

The Modern Transformation of the Art of Decorative Sculptural Patterns in European Architecture at the Beginning of the 20th Century

Xiankun Fan^{1,*}, Yijie Kang^{1,2}

¹ Graduate University of Mongolia, Ulaanbaatar, 11100, Mongolia

² Ningxia University, No. 489, West Helan Mountain Road, Xixia District, Yinchuan, Ningxia, China

* Corresponding author: Xiaokun Fan (Email: 215038213@qq.com)

Abstract: The beginning of the 20th century was a critical period in the transformation of European architectural decorative carving patterns from traditional to modern. Against the background of industrialization, urbanization and the collision of artistic trends, architectural decorative carving patterns broke through the classical paradigm, showing the characteristics of stylistic diversification, secularization of themes and technological innovation. This paper explores the internal logic and artistic value of this transition from the dimensions of historical context, style evolution, subject matter shift, technology drive and regional genres, and reveals its far-reaching impact on modern architectural decoration.

Keywords: Early 20th Century, European Architecture, Decorative Sculpture, Patterns, Modern Transformations.

1. Introduction

1.1. Social Change and Aesthetic Turn:

Material Revolution and Thought Stirring

At the beginning of the 20th century in Europe, the wave of industrialization upended the traditional paradigm of architectural decoration. With the decline of handmade stone carving under the impact of machine production, new materials and new technologies reshaped the logic of decoration: Hector Guimard captured the industrial potential of cast iron to create vine-like cast iron entrances for the Paris Metro (Figure 1), cast in molds to achieve the Art Nouveau movement's natural curves of mass production, so that the decorative arts that had been exclusive to aristocratic private homes into the mass of public space to break the monopoly of a single aesthetic of the stone carving. The London Underground is a concrete mold casting relief to respond to the dual requirements of urbanization on public space decoration, mechanical gears, subway line map and other industrial symbols into a standardized decorative pattern, not only to reduce costs but also to give the transportation hub of modern visual identity to promote decorative arts from the service of the divine right of the imperial power of the magnificent symbols, metamorphosis into the memory of the city's life as the bearing of the public visual language.

The collision of artistic trends in the same period gave birth to the diversified decorative aesthetics. The Art Nouveau movement drew inspiration from nature, such as Horta's iron vines wrapped around the columns of the Tassel Mansion (Figure 2), which softened the coldness of industry with the poetry of curves and constructed an emotional connection between people and architecture; the Art Deco movement blended Egyptian pyramid patterns, Mayan symbols, and modern industrial elements, such as the bas-reliefs on the façade of the Musée d'Art Moderne de Paris, which used a Cubist approach to cut up the human body, and constructed a totem of the technological era using linear triangles. This alludes to the collective psychology of the reconstruction of the post-war European order. The modernist "anti-decorative" ideology is even more radical. Mies van der Rohe practiced "less is more" in the German Pavilion in Barcelona (Figure 3), (S-Rong, 2024) interpreting minimalist aesthetics with the precise bite of steel frames and glass curtain walls, dividing the proportions, and discarding explicit sculptures, transforming industrial precision and the structure itself into hidden decorations. The structure itself is transformed into a hidden decoration, redefining the modern connotation of "decoration is structure". The interweaving of technological revolution and artistic self-awareness has jointly composed a diversified movement of architectural decoration transitioning from tradition to modernity.



Figure 1. Paris Metro Vine Entrance



Figure 2. Tassel House Vine Wrapped Columns



Figure 3. Barcelona German Pavilion Glass Curtain

1.2. Technological Advancement and Process Innovation: Material Empowerment and Structural Emancipation

The appearance of new materials is like a stage change, completely rewriting the material script of decoration. The ductility of cast iron, the plasticity of concrete, and the magic of light and shadow in glass mosaics have allowed decoration to break through traditional boundaries: Guimard's subway ironwork was naturalistic by means of industrialized production, and Wright's Prairie Houses were cast in Mayan patterns with concrete blocks, realizing the integrated symbiosis of material, structure, and decoration. Advances in machine processing technology as a stroke of genius, the standardization of molds so that the symmetrical geometric patterns of the Art Deco movement can be accurately reproduced to promote the "democratization of decoration", so that the exquisite relief from the aristocracy into the common building.

The liberation of architectural structures was a quiet revolution. Reinforced concrete frames and glass curtain walls put an end to the domination of heavy stone walls, the symbiotic relationship between carved patterns and structural components in Gothic architecture was broken, and decoration was reduced to a peelable skin in the "free plane" of modern architecture. (Yang Xuan,2016)Le Corbusier's Villa Savoye goes to the extreme, abandoning all carvings and patterns, and using only the arrangement of window holes and the outline of balconies to outline abstract rhythms, so that the declaration of "form follows function" resonates through the sky - when the structure itself becomes the aesthetic protagonist, the traditional decorative glass windows become the main character of the aesthetics. When structure itself becomes the aesthetic protagonist, the structural narrative of traditional decoration recedes, and the jagged rocks of functionalism are revealed.

1.3. The Logic of Transformation in Historical Context

This transformation, driven by materials, trends and technology, is essentially the deconstruction and reconstruction of the aesthetic system of agricultural civilization by industrial civilization. Industrialization broke the monopoly of materials, urbanization reshaped the functional position of decoration, Art Nouveau and Art Deco stretched the possibilities at both ends of the stylistic spectrum, and Modernism forged a new form of decoration with the hammer of theory. Guimard's ironwork and Hota's curves are transitional notes of transformation(Wang Zhongheng,2020), and the practices of Mies and Corbusier set a strong tone. When steel and glass replaced masonry and wood, and when machine production surpassed hand carving, the modern transformation of architectural decoration was not only a visual revolution, but also a recalibration of mankind's

aesthetic coordinates in the midst of the technological wave.

Looking back after a hundred years, this transformation has not only left behind architectural legacies of different styles, but also an eternal proposition: when functionalism becomes the main theme of architecture, how can decorative sculpture keep its artistic beginnings amidst the wave of technical rationality? The answer may be hidden in the natural curves of Guimard and the structural poetics of Mies - a true modern transformation is never a complete break with tradition, but rather, it allows the genes of history to grow new aesthetic branches belonging to the times in the soil of new technology. It reminds us that the vitality of decoration lies in always being rooted in the context of the times, and in the tension between tradition and innovation, it becomes a cultural link connecting the past, present and future.

2. Stylistic Transformation: From Classical Paradigm to Diverse Modernity

2.1. The Rebirth and Grafting of the Symbols of Traditional Patterns

The radical transformation of classical motifs in European architecture at the beginning of the 20th century presents a multifaceted modern transformation. Ancient Greco-Roman realistic column reliefs were "slimmed down" in the hands of modern architects (Liu Chen,2023), such as the Bauhaus schoolhouse column decorations (Figure 4), Gropius discarded the complex curls of Scopal leaves, geometric flutes outlining the columns, and refined the sense of power of Doric columns into a rhythm of simple lines, so that the classical elements shed their mythological garb and became a service to modern functions Gothic pointed arches are carved on the columns. Gothic pointed arch sculpture in the hands of Gaudi poetic metamorphosis, the Holy Family Cathedral spiral columns (Figure 5) mimic the growth of tree trunks, ribbed arches such as branches bifurcation, religious symbols into the natural syntax of "organic architecture," (Yang Xiangrong. ,2024).Divine solemnity is transformed into an abstract salute to life forms. Art Deco movement is good at "cross-time collage", such as the Chrysler Building in New York, the eagle emblem relief fusion of the ancient Roman eagle flag and the Native American totem (Figure 6), the Museum of Modern Art in Paris façade broken and reconstructed the ancient Egyptian sun disk and the Mayan pyramid outline (Nie Zhiqi, Lu Yongyi,2024,) historical patterns are embedded in modernity, bursting with new semantics, and becoming cultural metaphors of the times.



Figure 4. Bauhaus Schoolhouse Pillar Trim



Figure 5. Holy Family Cathedral Spiral Columns



Figure 6. Chrysler Building, New York, Eagle Emblem Relief

2.2. The Symbiotic Game of Multiple Aesthetics of the New Style

The Art Nouveau movement, like the rhapsody of naturalism, played an organic music in the architectural decoration. Horta's iron reliefs in the Tassel Mansion (Figure 2) make the staircase handrails grow like vines, and the curves of the blades retain the rusty texture, as if the building were "breathing" in nature. Gaudi's Casa Batlló (Figure 7) pushes this kind of fantasy to the extreme: the collage of broken porcelain tiles on the exterior wall resembles the scales of sea creatures, the balcony railing is shaped like the rib cage of the deep sea, and the blue and green curved surface creates a fantastic underwater world - naturalism is no longer a simple imitation, but is instead endowed with a symbolism filter, so that the building can become an extension of the natural fable.

Art Deco and Futurism join forces to build a temple of geometric rationality. Inspired by Cubism, the reliefs of the Musée d'Art Moderne in Paris (Figure 8) dismantle the human body into triangular and trapezoidal blocks, with dynamics realized through dislocation, like the precise occlusion of industrial gears, alluding to the aesthetics of efficiency. Futurist architect St. Elia's unfinished work is more like a declaration of mechanical civilization. The façade is covered with gears and propellers, and the reliefs of the robotic arms seem to be roaring and rotating, sublimating the geometric patterns into a visual totem of a technological utopia - decoration is no longer an embellishment but a direct declaration of the power of technology.



Figure 7. Gaudi's Casa Batlló



Figure 8. Reliefs at the Museum of Modern Art, Paris

2.3. A Deep Symphony of Stylistic Transformation

This stylistic metamorphosis is a symbiosis of multiple aesthetics in a wave of technology. Traditional patterns have been deconstructed into abstract symbols, naturalism and geometric rationality have been separated, and minimalism has reconstructed the essence of decoration with "less". Architectural decoration from the "historical replica" metamorphosed into "speakers of the times", each school is a unique movement, together write the rhapsody of modernity of European architecture in the early 20th century. It reveals to us that the vitality of architectural decoration lies in the continuous breaking of paradigms, and the growth of new aesthetic branches belonging to the era in the cracks of tradition and innovation - this is the real soul of modern transformation.

3. From Divine Narrative to Secular Speech

3.1. Theocratic Narrative" Turns to "Humanity

The industrial buildings in the Ruhr area of Germany (Figure 9) transform industrial elements such as mechanical gears and boiler pipes into cast iron reliefs, which were once hidden in the depths of the factories as symbols of production, (Huang Pengfei.,2024). are now being decorated on the façade of the factory building in a high-profile manner, and have become a monument to industrial civilization. The "Metro Genie" reliefs of the Paris Metro (Figure 10) focus on modern urban life: the commuters in the reliefs are dressed in simple modern clothes, talking or reading, replacing the saints and nobles in the traditional reliefs, becoming the "new protagonists" of the urban public space, reflecting the importance of decorative arts to the ordinary people. This reflects Art Deco's concern for the common man.

Anshun City, located on the eastern edge of the Yunnan-Guizhou Plateau, is characterized by peaks and rolling hills, and enjoys a humid subtropical climate with mild weather and abundant precipitation. This unique natural environment has given birth to the intermingling of multiple ethnic cultures and the evolution of diverse lifestyles. Historically, Anshun has been a hotbed of multi-ethnicity, especially the Han, Miao, Buyi and other ethnic groups, which has promoted cultural exchanges and integration, and nurtured the unique cultural landscape of the region.

As the hinterland of the ancient Yelang Kingdom, Anshun has witnessed the precipitation of history through the change of dynasties, leaving behind a rich cultural heritage. In the Ming Dynasty, due to the need for military defense, the Tunbu was built in Anshun, and these buildings not only played a role in defense in history, but also in the process of the evolution of the architectural style and functionality of the

Tunbu to resolve the spatial transformation of the Tunbu as an epiphenomenon (Song Jahui et al., 2024). Its unique architectural style has also become a representative of the outstanding residential architecture, which carries far-reaching historical significance and cultural value.



Figure 9. Industrial buildings in the Ruhr area, Germany



Figure 10. Reliefs of the Paris Metro

3.2. Dual Mapping of the Individual and Society

The New Woman figure appeared frequently in the Art Deco movement as a visual metaphor for gender equality. The female bas-reliefs of the Vienna Secessionist architecture (Figure 11) rejected the soft muse image of classical art and replaced it with independent women with short hair and tight clothes, either holding books or tools, with a confident and powerful posture, which alluded to the social reality of women entering the workplace after the First World War. The reinforcement of regional cultural symbols is particularly evident in Spanish Art Nouveau architecture: the reliefs on the façades of houses in Granada feature flamenco dancers, with the pleats of their skirts simplified into dynamic curves, which, combined with the Moorish arch coupons, have become visual labels of “Hispanicness,” countering the internationalist influence of French Art Deco.



Figure 11. Female relief

3.3. Modern Reconstruction of the Symbolic System

In the early 20th century, European architectural decoration and sculpture took on a new look due to the cult of technological symbols and ideological projection. Technological advances gave rise to the visual transformation of modern inventions such as the electric light and the train. For example, the London Underground bas-reliefs (Figure 12)

use radial lines to represent the light of the light bulb and geometric shapes as metaphors for scientific concepts, building a visual code for “modern life”; scientific rationality was visualized through abstract symbols such as the honeycomb structure and the Möbius ring. Ideology becomes a carrier of cultural power through motifs: the cornflower relief in the style of German youth uses the symbol of the national flower (Figure 13) to unite the national identity, and the mixed relief of French colonial architecture (Figure 14) blends African masks and classical columns on the surface, but in fact implies colonial cultural hegemony. This transformation of style and subject matter is essentially a multiple projection of modernity in architectural decoration, witnessing not only industrialization breaking the monopoly of the aristocracy and urbanization giving rise to the reassessment of the social value of mass aesthetics, but also becoming a tool for identity construction in the ideological game. From Gaudi's natural madness to Mies' minimalist rationality, from the cross-cultural collage of decorative arts to the technological cult of futurism, (Bian Aiheng,2023) Its diversified practices enlighten the contemporary times that the only way for architectural decoration to become a cultural allegory that transcends time and space is to be rooted in the context of the times.



Figure 12. London Underground relief



Figure 13. Cornflower relief



Figure 14. Architectural Mixed Relief

4. Technology Driven: Re-integration of Materials, Craftsmanship and Decoration

4.1. New Materials Shape New Forms

A dual role from structure to decoration. The industrial properties of iron and steel revealed a double possibility in the architectural decoration of the early 20th century: as a structural skeleton for mechanical support and as a decorative vehicle for aesthetics. Hector Guimard's cast iron entrances for the Paris Metro (Figure 1) are exemplary: the curved cast iron elements form the support structure of the door frame, while the naturalistic vine and insect motifs form a flowing decorative interface. (Liu Liyan, Yu Lulu, Li Hui, 2024). These iron reliefs were cast in molds to achieve mass production, bringing the natural curves of the Art Nouveau movement down to earth for the first time in an industrialized way, breaking the handmade monopoly of stone carving. Mies van der Rohe went to the other extreme, his design of the German Pavilion in Barcelona (Figure 3) will be exposed steel frame, cross-section of the steel columns do not apply any carving, only through the fine grinding of the metal surface and the refraction of light and shadow, to show the rationality of the beauty of industrial materials. This "naked decoration" elevates steel from an accessory of decoration to the main character of architectural aesthetics, and the precise bite of steel and glass becomes the visual code of minimalism. The use of glass and ceramics brought a revolution of light and texture to decorative sculpture. The Vienna Secession's Stoclet Palace (Figure 15), with Klimt's participation, pushed the stained glass mosaic collage to new heights: wall reliefs with geometrical figures as the theme, golden glass and colored ceramic tiles spliced to form a strong layer of light and shadow, and the folds of the figures' garments and the background's geometric patterns intermingled with reality and reality under the sunlight, which not only retained the decorative nature of Art Nouveau, but also infused with the modernity of abstract paintings. The artworks not only retain the decorative nature of Art Nouveau, but also inject the modernity of abstract painting.



Figure 15. Stockholm Palace

4.2. Craft Transformations and Changes in Decorative Logic

The popularization of concrete mold-casting technology and machine carving reconfigured the production logic of decorative carving. Wright's Prairie Houses (Figure 16) make extensive use of precast concrete blocks, which are molded with geometric Mayan patterns and native plant motifs on their surfaces, and are mass-produced through standardized molds, which not only reduces construction costs, but also creates a unified decorative language. (Zhu Ruiji, 2024) The

symmetrical patterns in the Art Deco movement (e.g., the eagle emblem in relief on the Chrysler Building in New York City) relied on the precise control of machine engraving, and the application of CNC milling machines enabled complex geometric patterns to be reproduced in a millimeter. The use of CNC milling machines allowed complex geometric patterns to be reproduced to exacting precision, and this "industrial sophistication" became a visual symbol of modernity, in contrast to the individuality of classical hand-carving. While machine aesthetics became dominant, the practices of the Wiener Werkstätte and Gaudi demonstrated the resilience of craftsmanship. In the Separatist exhibition hall designed by Olbrich (Figure 17), the bas-relief decorations at the entrance were hand-carved by the craftsmen of the Wiener Werkstätte. The interplay of botanical tendrils and geometrical lines retains the natural rhythm of Art Nouveau, while also integrating Austrian simplicity, reflecting the complementary role of the "craft renaissance" to the machine aesthetics.



Figure 16. Wright's Prairie Home

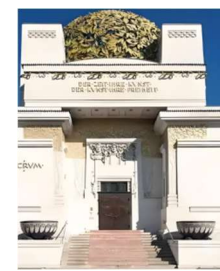


Figure 17. Separatist Exhibition Hall

5. Cultural Symbolism and Social Meaning in Patterns

The modern transformation of architectural decorative carving patterns in the early 20th century in European countries showed distinctive regional cultural characteristics and multiple styles. Germany explored the transition path in the game between Rationalism and Youth Style: Youth Style, as a local variant of Art Nouveau, reinvented the language of relief sculpture with "rationalized naturalism" in Munich Secessionist architecture, for example, a residence in Munich used straight lines to outline grape vines, geometrical leaves to preserve the natural vividness, and incorporated the preference for order (Figure 18); while the Bauhaus practiced minimalism with Gropius' school buildings; and the Bauhaus practiced a minimalist revolution with Gropius' school building, replacing traditional relief with exposed reinforced concrete beams, standardized steel windows, and other structural components, pioneering the aesthetics of industrial precision of "ornamentation as structure," and laying the foundation for the Internationalist style. The Austrian Secessionists balanced tradition and modernity

through geometric breakthroughs: Otto Wagner's Vienna Postal Savings Bank abstracted classical Corinthian column capitals into a rhombic grid in metal relief (Figure 19), realizing “simplified classicism”; Josef Hoffmann's Stoclet Palace made extreme use of squares and rectangles, and constructed “mathematical beauty” by geometrizing the composition. composition to construct “mathematical beauty”, opening up a path of rationalization between naturalism and geometric rationality.

The French Art Deco movement demonstrated diversified experimentalism: the buildings around the Madeleine Church fused ancient Egyptian exotic symbols with classical columns (Figure 20) to form a “neo-classical + exotic” style, which demonstrated the confidence of colonial culture and the inclusiveness of Parisian art; and Le Corbusier interpreted industrial aesthetics with reliefs of gears, dashboards, and other machine motifs. Le Corbusier interpreted industrial aesthetics with reliefs of gears, dashboards and other machine motifs, transforming technical symbols into visual totems of “machine civilization”. Spain's exploration of organicism insists on regional characteristics: Gaudi's Sagrada Familia Cathedral breaks through the classical paradigm with bionic reliefs, with columns that mimic the bifurcation of tree trunks, and the natural fusion of flora and fauna and religious symbols, creating a “natural cathedral”; Casa de la Mira retains the natural texture of stone, and practices “anti-machine” materials with its sea-wave-like façade and cavern-like bumps. The House of Mira retains the natural texture of stone and practices “anti-machine” material use with wave-like elevations and cave-like bumps, becoming a symbol of regional culture's resistance to globalization. The differentiated practices of different countries based on technical conditions and cultural traditions jointly constructed a rich picture of the modern transformation of European architectural decoration at the beginning of the 20th century.



Figure 18. Geometrized blades of a residence in Munich



Figure 19. Vienna Postal Savings Silver Cameo



Figure 20. Maddalena Church Classical Columns

6. Conclusion

The modern transformation of European architectural decorative carving patterns at the beginning of the 20th century is essentially the result of the joint action of technological revolution, social change and artistic self-awareness. From the natural fantasy of Art Nouveau, the geometric rationality of Art Deco to the minimalist restraint of modernism, the evolution of patterns not only recorded the architectural decoration from the “divine narrative” to the “expression of human nature” of the turn, but also foretells the contemporary architecture of technical rationality and humanism between the eternal search. The evolution of architectural decoration not only records the shift from “divine narrative” to “human expression”, but also signals the eternal search of contemporary architecture between technical rationality and humanism. This transformation has not only shaped the visual gene of modern architecture, but also left a rich revelation for the expression of regional culture in the era of globalization - when the decoration transcends the formal level and becomes a medium of dialogue between technology, history and humanity, its artistic value can truly realize the sublimation of modernity.

Acknowledgments

We thank A, B, and C. This work was supported in part by a grant from XYZ.

References

- [1] S-Rong . The Innovation of Technology and Function in Modernist Architecture[J]. *Art Appreciation*,2024,(34):52-59..
- [2] Yang Xuan. The Artistic Semantics of Stained Glass Windows in Gothic Architecture[J]. *Journal of Liaoning Media College*,2016..
- [3] Wang Zhongheng. The Tension of Nature and the Interest of the Times - The New Art of Hector Guimard[J]. *The Grand View of the Fine Arts*,2020,(11):134-136.].
- [4] Liu Chen. Study on the Image of Tree Pattern of Fabrics Unearthed in Astana[D]. Xi'an Academy of Fine Arts,2023.DOI:10.27399/d.cnki.gxamx.2023.000080.
- [5] Yang Xiangrong. Constructing Art Immersion Embodied Experience, Bringing History with Theory, and Proving History with Theory--The Teaching Thinking of University Aesthetics and Aesthetic Education under the Action of Aesthetic Immersion[J]. *China University Teaching*,2024,(04):40-47.
- [6] Nie Zhiqi, Lu Yongyi. Tracing the Image Method in Robin Evans' Architectural Theory[J]. *Journal of Architectural History*,2024,5(04):57-67..
- [7] Huang Pengfei. Germany's Ruhr area “industrial culture road” on China's industrial city tourism planning inspiration[J].

- Urban Architecture,2024,21(19):61-66+71.DOI:10.19892/j.cnki.csjz.2024.19.13..
- [8] Liu Liyan,Yu Lulu,Li Hui. Introduction to Industrial Design [M]. Chemical Industry Press:202408.217..
- [9] Zhu Ruiji,Gu Daqing. Stream Tracing: The Formation of Spatial Form Language of Frank Lloyd Wright's Residence[J]. Architectural Journal,2024,(01):88-97.DOI:10.19819/j.cnki.ISSN0529-1399.202401015.