

Muqarnas, Fold, and the Parametric Transition from Body to Soul

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ABSTRACT: More than eight hundred years ago, before the invention of digital tools, Muslim builders had achieved the creative vision and aesthetic complexity required for the production of Muqarnas: an architectural device that connects surface ornament to divine concepts. This research adopts a qualitative, comparative, and critical use of architectural source material to construct an alternative understanding of Muqarnas within a documented history of architectural allegories and theories. The paper follows the argument that in the absence of figurative depiction in Islamic art, geometry assumes greater symbolic power, which manifests itself in ornament, structure, and space. In this system, Muqarnas uses complex geometry to connect wall surfaces to spacious volumes. In the metamorphosis of two-dimensional planes to three-dimensional space, Muqarnas occupies the in-between space that connects the two worlds in a smooth and parametric process of transition. Thus, Muqarnas operates similarly to the folds of Baroque architecture and expresses, in a mannerist, yet geometric manner, the connection between the two realms of body and soul. However, unlike the Deleuzian model of Baroque sacristy, light does not enter from below; from the realm of the body and the senses, but rather it shines from above; from the realm of the soul and divine concepts. From this point of view, Muqarnas becomes a significant phenomenon in architecture being a symbolic, ornamental, and parametric architectural device that simultaneously alludes to the allegories of the Platonic tradition, the Deleuzian concept of fold/unfold, and to recent theories of Parametricism.

Keywords: *Muqarnas, Ornament, Deleuze, Fold, Parametric Transition.*

INTRODUCTION

Since the early twentieth century, the question of ornament has become the central theme of many celebrated architectural manifestos. From Gottfried Semper's "Principle of Dressing"¹ to Adolf Loos's "Ornament and Crime,"² followed by Le Corbusier's "Towards a New Architecture"³ and Robert Venturi and Dennis Scott Brown's "Learning from Las Vegas"⁴, the question of how to decorate buildings has determined the theories and style of architecture. Although Loos, Le Corbusier, and other pioneers of the Modern movement, strove to remove ornament from modern architecture, it has since been revealed that the white coat of paint that they put in place of traditional ornament, was itself ornamental, albeit a more disciplined, restrained and universal one at that.⁵

As the industrial era of the twentieth-century gradually transformed into the digital era of the twenty-first century,

so did ideas about ornamentation and the technologies that supported it. If in the early days of Modernism, the question was how to clothe buildings or how to reveal the architectural body through concepts of transparency and form, by the time Postmodernism and later Parametricism⁶ arrived, the main concern was how to articulate sophisticated ornament that not only responded to the advanced technologies of the time but also addressed the local and universal symbols that people had become accustomed to through global communication. (Fig. 1) In this context, the thin layers of ornament that previously were merely applied onto a building became thicker and harder shells that shared space-making and structural responsibilities too. The computer helped in producing geometric variety through parametric repetition leading to the emergence of architectural forms that were ornamental, structural, and space-making at the same time. These parametric designs seemed to

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Fig. 1: Islamic, Modern, Postmodern and Parametric architecture. Source: Left to Right: the authors; (Villepoissy, 2021; UPenn, 2010; Kaltenbach, 2011)

occupy a space between the two categories of ornament and structure, which in the previous decades had been used in an oppositional way against each other.

This paper argues that in this context, it is important to highlight Muqarnas in Islamic architecture as a very early precedent for such a fusion between categories through the use of complex geometry. It proposes that Muqarnas is a significant architectural allegory and a complex architectural device that expresses a parametric transition between different realms.

MATERIALS AND METHODS

This research utilizes key texts within architectural theory and philosophy to synthesize new concepts and models of thought. By comparing and re-appropriating ideas from philosophers and architects, the paper constructs an alternative understanding of Muqarnas and places this Islamic architectural device within a

documented history of architectural allegories and theories. In this sense, this research is qualitative, comparative, and critical in its use of textual and architectural source material.

The hypothesis is that Muqarnas is similar to the concept of the fold (in Baroque architecture) and expresses (in a mannerist manner) the connection between the two realms of body and soul. The paper argues that Muqarnas is a geometric bridge or a stepped transition device between the realms of the visible and the intelligible. Thus, Muqarnas is in line with the allegories of the Platonic tradition.

Definitions of Muqarnas

Muqarnas is a complex phenomenon. Achieving its geometric composition in three dimensions is an art form only mastered by the best builders of Islamic countries, especially Iran (Fig.2). The elaborate intersecting lines produced on paper creates a

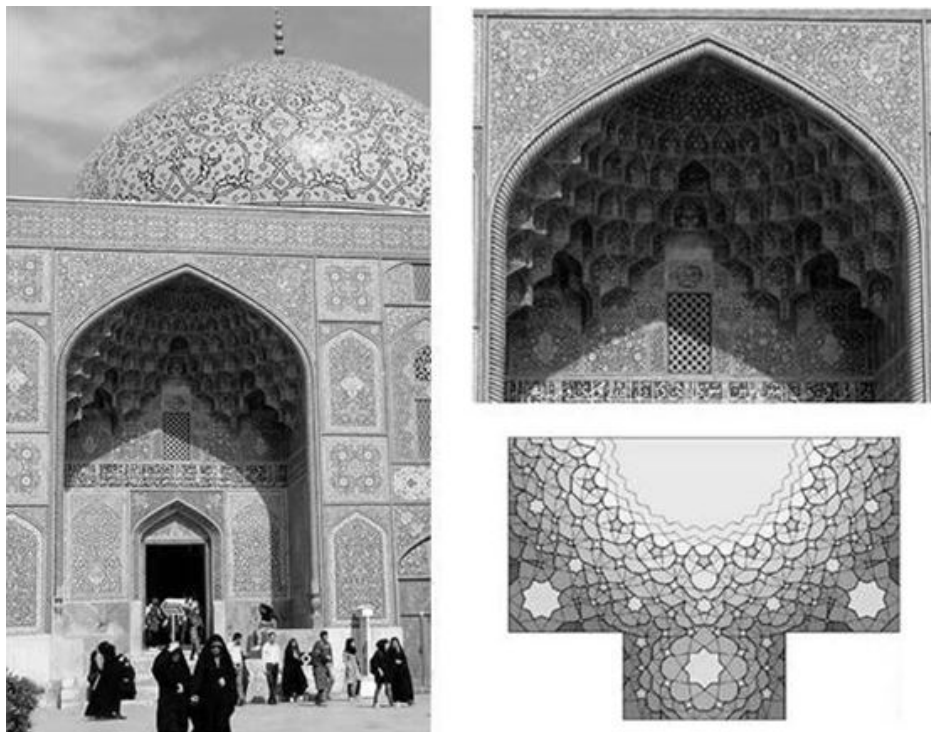


Fig. 2: One of the best examples of Muqarnas in architecture: the entrance gate of Sheikh Lotfollah Mosque, Isfahan, Iran, designed by Sheikh Bahai in the 17th Century. Source: the authors, Bottom Right: (Hoeven & Veen, 2011, 3).

highly intricate ornament that expresses profound complexity and divine harmony.

The oldest definition of Muqarnas belongs to the Persian mathematician, Ghiyāth al-Dīn Jamshīd Mas'ūd al-Kāshī (or al-Kāshānī)⁷ who in his book entitled “Maftāh al-Hesāb”⁸ devotes several pages to the calculation and measurement of Muqarnas.⁹ Kashani defines Muqarnas as: “a ceiling comprised of polygons”¹⁰ and a graduated covering with different angles and sides where the word unit, module, or component take their full meaning. (Memarian, 2012, 631; citing Al-Kāshī, 1987, 38) He considers different Muqarnas as variations of the same basic concept and goes on to categorize this variety into four groups: simple, arched, elongated, and Shirazi Muqarnas¹¹ (Ibid, 632). In the next step, Kashani begins to measure different Muqarnas and describes their unique characteristics (Fig. 3).

Throughout the years, others have also attempted to define Muqarnas. For example, Mohammad Karim Pirnia¹² and Hossein Zomarsheidi¹³ have offered different interpretations: from “hanging ceilings created from simple geometric forms” (Pirnia, 2008, 583) to an “ornament that is applied to the top of walls, especially arches and corners of arches” (Zomarsheidi, 1995, 87).

In the Dehkhoda Persian dictionary, not only different definitions have been offered, but also the root of the word has been elaborated. Dehkhoda defines Muqarnas as a form of “bas-relief plasterwork hanging from the ceiling”, or “Asemaneh” (which is derived from Aseman, meaning sky in Farsi). In other Persian dictionaries (Masaheb, Sokhan, or Moein) similar definitions have been proposed. In Masaheb for example, Muqarnas is defined as a “form of extruded decoration ... placed in the top area of walls and used for concealing the angles between one surface and another.” It explains further that the word Muqarnas has its roots “in the Greek word koronis” which means crest or curved, implying deflection. This relationship with the Greek word koronis, which in English is “cornice”, is also mentioned by Herzfeld and Diez. (Herzfeld, 1942, 1; Diez, 1987; citing NecipOglu,

1995)

The roots of the word can also be traced to Arabic. Words with the roots (Q, R, N, S) refer to activities such as falconry (Qernas), stepped swords (Moqarnas), and projected cliff faces (Qernas or Qarnas) (NecipOglu, 1995). Perhaps all these words have a shared concept, which is some form of stepped ornamentation, which is what architectural Muqarnas seem to be about.

The historical and geographical origin of Muqarnas is also hard to define. Someplace the first examples in North East of Iran around the 10th century, others place it in North Africa around 11th century, while others believe the Muqarnas first appeared in Baghdad in the 11th century (Tabbaa, 1985; Behrens-Abouseif, 1993; Grabar, 1979, 178, citing NecipOglu, 1995).

The precise role of the Muqarnas has also been up for debate. In other words, it was not always clear whether the Muqarnas is a merely decorative device or whether it had other structural or symbolic responsibilities too. Thus, there has always been a certain ambiguity about whether Muqarnas is purely decorative or not and there are many examples in which Muqarnas is a combination of both. (Edwards & Edwards, 1999, 68). This is perhaps why there are different definitions for this architectural device.

Andre Godard¹⁴ does not consider the Muqarnas as anything more than decoration and points out that some Muqarnas is not even connected to the structure or have any motifs of the building to which they are applied. He goes on to point out that some Muqarnas is even attached well after the original building (for example, the Muqarnas in Khan Medresa, Shiraz, or the main Ivan of the Qazvin Mosque) (Godard, 1990, 154). NecipOglu¹⁵ however, argues that although most Muqarnases are decorative devices, some can be structural too, like the ones under the main dome of the Soltan Barghogh Medresa (NecipOglu, 1995).

Regardless of these different interpretations, it seems that Muqarnas is in most cases, ingenious devices to conceal the

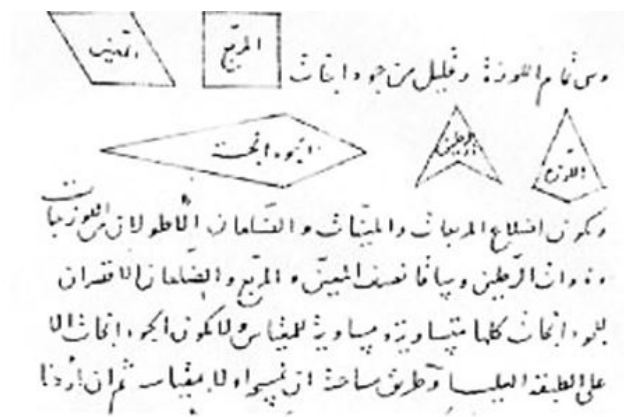


Fig. 3: Al-Kāshani's sketch of the different components of Muqarnas. Source: (Hoeven & Veen, 2011, 9)

heaviness of the structure since in Iran (and perhaps in other Islamic countries too) artists and architects have always avoided the heaviness of structure in favor of the intricacy of expression. (Godard, 1990, 95) This desire for intricate expression has resulted in various architectural devices that, in Semper's words, allowed the true masters of art in every field to mask the way the mask was constructed.¹⁶ (Semper, 1989a, 257).

Muqarnas As Parametric Transition

From a geometrical point of view, Muqarnas can be described as a transition tool, a blending device, or a smoothing mechanism, which connects wall surfaces to ceiling volumes through a series of smaller geometrical steps. In this way, two-dimensional geometry transforms into three-dimensional geometry through an evolutionary, parametric, and procedural process.

Muqarnas occupies the space between the layered realm of wall surfaces and the voluminous realm of ceiling domes. In the metamorphosis of a geometric pattern from the two-dimensional plane to three-dimensional space, Muqarnas seems to be centered on a two-and-a-half-dimensional space that connects the two worlds in a smooth and parametric process of transition. In this process, the two-dimensional and three-dimensional worlds are not conceived as two different realms but different manifestations of the same geometric concept (Fig

4). From this perspective, it is possible to define Muqarnas as an architectural expression of the heavenly ladder, the stepped transitional device that allows movement from one realm to the other:

“Starting from individual beauties, the quest for the universal beauty must find him ever mounting the heavenly ladder, stepping from rung to rung...that is, from one to two, and from two to every lovely body, from bodily beauty to the beauty of institutions, from institutions to learning, and from learning in general to the special lore that pertains to nothing but the beautiful itself...until at last, he comes to know what beauty is” (Plato, 1925, 210).

In the absence of figurative depiction in Islamic art, geometry assumes greater symbolic power, which manifests itself in ornament, structure, and space. In this model of thought, Muqarnas uses complex geometry to connect the square to the circle – the square being the symbol of earthly nature and the circle being the symbol of heavenly sky¹⁷. In other words, Muqarnas connects the physical realm of senses to the spiritual realm of ideas. The physical realm has four sides (four directions, four elements, four seasons), while the spiritual realm has infinite sides and dimensions. One emphasizes four (or eight) directions, while the other is focused on the center, which is the source of its creation. In this symbolic language, Muqarnas occupies a significant position and thus becomes more complex than a mere decorative device (Fig. 5).

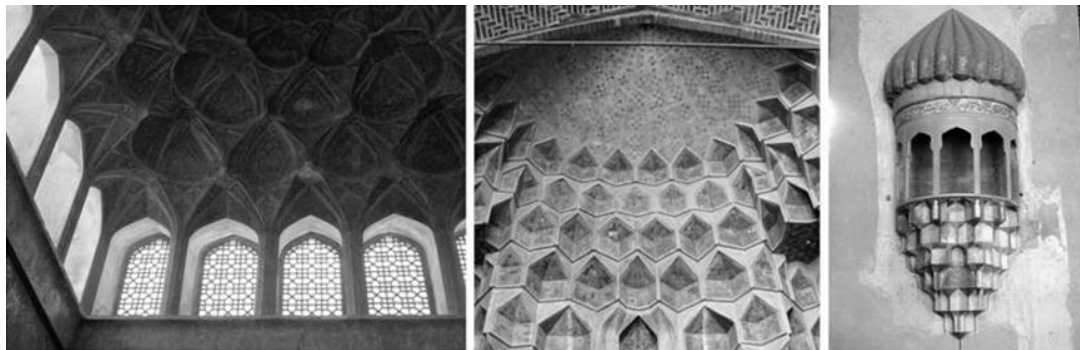


Fig. 4: Muqarnas is a geometric device of transition that connects the geometries of the 2D realm to geometries of the 3D realms. Left: Ali Qapu ceiling, Isfahan. Middle and Right: Isfahan Central Mosque.

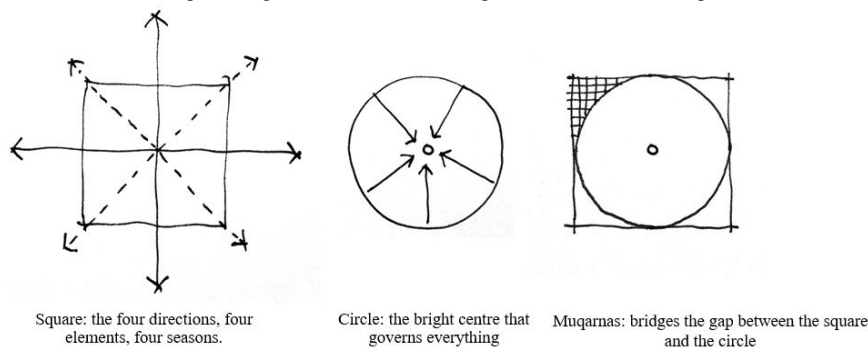


Fig. 5: The symbolic significance of square, circle, and Muqarnas. Muqarnas occupies the space between the earthly square and the heavenly circle.

If in most sacred architecture, two-dimensional paintings of human figures (or animals, plants, and other things) turn into bas-reliefs or three-dimensional statues, in Islamic sacred architecture, these figures are represented through symbolic geometry and pattern, which is inherently more compatible with the architectural language. This is because architecture cannot easily utilize the form of a human (for example), but it can use geometry to define ornament, structure, and space in a unified architectural language (Fig. 6). In Islamic architecture, geometrical patterns symbolize the process of divine creation and it is these patterns that undergo a process of evolution: from two-dimensional ornaments to three-dimensional architectural space. In other words, ornament and structure start with the same language and arrive at the same evolutionary stage, thus achieving a smoother continuity of concepts. This is not the case in other forms of architecture where ornament is figurative and realistic, while three-dimensional structure and space become abstract and even geometric (Fig. 7).

These ideas are echoed in the writings of the postmodern philosopher Gilles Deleuze, who in his book with Felix Guattari,¹⁸ highlights the difference between the “abstract line” of nomadic art and the “concrete line” of representational art

(Fig. 8). They argue that the abstract line involves “haptic vision” and “close-range vision” which is more complex and involved than the “optical vision” and “distant vision” of figurative or representational art. They argue that the abstract line has not yet been “downgraded” to concrete or a figurative line.¹⁹ Such a form of representation is more fundamental, seductive, and creative and artwork produced by such a mode of thought is not one of representation or reproduction but rather one of expression and re-production, which involves great complexity and creativity. From this point of view, the depiction of the organic body in Greek art marks the transformation of smooth space into striated space (Deleuze & Guattari, 1988, 498).

Muqarnas and the Fold

Muqarnas is an architectural expression of the heavenly ladder, the stepped transitional device that allows movement from one realm to the other. Muqarnas is also an example of the “fold/unfold” as described by Deleuze in explaining the essence of Baroque architecture and thought.

The concept of the fold,²⁰ which became quite influential in architectural circles in the late twentieth century, comes from



Fig. 6: Evolution of figurative ornament from 2D to 3D. From Left to Right: Kingsfelden, Mastrogiudici Chapel, Erechtheum. Source: (Erskine Clement, 2008); (Kren & Marx, 1996).

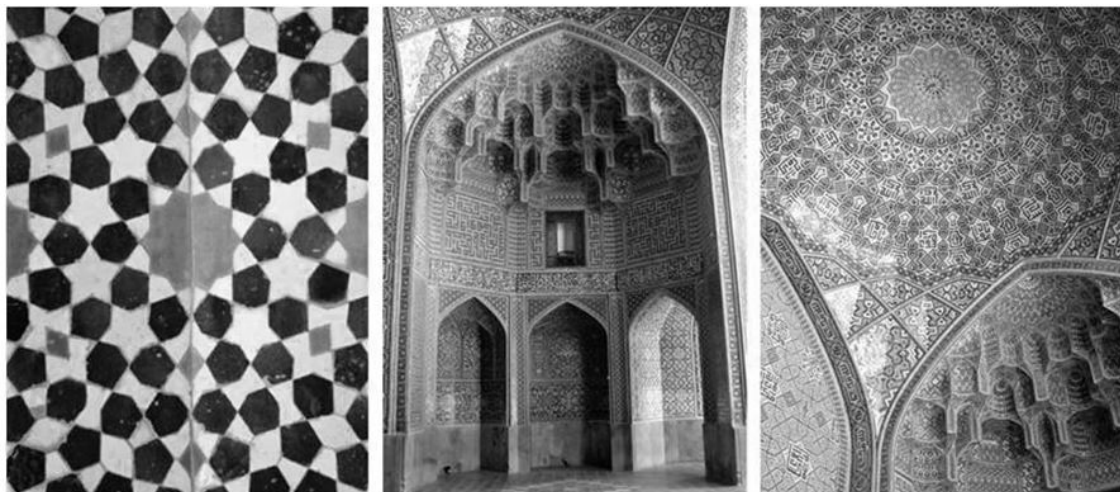


Fig. 7: In Islamic architecture, geometry shapes ornament and space, thus achieving a smooth continuity of concepts.

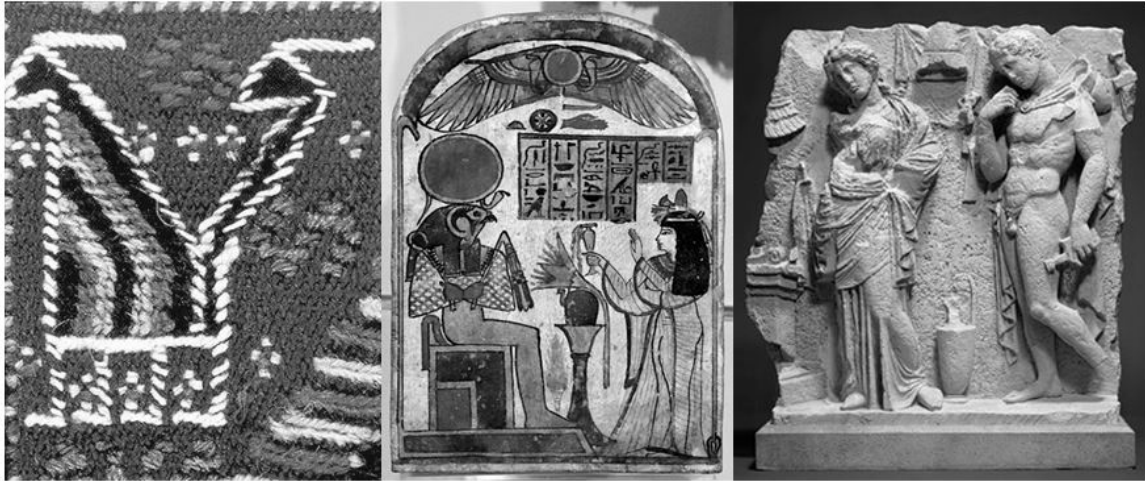


Fig. 8: From haptic expression to figurative representation. Source: Left to Right: (Shukir Muhammed, 2015; Met Museum, 2021).

the philosophical writings of Gilles Deleuze, who began to use topological²¹ and architectural metaphors to construct a model of thought for the relationship between “body” and “soul”, or the physical and the spiritual realms, which have preoccupied human discourses since the earliest philosophical writings in history, i.e. those of Plato.²² It is in his book entitled *The Fold, Leibniz and the Baroque*, that Deleuze uses Leibniz’s ideas to develop his new models of thought.

Leibniz’s Monadology describes a world consisting of Monads that are “the real atoms of nature” and “the elements of things.” (Leibniz, 1968, 3) Monads have perception²³ and those that possess feeling are defined as “souls.” For Leibniz, a “mind” is defined as a “soul” with the “knowledge of necessary and eternal truths”. This is the key to reason and the sciences “raising us to the knowledge of ourselves and of God.” (Leibniz, 1968, 29) The “body” of a Monad is something quite different. It belongs to “matter” and operates according to a different set of rules. The body exists in a plenum where all matter is connected so “every motion affects distant bodies in proportion to their distance”²⁴. All bodies are in a perpetual flux “like rivers” where parts enter and pass through each other continuously. Thus, the space of matter is thick and full and there is no void within it²⁵.

Leibniz proposes a complex relationship between the body and the soul: “bodies act as if (to suppose the impossible) there were no souls, and souls act as if there were nobodies, and both act as if each influenced the other.” (Leibniz 1968, 81) Thus, while distinguishing the soul from the body, Leibniz theorizes them as existing in a complex harmony and continuity with each other “since they are all representations of the same universe.” (Leibniz 1968, 78) It is for this “impossible” relationship that Deleuze proposes the “fold” as a concept that explains the connected difference that characterizes Leibniz’s metaphysical distinction between the monadic soul and body.

Deleuze takes Leibniz’s ideas and applies them to a Baroque

building. (Fig. 9). By doing this, he uses architecture to explore philosophy and simultaneously offers a way of exploring architecture through philosophy. To explain Leibniz’s ideas, Deleuze compares the Monad to a Baroque building, where the body of the Monad becomes an architectural façade, which he defines as “an outside without an inside.” (Deleuze, 1993, 28) This façade belongs to the material world and it deals with matter, the flowing plenum outside of the Monad. This façade “can have doors and windows – it is riddled with holes – although there may be no void, a hole being only the site of a more rarefied matter.” (Deleuze, 1993, 28) In this conception, openings are not a disruption of the façade (a rupture) but rather a different manifestation of the same surface. Thus, the monadic facade operates much like a Möbius strip: the opening “from the outside and onto the outside.” (Deleuze, 1993, 28)

The metaphor is expanded by assigning two floors to the Monadic building. (Deleuze, 1993, 28) The lower floor is assigned to the facade, which belongs to the exteriority of matter. It has four windows and a door, which represent the five senses, making the room “an infinite room for reception or receptivity.” (Deleuze, 1993, 28) The upper floor is assigned to the soul or the mind. It is pure inside without an outside. The upper floor is “blind and closed but on the other hand, resonating as if it were a musical salon translating the visible movements below into sounds up above.” (Deleuze, 1993, 4)

Deleuze’s sketch of the baroque house (Fig. 9) depicts the folds that connect the high with the low. The upper floor represents the metaphysical realm. It is dark and closed without windows or openings. The lower floor represents the physical realm. It has five openings representing the five senses and it is bright. In this Baroque sacristy that represents the Monad, the fold facilitates the connection between the two floors: the physical world as the bright lower floor and the metaphysical world represented by the dark upper floor. Leibniz’s impossible connection between these two worlds is made possible by the

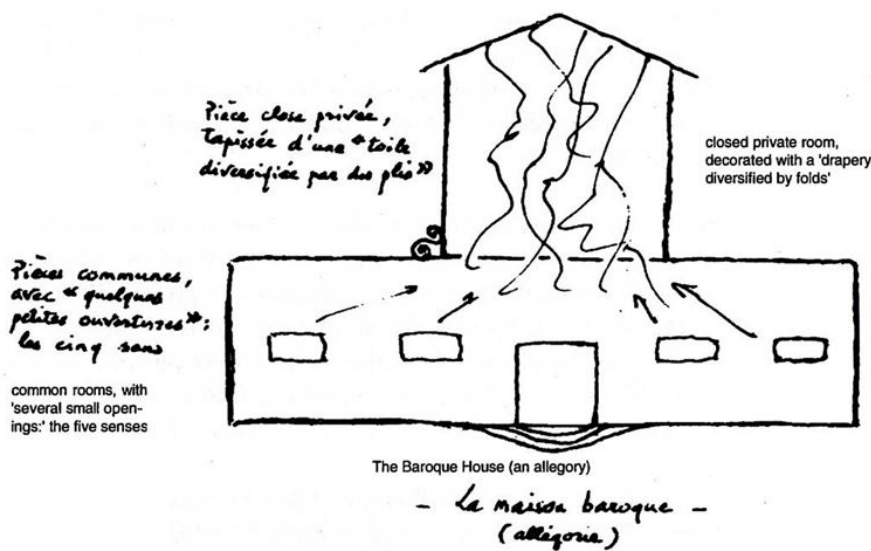


Fig. 9: Deleuze's sketch of the baroque sacristy depicting the folds that connect the dark metaphysical realm above to the light physical realm below. Source: (Deleuze, 1993, 28).

fold, not just as an architectural feature of Baroque form and ornamentation, but also as a philosophical concept and process.

RESULTS AND DISCUSSION

The fold not only connects oppositional categories but also explains their inherent connectedness. A fold of paper, for example, separates one side of the paper from the other, but the two sides are not two different pieces of paper; they are in fact, one continuous piece that is polarized by the operation of the fold. The fold is therefore a surface phenomenon that creates difference within the continuity of the same concept.

If the Platonic tradition introduced the ladder to connect the physical and the metaphysical realms, the fold can be considered the allegory of the Baroque. For Deleuze, Baroque architecture is triumphant because in it "The paradigm becomes 'mannerist,' and proceeds to a formal deduction of the fold." (Deleuze, 1993, 38) This mannerism is not depicting the metaphysical realm, but rather expressing it in physical forms. (Deleuze, 1993, 96) Thus, if the fold is the Baroque expression of a smooth connection, the "unfold" is any other expression of the same paradigm in other styles and cultures. In other words, "unfold" is not contrary to the "fold," but a different manifestation of the same principle.

It is at this junction that thinking about Muqarnas reveals its significance among architectural allegories that define the relationship between the two realms of body and soul. Muqarnas is the contribution of Islamic architecture to expressing the connected difference between the realms of soul and body; between the spiritual and the physical. Muqarnas is a stepped, parametric, and geometric device that smoothens the distinction between the worlds of the body and the soul as represented by the two-dimensional and three-dimensional

realms.

A sketch of an Iranian mosque below depicts the symbolic position of Muqarnas. (Fig. 10). The upper space represents the metaphysical realm and contains many openings that allow light in but no views to the outside. It contains both the geometric and spatial center of the mosque. Unlike Deleuze's baroque sacristy, it is the lower level (the physical realm), which is closed in on itself, without any windows. In this architectural model, light shines from above illuminating the world below. The two worlds are connected via Muqarnas, a stepped and parametric geometric device that bridges the gap between the two worlds.

Muqarnas is a complex bridge. Unlike the Platonic ladder and the Deleuzian fold, Muqarnas changes its dimensionality – it changes as it bridges the gap between the two realms. Though Muqarnas is stepped like the ladder, it is different because it not only facilitates change but also expresses it in every step. Muqarnas is also parametric without losing its original geometric order, meaning that the only change that happens is in the expression of the original geometry in different dimensions. Thus, Muqarnas connects the two-dimensional realm of the physical to the more-dimensional realm of the spiritual, where, in the symbolic order of Islamic art, the former is dark and the latter illuminated.

CONCLUSION

Muqarnas is a significant phenomenon in architecture. As an ornament, it is more significant than superficial decoration, creating a highly complex geometric composition, which connects the flatness of the two-dimensional ornament to the three-dimensionality of architectural space. As a symbolic architectural device, Muqarnas connects the diversity of forms

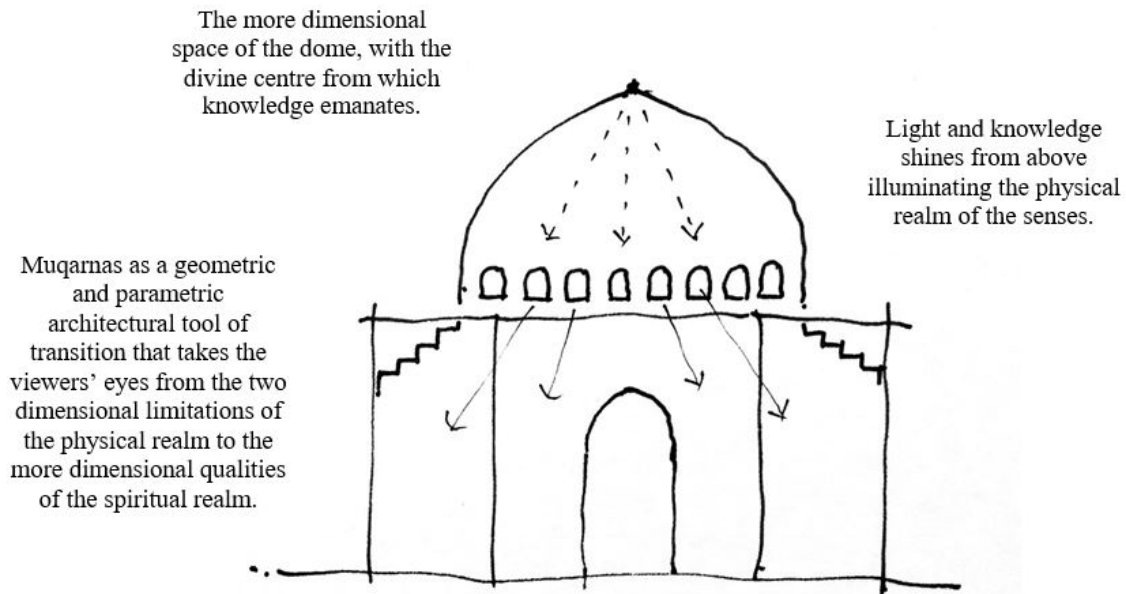


Fig. 10: A sketch of an Iranian mosque depicting the Muqarnas that connects the light metaphysical realm above to the dark physical realm below.

to the unity of the divine centre, which represents the eminent creator, who is n-dimensional. As geometric mannerism, Muqarnas is a parametric connection between the physical and the spiritual realms. It is a manifestation of the emanation of light and form from the bright centre that resides above the realm of the senses. It achieves this through parametric complexity: stepped graduation between different dimensions that expresses the continuity between two seemingly different worlds. In this sense, Muqarnas is a continuation of the Platonic idea of the heavenly ladder and another expression of the Deleuzian concept of fold/unfold.

In recent years, advances in digital tools have allowed architects to pursue new design processes. New surface-driven software is well suited to the spirit of the time in which there is a greater need for performance. The result is animate form, topological surfaces, and parametric transformations. Architects like Greg Lynn have infused topology and time into design, creating the scene for Parametric Architecture, as a new approach towards form making. These developments have allowed others like Patrik Schumacher to declare "Parametricism" as the great new style after modernism, which requires a certain degree of surface depth to create dynamic, high-performance ornaments. The increased complexity of post-Fordist society has necessitated new clothes, new shells, and new skins that are better and more eye-catching than before. Architects use digital tools to create new surfaces that go beyond two-dimensionality and into the realm of structural, spatial, and symbolic responsibility. As architecture pushes further into the depth of the surface, it is important to note that Muqarnas explored such

boundaries centuries before the invention of the computer and new digital design methodologies.

ENDNOTES

¹Semper drew on the similarities of the German word for the wall (Wand) and dress (Gewand) to arrive at his "Principle of Dressing" as the "true essence" of architecture. In a footnote, he writes: "The German word Wand [wall], paries, acknowledges its origin. The terms Wand and Gewand [dress] derive from a single root. They indicate the woven material that formed the wall." See Semper, G. (1989b). "The Four Elements of Architecture," in *The Four Elements of Architecture and Other Writings*, p. 104.

²See Loos, A. (2002). "Ornament and Crime (1908)," in *Crime and Ornament, the Arts and Popular Culture in the Shadow of Adolf Loos*, ed. Bernie Miller and Melony Ward, Los Angeles: XYZ Books, pp. 29-36.

³See Corbusier, L. (1987). *Towards a New Architecture*, trans. Frederick Etchells, London: Architectural Press.

⁴See Venturi, R., Brown, D. S., Scott, D., Izenour, S., Robert, I. V., & Steven, R. V. D. S. B. (1977). *Learning from Las Vegas: the forgotten symbolism of architectural form*. MIT press.

⁵See Wigley, M. (2001). *White walls, designer dresses: The fashioning of modern architecture*. MIT Press.

⁶See Schumacher, P. (2009). *Parametricism: A new global style for architecture and urban design*. *Architectural Design*, 79(4), 14-23.

⁷Ghiyāth al-Dīn Jamshīd Mas'ūd al-Kāshī (or al-Kāshānī) was a Persian mathematician and astronomer from the Timurid era. (Born 1380 in Kashan, Iran, died 1429).

⁸This book was published around 1421.

⁹See Maftāh al-Hesāb, article four, chapter nine.

¹⁰ Kashani writes: “A ceiling comprised of polygons whose sides intersect in the middle with the sides of other adjoining polygons in such a way that the angle of intersection is ninety degrees or half of that, and the addition of right-angled intersections with diagonal or other angles would produce two right-angled geometries.” (Memarian, 2012, 631, citing Kashani, 1987, 38)

¹¹ Evidently, three of these categories are based on the shape of the Muqarnas and the fourth is based on its popularity.

¹² Mohammad Karim Pirnia was a prominent architectural historian and architect. Pirnia’s efforts in documenting and categorizing traditional Iranian architecture are still being taught in many architecture schools in Iran. His book, the History of Iranian Architecture is considered a primary source for this subject matter. He was born in 1922 in Naean, Iran.

¹³ Hossein Zomarsheidi was a master builder and craftsman from Iran. He was born in 1939 in Mashad (Khorasan) Iran. He is currently a member of the Iranian Academy of Arts and an academic staff member of the Shahid Rajaei University. In 2002, he was recognized as Leading Figure in Traditional Art in Iran.

¹⁴ Andre Godard was a French historian, archaeologist, and architect. He was the director of the Iranian Archaeological Service, designed the National Museum of Iran, and was instrumental in the design of the University of Tehran main campus.

¹⁵ Gülru Necipoğlu has been Aga Khan Professor and Director of the Aga Khan Program for Islamic Architecture at Harvard University’s Department of History of Art and Architecture.

¹⁶ “The untainted feeling led primitive man to the denial of reality in all early artistic endeavors; the great, true masters of art in every field returned to it – only these men in times of high artistic development also masked the material of the mask.” (Semper, 1989a, 257)

¹⁷ In his book entitled “Sacred Art in East and West” Titus Burckhardt explains the significance of the dome, circle, and square: “While the dome of such a sacred building represents the universal Spirit, the octagonal ‘drum’ that supports it symbolizes the eight angels, ‘bearers of the Throne’, ... These aspects are: heaven, which in its generative activity as opposed to the earth — the passive and maternal principle — and the four directions or ‘winds’, whose forces determine the cycle of the day and the changes of the seasons; they correspond to as many powers or aspects of the Universal Spirit.” (Burckhardt, 1997, 147)

¹⁸ Felix Guattari (1930 – 1992) was a French psychotherapist, philosopher, and semiologist.

¹⁹ The nomadic line “is no less at the ‘beginning,’ since it is a pole always presupposed by any line capable of constituting another pole.” (Deleuze, Guattari, 1988, 497)

²⁰Pli in French.

²¹ Topology is the study of the properties of space that are preserved under continuous deformation. It was developed as a field of study out of geometry and set theory.

²² See Plato’s three metaphors of the Sun, the Divided Line, and the Cave.

²³ Leibniz makes a clear distinction between perception and consciousness as he dismisses the Cartesian argument that “minds

[esprits] alone are Monads, and that there are no souls of animals nor other Entelechies.” (Leibniz, 1968, 14). Thus, Leibniz disagrees with souls being entirely separate from bodies, yet also dismisses that souls are mortals. Therefore, the essence of a Monad is perception and this can only be found in the simplest of things, the atoms of the universe, which are indivisible.

²⁴ Leibniz writes: “Though the earth and the air which are between the plants of the garden, or the water which is between the fish of the pond, be neither plant nor fish; yet they also contain plants and fishes, but mostly so minute as to be imperceptible to us.” (Leibniz, 1968, 68)

²⁵ “Though the earth and the air which are between the plants of the garden, or the water which is between the fish of the pond, be neither plant nor fish; yet they also contain plants and fishes, but mostly so minute as to be imperceptible to us.” (Leibniz, 1968, 68)

²⁶ Schumacher, P. (2009). Parametricism: A new global style for architecture and urban design. *Architectural Design*, 79(4), 14-23.

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