Understanding Architectural Form: A Conceptual Framework

Dr. Saleem M. Dahabreh
Department of Architecture, Faculty of Engineering and Technology, University of Jordan, Amman 11942, Jordan

Abstract

This paper addresses the issue of architectural form. Exploratory in nature, this paper will provide an understanding of architectural form through qualitatively discerning the multiplicity of its understandings. Using a grounded theory method, the paper recasts the Vitruvian triad of structural, sculptural, and geometric forms into spatial form, intellectual form, and structural form respectively. The paper concluded that this basic understanding can offer a more robust understanding of architectural form, which establishes a foundation for a more effective and rational architectural design practice. This foundation can be used in structuring the analysis of existing works of architecture and synthesis of architectural form. Further, the value of this understanding extends towards architectural pedagogy in teaching design studio.

Keywords: Conceptual Framework, Architectural form, Conceptual form
Introduction

Architectural buildings are multifaceted artifacts that can be ‘described’ in different ways; they can be described according to the context in which they operate, according to their features and properties as designed artifacts, and/or according to the function they have to perform (Dahabreh, 2006). To be able to reason about any artifact rests on the ability to abstractly categorize that artifact and provide a minimal description of its structural or salient aspects and present it as a system (Ulrich, 1988). According to Tzonis (1992), the basic starting point to develop such a system is the artifact's morphology, its characteristic attributes, its spatial composition and its material structure i.e. its form. Generally speaking, form is an inclusive term that has several meanings; commonly, it issued to refer to the shape of the external appearance of a something that can be recognized. In the fields of art and design, form is generally used to “denote the formal structure of a work—the manner of arranging and coordinating the elements and parts of a composition so as to produce a coherent image.” (Ching, 2019: 34). Form in this case refers to the sum of the artifact’s physical properties, the materials out of which its components are made, their geometric shapes and the spatial relations that exist between the components (Flemming et. al., 1992). To explore form in architecture is the focus of this paper.

The concept of ‘form’ along with ‘space’ and ‘design’ are triadic terms in which architecture exists; form is central to architecture because of “its works in physically shaping the material objects and spaces that surrounds us” (Forty, 2000:149). Many theorists attempted to formulate an understanding of architecture and architectural form through the determination of its constituents and ruling principles. It was Vitruvius, in his treatise De Architectura in the first century B.C who identified the three basic aspects of architecture as firmitas, utilitas and venustas, later translated by Sir Henry Wotton (1624, 2013), in the seventeenth century, as ‘firmness’, ‘commodity’ and ‘delight’. Since then, subsequent researchers such as Alberti, Palladio, Frankl, and Le Corbusier among others have always contemplated the concept of form and proposed different frameworks by which buildings may be described, their qualities discussed, and their aesthetic meanings understood in architecture (Weber, 1995). The study of architectural form has shifted focus between either the corporeality of architectural artifact, its spatiality, or its internal logic. For instance, (Hendrix, 2013) identified form as the visual shape or appearance of architecture and supported his definition by e.g. Peter Eisenman’s The Formal Basis of Modern Architecture (1963), Rudolf Arnheim’s The Dynamics of Architectural Form (1977) among others. Other researcher such as Henry Lefebvre in his book
The Production of Space (1991) and Bill Hillier’s Space is the Machine (1996) focused more on the spatiality of architectural form. Thus, as a theoretical phenomenon, architectural form is multifaceted, characterized by complexity, and can be linked to multiple bodies of knowledge belonging to diverse disciplines.

Through qualitative literature review, this paper attempts to distill concepts, relate the different interpretations of architectural form, and structure them as a conceptual construct. It will build upon the Vitruvian triad of architectural form to clarify basic concepts involved in any work of architecture, and integrates them in an orderly manner. By no means is this paper intended to be a fully detailed account of what architectural form is; rather, the paper lays out the key concepts and constructs that identify architectural form. These are considered to be the building blocks through which one can schematically reason about architectural form, structure and frame academic debate about architecture in terms of basic taxonomy of concepts, relationship between concepts and propositions.

**Architectural form**

Engaging architectural form without shedding some light on the origins of the term, would render our discussion incomplete. Originally, the Latin word *forma*, from which the English form derives, replaced two Greek terms: *eidos*, which was used to refer to conceptual forms, and *morphē*, mostly used to refer to the sensible ones (Tatarkiewicz, 1974). Both meanings were inherited by the Latin *forma*, and this dual meaning has persisted up to the present time. Thus, the definition of Form in the dictionary as *shape and arrangement of parts*, corresponds respectively to the sensible and conceptual meanings of form (Agudin, 1995).

The Greek word *eidos* (*eide* or *ideai*, in Greek ‘to see’), from which the English word idea ultimately derives, acquired its abstract meaning in the theory of Ideas or Forms of Plato. Understanding the theory of Form goes back to the classical distinction between Form i.e. abstract and intellectual, and matter i.e. physical and sensible. Plato in his theory of Form proposed that Form is something cannot be described as a physical object that we encounter in our sensory experience but *universal essence* (Allen, 2012). It’s described beyond the concrete objects as perfect *ideas* in the realm of the intelligible i.e. *transcendental* realm and can only be investigated by means of the intellect using logic.
Accordingly, the Form of a thing is ideal and more important than its physical substance, its ‘aspatial’ i.e. transcendent to space that hasn’t spatial dimensions (Allen, 2012). Similar to Plato, Aristotle also believes in the distinction between Form and matter, however, he criticizes Plato for ignoring the relation between them. For Aristotle, Form exists inside of objects themselves i.e. inherent or intrinsic quality which lies in existence rather than essence.

Thus, the aim is not to produce the perfect or the ideal as Plato that completely separate from matter, but rather it’s the creation process of selection, translation, and transformation from potential being to actual being (Ainsworth, 2016). In his Metaphysics, Aristotle asserts that form is what binds matter into one object. Thus, the matter and Form are inseparable, where the matter has the potential of becoming something and form is the actualization of this potential with certain qualities (Pasnau, 2010). Thus, all physical objects are considered a combination of form as well as matter. The aforementioned perspectives towards form (Aristotelian and Platonic) form the basis for interpreting Form.

Any discussion about architecture can always be traced back to Vitruvius and his treatise De Architectura written in the first century B.C. Vitruvius identified the three basic aspects of architecture as firmitas, utilitas and venustas. Vitruvius not only discussed his triad, but also dealt with the classification of architectural forms in Book II, chapter 1 entitled ‘Origin of the Dwelling House’, of the De Architectura. His conception of the source of form developed from his account of how primitive men created the first shelters; either via using what was given in nature e.g. cave, or through an imitation of nature’s procedures. The first men improved first experiments by observing the shelters of others and adding new details to their own inceptions, and by modifying constructional forms and details (Gelenter, 1995). In this regard, Vitruvius’ account of the origins of architecture seems to be in line with some previous Creek theories of mimesis (Madarazo, 1995). The original source of form, then, was found first in experiments with building materials, then in adaptation and refinement as climate and use tested and the shelters, and also in imitation of successful shelters elsewhere. The source of form is thoroughly embedded in the physical world itself and owes nothing to an extra-sensory divine overseer. (Gelenter, 1995:62)

For Madrazo (1995), in his discussion of Vitruvius’s theory of the origins of architecture in the chapter, three categories of form can be identified: first, by contending that the wood house
provided the model for the stone temple, Vitruvius suggested that architectural form is, in its inception, structural form. Second, when Vitruvius drew a comparison between architectural forms and natural forms, he acknowledged the sculptural nature of architectural form. This sculptural or ornamental form has the capability to evoke different images of the natural world and reconnects with the spiritual world of man. Further, Vitruvius distinguished between ratiocinatio which is the intellectual apprehension of architecture and fabrica, the craft of architecture (Hendrix, 2012). Hendrix further noted that Vitruvius identified the six principles of architecture, namely, ordinatio, dispositio, eurythmia, symmetria, decor, and distributio to refer to how to geometrically organize the building both conceptually and on site. As such, Vitruvius identified a third kind of form whose nature is geometric, in the conceptual sense (Madrazo, 1995) (fig 1).

![Figure 1Vitruvian forms as identified by Madrazo, (1995)](image)

Weber (1995) argued that the experience of architecture encompasses both the physical objects and the relationships between them that segregate, bound, and articulate space. Thus, any discussion about architecture would include space and physical form; architecture “displays space” which means “it experienced both as the corporeality of physical objects and the shape of the void these objects create.” (Weber 1995: 131). Zevi (1957) argued that internal space constitutes the essence of architecture; following an analysis of historical buildings from ancient Greek temples to Modern Architecture, he asserted that the "history of architecture is primarily the history of spatial conceptions. Judgement of architecture is fundamentally judgement of the internal space of buildings" (Zevi, 1957: 32). The main purpose of space inside a building is to house human activities, which respond to the needs and values of different individuals, groups, and institutions (Hill, 1999). By designating a projected building to house a certain institution, the building is given a label e.g. hospital, which defines it as a functional type (Markus, 1993). According to Markus (1987) for any building to function effectively i.e. accommodate the function/s required by an institution occupying space, the building has to organize people, objects, and activities into meaningful relationships in space. Thus, the spatial division of the space inside a building is not ad-hoc; there are explicit rules about how people, objects and activities are disposed in space so that the spatial embodiment of these dispositions represents...
the particular practices or knowledge in a certain field (Hillier, 2007). Since space has geometric properties in terms of length, width, height...etc. as well as being experienced through the corporeality of physical objects that define it, spatial organization inside any work of architecture can be labeled as spatial form.

The material constructions are physical structures that define space and signify how to construct the physicality of the building. These structures play a dual role both as provider of necessary stiffness and strength i.e. technical artifacts, and as instruments for creating architectural spaces that embody certain qualities (Sandaker, 2010). As technical artifacts, they are concerned with the ability of the building to preserve its physical integrity through supplying the strength and rigidity necessary to resist different types of loads required to prevent a building from collapsing (Macdonald, 2001). The engineering design is concerned with various structural systems and its material, and construction technology as well as issues of structural performance, efficiency, and expressiveness. This structural part of the corporeality of building is its structural form.

As for the physical constructions that do not have a mechanical/technical function i.e. structural role, they are architectural forms that constitute the spatial envelope that encloses, structures, and subdivides space in order to create a protected environment. This sensible construction has visual qualities such as used materials, color and surface texture, and with aspects of construction and detailing including moldings, grooves, and change in materials etc... that characterize space. In the Aesthetics of Architecture, Scruton (1980) focused on the significance of visual details to the appraisal of any architectural work; Scruton argued that spatial effect is often produced through significant architectural details e.g. the expression of ornaments, moldings, textures, materials, and light and shade. He cited a number of spatial effects to demonstrate that architectural details with "perceptible quality of workmanship", more often than not, dominate the observer's attention and possess "emotional powers." The visual treatments that characterize space become a work of architecture’s perceptual form.

It is this form that is most closely to Vitruvius’s ‘Delight’ because of the effect it has on the aesthetic sensibilities of the building for those who come into contact with it. It also affects the symbolic meanings of the chosen forms, and the elegance with which the various practical and programmatic problems posed by the building have been solved (Macdonald, 2001). As such, perceptual form characterize space, thus adding cultural significance and aesthetic appeal. In other words, through their material construction, buildings organize and structure space and transmit social meaning through their physical form.
This conforms with Hiller’s (2007: 24) comment in The Space is the Machine where he stated that:

“A building then becomes socially significant...in two ways: first, by elaborating spaces into socially workable patterns to generate and constrain some socially sanctioned—and therefore normative—pattern of encounter and avoidance; and second, by elaborating physical forms and surfaces into patterns through which culturally and aesthetically sanctioned identities are expressed”

Nonetheless, the form of an architectural work cannot merely be construed as an arbitrary choice constrained only by functional requirements, natural laws, and technical requirements; if the aim of design is the production of form which is intelligible in its own right over and above the accommodation of specific instrumental functions, as is typically the case in architecture, designer’s systematic intent and intentionality become a major issue in form generation (Peponis et. Al. 2002). Furthermore, material constructions have formal attributes that are not material in nature but are cognitive, conceptual, and affective (Peponis, 2005). These attributes include design elements, architectural vocabulary, design principles, etc... which are axiomatic to the design but not dedicated by its pragmatic functionality, mechanicality, or technical construction. In that sense, the material construction has an abstract and architectonic aspect, usually expressed geometrically, that signifies how to logically and formally structure the materiality of the building (Unwin, 2003). This formal structure is similar to Susan Langer’s logical form; for her, anything can have a form if it follows a pattern of any sort, exhibits order, and internal connection (Langer, 1953). To distinguish the abstract principles of form that belong to the intellect from shape or physical form that belongs to the sensible, Langer coined the term ‘logical form’. Langer’s definition of logical form corresponds to Aristotle’s ‘substantial’ form meaning that which structures and governs the changes of matter in order to make a thing what it is.

As mentioned earlier, Vitruvius identified a geometric form that orders and regulates any work of architecture. But it was Alberti who explicitly made the distinction between the abstract and the material in architecture the 15th century in his Ten Books on Architecture; Alberti distinguished between geometry and material construction of the building; (Alberti et al., 1988:77) proposed that a building is "a form of body, which like any other consists of lineaments and matter." Alberti (1988:8) defined lineaments as the "precise and correct outline, conceived in the mind, made up of lines and angles." The function of geometry, lineaments in Alberti’s terms, is to “prescribe, and appropriate place, exact numbers, a proper scale, and a graceful order for whole buildings and each of the constituent parts".
In that sense, underlying the corporeality of any work of architecture, there is a conceptual system/s that structure these architectonic elements according to design rules and principles and organize the material construction, generate its formal properties of the building. This can be identified as a conceptual form.

Consequently, the form of the material construction can be read as: a structural form of utilitarian nature that supports the building and structures space, an architectural/perceptual form related to the articulation of surfaces and pertaining to sensory perception and experience, and a conceptual/logical form that orders the elements and regulates the material form (fig. 2). The former three types of form related to the material structure correspond to Vitruvius’s structural, sculptural, and geometric respectively as identified by Madrazo (1995).

Hendrix (2013) made a distinction between the functions of form in architecture; a ‘communicative’ function in terms of expression and representation fulfilled by perceptual and conceptual forms, and an ‘instrumental’ function in terms of utility and technology as performed by spatial and structural forms respectively. The instrumental has to do with the practical, the material, and the expression of structure and technology and the communicative has to do with the express a metaphysical or transcendent idea which extends beyond its material presence. That being said, the relation between intentionality, the intellect spatial form, structural form, and intellectual form becomes intriguing. Intentionality implies logic and choice. Instrumentality implies necessity and contingency. If architectural design is about the harnessing of physical laws (necessity) towards the satisfaction of human needs (contingency), then forms abovementioned
are about instrumentality, but if a design decision, is linked not merely to the actual form but, more fundamentally, to the logic that is applied to the generation of the form, then form rises to the realm of the intellect.

For instance, Similarly, Frascari (1983) while discussing structure and construction, pointed out that the significance of architecture came from the development of the structure; he was opposed to controlling details with technique and asserted that detail design is a way of innovative thinking and an exercise in the power of conscious judgment. The intellect as such is an exploration of possibilities within geometric, physical and functional constraints, that ultimately manifests itself as an intrinsic attribute of the artifact’s form. Accordingly, the constituent forms of architecture can be regrouped into three: spatial form related to utility, intellectual form combining conceptual and perceptual form and related to the agency of the ‘intellect’, and a structural form related to technology and construction (fig 3).

![Figure 3 form categorization](image)

To summarize, Spatial form is the pattern of spaces housing the activities of the intended design, structural form signifies the structural stability and constructability of the work of architecture. The intellectual form has two aspects: a corporal aspect with visual qualities such as used materials, colors and surface textures that characterize space. This is the perceptual form that articulates surfaces and pertains to sensory perception and experience of the building. The other aspect is conceptual in nature; it signifies ‘how to logically and formally’ structure the materiality of the work.
Afterthought

This paper explored the various understandings of architectural form. Spatial form, intellectual form consisting of conceptual and the perceptual, and structural form. These forms bridge across theoretical, functional, and technical domains to be synthesized as one. The identification of several definitions of form tackles what to design, how to design it, and how to construct it, and include how to conceptually think about it. Further a question arises whether the various approaches to form exist in parallel, so that a designer has to synthesize them on a project by project basis, thus, any design project can be seen as a concretion of multiple interlocking definitions of form, or whether there are links between them.

This paper is inclined to think that the various definitions of form exist in parallel and that projects are syntheses of form in the sense of concretion. In that sense, the final form simultaneously satisfies criteria embedded in the different definitions of form. Although they are presented categorically, spatial form along with structural perceptual form, and conceptual form are interrelated and cannot be separated; each affects and conditions the other and all exist simultaneously in every work of architecture. Following Bafna’s (2012) argument this categorization is not intended to capture two or more kinds of organization, but rather as one of recognizing the different aspects of building that become important depending upon the kind of question one asks. The different conceptualization of form can be looked at from the point of view of the Vitruvian triad; structural stability, aesthetic pleasure, and comfort or convenience. As such, across different periods, form emphasis has shifted from spatial to conceptual, to constructional form depending on the spirit of the age and the theoretical stance/s dominant at a certain age.

The clarification of different concepts, depicts the underlying status quo of an architectural form. By explicating the status quo, a platform is offered for future explorations, reflections, and investigation. Such an understanding can also have a pedagogical impact as a framework that can be used in architectural analysis and criticism or it can be used as a-priori framework supporting architects in the conceptual stages design.
Acknowledgments

This research has been made possible by a research grant from the University of Jordan

References

25. Langer, Susanne (1967, 1st 1937), An Introduction to Symbolic Logic. (3rd ed), New York,