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Architectural culture as a system of signs: A semiotic reading of space design

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Keywords

Architectural culture; Semiotic analysis; Design sings; Form; Function.

Abstract

Architecture, as a manifestation of cultural production, exhibits both diversity and commonality in the creation of design images and the interpretation of design meanings across various historical contexts. Each era has generated its own design signs, and architectural culture has formally and functionally shaped them into spatial expressions. This article proposes a methodological framework for analyzing and comprehending the similarities and differences in architectural culture. By correlating the fundamental architectural terms, 'form' and 'function,' with the semiological concepts of 'the signifier' and 'the signified,' it aims to establish a foundation for deciphering the cultural codes that generate the design patterns across various contexts. As the historical reading of architecture inherently involves cultural interpretation by being influenced by the imaginative and semantic framework of its context, this article undertakes a semiotic analysis to promote an objective understanding and coherent development of architectural culture.

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Highlights

- This introduces a methodological framework integrating semiotics with architecture to decode cultural meanings in design.
- It offers a systematic approach to identifying cultural codes in architectural form and function across diverse historical contexts.
- This conceptualizes architectural design as a system of signs, associating the signifier with form and the signified with function.

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Bir işaretler sistemi olarak mimarlık kültürü: Mekân tasarımının göstergebilimsel okuması

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Anahtar Sözcükler

Mimarlık kültürü; Göstergebilimsel analiz; Tasarım göstergeleri; Biçim; İşlev.

Öz

Mimarlık, kültürel üretimin bir dışavurumu olarak, tasarım imgelerinin yaratımı ve tasarım anlamlarının yorumlanışı bağlamında çeşitli tarihsel bağlamlar boyunca hem çeşitlilik hem de ortaklık sergilemektedir. Her dönem, kendine özgü tasarım işaretlerini üretmiş; mimarlık kültürü ise bu göstergeleri biçimsel ve işlevsel olarak mekânsal ifadelere dönüştürmüştür. Bu makale, mimarlık kültüründeki benzerlikleri ve farklılıkları analiz etmek ve kavramsallaştırmak üzere yöntemsel bir çerçeve önermektedir. Temel mimarlık kavramları olan "biçim" ve "işlev" ile göstergebilimsel kavramlar olan "gösteren" ve "gösterilen" arasında kurduğu ilişki aracılığıyla, farklı bağlamlarda tasarım kalıplarını oluşturan kültürel kodların çözümlenmesine yönelik kuramsal bir zemin oluşturmayı amaçlamaktadır. Mimarlığın tarihsel olarak okunması, bağlamının imgesel ve anlamsal çerçevesinden etkilenerek kültürel bir yorumu da içermektedir. Bu doğrultuda makale, mimarlık kültürünün nesnel bir anlayışla yorumlanması ve tutarlı biçimde geliştirilmesine katkı sağlamak amacıyla göstergebilimsel bir araştırma yöntemi ortaya koymaktadır.

Öne Çıkanlar

- Bu makale, tasarımdaki kültürel anlamları çözümlemek amacıyla göstergebilim ile mimarlığı bütünleştiren yöntemsel bir çerçeve sunmaktadır.
- Mimari biçim ve işleve içkin kültürel kodları farklı tarihsel bağlamlarda saptamaya yönelik sistematik bir yaklaşım önermektedir.
- Mimari tasarımı, biçimi gösteren ve işlevi gösterilen olarak tanımlayan bir işaretler sistemi olarak ele almaktadır.

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INTRODUCTION

Architecture is a culturally embedded intellectual and professional endeavor that encompasses both theoretical and practical dimensions, contingent upon the economic, political, and technological contexts in which it exists (Hays, 1884). While architecture adopts the material and technical characteristics of its context, it also fulfills functional roles by addressing the vital, spiritual, and ideological needs generated within that context. Moreover, architecture is shaped by cultural hegemony while simultaneously legitimizing and consolidating cultural domains. It possesses the dual capacity to serve as a historical artifact of its era and as an expression of universal human values, drawing from a diverse array of sources, including collective identities, daily routines, religious rituals, and social experiences, alongside its aesthetic significance (Akkach, 2000). Architectural design emerges from the cohesive characteristics of a community, encompassing geographical proximity, shared language, collective intellectual and technical knowledge, and artistic traditions. These cultural codes inform every stage of architectural production, from initial sketches to construction techniques and material selection. Given that architecture incorporates both formal and functional symbols of culture, it inherently facilitates communication between design and its contextual environment. Cultural codes have continuously evolved throughout history, resulting in a corresponding variation in architectural design. Understanding the architecture of a culture requires interpretation, influenced by a mindset and imagination shaped by specific historical contexts, thereby constraining the possibility of achieving a wholly objective interpretation. Consequently, comprehending architecture within a culturally distant context inevitably involves biased perspectives and attitudes.

Within this framework, the article adopts Ferdinand de Saussure's dyadic model (2013), which defines language as a structured system of meanings constituted through the relationship between the signifier and the signified. This model provides a robust conceptual framework to interpret architecture as a semiotic system, enabling systematic analysis of how form (signifier) conveys meaning (signified) across historical contexts. Roland Barthes (1977) extends this dyadic model by situating the signifier–signified relationship within culturally structured systems of codes, emphasizing that meaning is not produced through individual interpretation but is socially generated and stabilized through historically established symbolic structures. In this sense, cultural codes do not replace the structural logic of the sign; rather, they regulate and condition the operation of this structure within specific contexts, ensuring a relative stability of meaning while allowing for historically grounded variation. By grounding the study in this dyadic approach, architecture is examined as a communicative cultural design, where meaning arises from the structural relationship between form and function rather than from interpretive or experiential processes to maintain analytical objectivity and theoretical precision within a Saussurean

framework. Meaning emerges through the interdependent relationship of signifier and signified: form represents the perceptible and material aspects of design, while function embodies conceptual and semantic content. Through this lens, architecture is interpreted not merely as a physical artifact but as a symbolic language encoding design values, norms, and aspects of its context, providing a methodological foundation to analyze how visual and semantic dimensions of design evolve. (Figure 1)

Finally, this article proposes an analysis method for coding and decoding design patterns of a culture by integrating semiotics with architecture. The initial segment will present a comprehensive conceptual framework and elucidate the significance of semiology in deciphering architectural culture. Following the assertion that the semiological relationship between the signifier and the signified aligns with the concepts of form and function in architecture, the methodological approach for reading design signs, which reveal differences or similarities within a historical context, will be addressed.

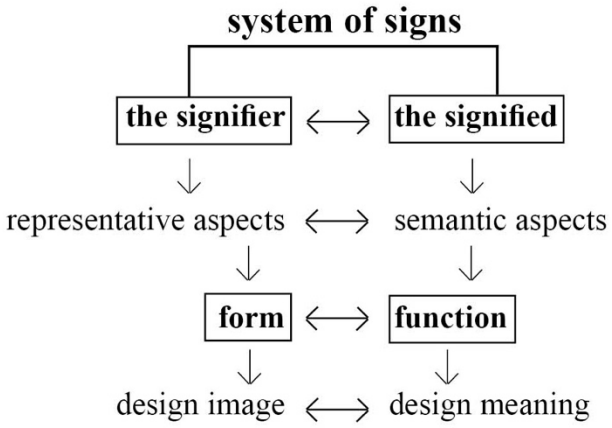

Figure 1. The methodological approach for reading design signs.

INTERPLAY BETWEEN THE SIGNIFIER AND THE SIGNIFIED IN SEMIOTICS

This article employs semiotics as a foundational research methodology in interdisciplinary studies to enhance the understanding of symbolic constructs within architecture, specifically in the coding and decoding of design patterns across diverse historical contexts. Semiotics facilitates the apprehension of the realm of signs, navigating the interplay between the signifier (perceptible aspects of signs) and the signified (understandable meanings conveyed by signs) (Chandler, 2017). Despite the sign's perceived immutability, famously characterized by Saussure (2013: 60) through its arbitrary connection between the signifier and the signified, semiotics remains socially constructed, exerting a pivotal role in shaping cultures within their respective spheres of existence. In this regard, Barthes (1977: 51) situates the signifier–signified relationship within organized systems of cultural codes that regulate the production and stabilization of meaning, emphasizing

that signs operate within historically established symbolic structures rather than through subjective interpretive acts. In this sense, cultural codes function as organizing frameworks that enable the systematic operation of signs across different historical contexts. Barthes's framework is employed here not to expand the analysis toward interpretive or phenomenological semantics, but to clarify how structural relations of meaning are culturally coded and stabilized within historically specific contexts. Accordingly, this study is explicitly framed within a Saussurean dyadic semiotic model and deliberately delimits its analytical scope by setting aside broader pragmatic, experiential, and interpretive dimensions of meaning—such as Peircean interpretants, atmospheric perception, movement–time relations, and affordance-based semantics—to maintain a structurally grounded analytical framework and theoretical coherence.

In this theoretical reading, the primary emphasis is placed on the relational dependency of the components of the sign. Meaning does not pre-exist the signifier, nor does the signifier autonomously produce meaning; rather, meaning emerges through differentiated relations within a system of signs. Barthes's concept of cultural codes is employed as an intermediary theoretical layer that explains how Saussure's abstract relational model is concretized within architectural practice, without reducing the sign to subjective interpretation or symbolic excess. Accordingly, while preserving the analytical core of Saussure's framework, this study selectively adopts Barthes's approach to elucidate how sign relations are historically conditioned. Through this perspective, the article examines how architectural culture produces coherence and continuity within historical contexts through systematically organized form–function relations, and positions architectural design as a product of structured cultural coding. This approach enables comparative analysis across different historical contexts without extending the analysis toward relativistic or phenomenological interpretations.

The dialectic established within this dual structure in semiotics provides a method of analysis to understand concrete representations that produce a cultural structure and the abstract meanings they represent in architecture. Hence, the relationship between the signifier and the signified exhibits variations across different cultures (Tura, 1996: 98), with signs susceptible to evolution over time through social production. In analyzing various architectural cultures, this article conceptualizes a research method that associates semiotic concepts of the signifier and the signified with the terms form and function of design. Here, the signifier corresponds to form as the visual representation in design imagery, while the signified relates to function as the underlying meaning. Form encompasses the tangible and objective aspects of design, including considerations of materiality that influence spatial configurations such as mass-void relationships, as well as typological, morphological, and quantitative attributes defining design patterns. Form plays a critical role in facilitating cognitive understanding through sensory perception, thereby signifying design meanings in diverse architectural design.

Conversely, function in this context denotes the broader semantic aspects within architectural design, extending beyond the mere usability of space to encompass cultural factors like religious symbolism, ideological connotations, and environmental references expressed through design form. This article contends that correlating the duality of the signifier and the signified in semiotics with form and function in architecture enriches comprehension of architectural cultures of different historical contexts. This correlation enables the development of a comprehensive research

framework that delineates similarities and differences in relationships between design image and design meaning, as well as continuities and contradictions within architectural culture.

The article argues against a hierarchical reading of architecture that overly prioritizes the visual characteristics of designs alone (Arnheim, 1977: 256), advocating instead for a balanced consideration of both form and function to grasp the complexity of architectural culture. Likewise, without considering design images, it is claimed that engaging in debates solely on function fails to foster a comprehensive cultural understanding of architecture. Thus, the article posits an intrinsic interconnection between form and function in architecture, where each influences and shapes the other, echoing the symbiotic relationship observed in semiotic analysis between the signifier and the signified.

THE DYNAMICS OF FORM AND FUNCTION IN ARCHITECTURE

In the 1980s, Manfredo Tafuri profoundly influenced the discourse on architectural history by emphasizing its semiotic construction within culture. Tafuri posited that history should be understood as "the production of meaning," contingent not merely on definitive analyses of events but on interpreting tangible realities through the "signifying traces" those events leave behind. He argued that history is shaped by or for a specific language, suggesting that it is not a fixed entity but a construction of concrete realities simultaneously objective and open to interpretation. Through language, history assigns meaning to the context in which it is expressed and communicated.

This article proposes an analytical method to comprehend the evolution of architectural culture through two fundament terms, form and function (Benton & Benton, 1975), building on Tafuri's assertion regarding the complex interplay between semiotics and architecture. Form, epitomizing the material essence of architecture, and "function," denoting the causal nexus between architectural design and human activities, serve as the main constructs for understanding design images and design meanings. Despite the theoretical and practical variations that have characterized these two terms over historical context (Conway & Roenisch, 1994: 45-49), their enduring significance in shaping the cultural framework of architecture remains steadfast within both intellectual discourses and professional positions (Smith, 2012: 143-210).

Throughout history, efforts have been made to delineate the principles and norms governing the relationship between these terms to produce a design language. Over an extensive duration, these standards have sought to embody symbolic meanings, often through mathematical proportions related to bodily actions or allusions to divine principles. Each principle and norm has engendered distinct architectural typologies, leading to the objectification of diverse cultural meanings throughout history. These typologies have been instrumental in constructing a design language emblematic of the ideological structure and artistic movement within a historical context (Niven, 2009).

In essence, form, as the tangible manifestation of architecture, parallels establishing a design image (the signifier) of a structured and organized meaning within a cultural framework. In other words, this term encapsulates the perceptual dimension of architecture. It corresponds to the signifier of architecture as an image conceptualized as both a mental representation of a design and an objective

portrayal of the conceived entity. This term is employed within architectural discourse and profession to encompass the act of perceiving architecture. It serves as a communicative instrument in architecture, portraying symbolic meaning that influences design materials, tectonics, scale, and proportions. Moreover, form conveys a myriad of elements, including technical expertise and aesthetic considerations inherent to the historical context in which architecture resides.

Aristotelian philosophy of ontology delineates the concept of form through dual perspectives, wherein it is construed both as a perceptible entity (morphe, sensible species) and as an intelligible entity (eidos, apprehensible species). This differentiation bears relevance to the notion of the signifier, which encompasses both the inherent attribute of an object and the cognitive construct of the mind. In this point, form is construed as contingent upon an institutional image that embodies a meaning. In architecture, this conceptualization has been imbued with analogous semantics since Marcus Vitruvius Pollio. According to Vitruvius (*De Architucture*), architecture encompasses both the signifiers—the components that give tangible form—and the signified—the overarching meaning that unifies these components. Perceivable elements constituting architecture are scrutinized as signifiers, whereas the underlying significance that orchestrates their synthesis is regarded as the signified. Vitruvius delineated form as a "sculptural" and "geometric" entity that generates representations of an architectural culture, with considerations encompassing materials, tectonics, scale, and proportion in this formation is an objective practice.

According to this perspective, architecture assumes the responsibility for generating the intended signification beyond the mere use value of design. Friedrich Schelling (1859: 111) interprets this responsibility as reflecting the fact that architecture is an "imitation of itself as the art of need." Despite diverse visual interpretations and techniques, form is assessed for its capacity to engender the image of architectural signification and to elevate it into a multifaceted representation encompassing social, political, and economic dimensions, transcending its mere utility as an object for daily use (Behne, 1996: 137). The genesis of this discourse can be attributed to Quatremère de Quincy's critique of Classical Greek architecture (1788), wherein he posited that it comprises conceptual derivations of "abstracted form" from nature. He contends that form transcends mere visual representation, instead serving as an expressive signifier within architecture. At this juncture, form ceased to be perceived merely as a mimetic representation of natural objects, but rather as a design element governed by a coherent set of aesthetic rules and principles. Its significance lies in its capacity to encapsulate the sensible apprehension of spatial functions, delineating it within a broader perspective that transcends mere usability (Winckelmann, 2006).

At this point, the term function corresponds conceptually with the semantic connotations referred to by the term form, denoting the signified aspect in the design language of an architectural culture. Function encapsulates values that are symbolized by the design image. Its diverse meanings throughout history conceptualize the formal essence of architecture, enabling it to adapt to the social dynamics inherent in everyday practices (Hitchock & Johnson, 1932). Abstract and concrete inputs signified by form are justified with the term function by corresponding to cultural references pointed out in architecture influencing/influenced by human life. Initially imbued with connotations of divine significance and fundamental shelter, function has evolved over time to encompass the social, political, and economic dimensions of spatial use, thereby referencing the architectural functionality necessary to support daily activities. In this context, function denotes the

architectural efficacy required to facilitate human life in various domains, including commerce, recreation, communication practices administration.

Notable examples, such as the Newton monument, the Acropolis in antiquity, or the neoclassical symbolic order proposed by Étienne-Louis Boullée, serve as important representatives of the transformative nature of architectural culture within their respective contexts. In this respect, the most important order producing image in architecture was defined through the term function. An image is produced through symbolic meaning that constructs the perceivable characters of signs in architectural design by interpreting the term function as the design logic, idea, or purpose. In this respect, function corresponds to the comprehensible characters of signs indicated with the form in architecture, and it has been interpreted in line with cultural meanings throughout history.

Form, discussed as the sculptural geometry of architecture in the Classical Period as a reference to spiritual meanings and was rationalized and simplified with the Modern Movement, was mainly construed as pertaining to the utilization or practicality of space (Eisenman, 1984). During this era, architecture was approached as a pragmatic reality within human life, consolidating the notion that a design constitutes a usable object (Eisenman, 1970). Functionalism, a concept that Edward Robert de Zurko (1957: 7) regarded as addressing the practical and material requirements of occupants, emerged as a vigorously defended principle within the Modern Movement. In this era, Le Corbusier argued that "architecture has different meanings and different tasks from showing constructions and fulfilling purpose that is understood as a matter of pure utility, of comfort and practical elegance." Mies Van Der Rohe's assertion that "form follows function," deemed the motto of the Movement, upholds the contention regarding the utility of form and the objectivity of function alike. This perspective contended that relying solely on formal features functionalized with spiritual meaning was inadequate for expressing a design, particularly in light of the Modern Movement's emphasis on defining architecture's foundational characteristic through usability (Agudin, 1995: 380).

Throughout history, the term function finds its terminological equivalent in a number of cultural references because the values that produce the architectural form and are prioritized in space design are given meaning by this term. Besides spatial needs of human life, function includes the meaning of the social, political or economic values that the form indicates in architecture. The term extends beyond its conventional association solely with the utility of daily routines. Architectural culture has undergone successive transformations within specific contexts, thereby reshaping our comprehension of the term function with distinct meanings embedded within different historical periods. In this regard, Umberto Eco, within his renowned work on architecture and semiotics, presented a pioneering hypothesis elucidating the multi-dimensional essence of the term function by regarding the primary and secondary uses of a Gothic vault concerning both its physical and spiritual meaning in design. The physical function of the Gothic vault entails bestowing height and lightness while acting as a skeleton for a load-bearing system. Its spiritual function transcends the realm of the mere structure by contributing a mystical ambiance to space. Here, the emphasis on linearity and the vault's role in manipulating light, notably through stained glass, lends itself adeptly to deeper semiotic analyses. For Eco, nothing held infinite values or rigid judgments. Architecture constitutes a realm of design that imbues its cultural context into the third dimension (form) and

seeks to alter reality in a manner conducive to fulfilling a function within human life (Eco, 2019: 17-22).

Therefore, this article considers architecture as both a signifier and a signified, producing design signs of its cultural context. What motivates this article to engage in discussions within the field of semiotics is the fact that architecture generates not only a design image that visually reflects the contextual values of a specific time but also a design meaning whose functionality serves them. Architectural functions, influenced by the quotidian daily practices and rituals of society and underpinned by its belief systems and ideological frameworks, provide their objective installation with architectural forms that produce symbolic transfers of these cultural needs. In other words, while function produces the design meaning of a culture, form corresponds to the design image that provides the communication of these meanings. Eco contends that cultural phenomena signify a progression wherein form becomes enriched with novel meanings as new signifiers emerge– as a historical reality that exemplifies the dynamic nature of the context (Eco, 2019: 43-45). These two terms have different interpretations and understandings in different contexts, establishing the symbolic causes of similarities and differences in architectural cultures. The form-function relationship does not have a stable or uniform pattern and it acquired different hierarchical relationalities in various contexts.

SEMIOTICS OF ARCHITECTURE

The terms of form and function have historically been positioned in an oppositional and hierarchical relationship within the field of architecture (Moussavi, 2009:7). In architecture, which adapts to the evolving needs of human life, the role of the terms within the multifaceted interpretations in various cultures remains consistent: "form is a product of the mind" as a design image, while "function is a product of matter" as a design meaning (Hendrix, 2013: 4). Architecture constructed with the system of signs of its time establishes semiotics with the design image and design meaning it produces (Preziosi, 1979: 5-8). The visual and semantic codes that establish these semiotics produce a formal and functional organization of architecture. In semiotics of architecture, each code includes formative elements whose meaning is a reference to sign formations in other codes. Architects orchestrate and articulate these codes to construct a design pattern.

The semantic association of visual codes comprises diverse and multifaceted relationships that contribute to the creation of a architectural culture. The similarities and differences in the combination of codes, as a system of signs, generate visual and semantic overlaps and dissociations within a design pattern. This article establishes a semiotic analysis system for reading form as "the material vocabulary of architecture" and understanding a architectural culture by associating it with the function it expresses. In this analysis, two fundamental terms are regarded as code spirals that constitute the DNA of architectural culture. Their features and interrelationships are evaluated as references for generating differentiation and similarities in the architecture of various historical contexts. The codes that generate form comprise the structural, material, and geometric features of design. The codes that generate function are categorized into programmatic utility (addressing the architectural needs of daily practices and routines) and thematic utility (addressing the architectural counterparts of religious, ideological, and economic needs). (Figure 2)

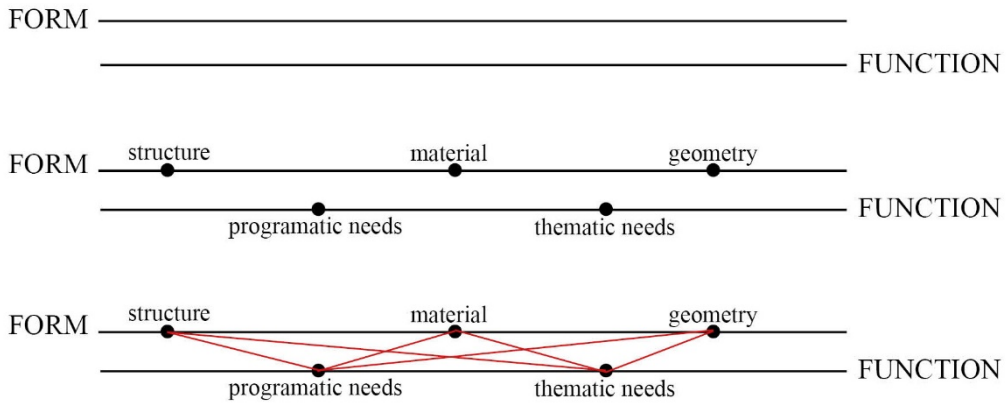

Figure 2. Design codes in semiotic analysis of architecture.

The code that generates form may be multifunctional, or an architectural function may be signified by multiple codes. In this parametric variation, each relationship between form and function defines design patterns of architectural culture. This method, introduced to analyze the diachronic and diatopic nature of relationships between form and function, systematically elucidates the elements for understanding the distinctive structural characteristics of architectural cultures across different epochs. The task of this semiotic analysis is to recognize and account for patterns of constancy in the variation of design codes built upon a principle of relational invariance between form and function in architecture. (Figure 3)

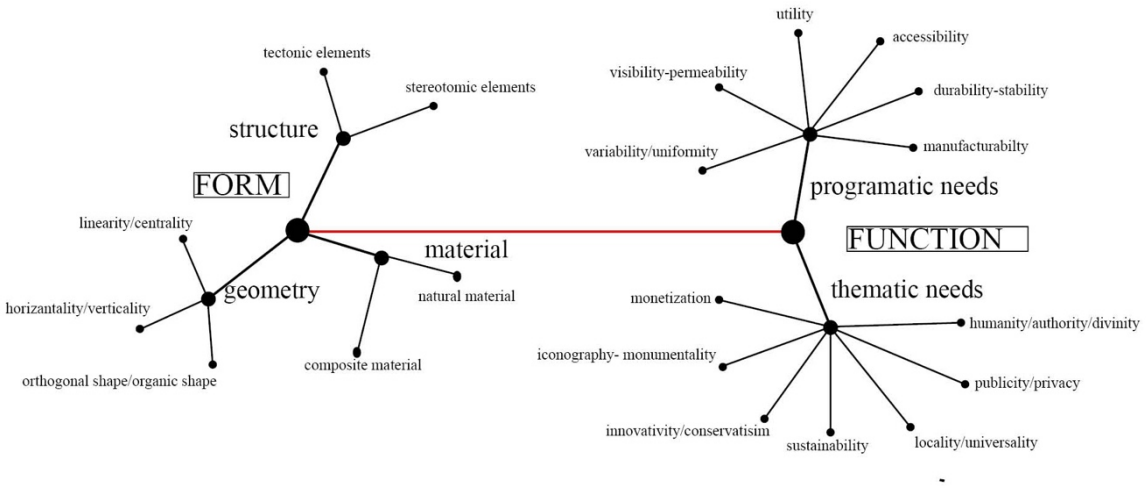

Figure 3. The diachronic and diatopic nature of relationships between form and function.

Structure as a design sign

One of the most important components that define form is structure of the building (Figure 4). In architecture as a constructional craft (Frampton, 1995), structural elements play an essential role in determining the architectural image. The evolution of structural knowledge in architecture, initially primitive, was first established through masonry systems that utilized the inherent weight of materials. This architecture, characterized by more enclosed forms, comprised building typologies with limited diversification, where heavy and thick structural elements also functioned as surface elements. This configuration, unable to accommodate large architectural volumes, functionally restricted spatial permeability essential for active integration of social life, thereby limiting a robust indoor-outdoor relationship.

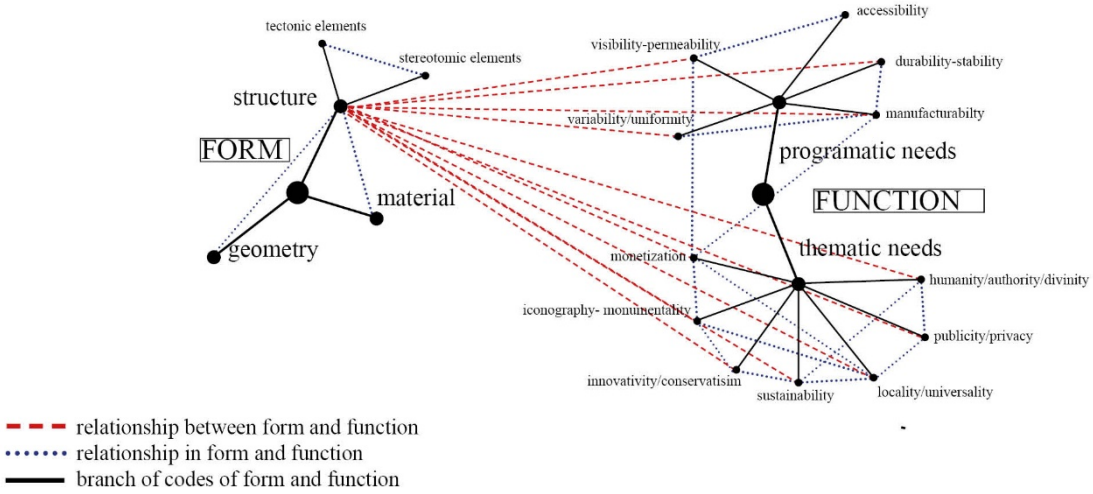

Figure 4. Structure as a design sign in the formation of the relationship between design image and design meaning.

With the evolution of frame systems over time, structures became lighter and surface openings increased, fostering greater interaction between the building and its environment compared to the masonry system, which tended to support a relatively conservative social life. In this point, architecture is considered a cultural change with the development of structural knowledge and technical mastery of materials. The modern skeleton structure, achieved through the rational application of wood, concrete and followed by steel in construction, has minimized the size of load-bearing members and established a distinct separation between structural and non-structural elements (Kriger, 1975: 13). Thus the significant role of structure in shaping form has facilitated the diversification of architectural design.

In this new cultural context, the term function was predominantly interpreted as combining architecture with technological innovations and their assimilation into daily life (Frampton, 1999). In this culture, vertical construction emerged as a pivotal theme, establishing new social and

economic icons for the city. Significantly, high-rise buildings symbolizing urban wealth, technological progress, and industrial development have surfaced as "landmark creations" of the context, artistically transforming the urban landscape and becoming distinguished designs with their formal influences (Sarkisian, 2011). Creating iconographic forms gained momentum in architecture, meaning it was attributed to structure through utilitarian purposes of the changing nature of social and economic context in the post-war time because iconic buildings with structural complexity produced design images of socio-economic prosperity as well (Dougles, 2004; Jencks 2005; Dupré, 2008). Moreover, the growing verticality in architectural forms has not only given rise to iconic structures that alter the city skyline but also contributed to creating monumental buildings as signifiers of ideological and religious meanings.

Thanks to industrial advancements (Fixson & Park, 2008), the rapid and efficient production of structural elements has facilitated the emergence of new design meanings in architecture. The reduction in construction time decreased manpower in production, and the availability of global structural production with demountable systems have contributed to the emergence of a new architectural culture. This emerging architecture, known as digital culture (Picon, 2010), has bolstered interdisciplinary relationships in design, leveraging intensive technical knowledge to generate novel design images. Owing to advancements in technology, coupled with the evolution of engineering knowledge, as well as improved calculability and manufacturability, lightweight and slender structural elements have been employed to achieve extensive spans and substantial cantilevers. The impact of structural elements on plan schemes and building sections has notably increased, particularly with forms generated using 3D structural systems.

The development of structural knowledge in shaping architectural form does not always progress in a parallel and cumulative manner across various contexts. While a significant factor is the affordability of technological and industrial structural production, another consideration is the influence of local architectural traditions and designs prioritizing ecological sustainability as a core design principle. Especially as the impacts of the climate crisis have intensified, sustainability has been a topic of intensive discussion in architecture since the 1990s (Author, 2023). This has led to a preference for traditional and more modest building structures with a smaller carbon footprint, facilitating a shift towards more restrained form production.

Structure plays a crucial role in shaping the design image by ensuring the durability and stability of the form. Additionally, it is pivotal in achieving suitable spatial proportions, shapes, and sizes to fulfill the architectural programmatic requirements such as accessibility, visibility, permeability, comfort, and ergonomics as indicated by the form. The evolution of structural knowledge over time has facilitated complexity and diversity in form production, enabling the creation of new spatial functions that adapt to cultural changes. While structural features reflect the technical knowledge and technological advancements of their era (Macdonald, 2018), they also bear political and economic implications within the societal contexts attributed to these features. In addition to facilitating the production of iconographic, monumental, or monetization forms, structure plays a crucial role in creating architecture that fulfills thematic needs such as publicity, locality, or sustainability. (Figure 5)

Figure 5. Chartres Cathedral, 1194–1250, architect unknown; 30 St Mary Axe, Norman Foster, 2003; Seagram Building, Mies van der Rohe, 1958. (ArchDaily).

Material as a design sign

One of the crucial inputs in the production of the design image is the material (Figure 6). The material determines the architectural form through its durability and elasticity. Louis Kahn's aphorism[i] on brick underscores the significance of material in shaping place and identity of design, which collectively constitute the architectural culture. Material selection is a crucial method for decoding the technical knowledge and design language of a given period, as it determines not only the surface elements but also the structural element's ability to take shape and endure.

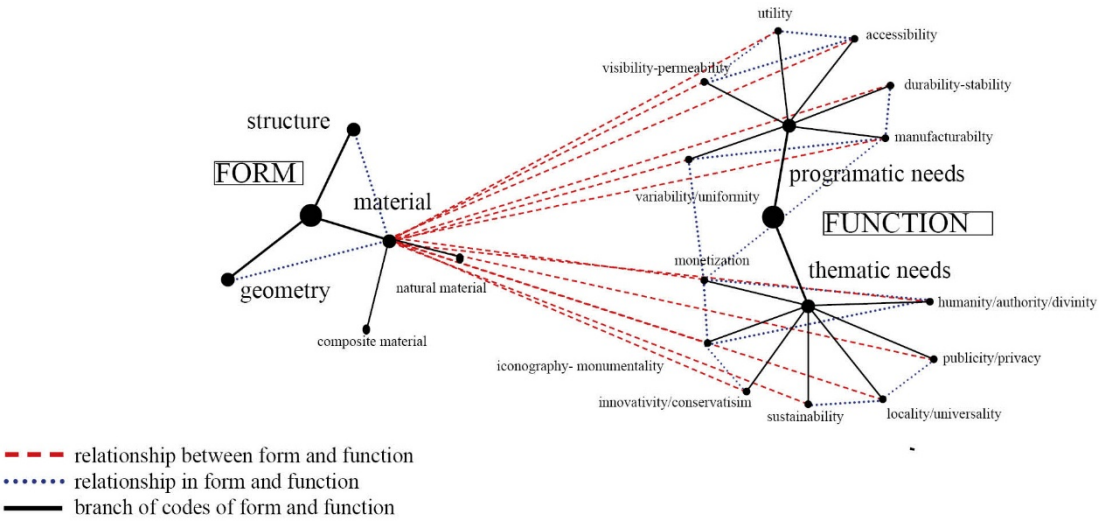

Figure 6. Material as a design sign in the formation of the relationship between design image and design meaning.

The use of natural building materials such as brick, stone, concrete, and adobe varies across local regions, displaying both differences and similarities. This variation has played a pivotal role in shaping architectural cultures influenced by ecological and economic considerations as well. Minimizing material usage and selecting easily accessible local building materials facilitate cost-effective construction and promote time saving. In particular, ensuring that the design is manufacturable with natural materials on a local scale is crucial for the affordability of the building. Furthermore, the selection of materials appropriate for the local climate is crucial for optimizing building functions such as ventilation, heating, and cooling. Given its functional properties for conditioning the building, material choice serves as a significant indicator in shaping approaches to ecological sustainability within architectural culture.

With the advancement of technical knowledge and the development of new materials, the durability and elasticity of structural and surface elements that define architectural form have been enhanced. The constructive potentials of steel and concrete materials have particularly contributed to creating monumental and iconographic designs that defy gravity, lightening the relationship of the architectural form with the ground in contrast to bulky buildings. Additionally, the use of glass, as a result of the ability to create large volumes and expansive openings, has played a crucial role in achieving transparency in design. This article posits that these material features serve as significant indicators of the programmatic utility of form, influencing aspects such as lighting and air conditioning in architecture.

The transparency of enhances visual accessibility and permeability of design by offering important insights into the social and ideological context in which they are situated. By mitigating the division between indoor and outdoor spaces through visual continuity, this surface material facilitates a more thematically inviting or participatory use of space and programmatically organize spaces within specific social and political purposes. One of the key determinants of materials that provide transparency in form is the heterogeneous daily values and practices in social life. The visual permeability of materials plays a crucial role in delineating private and public uses within societies (Colamina, 1996). In spatial designs that segregate functions based on gendered roles, especially in conservative societies where women are secluded from public spaces, buildings tend to be introverted, and glass surfaces such as windows are limited to control external interactions.

Thanks to advances in engineering knowledge and the development of composite materials, diversity and richness in form production have been achieved through the creation of surface elements that offer high elasticity, stability, and durability. These new materials have emerged as symbols of contemporary architectural culture alongside digital designs, giving rise to complex forms that define iconic buildings of digital culture. Composite materials, which enable fluid and folded forms, have played a revolutionary role in reinterpreting design meanings and transforming architectural functions throughout history (Vidler, 1994). Striking and captivating features of unconventional forms that defy immediate comprehension have become functional features of the new architectural culture. (Figure 7)

Figure 7. Salk Institute, Louis Kahn, 1965; The Crystal, WilkinsonEyre, 2012 (ArchDaily).

Geometry as a design sign

Geometry serves as a crucial determinant of architectural form (Figure 8). Architectural design elements and the spatial volumes they create have historically been shaped by simple mathematical ratios. These mathematical calculations, rooted in observations of nature and astronomy, imbue designs with both practical and symbolic significance, reflecting worldly and religious meanings. Horizontal and vertical sections, facade features, and volumetric articulations of buildings have been derived from these mathematical calculations. By transferring specific mathematical proportions to the design, architects express both the usability and aesthetic values of space.

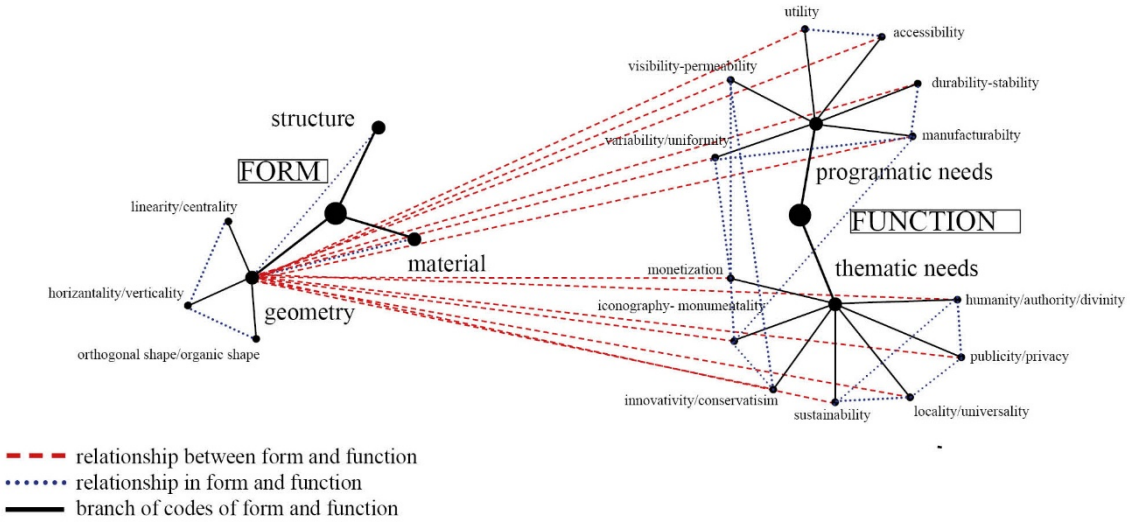

Figure 8. Geometry as a design sign in the formation of the relationship between design image and design meaning.

Mathematics, which governs the geometry in design, has also been employed to regulate the relationships between design elements. These relationships, theorized within basic design principles, dictate the organization and composition of the design image and its meaning. In other words, design principles are established to formalize architectural knowledge by codifying the relationship between signifiers and the signified throgh geoemtric norms and rules. Architecture is considered as three-dimensional artifacts through the articulation of solids and voids geometries (Carpo, 2017). Within this conceptual framework, humans perceive solidity and imagine emptiness, while space offers a spatial experience by harmoniously integrating solid and void according to basic design principles in architecture. Thanks to this princpiles, such as the Gestalt principles, architectural elements are organized from part to whole, thereby defining how the design image is perceived. These principles facilitate the interpretation of architecture as a design discipline by ensuring the functionality of visual aesthetics (Peterson, 1996).

The historical variations in architectural culture can be interpreted through the similarities and divergences in geometric proportions. For instance, whether the floor plan is linear or centrally organized affects its function in terms of gathering or orientation, reflecting the ideological and religious characteristics of its context (Benevolo, 1978: 660-661). While geometric features shape the design form, they also define its relationship with the topography and built environment with properties of horizontality or verticality by influencing the form's visibility and public perception of its surroundings. Horizontal forms are often more aligned with human scale, offering a sense of intimacy and accessibility. In contrast, vertical forms lend themselves to a monumental presence on an urban scale, thereby imbuing architectural designs with signs of ideological or religious authority within their societal context.

Geometry plays a crucial role in the composition of building surfaces, influencing the arrangement of building masses, the division of facades, and the balance between openness and closure. Decorations and ornaments on facades serve as significant codes for interpreting similarities and differences within architectural cultures (Bringgs, 1967: 122-126). Relief, engraving, and painting on architectural surfaces require craftsmanship, serving as indicators of local aesthetic skills, cultural traditions, and artistic expressions by ensuring originality in form through specific knowledge and mastery of skills. These decorations and ornaments provide essential clues in tracing art movements and architectural periods throughout history, from the classical era to modernism (Wagner, 1988). They affect architectural manufacturability as it increases complexity against simplicity and purism in architecture, and this is an important factor in the formation of standardizing design principles for a universal architectural culture.

Throughout the historical process, developments in digital technologies have led to the development of structural and material knowledge by changing architectural typologies and producing non-Euclidean geometric designs and kinetic and dynamic forms. The generative and creative potential of computer-based design has provided open-ended and unpredictable but consistent transformations of three-dimensionalty, which have risen to new architectonic possibilities (Grobman & Neuman, 2011). This has resulted in the emergence of plurality and variety in the geometric production within the field of form design.

New geometries in form design have given rise to a new programmatic and thematic meaning through the design of linearity and curvilinearity in architecture, which Jencks (2004) referred to as "the new sciences of complexity." In contemporary times, the effective harnessing of parametric design technologies has given rise to a new body of design knowledge, empowering designers with enhanced skills and capabilities to shape architectural forms (Goldschmidt, 1998; Garcia, 2007; Carpo, 2013). Architectural forms are no longer static and fixed geometries (Lynn, 1999) due to the advent of innovative surface materials and structural elements. Instead, the form-function relationship has been reexamined with a more subjective and relative perspective, leveraging the construction of complex geometries generated via time-based digital techniques. The design image of complex geometries can be associated with a tendency and desire toward a design of more sculptural forms, which critiques modern discussions on the prioritization of programmatic utilization of architecture. The distinction between utilitarian functionality and aesthetic pleasure has been constructed in numerous "renowned buildings" distinguished by their sculptural forms in contemporary architectural culture (Vidler, 1994). In this cultural context, functionality is frequently characterized by the fulfillment of intricate geometries engineered for structural integrity and visual coherence within the architectural form. (Figure 9)

Figure 9. Parthenon, 447–432 BCE; Villa Savoye, Le Corbusier, 1931; Heydar Aliyev Center, Zaha Hadid Architects, 2012. Images sourced from ArchDaily.

CONCLUSION

Architecture, as a cultural practice beyond the production of merely a material artifact or useful void, operates within a system of meanings that extends beyond its physical manifestations. Semiotics provides a critical framework for deciphering these meanings by examining how architectural elements function as signs within their spatial and temporal contexts. The association of foundational terms of architecture —form and function—with semiotic analysis allows for a deeper understanding of how design communicates cultural values. In this context, form can be conceptualized as the design image, representing the visual and perceptual characteristics of architecture, while function embodies the design meaning, signifying not only the performative and experiential aspects of spatial configurations but also the culturally coded values through which architecture acquires ideological, religious, and environmental significance. This semiotic perspective not only refines architectural interpretation but also situates architectural discourse within a broader cultural and intellectual matrix.

This article presents a research methodology for analyzing architecture as both a product and a determinant of cultural transformations over historical processes. Integrating architectural analysis with semiotic inquiry develops an analytical framework to interpret the design theory and practice of a given period, emphasizing the reciprocal relationship between built environments and cultural paradigms. This seeks to illuminate architectural culture through the interrelation of form and function, employing a semiotic analysis method it introduces. By coding the formal and functional patterns of architectural designs, this method enables the interpretation of cultural signifiers within their specific contexts. Examining the relationship between design image and design meaning enriches both the intellectual and professional production of architecture, uncovering cultural divergences and convergences embedded in the built environment.

By positioning architecture within a semiotic framework, this article underscores the necessity of interpreting built environments not only as physical constructs but also as cultural texts embedded with meaning. As the historical reading of architecture inherently involves cultural interpretation shaped by the imaginative and semantic framework of its context, a semiotic approach provides a structured method for deciphering these embedded meanings. This analysis contributes to a more objective understanding of architectural culture while fostering a coherent theoretical foundation for its development. By bridging the disciplines of architecture and semiotics, the article advances a critical discourse that enhances both the analytical and creative dimensions of architectural theory and practice.

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Author Contribution Statement | Yazar Katkı Beyanı

AUTHOR: (a) Idea, (b) Methodology, (c) Literature Review, (d) Supervision, (e) Material, Resource Supply (f) Data Collection, Processing (g) Analyses, Interpretation (h) Writing Text (i) Critical Review

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[i] "You say to a brick, 'What do you want, brick?' And brick says to you, 'I like an arch.' And you , say to brick, 'Look, I want one, too, but arches are expensive and I can use a concrete lintel.' And then you say: 'What do you think of that, brick?' Brick says: 'I like an arch."