretto di Messina. Officina Edizioni, Roma
16. Coppedè C, Palladino P (2012) La luce in architettura. Maggioli Editore, Rimini
17. Gulli R (2015) Figure. Ars e ratio nel progetto di architettura. Firenze University Press, Firenze
18. Castro Noblejas H, Sortino Barrionuevo JF, Gumiel Muñoz D, Mérida Rodríguez MF (2021) A Methodological Proposal for the Analysis of Lighting the House Building Façades. ISPRS International Journal of Geo-Information. 10(8): 536
19. Pontiggia E (2021) (a cura di) Piet Mondrian. Una vita per l'arte. 24 Ore Cultura, Milano
20. Fernández J, Muñoz L (2021) Mestres. Arquitectura moderna en la Comunidad Valenciana. In arquia/temas, 44:176-189
21. Sapienza V (2014) Il nuovo parlamento di Malta: immagine architettonica e tecnica costruttiva. In Techne 08: 219-227